

10th International EUROPEAN CONGRESS ON SCIENTIFIC RESEARCH

FULL TEXTS BOOK

EDITORS:
Assoc. Prof. Dr. Eglentina DERVISHI
Dr. Mehtap DEMİR

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10. INTERNATIONAL EUROPEAN CONGRESS ON ADVANCED STUDIES IN BASIC SCIENCES

26-28 July 2024
Amsterdam, Netherlands

FULL TEXTS BOOK

Edited by

Assoc. Prof. Dr. Eglentina DERVISHI

Dr. Mehtap DEMİR

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CONFERENCE ID

10. INTERNATIONAL

EUROPEAN CONGRESS ON ADVANCED STUDIES IN BASIC SCIENCES

DATE-PLACE

26-28 July 2024

Amsterdam, Netherlands

EDITORS

Assoc. Prof. Dr. Eglentina DERVISHI

Dr. Mehtap DEMİR

EVALUATION PROCESS

All applications have undergone a double-blind peer review process

TOTAL NUMBER OF PAPERS: 324

THE NUMBER OF PAPERS FROM TÜRKİYE: 150

OTHER COUNTRIES: 174

PARTICIPANT COUNTRIES (32):

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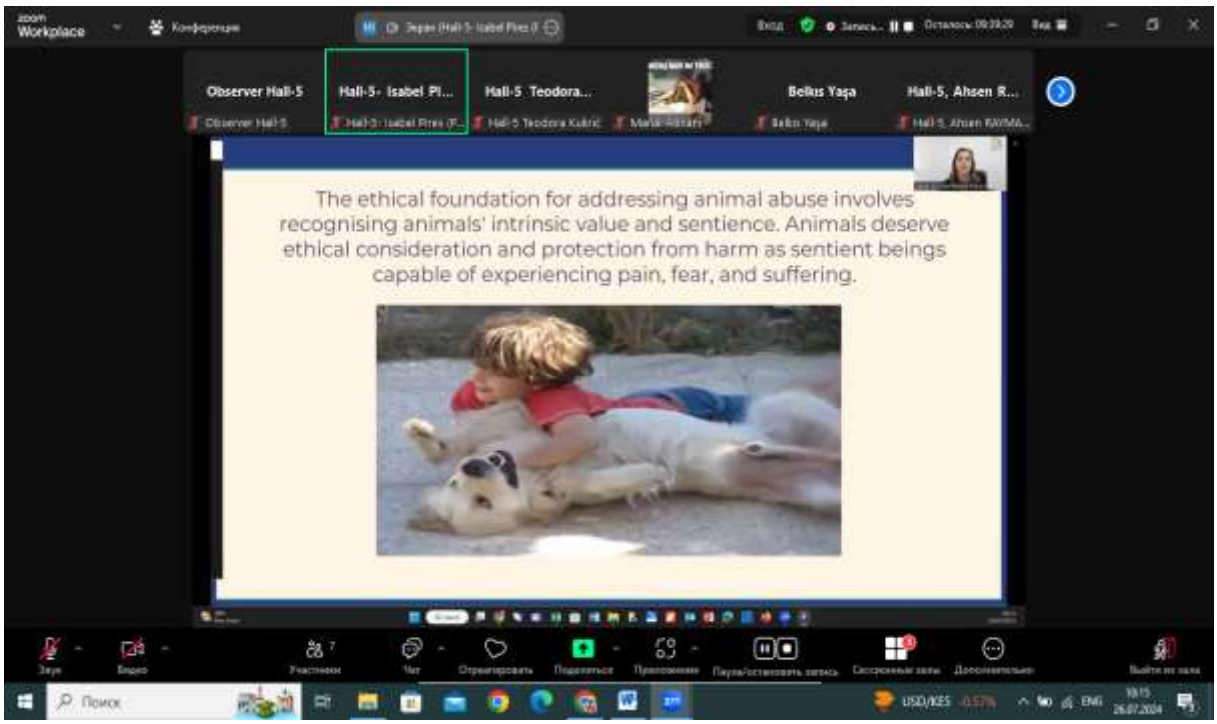

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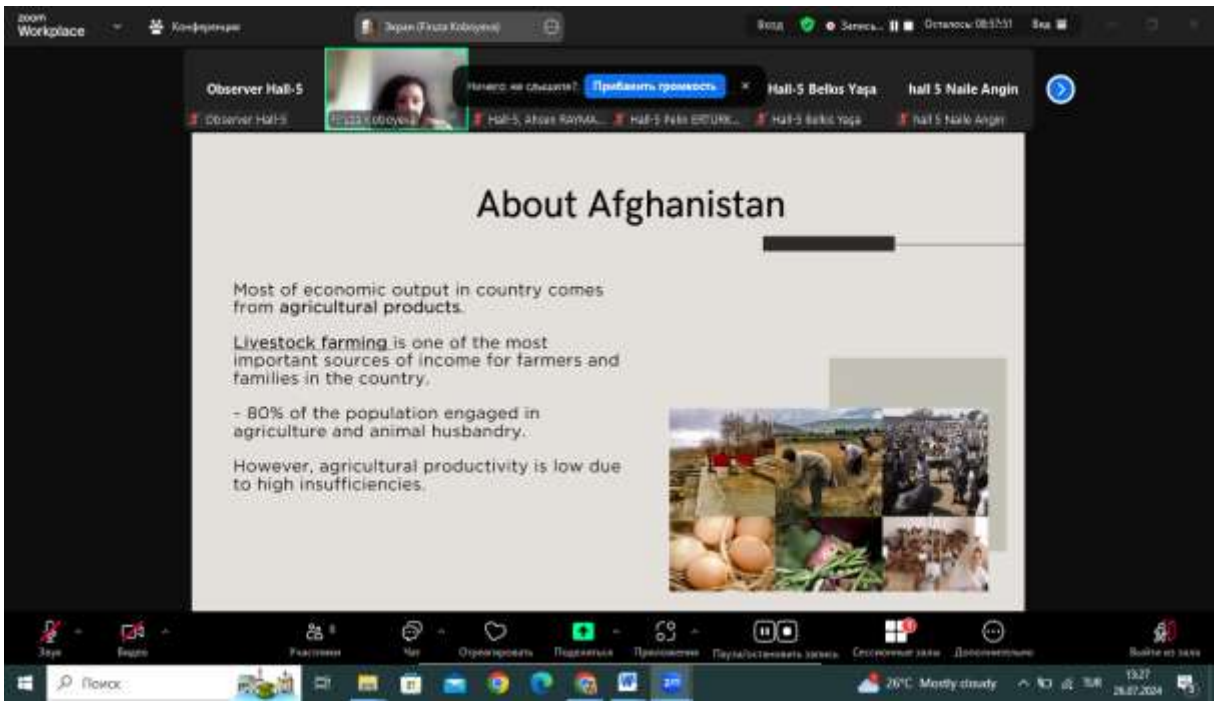

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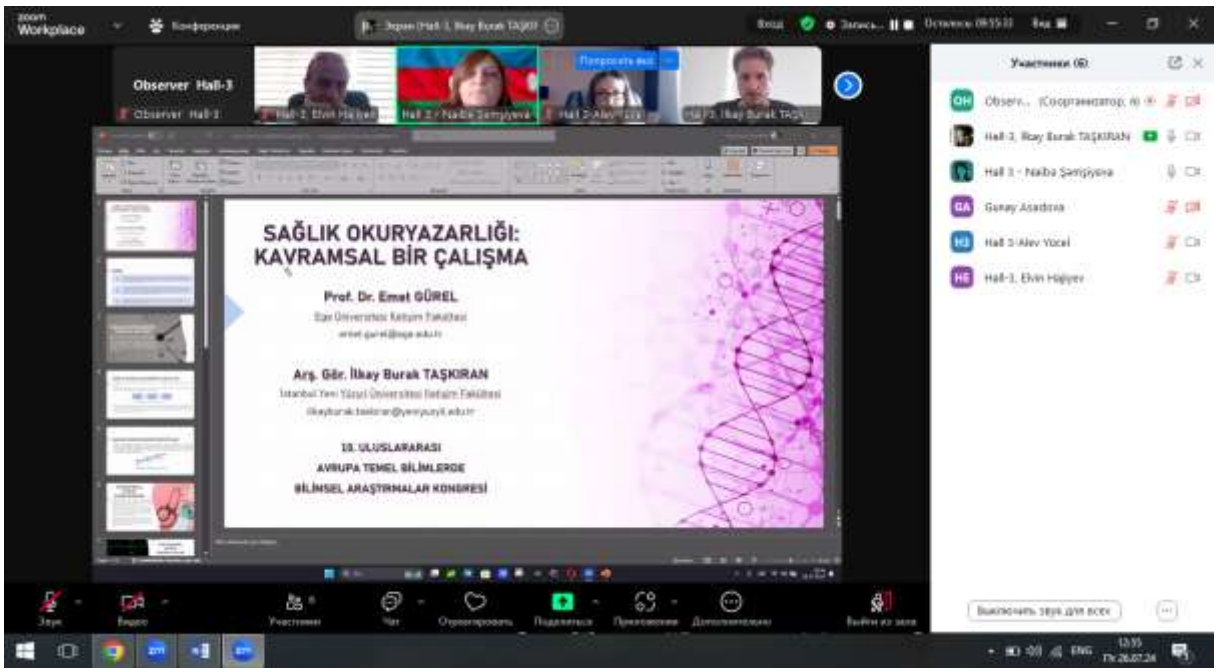

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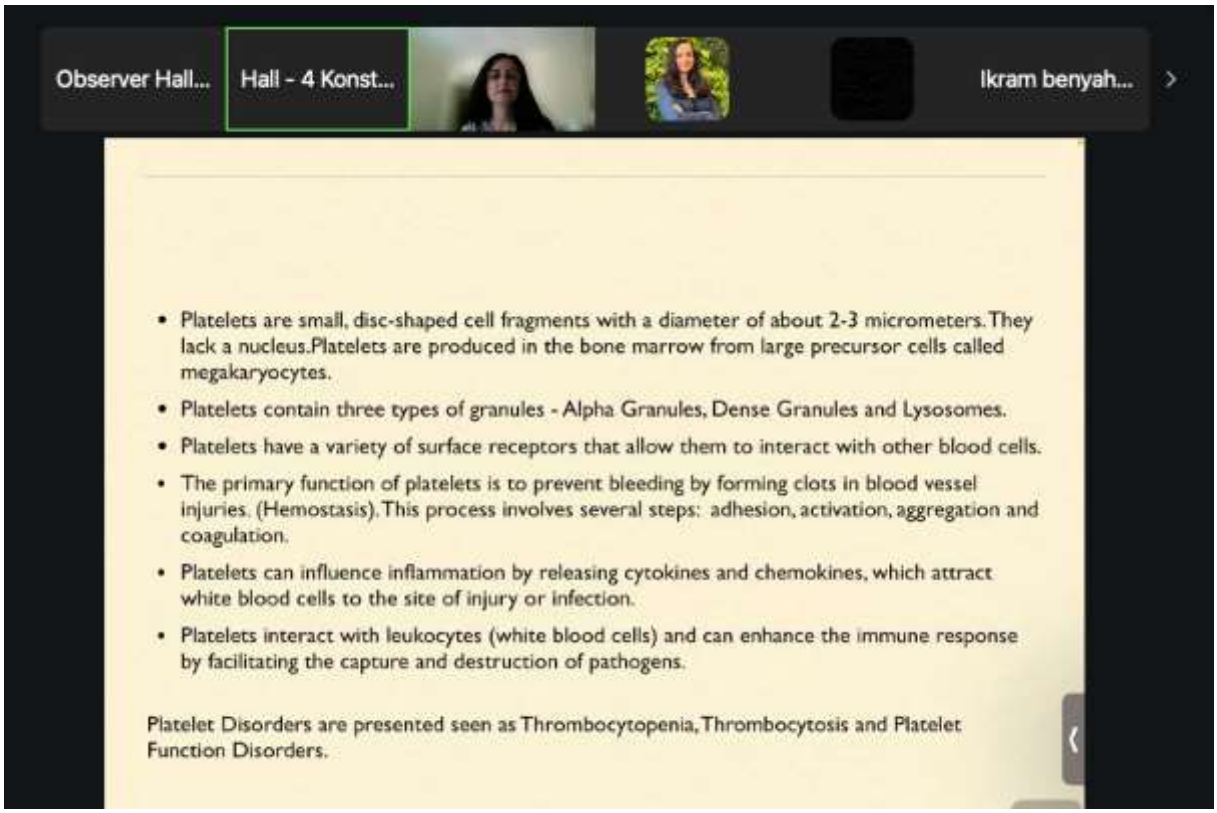

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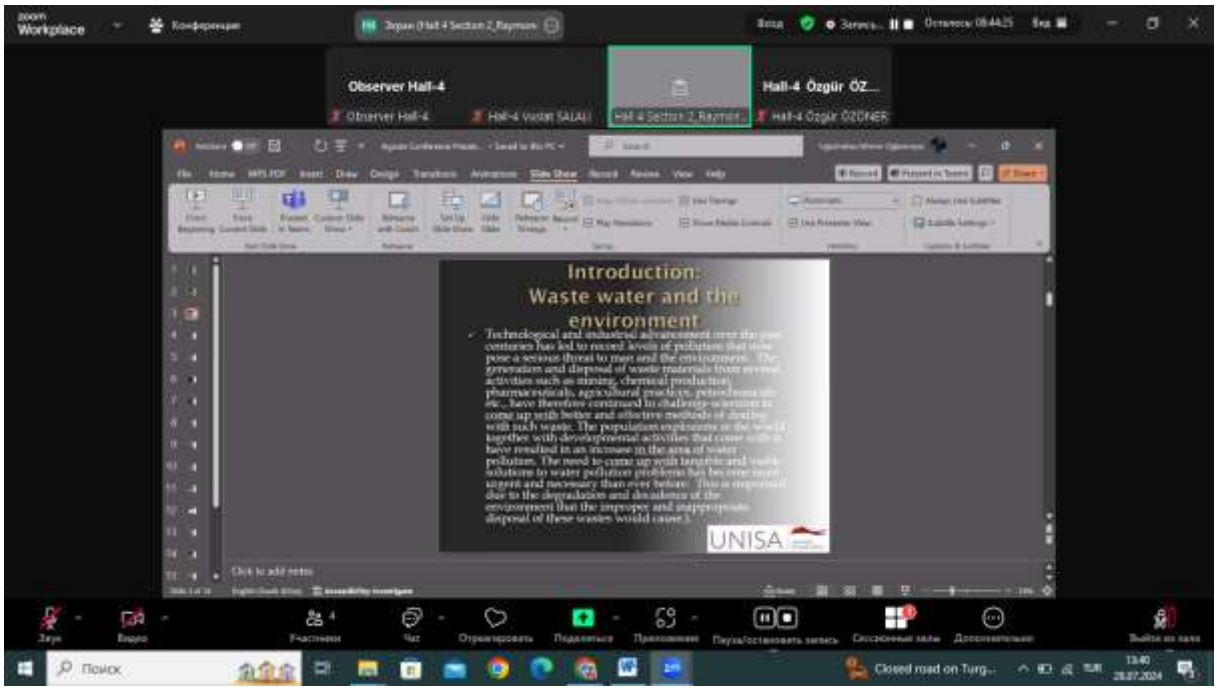


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Özge Özbayrak...
Hall 2-Sibel Kılı...


Observer H-1





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10. INTERNATIONAL EUROPEAN CONGRESS ON ADVANCED STUDIES IN BASIC SCIENCES

26-28 July 2024
Amsterdam, Netherlands

27 July 2024

FACE TO FACE PROGRAM

PARTICIPANT COUNTRIES (32):

Türkiye, Azerbaijan, Turkish Republic of Northern Cyprus, Poland, Portugal, Kosovo, Albania, Morocco, Hungary, Ireland, UK, Ghana, Bosnia and Herzegovina, Albania, Bulgaria, Iraq, North Macedonia, France, Lebanon, Spain, Vietnam, Romania, USA, Serbia, Georgia, India, Algeria, Pakistan, Russia, Israel, Bangladesh, Nigeria



Time	Title	Author/Presenter	Affiliation
SESSION-1	Moderator	Assoc. Prof. Dr.Ebru ÇOKAY	
09:05	REMOVAL OF OIL&GREASE BY A NEW GENERATION MICROBUBBLE PUMP DISSOLVED AIR FLOTATION SYSTEMS	Yasemin Ozdemir Deniz Dölgen M. Necdet Alpaslan	Dokuz Eylül University
09:15	ECO-FRIENDLY COLOR REMOVAL FROM SOAPSTOCK WASTEWATER	Ebru ÇOKAY Serkan EKER	Dokuz Eylül University
09:25	BIOGAS PRODUCTION: CURRENT TRENDS AND FUTURE PROSPECTS	Serkan EKER Ebru ÇOKAY	Dokuz Eylül University
09:35	INVESTIGATION OF NEW GENERATION ADOBE MATERIALS IN THE CONTEXT OF ENVIRONMENTAL SUSTAINABILITY	Betül ALANKUŞ Nilay COŞGUN	Gebze Technical University
9:45	POZZOLANIC MATERIALS IN CONCRETE: ADVANCING SUSTAINABILITY IN CONSTRUCTION	Zehra Funda AKBULUT Soner GÜLER	Van Yüzüncü Yıl University
09:55	Panel Discussion Refreshment Break		
SESSION-2	Moderator	Assoc. Prof. Dr. Adnan SÖYLEMEZ	
10:15	ACCESSIBILITY AS A CORNERSTONE OF CULTURAL ENGAGEMENT: LESSONS FROM THE ÇATALHÖYÜK MUSEUM	Duygu İLKHAN SÖYLEMEZ Adnan SÖYLEMEZ	Selçuk University
10:25	CREATING AN INCLUSIVE CITY: THE EXEMPLARY BARRIER-FREE PROJECT OF KONYA METROPOLITAN MUNICIPALITY	Adnan SÖYLEMEZ Duygu İLKHAN SÖYLEMEZ	Selçuk University
10:35	SOLID WASTE SERVICES IN CITIES IN THE CONTEXT OF MIGRATION AND ENVIRONMENTAL ISSUES: GAZIANTEP METROPOLITAN MUNICIPALITY	Ömer Faruk TEKİN	Selçuk University
10:45	Panel Discussion Refreshment Break		



SESSION-3	Moderator	Suheyla Kocaman	
11:00	NEW GAUSS SEQUENCES	Merve TAŞTAN TEKİN	Tokat Gaziosmanpaşa University
11:10	DEVELOPMENT OF A NOVEL BIO-DERIVED EPOXY RESIN AND ITS APPLICATION IN THE MANUFACTURING OF COMPOSITE MATERIALS	Suheyla Kocaman Nimet Özmeral Gülnare Ahmetli	Konya Technical University
11:20	EVALUATION OF MALWARE DETECTION METHODS AND EMERGING THREATS IN CYBERSECURITY	Nida Akdoğan Osman Akın	Ostim Technical University
11:30	DESIGNING MEDICAL EXPERT SYSTEM BASED ON LOGICAL REDUCED RULE FOR ASTHMA DIAGNOSIS	Fatih BAŞÇİFTÇİ Serkan ÖRÜCÜ	University of Selçuk Karamanoğlu Mehmetbey University
11:40	APPLICATION OF SIX SIGMA METHODOLOGY TO STABILIZE ENERGY CONSUMPTION MEASUREMENTS IN A DOMESTIC BUILT-IN OVEN	Ayberk Salim MAYIL Can UGURELLI Nurhan VATANSEVER	Haier Europe Research and Development Center
11:50	COMPUTER VISION AND IMAGE PROCESSING APPLICATIONS IN CONSTRUCTION INDUSTRY	İbrahim KARATAŞ Doğucan RESULOĞULLARI Emriye ÇINAR RESULOĞULLARI	University of Osmaniye Korkut Ata
12:00	Refreshment Break & Networking		
SESSION-4	Moderator	Lect. Şeyda KAYA	
13:30	DETERMINATION OF DNA DAMAGE PROTECTIVE ACTIVITIES OF WATER EXTRACTS OF DİFFERENT PART OF DANDELION (TARAXACUM OFFICINALE) PLANT	Ebru DOYMAZ Beyza Nur DOĞANYILMAZ Şeyda KAYA Taner Daştan	Gaziantep Islam Science and Technology University Sivas Cumhuriyet University
13:40	THE INHIBITORY EFFECTS OF SOME NOVEL BENZOTHIOPHENE DERIVATIVES ON BUTYRYLCHOLINESTERASE	Öznur YALMAÇ Ceylan FİDAN BABAT Muheb ALGSO Emrah KAVAK Arif KIVRAK Can YILMAZ	Van Yüzüncü Yıl University University of Duhok Necmettin Erbakan University Eskişehir Osmangazi University
13:50	Panel Discussion Networking Break	All Presenters	



SESSION-5	**Moderator**	**Prof. Dr. Yüksel GÖĞEBAKAN**	
14:10	**ARTISTIC POSTMODERN APPROACHES IN THE CONTEXT OF BIO-CELLULAR REALISM**	**Yüksel GÖĞEBAKAN Arif Esen BAYKURT**	**İnönü University**
14:20	**CONFLICT THEORY, SOCIETY, AND RELIGION**	**Ali AKSAÇ**	**Çukurova University**
14:30	**DIGITAL PREFERENCES IN POLITICAL PARTICIPATION: THE CASE OF PLATFORM X**	**Burak BALIK Merve KÜÇÜK**	**Çanakkale Onsekiz Mart University**
14:40	**Panel Discussion Networking Break**		
SESSION-6	**Moderator**	**Dr. Fatmagül Saklavcı**	
15:00	**EARLY CHILDHOOD TEACHERS' PERCEPTIONS ON THEIR USE OF ARTIFICIAL INTELLIGENCE IN PRESCHOOLS**	**Gizem Nur Şakar Nazmiye Temiz**	**Middle East Technical University Çukurova University**
15:10	**COMPARATIVE ANALYSIS OF THE METHODS OF SUZUKI VIOLIN SCHOOL 1 AND OMER CAN VIOLIN EDUCATION 1**	**Canan FİDAN ERTEN Musa ERTUŞ**	**Van Yüzüncü Yıl Üniversitesi**
15:20	**AN EVALUATION ON SIVAS YILDIZ RIVER BRIDGE AND STONE DECORATION WITH HUMAN FIGURES**	**Fatmagül Saklavcı**	**Cumhuriyet University**
15:30	**PSİKOLOJİK GÜÇLENDİRME ALGISININ DEMOGRAFİK ÖZELLİKLER BAKIMINDAN İNCELENMESİ: SAĞLIK ÇALIŞANLARI ÜZERİNE BİR ARAŞTIRMA**	**Duygu ÖZKAN**	**Karabük University**
15:40	**TRANSLANGUAGING AS A BILINGUAL EDUCATION PEDAGOGY IN THE EARLY YEARS: A META-SYNTHESIS APPROACH**	**Elif AYDIN YAZICI Kenan DİKİLİTAŞ**	**Trabzon University University of Bergen**
15:50	**Panel Discussion Refreshments Break**	**All presenters**	



SESSION-7	Moderator	Uz. Dr. Mehmet ÖZDİN	
16:30	ENHANCING SOCIAL INCLUSION FOR INDIVIDUALS WITH ASD AND/OR INTELLECTUAL DISABILITIES THROUGH ASSISTIVE TECHNOLOGY	Eglantina Dervishi Cecilia Sik-Lanyi Geraldine Leader Zeynep Şahin Timar Özge Mısırlı	University of Tirana University of Pannonia National University of Ireland Galway Karadeniz Technical University Eskişehir Osman Gazi University
16:40	THE EFFECT OF TACTILE STIMULUS OR SWIMMING EXERCISE AND THEIR COMBINATIONS ON FGF-2, BDNF, IRISIN, LAKTAT, AND OXIDATIVE STRESS IN AN ALZHEIMER'S MODEL	Deniz ASLAN Nuray ALACA Filiz ONAT	Acibadem University Yeditepe University
16:50	THE RELATIONSHIP BETWEEN NEUTROPHIL/LYMPHOCYTE RATIO AND PLATELET/LYMPHOCYTE RATIO IN PATIENTS WITH SMALL CELL LUNG CANCER	Mehmet ÖZDİN	Sakarya University
17:00	Panel Discussion Refreshments Break	All presenters	

SESSION-8	Moderator	Mustafa Latif EMEK	
18:10	ENERGY RESOURCES IN TURKEY AND ENVIRONMENTAL EFFECTS OF ENERGY SOURCES	Ebru ÇOKAY Serkan EKER	Dokuz Eylül University
18:20	TREATMENT OF URBAN WASTEWATER USING THE ELECTRO-FENTON PROCESS	Ebru ÇOKAY Serkan EKER	Dokuz Eylül University
18:30	THE ROLE OF BLOCKCHAIN TECHNOLOGY IN PUBLIC ADMINISTRATION	Adnan SÖYLEMEZ Duygu İLKHAN SÖYLEMEZ	Selçuk University
18:40	RESTORING HISTORICAL BUILDINGS FOR BARRIER-FREE ACCESS (KONYA ALAADDIN MOSQUE)	Duygu İLKHAN SÖYLEMEZ Adnan SÖYLEMEZ	Selçuk University
18:50	THE ROLE OF CITY ADMINISTRATIONS IN SOLVING GLOBAL CLIMATE CHANGE PROBLEMS	Ömer Faruk TEKİN	Selçuk University



SESSION-9	Moderator	Fatmagül SAKLAVCI	
19:10	GAUSS k-JACOBSTHAL and GAUSS k-JACOBSTHAL LUCAS SEQUENCE	Merve TAŞTAN TEKİN	Tokat Gaziosmanpaşa University
19:20	DETERMINATION OF ANTIMICROBIAL ACTIVITY OF LONGEVITY SPINACH (Gynura procumbens) PLANT	Şeyda KAYA Duygu KANSOY Serpil ATLI Eda SÖNMEZ GÜRER Taner Daştan	Gaziantep Islam Science and Technology University Sivas Cumhuriyet University
19:30	INVESTIGATION OF ANTI-OBESITY POTENTIAL OF TYRAMINE AND 2-PHENYLETHYLAMINE AS INHIBITORS OF PANCREATIC LIPASE	Semanur DURAN Ceylan FİDAN BABAT Can YILMAZ	Van Yüzüncü Yıl Üniversitesi
19:40	GROUP LESSONS IN SUZUKI METHOD	Canan FİDAN ERTEN	Van Yüzüncü Yıl Üniversitesi
SESSION-10	Moderator	Mustafa Latif EMEK	
20:00	AKADEMİSYEN BAKIŞ AÇISIYLA ÖRGÜTSEL DNA ÖZELLİKLERİ: KARABÜK ÜNİVERSİTESİ'NDE BİR ARAŞTIRMA	Duygu ÖZKAN Ozan BÜYÜKYILMAZ	Karabük University
20:10	CULTURAL AND TECHNICAL SIGNIFICANCE OF COLORED CONCRETE IN CONTEMPORARY CONSTRUCTION	Zehra Funda AKBULUT Soner GÜLER	Van Yüzüncü Yıl University
20:20	LEVENT VADİSİ JEOPARKI MİRAS ENVANTERİNİN ÇIKARILMASI VE KORUMA, SÜRDÜRÜLEBİLİRİLİK, TANITIM STRATEJİLERİ İLE JEOPARK YÖNETİM PLANI HAZIRLANMASI	Yüksel GÖĞEBAKAN Levent İSKENDEROĞLU	İnönü University
20:30	FUNCTIONAL THEORY, SOCIETY, AND RELIGION	Ali AKSAÇ	Çukurova University
20:40	ADVANTAGES OF USING CONCRETE RECYCLING PROCESS IN CIRCULAR ECONOMY	Emriye ÇINAR RESULOĞULLARI İbrahim KARATAŞ Doğucan RESULOĞULLARI	University of Osmaniye Korkut Ata



10. INTERNATIONAL EUROPEAN CONGRESS ON ADVANCED STUDIES IN BASIC SCIENCES

26-28 July 2024
Amsterdam, Netherlands

ONLINE PROGRAM

Meeting ID: 859 7119 7642
Passcode: 262728

https://us02web.zoom.us/j/85971197642?pwd=HbRDaQdVj1ziOZNbOaxBIFcCXay64b.1

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Session 1 / Hall-1
26.07.2024
Moderator: Assoc. Prof. Dr. Veysel LİDAR
Meeting ID: 859 7119 7642 / Passcode: 262728
Ankara Local Time: 10:00 – 12:00
Amsterdam Local Time: 09:00 – 11:00

TITLE	AUTHOR(S)	AFFILIATION
THE ATTRIBUTES OF GOD IN THE CONTEXT OF AHMAD IBN MUHAMMAD AL-ADAWIYA'S WORK TITLED SHARH AL-HARIDAT	Yakup KAYA	Dicle University, Türkiye
DISAGREEMENTS BETWEEN IMAM AL-BUWAYTĪ AND IMAM AL-MUZENĪ IN THEIR WORKS TITLED "AL-MUKHTASAR"	Yunus SEVÜK	Dicle University, Türkiye
FUNCTIONAL REFLECTION OF THE BINDING PREPOSITION "YA" IN GAGAUZ TURKISH IN THE SEMANTIC LAYER	Leyla DİLEK	Siirt University University, Türkiye
EVLİLİK VE KADIN: MAVİ SAKAL VE THE YELLOW WALLPAPER ADLI ESERLERDE KUŞATILMIŞ KADINLIK	Veysel LİDAR	Eskişehir Osmangazi University, Türkiye
VASİLİ VASİLYEVİÇ RADLOV'UN ALTAY'A SEYAHATİNİN 163. YILI MÜNASEBETİYLE	Nevin Evrim Küçük	
CATO STREET CONSPIRACY IN LONDON	Gülsüm TÜTÜNCÜ	Dokuz Eylül University, Türkiye

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Session 1 / Hall-2
26.07.2024
Moderator: Prof. Dr. Ahmet Niyazi ÖZKER
Meeting ID: 859 7119 7642 / Passcode: 262728
Ankara Local Time: 10:00 – 12:00
Amsterdam Local Time: 09:00 – 11:00

TITLE	AUTHOR(S)	AFFILIATION
VISUALIZING TIME: A CINEMATIC EXPLORATION OF TIME-IMAGE IN "COCOON"	Fatma Serdaroğlu	Anadolu University
EU ENLARGEMENT STRATEGY: EVOLUTION AND IMPACT ON ACCESSION DYNAMICS	Tatia Dolidze	European University, Tbilisi, Georgia
MANAGEMENT OF THE ECONOMY IN THE CONDITIONS OF RESPECTING THE PROTECTION OF THE NATURAL ENVIRONMENT AND PRIMARY HEALTH PROTECTION OF THE POPULATION AS A CARRIER OF ECONOMIC ACTIVITY	Dijana Dugonjić Jadranka Đuranović-Miličić Željko Grubješić Tatjana Davidov Slobodan Popović	JZNU Community Health centre Dr. Mustafa Sehović, Tuzla, Bosnia and Herzegovina College of Vocational Studies for the Education of Teachers and Trainers Subotica, Serbia PIM University, Bosnia and Herzegovina College of Modern Business, Serbia
PRIMARY HEALTH CARE AS THE BASIS OF ECONOMISATION BETWEEN THE ECONOMY AND HEALTH AND ALL WITH THE GOAL OF IMPROVING THE HEALTH AND WORKING ABILITY OF THE BROAD POPULATION CONSIDERED IN TERMS OF ENVIRONMENTAL PROTECTION	Jadranka Đuranović-Miličić Dijana Dugonjić Željko Grubješić Tatjana Davidov Slobodan Popović	JZNU Community Health centre Dr. Mustafa Sehović, Tuzla, Bosnia and Herzegovina College of Vocational Studies for the Education of Teachers and Trainers Subotica, Serbia PIM University, Bosnia and Herzegovina College of Modern Business, Serbia
THE IMPACT OF SOCIETAL REFLECTION IN THE CONTEMPORARY COMMERCIAL HINDI FILMS: A CASE STUDY ON THE JAWAN	Ms. Noveena Chakravorty	Adamas University
MODEL FOR THE PREDICTION OF FEDERAL GOVERNMENT'S EXPENDITURE AND REVENUE IN NIGERIA	Abdullahi, A., Jamilu Hussaini, Babayemi, A. W.	
FARM TOURISM: AN OVERVIEW OF PALAKKAD DISTRICT IN KERALA	Anjitha. A. Asha Devi. J. Dr. K.S.Chandrasekar. Dr. B. Rajendran	University of Kerala, Thiruvananthapuram, Kerala.
REVOLUTIONISING LARGE-SCALE IRRIGATION: MACHINE LEARNING FOR SUSTAINABLE WATER MANAGEMENT	Dr. BOUZIDI MARYAM, Prof. BOUIKHALENE BELAID, Prof. MADANI YOUNESS, Prof. FARISSI MOHAMED	Sultan Moulay Slimane University
RECENT REGIONAL MACROECONOMIC DEVELOPMENTS AND POSSIBLE FINANCIAL RISKS AT THE GLOBAL LEVEL	Prof. Dr. Ahmet Niyazi ÖZKER	Bandirma Onyedi Eylul University

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Session 1 / Hall-3
26.07.2024
Moderator: Lect. Naiba Shamshiyeva
Meeting ID: 859 7119 7642 / Passcode: 262728
Ankara Local Time: 10:00 – 12:00
Amsterdam Local Time: 09:00 – 11:00

TITLE	AUTHOR(S)	AFFILIATION
SAĞLIK OKURYAZARLIĞI: KAVRAMSAL BİR ÇALIŞMA	Emet GÜREL İlkay Burak TAŞKIRAN	Ege University, Türkiye İstanbul Yeni Yüzyıl University, Türkiye
THE EFFECTS OF DIGITAL TRANSFORMATION IN THE CONTEXT OF SUSTAINABILITY: A STUDY FOR THE LOGISTIC SECTOR	Pervin Kaçmaz Meltem Gürünlü	Istanbul Arel University, Türkiye
AZERBAYCAN'IN ENERJİ KAYNAKLARI VE BÖLGESEL KALKINMA: PETROL VE GAZIN ROLÜ	Tehran Masimov	Bartin University, Türkiye
MANAGEMENT ACCOUNTING IN THE HOSPITALITY SECTOR: OPERATING STATEMENTS AND FINANCIAL STATEMENTS	Əsədova Günay Cahangir qızı	Azerbijan State University of Economics
THE MYSTERY OF WATERS: A BIBLIOMETRIC ANALYSIS ON CLIMATE CHANGE AND RISING SEA LEVELS	Nida ORUÇ Batuhan KOCAOĞLU Fazlı YILDIRIM	İstanbul Topkapı University, Türkiye
ORGANIZATIONAL CONFLICTS AND THEIR MANAGEMENT	Naiba Shamshiyeva Aida Guliyeva	Military Institute named after Heydar Aliyev, "NATO/Partnership for Peace and Humanitarian Sciences" department, Baku, Azerbaijan.
PUBLIC INVESTMENTS IN THE GREEN ECONOMY: BENEFITS AND CHALLENGES	Elvin Hajiyev	Azerbaijan University, Türkiye
THE STRATEGIC FRAMING OF WORLD NEWS IN TURKISH MEDIA	Alev Yücel	Istanbul Bilgi University, Türkiye

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Session 1 / Hall-4
26.07.2024
Moderator: Assoc. Prof. Dr. Ayşe Meriç Yazıcı
Meeting ID: 859 7119 7642 / Passcode: 262728
Ankara Local Time: 10:00 – 12:00
Amsterdam Local Time: 09:00 – 11:00

TITLE	AUTHOR(S)	AFFILIATION
POLITICAL INSTABILITY AFTER THE BREXIT REFERENDUM AND ITS IMPACTS ON THE FOREIGN POLICY OF THE UNITED KINGDOM	İbrahim Çağrı ERKUL	Osmaniye Korkut Ata University, Türkiye
THE ROLE OF PLATEAUS FESTIVALS IN THE DEVELOPMENT OF PLATEAUS TOURISM: EXAMPLE OF AYBASTI/PERŞEMBE PLATEAU FESTIVALS	Emrah KARA Bilgin GÜNER Emine YILMAZ Hüseyin ÇEKEN	Muğla Sıtkı Koçman University, Türkiye
FLEXIBLE WORKING AND ENVIRONMENTAL SUSTAINABILITY: DEVELOPING A BUSINESS MODEL IN HARMONY WITH NATURE	Ayşe Meriç Yazıcı	Istanbul Gelisim University, Türkiye
THE IMPACT OF THE PARIS CLIMATE AGREEMENT ON THE MARKET VALUE OF UNSUSTAINABLE FIRMS IN BORSA ISTANBUL: A DIFFERENCE-IN-DIFFERENCES ANALYSIS	Sinem Güler KANGALLI UYAR İrem GÖNÜL Çağla GEÇİCİ	Pamukkale University, Türkiye
A STRESS TEST COMPARISON IN TERMS OF TURKISH AND US BANKING SECTOR	Umut UYAR Şerife KILIÇASLAN	Pamukkale University, Türkiye
ECONOMIC MOVEMENT; THE CRIME OF IMMIGRANT TRAFFICKING	Zeynep Müjde SAKAR	Harran University, Türkiye
ROMANIA IN CHANGING WORLD CONDITIONS; ASSESSMENT OF LIVE ANIMAL IMPORT AND EXPORT RATES	Zeynep Müjde SAKAR	Harran University, Türkiye

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Session 1 / Hall-5
26.07.2024
Moderator: Teodora Kukrić
Meeting ID: 859 7119 7642 / Passcode: 262728
Ankara Local Time: 10:00 – 12:00
Amsterdam Local Time: 09:00 – 11:00

TITLE	AUTHOR(S)	AFFILIATION
HISTOPATHOLOGICAL STUDY OF A CANINE LANGERHANS CELL TUMOUR (CANINE CUTANEOUS HISTIOCYTOMA)	Isabel PIRES, Paula RODRIGUES, Filipe SILVA, Anabela ALVES	University of Trás-os-Montes e Alto Douro, Vila Real, Portugal
ANIMAL BFF - AN INNOVATIVE PROJECT FOR ANIMAL WELFARE AND VIOLENCE PREVENTION	Isabel PIRES, Celso SANTOS, Sónia SARAIVA, Precilia AMARAL, Camila ALAMPE, Paula RODRIGUES, Filipe SILVA	University of Trás-os-Montes e Alto Douro, Vila Real, Portugal
NATURAL ALTERNATIVES TO SYNTHETIC FUNGICIDES FOR CONTROLLING MONILINIA FRUCTICOLA IN SWEET CHERRY FRUITS	Teodora Kukrić, Renata Iličić, Ferenc Bagi, Boris Popović	University of Novi Sad, Republic of Serbia
EVALUATION OF NATURAL COMPOUNDS AS ALTERNATIVE FUNGICIDES AGAINST BOTRYTIS CINEREA IN TWO PHASES IN VITRO	Teodora Kukrić, Renata Iličić, Ferenc Bagi, Boris Popović	University of Novi Sad, Republic of Serbia
INFLUENCE OF BIOSTIMULATS ON GROWTH, YIELD AND QUALITY OF BLACK CUMIN (NIGELLA SATIVA L.)	Mahendra Belagumpi, Rajeshwari S Durgad, Gorle Roja Ramani, D.K. Ghosh (Lkn) And N. Chattopadhyay	Bidhan Chandra Krishi Vishwavidyalaya, Mohanpur-741252, Nadia, West Bengal, India.
FORMULATION FOR CONTROLLING FUSARIUM EQUISETI IN CHICKPEA SEEDS BASED ON TRICHODERMA ASPERELLUM	Adnani Manal, El Hazzat Naila,Msairi Soukaina, El Alaoui Moulay Abdelaziz, Mouden Najoua, Selmaoui Karima, Benkirane Rachid, Ouazzani Touhami Amina, Douira Allal	Université Ibn Tofail, Morocco National Agency of Medicinal and Aromatic Plants, Morocco Université Mohammed 1er Oujda, Morocco
EFFECT OF COMBINING PHOSPHORUS FERTILIZER AND TRICHODERMA VIA SEED TREATMENT ON CHICKPEA GROWTH AND YIELD	Adnani Manal,Imrani Nawal, Ourras Samah, El Hazzat Naila, Ettouil Abdessamad, Selmaoui Karima, El Alaoui Moulay Abdelaziz, Ouazzani Touhami Amina, Douira Allal	IBN TOFAIL University, Morocco
IDENTIFICATION OF SOLANUM NIGRUM (LEAVES EXTRACT) PHENOLIC COMPOUNDS, THEIR EFFECTS ON BEHAVIOR AND BLOOD BIOCHEMISTRY OF ROTENONE INDUCED PARKINSON'S RAT MODEL	Farzana Iftikhar Shazia Perveen Sumaira Kanwal	The Women University Multan, Punjab, Pakistan
EFFECTS OF HOT AIR- AND FREEZE-DRYING ON THE COLOUR AND CAROTENOID CONTENT OF POWDERS OBTAINED FROM DIFFERENT ROSEHIP WASTE	Alexandra Raluca BORŞA (BOGDAN), Maria-Ioana SOCACIU, Melinda FOGARASI, Andrei BORŞA, Dan Cristian VODNAR, and Cristina Anamaria SEMENIUC	University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca, Romania



Session 2 / Hall-1
26.07.2024
Moderator: Dr. Neha
Meeting ID: 859 7119 7642 / Passcode: 262728
Ankara Local Time: 12:30 – 14:30
Amsterdam Local Time: 11:30 – 13:30

TITLE	AUTHOR(S)	AFFILIATION
MOLECULAR GENOTYPING OF ANOPHELES MOSQUITOES IN ILORIN, KWARA STATE, NIGERIA	Tawa Omolade Olusegun, Dr. A.O Iyiola, Jesunifemi Miracle Babalola, Oluwatomi Jeremiah Dada	University of Ilorin, Microbiology, Ilorin, Nigeria
ADVANCES IN AGRICULTURAL MACHINERY	Savarna.K, Vaishnavi.D,Mohithaa.N,Sushmitha.B,Thangasakthi.M, Ms.Lalitha Ramachandran	R.M.K Engineering College,Chennai
OCCURRENCE AND INTENSITY OF VARIOUS CITRUS DISEASES IN THE SYLHET REGION	Tareq Ahmed Most. Moslema Haque Md. Kamrul Haque Md. Sharif Ahmed	Sylhet Agricultural University University of Rajshahi
WATER SAFETY INFORMATION NEEDS OF RURAL WOMEN FARMERS IN NSUKKA AGRICULTURAL ZONE, ENUGU STATE, NIGERIA	Okoro John Chukwuma, Aguorah Loveth Ogechi	University of Nigeria, Nsukka
CLIMATE CHANGE AND ITS IMPACT ON AGRICULTURE IN INDIA: A REVIEW STUDY	Dr. Neha	Swami Vivekannad Subharti University, India
MULTIDIMENSIONAL POVERTY STATUS CORRELATES OF RURAL HOUSEHOLDS IN KADUNA STATE OF NIGERIA	Sadiq M.S, Singh I.P, Ahmad M.M, Moses G	FUD, Dutse, Nigeria SKRAU, Bikaner, India BUK, Kano, Nigeria
MULTIDIMENSIONAL POVERTY STATUS CORRELATES OF RURAL HOUSEHOLDS IN KADUNA STATE OF NIGERIA	Sadiq M.S, Singh I.P, Ahmad M.M, Moses G	FUD, Dutse, Nigeria SKRAU, Bikaner, India BUK, Kano, Nigeria
GEOPOLITICAL AGRICULTURE: STRATEGIES FOR SUSTAINABLE FARMING IN CONFLICT ZONES	Md.Mizanur Rahman	Bangabandhu Sheikh Mujibur Rahman Science and Technology University Gopalganj Bangladesh.
TEXTUAL ANALYSIS OF SELECTED SONGS ON AGRICULTURE (FARMING) AMONG THE YORUBA OF SOUTH-WEST NIGERIA	Julius Oluwayomi OLUWADAMILARE Bashiru Adeniyi ADEGBITE Akinyele John AJIBOYE	University of Ilesa, Ilesa, Osun State, Nigeria.

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Session 2 / Hall-2
26.07.2024
Moderator: Assoc. Prof. Dr. İlyas Kartal
Meeting ID: 859 7119 7642 / Passcode: 262728
Ankara Local Time: 12:30 – 14:30
Amsterdam Local Time: 11:30 – 13:30

TITLE	AUTHOR(S)	AFFILIATION
THE INVESTIGATION ON THE INHIBITION EFFECTS OF THE MAIN EFFECTIVE COMPOUNDS IN HONEY FOR "5p21" ONCOGENE RECEPTOR	Faik Gökalp	Kırıkkale University, Türkiye
NANOPARTICULATE DRUG SYSTEMS FOR BRAIN DELIVERY	Deniz SAKARYA	Istanbul University-Cerrahpaşa, Türkiye
MICRO-INJECTION BASED DRUG DELIVERY	Deniz SAKARYA	Istanbul University-Cerrahpaşa, Türkiye
INVESTIGATION OF TERPOLYMER SYNTHESIS AND CHARACTERIZATION	Şimal KÜRÜMOĞLU Nur Erel AYDIN	Tekirdağ Namık Kemal University, Türkiye
INVESTIGATION OF THE BALLISTIC PERFORMANCE OF Al2O3-Sm2O3 CERAMICS AND Al2O3 BASED ZrO2 AND Sm2O3 ADDED SANDWICH SAMPLES	Tuğba ŞANLI Betül KAFKASLIOĞLU YILDIZ Elif IŞIK Yahya Kemal TÜR	Sivas University of Science and Technology, Türkiye Gebze Technical University, Türkiye
EXAMINATION OF THE HEAT AFFECTED ZONE IN THE WELDING OF DIFFERENT STAINLESS STEEL GROUPS	Eyüp Can İÇLİ	Oyak Renault Otomobil Fabrikaları A.Ş
INVESTIGATION OF MECHANICAL PROPERTIES OF HAZELNUT SHELL FILLED POLYESTER BASED COMPOSITES	İlyas Kartal Batuhan Atmaca	Marmara University, Türkiye
INVESTIGATION OF MECHANICAL PROPERTIES OF JUTE FIBER REINFORCED POLYESTER BASED COMPOSITES	İlyas Kartal Nurşah Elif Nalbant	Marmara University, Türkiye
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Session 2 / Hall-3
26.07.2024
Moderator: Bogdan-Catalin SERBAN
Meeting ID: 859 7119 7642 / Passcode: 262728
Ankara Local Time: 12:30 – 14:30
Amsterdam Local Time: 11:30 – 13:30

TITLE	AUTHOR(S)	AFFILIATION
PRISTINE AND FUNCTIONALIZED CARBON NANOHORNS AND THEIR APPLICATIONS	Bogdan-Catalin SERBAN Octavian BUIU Marius BUMBAC Cristina-Mihaela NICOLESCU Vlad DIACONESCU	National Institute for Research and Development in Microtechnologies–IMT Bucharest, Romania Zentiva Romania S.A, 032266 Bucharest, Romania
THE HIDDEN DANGERS IN HONEY: FROM GRAYANOTOXINS AND FRUCTOSE SYRUP TO ANTIBIOTICS AND HEAVY METALS	Bogdan-Catalin SERBAN Octavian BUIU Marius BUMBAC Cristina-Mihaela NICOLESCU Vlad DIACONESCU	
SEARCH, PREPARATION AND PESTICIDAL ACTIVITY OF NEW FUNCTIONALLY-SUBSTITUTED MONOSACCHARIDES FOR THE CREATION OF THEIR BASIS OF PROMISING POLYFUNCTIONAL PESTICIDES	Dr. Valery V. Belakhov Dr. Irina V. Boikova	Technion – Israel Institute of Technology, Schulich Faculty of Chemistry, Haifa, Israel All-Russian Institute of Plant Protection, Microbiological Plant Protection Laboratory, Russia
PREPARATION AND CHARACTERIZATION OF ACTIVATED CARBON-NANOPARTICTES	Khadidja KHALILI, Zohra MEKIBES, Mokhtar BENZEKRI BENALLUOU, Nadia DOUARA	University of Mostaganem, Algeria
ISOLATION AND IDENTIFICATION OF THE AIR MYCOFLORA OF THE JOSEPH SARWUAN TARKA UNIVERSITY MAKURDI, MICROBIOLOGY LABORATORIES	Igene, Moses Dennis, Dr Ubogu Monday	Joseph Sarwuan Tarka University, Makurdi, Benue State, Nigeria.
INNOVATIONS IN SYNTHETIC BIOLOGY AND BIOTECHNOLOGY: PIONEERING THE FUTURE OF SCIENCE AND INDUSTRY	Pritha.R, Sandhya.S, Sai Prithika.M, Lakshana Sri.Ss, Neha.Cm, Subha.Td	R.M.K Engineering College,Chennai
SOLID STATE FUNGAL FERMENTATION OF RICE HUSK USING RESIDENT FUNGUS AND ITS MOLECULAR IDENTIFICATION	Majekodunmi Racheal Adedayo, Fareedah Oluwaseun Muhammed	Kwara State University, Malete, Nigeria
INSECTICIDAL AND TOXICITY STUDIES OF HELIOTROPIUM INDICUM LEAF EXTRACTS	Adeniyi, B. M; Kyenge, B.A; Adah, C.A; Ogungbemi K; Popoola, S.T; Adeniyi, G.R; Adeniyi, O.S	Benue State University, Makurdi, Benue State, Nigeria. De-Expert College, Ijaiye, Lagos, Nigeria

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Session 2 / Hall-4
26.07.2024
Moderator: Assoc.Prof.Dr.Skender Demaku
Meeting ID: 859 7119 7642 / Passcode: 262728
Ankara Local Time: 12:30 – 14:30
Amsterdam Local Time: 11:30 – 13:30

TITLE	AUTHOR(S)	AFFILIATION
BIOREMEDIATION OF WASTEWATER TOWARDS REDUCTION OF WATER POLLUTION	Agbo D.C., Okafor U.,Eze U.D., Anyasi R.O.	Ebonyi State University, Abakaliki-Nigeria Federal Polythecnic, Nekede-Owerri, Nigeria University of South Africa
PHYSICO-CHEMICAL AND HEAVY METALS ANALYSIS IN PEJA RIVER USING ICP-OES	Skender Demaku, Donika Sylejmani, Arbnorë Aliu, Jeton Halili	University of Pristine "Hasan Prishtina", 5, "Nënë Tereze" str., 10000 Pristine, Kosovo
CHEMICAL ANALYSIS OF THE CONCENTRATION OF HEAVY METALS, IN PARTICULATE MATTER, PM: 2.5 AND PM: 10 MG/M3, IN THE FLY ASH OF: TC "KOSOVO", COMPLEX "TREPÇA" AND FACTORY "FERRONICELI", IN THE CITIES: KASTRIOT, MITROVICA, DRENAS AND PRISTINA - CORRELATION WITH EU STANDARDS	Assoc.Prof.Dr.Skender Demaku, Ma. Donika Sylejmani, Ma.Arbnore Aliu, Aulona Krasniqi, Besjana Bajramaj, Behlul Krasniqi, Besjan Podvorica	University of Pristine "Hasan Prishtina", 5, "Nënë Tereze" str., 10000 Pristine, Kosovo
SUNLIGHT PROMOTED THE PHOTODEGRADATION OF DYE WASTEWATER USING WASTE-DERIVED CATALYST	Pushpendra Kushwaha, Madhu Agarwal	Malviya National Institute of Technology, Jaipur-302017, India
STUDY ON THE EFFECT OF FUNGAL SOLID STATE ERMENTATION ON THE PROXIMATE STATUS OF ALBIZIA LEBBECK SEED	Majekodunmi Racheal Adedayo, Adisa Bolaji Ibrahim	Kwara State University, Malete, Nigeria
SOME LATEST ADVANCEMENTS IN GREEN TECHNOLOGIES FOR DECONTAMINATING WASTEWATER FROM FOOD INDUSTRY IN ALBANIA	Terkida Prifti, Ilirjan Malollari	University of Tirana, Albania
ON THE DETOXIFICATION OF THE WATERS DISCHARGED FROM A REGIONAL HOSPITAL FOR CONTROLLING CONTAMINATION BY THE PERSISTENT PHARMACEUTICALS	Ilirjan Malollari, Sami Makolli, Terkida Prifti, Redi Buzo	University of Tirana, Albania University of Business and Technology (UBT), Prishtina, Kosovë Fan S. Noli University of Korça, Albania

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Session 2 / Hall-5
26.07.2024
Moderator: Assoc. Prof. Dr. Ahsen Rayman ERGÜN
Meeting ID: 859 7119 7642 / Passcode: 262728
Ankara Local Time: 12:30 – 14:30
Amsterdam Local Time: 11:30 – 13:30

TITLE	AUTHOR(S)	AFFILIATION
POLYMORPHISMS OF STAT5A GENE AND ITS EFFECT ON PROTEIN CONTENT IN DAIRY CATTLE BREED: A META-ANALYSIS	Zekrullah Motmain Kubra Ekinci Memis Ozdemir Esranur Saygılı	Ataturk University, Türkiye
META-ANALYSIS OF FATTY ACID SYNTHASE GENE POLYMORPHISMS AND THEIR RELATIONSHIP WITH PALMITOLEIC ACID IN CATTLE	Kubra Ekinci Zekrullah Motmain Memis Ozdemir Esranur Saygılı	Ataturk University, Türkiye
EVALUATION OF ANTIOXIDANT ACTIVITY IN ARONIA MELANOCARPA (MICHX.) ELLIOT BERRY EXTRACT	Belkıs YAŞA Naile ANGIN Murat ERTAŞ	Bursa Teknik University, Türkiye
THE POTENTIAL OF NATURAL RESIN DERIVATIVES PRODUCTION IN TÜRKIYE: THE CASE OF KAZDAĞLAR	Naile ANGIN Murat ERTAŞ Çağatay TAŞDEMİR	Bursa Teknik University, Türkiye
FOOD INDUSTRY IN AFGHANISTAN	Nuray GÜZELER Firuza KOBOYEVA Raihana HALIM	Çukurova University, Türkiye
DETERMINATION OF EPS PRODUCTION, ORGANIC ACID AND ANTIMICROBIAL LEVELS OF SOME LACTIC ACID BACTERIA ISOLATED FROM BUFFALO YOGURT AND MILK	Pelin ERTÜRKMEN	Burdur Mehmet Akif Ersoy University, Türkiye
MILK PRODUCTION AND TRADITIONAL DAIRY PRODUCTS OF AFGHANISTAN	Nuray GÜZELER Firuza KOBOYEVA Raihana HALIM	Çukurova University, Türkiye
INVESTIGATION OF QUALITY CHARACTERISTICS OF INTERMEDIATE MOISTURE DRIED TOMATO SNACK ENRICHED BAY AND FIG LEAF EXTRACTS	Ahsen Rayman ERGÜN Taner BAYSAL İrem AKBULUT Elif GÜRBÜZ Fatma Betül AŞKIN	Ege University, Türkiye
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Session 3 / Hall-1
26.07.2024
Moderator: Assoc. Prof. Dr. Aykut Evren Yavuz
Meeting ID: 859 7119 7642 / Passcode: 262728
Ankara Local Time: 15:00 – 17:00
Amsterdam Local Time: 14:00 – 16:00

TITLE	AUTHOR(S)	AFFILIATION
WASTEWATER TREATMENT IN ANTARCTIC RESEARCH STATIONS WITH POLAR MICROALGAE	Deniz Erçetin Benan İnan	Robert College, Istanbul, Turkey Yıldız Technical University, Türkiye
ORIENTATION EFFECTS OF COBALT-BASED NANOPARTICLES ON LYOTROPIC LIQUID CRYSTALS	Aykut Evren Yavuz	Ege University, Türkiye
DOSIMETRIC USAGE OF Si2O3 MATERIAL VIA WELL-KNOWN LUMINESCENCE TECHNIQUES	Volkan ALTUNAL Adnan ÖZDEMİR	Cukurova University, Türkiye Kahramanmaras Istiklal University, Türkiye
LUMINESCENCE CHARACTERISTICS OF PURE Li2B4O7 POWDERS PURCHASED FROM SIGMA ALDRICH	Volkan ALTUNAL	Cukurova University, Türkiye Kahramanmaras Istiklal University, Türkiye
INVESTIGATION OF THERMOLUM KINETIC PARAMETER OF SrB6O10:Dy PHOSPHOR SYNTHESIZED BY SOLUTION COMBUSTION SYNTHESIS	Adnan ÖZDEMİR	Kahramanmaras Istiklal University, Türkiye
INVESTIGATION OF FATIGUE LIFE TESTS IN A CRUCIFORM STRUCTURE WITH WELDED JOINT	Osman Bahadır ÖZDEN Barış GÖKÇE	Necmettin Erbakan University, Türkiye
FEASIBILITY AND OPTIMIZATION OF HYBRID ENERGY SYSTEMS IN THE SAKARYA–KARASU REGION: A CASE STUDY	Aykut Fatih Güven Necat Uzuner	Yalova University, Türkiye
SUSTAINABLE ENERGY INTEGRATION IN MICROGRIDS AND HOMER GRID OPTIMIZATION: ENHANCING EFFICIENCY WITH ELECTRIC VEHICLE CHARGING SOLUTIONS	Aykut Fatih Güven Şaban Türkmen Faruk Karayiğit	Yalova University, Türkiye
A HYBRID APPROACH TO DISTINGUISHING MOTOR AND IMAGINED TASKS FROM EEG SIGNALS	Eda DAĞDEVİR Mahmut TOKMAKÇI	Kayseri University, Türkiye Erciyes University, Türkiye

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Session 3 / Hall-2

26.07.2024

Moderator: Younesse EL-OUAZZANI

Meeting ID: 859 7119 7642 / Passcode: 262728

Ankara Local Time: 15:00 – 17:00

Amsterdam Local Time: 14:00 – 16:00

TITLE	AUTHOR(S)	AFFILIATION
COMPUTATIONAL ANALYSIS OF NANOPARTICLE SHAPES INFLUENCE ON CYLINDRICAL FLOW OF UNSTEADY OLDROYD-B COMPOSITE NANO-LIQUID	Jeevankumar, N. Sandeep	Central University of Karnataka, Kalaburagi-585367, India
SOME CHARACTERIZATIONS OF Γ-TERNARY SEMIGROUPS	Anila Peposhi	
ETHNOMEDICINAL SURVEY OF MEDICINAL PLANTS USED FOR GASTROINTESTINAL DISORDERS IN SOUTHEAST MOROCCO	Younesse EL-OUAZZANI	Laboratory of Biotechnology and Valorization of Natural Resources, Faculty of Sciences, Ibn Zohr University, Agadir, Morocco
COMPUTATIONAL STUDIES OF THE INFLUENCE OF TERMINAL ACCEPTORSIN THE A'-D-Π-A STRUCTURE OF ORGANIC DYES ON THE PHOTOVOLTAIC PERFORMANCE OF DYE SOLAR CELLS	Hanane Etabti, Asmae Fitri, Adil Touimi Benjelloun, Mohammed Benzakour, Mohammed Mcharfi	Sidi Mohamed Ben Abdellah University, Fez, Morocco.
MOX-BASED CHEMORESISTIVE GAS SENSORS FOR DETECTION OF A WIDE RANGE OF SO2 CONCENTRATIONS	Danial Ahmed, Arianna Rossi, Barbara Fabbri, Elena Spagnoli, Marco Marzocchi, Vincenzo Guidi	University of Ferrara, Italy
EVALUATION OF THE COMBINED APPLICATION OF FLY ASH AND MARBLE COARSE AGGREGATES ON THE CHARACTERISTICS AND DURABILITY OF CONCRETE	Saloua FILALI, Abdelkader NASSER	Mohammed Premier University, Morocco
BOUALMA LANDSLIDE IN THE MIDDLE RIF REGION OF MOROCCO – AL HOCEÏMA	Hammouti Marwane, El Haim Mohamed, Medini Mohammed, Mouaouiya Bensaid	ENSAH-ABDELMALEK ESSADI University, AL Hoceïma, Morroco
HYDROCHARS AS SLOW-RELEASE NITROGEN FERTILISERS FOR ENHANCING CORN GROWTH IN AN AGRICULTURAL SOIL	Salma ELAMIRI, Flore Nadine Nelly Noah Metomo, Younes ESSMLALI, Achraf CHAKIR, Mohamed ZAHOUILY	Hassan II University, B.P. 146, Casablanca, Morocco Mohammed VI Polytechnic University, Ben Guerir, Morocco

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Session 3 / Hall-3

26.07.2024

Moderator: Assoc. Prof. Dr. Aida Bendo

Meeting ID: 859 7119 7642 / Passcode: 262728

Ankara Local Time: 15:00 – 17:00

Amsterdam Local Time: 14:00 – 16:00

TITLE	AUTHOR(S)	AFFILIATION
FUNCTIONAL ASSESSMENT OF MASTERS CATEGORY ATHLETES USING THE FMS METHOD	Patrycja Widłak, Jakub Adamczyk, Dariusz Boguszewski, Bartłomiej Michalak	Józef Piłsudski University of Physical Education in Warsaw, Warsaw, Poland
THE INFLUENCE OF AI ON CUSTOMIZING SPORTS NUTRITION	MSc. Denada AHMETI RADA MSc. Bertina HOXHA LAMI	Logos University College Sports University of Tirana
TRANSFORMING SPORT AND HEALTH MANAGEMENT THROUGH DIGITAL EVOLUTION	MSc. Denada AHMETI RADA MSc. Bertina HOXHA LAMI	Logos University College Sports University of Tirana
AN OVERVIEW OF REHABILITATION REGIMEN AFTER SURGICAL TREATMENT OF ACUTE ACHILLES TENDON RUPTURES	Assoc. Prof. Dr. Aida Bendo, Msc. Anxhela Ahmataj	Sports University of Tirana
OVERVIEW OF RISK FACTORS FOR ACHILLES TENDON RUPTURE	Assoc. Prof. Dr. Aida Bendo, Msc. Anxhela Ahmataj	Sports University of Tirana
CORRELATION I OF ANTHROPOMETRIC, PHYSIOLOGICAL AND PHYSICAL DATA IN FEMALE BOXERS	Phd.(c) Marsida Bushati Prof.Asc. Sead Bushati	Sports University of Tirana
USE OF CORE TRAINING IN THE PREVENTION OF TRAUMA IN SOCCER PLAYERS	Ergys Rexha Altin Bulku	

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Session 3 / Hall-4

26.07.2024

Moderator: Assoc. Prof. Dr. Hande Albayrak

Meeting ID: 859 7119 7642 / Passcode: 262728

Ankara Local Time: 15:00 – 17:00

Amsterdam Local Time: 14:00 – 16:00

TITLE	AUTHOR(S)	AFFILIATION
THE EFFECT OF BIOFEEDBACK TRAINING ON ATHLETIC PERFORMANCE AND PSYCHOLOGICAL WELL-BEING	İlinsu DEMİRALP ÖZGÜR EKEN	İnönü University, Türkiye
LOWER LIMB SINGLE AND DOUBLE LEG STRENGTH ASYMMETRY IN PROFESSIONAL SOCCER PLAYERS	Sinan SEYHAN	Celal Bayar University, Türkiye
A CRITICAL OVERVIEW OF COMMUNITY-BASED SERVICES IN THE FIELD OF DISABILITY	Hande Albayrak Aslıhan Aykara	Kocaeli University, Türkiye Hacettepe University, Türkiye
RELATIONSHIP BETWEEN MATURATION LEVEL AND INJURY IN ADOLESCENT ATHLETES	Enes SOLAK Ayça ARACI Ayşe ÜNAL Seher ÜLKER	Alanya Alaaddin Keykubat University, Türkiye
NEUROCOGNITIVE CHANGES IN GERIATRIC INDIVIDUALS	Zeynep Sena OĞUZ Ayşe ÜNAL Ayça ARACI	Alanya Alaaddin Keykubat University, Türkiye
GEBELİKTE KADIN RUH SAĞLIĞI VE BİLİNÇLİ FARKINDALIK	Ayşenur Kirazlı Oya Sevcan Orak	Ondokuz Mayıs University, Türkiye
HORTİKÜLTÜREL TERAPİNİN PSİKİYATRİ HEMŞİRELİĞİNDE KULLANIMI	Timur Selçuk UNUTMAZ Oya Sevcan Orak	Ondokuz Mayıs University, Türkiye
BEING A WOMAN SOCIAL WORKER IN PSYCHOSOCIAL SUPPORT PRACTICES IN KAHRAMANMARAŞ EARTHQUAKE	Hande Albayrak Görkem Kelebek Küçükarslan	Kocaeli University, Türkiye Sivas Cumhuriyet University, Türkiye

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Session 3 / Hall-5

26.07.2024

Moderator: Dr. Ishwar Mittal

Meeting ID: 859 7119 7642 / Passcode: 262728

Ankara Local Time: 15:00 – 17:00

Amsterdam Local Time: 14:00 – 16:00

TITLE	AUTHOR(S)	AFFILIATION
KNOWLEDGE OF WOMEN OF REPRODUCTIVE AGE ABOUT THE HEALTH STATUS AND DEVELOPMENT OF THE FETUS RELATED TO TOBACCO USE	Saemira Durmishi, Erlini Kokalla	"Ismail Qemali" University Vlorë, Albania
EXPLORING THE NUTRITIONAL AND HEALTH BENEFITS OF UNDERUTILIZED HIMALAYAN KAINTH FRUIT	Abhishek Sharma, Barinderjit Singh, Pratibha Sharma	I.K. Gujral Punjab Technical University (Main Campus), Kapurthala, Punjab, India.
THE IMPACT OF SOME INFECTIOUS DISEASES ORIGINATING FROM SURFACE WATER ON PUBLIC HEALTH IN SARANDA REGION	Ph.D. process. Blerina Çullaj Prof.Dr. Klementina Puto	Aldent University, Tirana, Albania
EXPLORING FACTORS SHAPING HOSPITAL REPUTATION: INSIGHTS FROM INDIAN HEALTHCARE	Dr. Ishwar Mittal Dr. Rosy Dhall Mikul	IMSAR, Maharshi Dayanand University, Rohtak
SUSTAINABILITY IN HEALTHCARE OF GEORGIA COMPARATIVE ANALYSIS	Shalva Zarnadze Irine Zarnadze Nino Jafaridze Levan Baramidze	Tbilisi State Medical University, Tbilisi, Georgia
THE IMPACT OF WORKING MEMORY ON THE RECOVERY IN INDIVIDUALS WITH APHASIA	Annamária Kiss	University of Pannonia, Multilingualism Doctoral School, Hungary
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Session 1 / Hall-1

27.07.2024

Moderator: Assoc. Prof. Dr. Ayşe ELİÜŞÜK

Meeting ID: 859 7119 7642 / Passcode: 262728

Ankara Local Time: 10:00 – 12:00

Amsterdam Local Time: 09:00 – 11:00

TITLE	AUTHOR(S)	AFFILIATION
THE RELATIONSHIP BETWEEN EMOTIONAL EATING, PERCEIVED STRESS AND PERCEIVED SOCIAL SUPPORT IN PEOPLE WITH AND WITHOUT A DIAGNOSIS OF BIPOLAR DISORDER	Ozan Acar	İstanbul Arel University, Türkiye
PATIENCE AND SELF-COMPASSION IN RELATIVES OF PATIENTS WITH SCHIZOPHRENIA	Ayşe ELİÜŞÜK BÜLBÜL Ahmet ÖZBAY	Selçuk University, Türkiye Millî Eğitim Bakanlığı
DISCOVERY OF A UNIQUE EXPERIENCE: CONSCIOUS AWARENESS IN PARENTS	Berna Şencal Oya Sevcan Orak	Ondokuz Mayıs University, Türkiye
THE EFFECT OF THE ATTENTION DRAWING METHOD USED WITH A FINGER PUPPET DURING VASCULAR ACCESS ON THE PAIN LEVEL OF CHILDREN IN THE 3-6 YEAR OLD GROUP	Sevgi YAZIM Serap GÜLEÇ KESKİN	Ondokuz Mayıs University, Türkiye
THE EFFECT OF KANGAROO CARE APPLIED TO MOTHERS WITH PREMATURE BABIES IN THE NEWBORN INTENSIVE CARE UNIT ON STRESS LEVELS	Hatice ERGEN Serap GÜLEÇ KESKİN	Ondokuz Mayıs University, Türkiye
EXAMINING THE RELATIONSHIP BETWEEN DIGITAL TRANSFORMATION AWARENESS AND ARTIFICIAL INTELLIGENCE LITERACY IN ADULT INDIVIDUALS	Ümran SARIKAN Hakan SUNAY Tuna TURĞUT	Ankara University, Türkiye
WHAT A PAEDIATRIC NURSE SHOULD KNOW ABOUT CONGENITAL HEART DISEASE	Mehmet Bulduk Emre Aktaş Veysel Can	Van Yüzüncü Yıl University, Türkiye
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Session 1 / Hall-2

27.07.2024

Moderator: Prof. Dr. Eti Akyüz Levi

Meeting ID: 859 7119 7642 / Passcode: 262728

Ankara Local Time: 10:00 – 12:00

Amsterdam Local Time: 09:00 – 11:00

TITLE	AUTHOR(S)	AFFILIATION
RAISING CLIMATE CHANGE AWARENESS AMONG SECONDARY SCHOOL STUDENTS	Eti Akyüz Levi	Dokuz Eylül University, Türkiye
LETTER GROUPS FROM THE PERSPECTIVE OF PRIMARY SCHOOL TEACHERS	Ayşe YILDIRIM Onur BATM AZ	Yozgat Bozok University, Türkiye
STUDENT OPINIONS ABOUT THE AUGMENTED REALITY APPLICATION PREPARE ON STRONG BONDS	Gizem SALTIK Özge ÖZBAYRAK AZMAN	Dokuz Eylul University, Türkiye
CHEMISTRY TEACHER CANDIDATES' OPINIONS ON ANALYTICAL CHEMISTRY LABORATORY 1 AND 2 COURSES	Özge ÖZBAYRAK AZMAN Sibel KILINÇ ALPAT	Dokuz Eylul University, Türkiye
THE PLACE OF GEOGRAPHICAL INFORMATION SYSTEMS IN GEOGRAPHY COURSE TEACHING PROGRAM	Sibel TEMİZBAŞ ÖNER Fatih AYDIN Osman ÇEPNİ	Sinop University, Türkiye Karabük University, Türkiye
AN EXPLORATORY RESEARCH INTO THE IMPLEMENTATION OF SUSTAINABLE DEVELOPMENT GOALS THROUGH RECYCLED MATERIALS IN ELT	Ayça Aslan Abide Tuncer	Yozgat Bozok University, Türkiye
ENHANCING EFL SPEAKING SKILLS THROUGH PUBLIC SPEAKING: A QUALITATIVE CASE STUD IN TURKISH HIGHER EDUCATION	Ayça Aslan Tunay Taş	Yozgat Bozok University, Türkiye

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Session 1 / Hall-3

27.07.2024

Moderator: Dr. Cansu Yıldırım

Meeting ID: 859 7119 7642 / Passcode: 262728

Ankara Local Time: 10:00 – 12:00

Amsterdam Local Time: 09:00 – 11:00

TITLE	AUTHOR(S)	AFFILIATION
GALECTIN-9 IS PART OF THE COMPLEX IMMUNE ESCAPE MACHINERY IN ACUTE MYELOID LEUKEMIA	Cansu Yıldırım	Afyonkarahisar Health Sciences University, Türkiye
A RARE CAUSE OF CHRONIC COUGH: TRACHEOCELE	Fatma Selen Ala Çıtlak	Samsun, Çarşamba Devlet Hastanesi
VALIDITY AND RELIABILITY EVALUATION OF THE FAMILY ROUTINES INVENTORY IN TURKISH: A METHODOLOGICAL RESEARCH	Deniz S. YORULMAZ-DEMİR Deniz KOÇOĞLU-TANYER	Artvin Çoruh University, Türkiye Selçuk University, Türkiye
THE EFFICACY OF DOXYCYCLINE-IMPREGNATED COLLAGEN SPONGE IN COMPLETE WOUND CLOSURE	Günay Kosayeva Arif	Azerbaijan Medical University, Baku, Azerbaijan
CELLULAR STRESS CAN LEAD TO ABNORMAL CELL MORPHOLOGY AND GENOMIC INSTABILITY ALTERING THE EXPRESSION OF CCNE1, PARP1, IGF1R, EEF1A1, AURKB, EIF4E AND CDK4 GENES	Murat Kaya Ilknur Suer	Istanbul University, Türkiye
THE RELATIONSHIP BETWEEN IRISIN LEVELS AND BODY MASS INDEX IN SERUM AND URINE SAMPLES OF OBESE TURKISH MEN WITH ANDROGENIC ALOPECIA : PRELIMINARY STUDY	Ergul Belge Kurutas Perihan Ozturk Aslıhan Saglam	Sutcuimam University, Türkiye
EVALUATION OF BIOFILM FORMATION PROCESSES IN MICROORGANISMS USING BIOCHEMICAL ANALYSIS TECHNIQUES	Sena Nur BAŞARAN İrem ARSLANTÜRK	Ağrı İbrahim Çeçen University, Türkiye

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Session 1 / Hall-4

27.07.2024

Moderator: Saeed Ahmad Zaman

Meeting ID: 859 7119 7642 / Passcode: 262728

Ankara Local Time: 10:00 – 12:00

Amsterdam Local Time: 09:00 – 11:00

TITLE	AUTHOR(S)	AFFILIATION
DEVO-AGING: INTERSECTIONS BETWEEN DEVELOPMENT AND AGING	Saeed Ahmad Zaman, Dr. Naima Nawaz, Dr. Zain Nawaz, Dr. Ijaz Ashraf, Dr. Idrees, Nadia Idrees, Lubna Anjum, Dr. Shahzad, Ayesha Riaz, Abdul Rahman, Quratul Ain	University of Okara. University of Agriculture Faisalabad. Government College University Faisalabad
AN EMERGING ERA OF RESEARCH IN AGRICULTURE USING AI	Saeed Ahmad Zaman, Dr. Naima Nawaz, Dr. Zain Nawaz, Dr. Ijaz Ashraf, Dr. Idrees, Nadia Idrees, Lubna Anjum, Dr. Shahzad, Ayesha Riaz, Abdul Rahman, Quratul Ain	University of Okara. University of Agriculture Faisalabad. Government College University Faisalabad
DATA SCIENCE FOR AGRICULTURAL INNOVATION AND PRODUCTIVITY	Saeed Ahmad Zaman, Dr. Naima Nawaz, Dr. Zain Nawaz, Dr. Ijaz Ashraf, Dr. Idrees, Nadia Idrees, Lubna Anjum, Dr. Shahzad, Ayesha Riaz, Abdul Rahman, Quratul Ain	University of Okara. University of Agriculture Faisalabad. Government College University Faisalabad
FROM DISCOVERIES IN AGEING RESEARCH TO THERAPEUTICS FOR HEALTHY AGEING	Saeed Ahmad Zaman, Dr. Naima Nawaz, Dr. Zain Nawaz, Dr. Ijaz Ashraf, Dr. Idrees, Nadia Idrees, Lubna Anjum, Dr. Shahzad, Ayesha Riaz, Abdul Rahman, Quratul Ain	University of Okara. University of Agriculture Faisalabad. Government College University Faisalabad
CONCEPT OF CLIMATE CHANGE AND LEGAL ATTEMPT TOWARDS IT IN THE CONTEMPORARY WORLD (AN ANALYTICAL STUDY WITH SCIENTIFIC APPROACH)	Saeed Ahmad Zaman, Dr. Naima Nawaz, Dr. Zain Nawaz, Dr. Ijaz Ashraf, Dr. Idrees, Nadia Idrees, Lubna Anjum, Dr. Shahzad, Ayesha Riaz, Abdul Rahman, Quratul Ain	University of Okara. University of Agriculture Faisalabad. Government College University Faisalabad
CLIMATE CHANGE: A CURRENT ISSUE AND THEIR DEVASTATING IMPACT ON FISHERIES AND AQUACULTURE FOR LAST DECADES	Saeed Ahmad Zaman, Dr. Naima Nawaz, Dr. Zain Nawaz, Dr. Ijaz Ashraf, Dr. Idrees, Nadia Idrees, Lubna Anjum, Dr. Shahzad, Ayesha Riaz, Abdul Rahman, Quratul Ain	University of Okara. University of Agriculture Faisalabad. Government College University Faisalabad
RESEARCH ON DIGITALIZATION PROCESSES IN AGRICULTURE	Saeed Ahmad Zaman, Dr. Naima Nawaz, Dr. Zain Nawaz, Dr. Ijaz Ashraf, Dr. Idrees, Nadia Idrees, Lubna Anjum, Dr. Shahzad, Ayesha Riaz, Abdul Rahman, Quratul Ain	University of Okara. University of Agriculture Faisalabad. Government College University Faisalabad

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Session 1 / Hall-5

27.07.2024

Moderator: Assist. Prof. Dr. Sina KISACIK

Meeting ID: 859 7119 7642 / Passcode: 262728

Ankara Local Time: 10:00 – 12:00

Amsterdam Local Time: 09:00 – 11:00

TITLE	AUTHOR(S)	AFFILIATION
THE ROLE OF THE STATE AS ACTOR IN CHINA'S ENERGY SECURITY STRATEGY: A COMPARISON IN THE CONTEXT OF THE USA AND INDIA	Sina KISACIK Murat YORULMAZ	Kıbrıs İlim University, Türkiye Trakya University, Türkiye
A STUDY ON THE EFFECT OF AN INDIVIDUAL'S IDENTITY PERCEPTION ON THE MIGRATION PROCESS	Pakize UZUN Ahmet TUNÇ	Çanakkale Onsekiz Mart Üniversitesi
BELONGING AND INTEGRATION OF MIGRANTS IN TURKEY: AN EVALUATION IN THE CONTEXT OF HEALTH POLICIES	Ahmet Tunç Pakize Uzun Fedayi Yağar	Çanakkale Onsekiz Mart University, Türkiye Kahramanmaraş Sütçü İmam University, Türkiye
BAN OR REGULATE: AN ASSESSMENT OF LETHAL AUTONOMOUS WEAPON SYSTEMS (LAWS)	Ramazan Ercan	Ankara Yıldırım Beyazıt University, Türkiye
DENİZCİLİK ÇALIŞMA SÖZLEŞMESİ 2006'NIN TÜRK TİCARET GEMİLERİ BAKIMINDAN ÖNEMİ	Uğur TÜLÜ	Piri Reis University, Türkiye
IN THE SHADOW OF HUMAN RIGHTS AND JUSTICE: WESTERN POLICIES TOWARDS ISRAEL AND UKRAINE	Burak BALIK Mehmet ÇAKAR	Çanakkale Onsekiz Mart University, Türkiye

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Session 2 / Hall-1

27.07.2024

Moderator: Assoc. Prof. Dr. Semra TETİK

Meeting ID: 859 7119 7642 / Passcode: 262728

Ankara Local Time: 12:30 – 14:30

Amsterdam Local Time: 11:30 – 13:30

TITLE	AUTHOR(S)	AFFILIATION
OPINIONS OF SCHOOL ADMINISTRATORS AND TEACHERS ON THE PRACTICES OF SELECTING AND ASSIGNING ADMINISTRATORS TO EDUCATIONAL INSTITUTIONS	Ali VEZİROĞLU İlknur MAYA	Çanakkale Onsekiz Mart University, Türkiye
TEACHERS' OPINIONS ON THE REASONS OF ORGANIZATIONAL SILENCE	Çiğdem YILMAZ İlknur MAYA	Çanakkale Onsekiz Mart University, Türkiye
INVESTIGATION OF UNIVERSITY STUDENTS' DECISION-MAKING STYLES IN TERMS OF VARIOUS VARIABLES	Semra TETİK	Manisa Celal Bayar University, Türkiye
THE RELATIONSHIP BETWEEN UNIVERSITY STUDENTS' EMPATHIC TENDENCIES AND MOTIVATION LEVELS	Semra TETİK	Manisa Celal Bayar University, Türkiye
TEACHERS' OPINIONS ON LIFELONG LEARNING CULTURE IN SCHOOLS	Kıymet Yıldırım	Kırıkkale University, Türkiye
THE EFFECT OF GENDER AND RELIGIOSITY ON SUICIDE IDEATION IN A SAMPLE OF TURKISH MUSLIM-MAJORITY YOUTH	Berkan Demir	Bartın University, Türkiye
ORTAOKUL ÖĞRENCİLERİNİN WEB 2.0 ARACI İLE FRANSIZCA KELİME ÖĞRENME BAŞARILARINA ETKİSİNE YÖNELİK BİR ARAŞTIRMA	Merve Reis Perihan Yalçın	Özel Nesibe Aydın Ortaokulu, Gölbaşı, Ankara, Türkiye Gazi University, Türkiye

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Session 2 / Hall-2

27.07.2024

Moderator: Dr. Džana Rahimić Ramić

Meeting ID: 859 7119 7642 / Passcode: 262728

Ankara Local Time: 12:30 – 14:30

Amsterdam Local Time: 11:30 – 13:30

TITLE	AUTHOR(S)	AFFILIATION
THE IMPACT OF SELF-EFFICACY ON NORTH-EAST INDIA STUDENT'S ACADEMIC PERFORMANCE	Ms. Happy Baglari, Ms. Rakeiveine David	Dibrugarh University, Dibrugarh, India Independent Researcher, Guwahati, India
PEDAGOGICAL TECHNOLOGIES AS A FACTOR OF OPTIMIZATION OF STUDENTS' INTELLIGENCE	Raxmanova Dilfuza Uchkunovna	Chirchik State Pedagogical University, faculty of psychology, Chirchik, Uzbekistan
INTERRELATIONSHIPS AMONG ONLINE TEACHING SELF-EFFICACY, ATTITUDES, KNOWLEDGE, AND CONFIDENCE IN TRANSITIONING FOR CHEMISTRY TEACHERS IN UNIVERSITY OF CAPE COAST AFFILIATE COLLEGES OF EDUCATION	John Ametefe	University of Cape Coast, Ghana
PHILOSOPHICAL FOUNDATIONS OF EDUCATION AND UONEDU AS A SOCIAL INNOVATION	Džana Rahimić Ramić Minela Kerla	University of Sarajevo, Bosnia and Herzegovina
NAVIGATING MISUNDERSTANDINGS AND CONFLICTS IN MULTICULTURAL CLASSROOMS: A COMPREHENSIVE LITERATURE REVIEW	PhD (Cand) Xhiljola ABDİHOXHA	Barleti University, Tirana, Albania
INTEGRATED PLAY-BASED LEARNING IN LEBANESE PRE-PRIMARY EDUCATION: ENHANCING ACADEMIC COMPETENCES AND SOCIOEMOTIONAL DEVELOPMENT	Aya Jaber	Saint Joseph University of Beirut
APPLYING PYTHON TO DESIGN VISUAL AIDS FOR THE TOPIC "PERPENDICULAR RELATIONSHIPS IN SPACE" IN TEACHING MATHEMATICS AT HIGH SCHOOLS	Thi Thai Nhat Duy Du Xuan Phu	Can Tho University, Vietnam

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Session 2 / Hall-3

27.07.2024

Moderator: Prof. (Assoc.) Anna KOPICZKO

Meeting ID: 859 7119 7642 / Passcode: 262728

Ankara Local Time: 12:30 – 14:30

Amsterdam Local Time: 11:30 – 13:30

TITLE	AUTHOR(S)	AFFILIATION
ASSOCIATION BETWEEN BODY MASS INDEX, BIOLOGICAL STATUS, HABİTUAL PAST AND PRESENT PHYSİCAL ACTİVİTY, DIETARY PATTERNS AND BONE MINERAL DENSITY IN CAUCASIAN WOMEN	Prof. (Assoc.) Anna KOPICZKO PhD Joanna CIEPLIŃSKA	Józef Piłsudski University of Physical Education in Warsaw, Warsaw, Poland
REDUCING STRESS AMONG NEWLY RECRUITED TEACHERS IN MOROCCO	Fatima Bouizzal, Youssef EL Madhi, Moulay laarbi Ouahidi, Marouan EL Mourabit	University Ibn Tofail, Kenitra, Morocco
STRESS AND BURNOUT AMONG TEACHERS: ANALYSIS OF SCORES FROM THE MASLACH BURNOUT INVENTORY AND PERCEIVED STRESS SCALE	Fatima Bouizzal, Youssef EL Madhi, Moulay laarbi Ouahidi	University Ibn Tofail, Kenitra, Morocco
A REVIEW ON THE ROLE OF FEEDBACK IN FOREIGN LANGUAGE TEACHING	Prof.Assoc.Dr. Jonida Bushi Mscs. Arsilda Aliaj	University of Tirana
WRITING COMPETENCE IN DAF (GERMAN AS A FOREIGN LANGUAGE) INSTRUCTION IN ALBANIA: A COMPREHENSIVE OVERVIEW	Prof.as.dr. Ema Kristo, MA. Nensi Gjetani	
SOCIAL SCIENCE AND STEM EDUCATION: A COMMENTARY ON OF THE IMPORTANCE OF AN APT BALANCE IN MANOEUVRING THROUGH KNOWLEDGE DOMAINS	Assoc Prof (Dr) Chaudhary Uniyal Assoc Prof (Dr) Amna Mirza	University of Delhi
PROFESSIONAL DEVELOPMENT NEEDS OF ASSISTANT TEACHERS IN PRE-UNIVERSITY EDUCATION	Prof. As. Dr. Florinda TARUSHA Dr. Aurela ZISI	"Aleksander Xhuvani" University, Elbasan Specialist of Curriculum, ASCAP
ARTIFICIAL INTELLIGENCE CHATBOTS AWARENESS AND ACCESSIBILITY FOR LEARNING AMONG SCIENCE PRE-SERVICE TEACHERS IN MINNA, NIGER STATE	Mohammed, C.M., Idris, U.S.B, Mohammed S., Shuaeeb, A. I.	Federal University of Technology Minna, Niger State, Nigeria.

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Session 2 / Hall-4

27.07.2024

Moderator: Saeed Ahmad Zaman

Meeting ID: 859 7119 7642 / Passcode: 262728

Ankara Local Time: 12:30 – 14:30

Amsterdam Local Time: 11:30 – 13:30

TITLE	AUTHOR(S)	AFFILIATION
RESEARCH ON THE COUPLING BETWEEN THE DEVELOPMENT LEVEL AND EFFICIENCY OF GREEN AGRICULTURE IN PAKISTAN	Saeed Ahmad Zaman, Dr. Naima Nawaz, Dr. Zain Nawaz, Dr. Ijaz Ashraf, Dr. Idrees, Nadia Idrees, Lubna Anjum, Dr. Shahzad, Ayesha Riaz, Abdul Rahman, Quratul Ain	University of Okara. University of Agriculture Faisalabad. Government College University Faisalabad
EXPLORING BIG DATA INNOVATIONS IN FOOD AND AGRICULTURE RESEARCH: AN IN-DEPTH ANALYSIS	Saeed Ahmad Zaman, Dr. Naima Nawaz, Dr. Zain Nawaz, Dr. Ijaz Ashraf, Dr. Idrees, Nadia Idrees, Lubna Anjum, Dr. Shahzad, Ayesha Riaz, Abdul Rahman, Quratul Ain	University of Okara. University of Agriculture Faisalabad. Government College University Faisalabad
WHAT DOES AGRICULTURAL SCIENCE NEED TODAY?	Saeed Ahmad Zaman, Dr. Naima Nawaz, Dr. Zain Nawaz, Dr. Ijaz Ashraf, Dr. Idrees, Nadia Idrees, Lubna Anjum, Dr. Shahzad, Ayesha Riaz, Abdul Rahman, Quratul Ain	University of Okara. University of Agriculture Faisalabad. Government College University Faisalabad
THE NEW BIOLOGY OF AGEING	Saeed Ahmad Zaman, Dr. Naima Nawaz, Dr. Zain Nawaz, Dr. Ijaz Ashraf, Dr. Idrees, Nadia Idrees, Lubna Anjum, Dr. Shahzad, Ayesha Riaz, Abdul Rahman, Quratul Ain	University of Okara. University of Agriculture Faisalabad. Government College University Faisalabad
THE GREENHOUSE EFFECT AND CLIMATE CHANGE	Saeed Ahmad Zaman, Dr. Naima Nawaz, Dr. Zain Nawaz, Dr. Ijaz Ashraf, Dr. Idrees, Nadia Idrees, Lubna Anjum, Dr. Shahzad, Ayesha Riaz, Abdul Rahman, Quratul Ain	University of Okara. University of Agriculture Faisalabad. Government College University Faisalabad
NEUROPROTECTIVE AGENTS, NATURAL PLANT HERBS & DRUGS IN ISCHEMIC STROKE: A REVIEW	A.Dinesh babu, T.Thirumurugan, S.Kalaivanan, Dr.srinivasan	Bharath Institute Of Higher Education And Research Chennai, India
STRUCTURE-BASED DRUG REPURPOSING TO INHIBIT THE DNA GYRASE OF MYCOBACTERIUM TUBERCULOSIS	Balasubramani G L, Rinky Rajput, Manish Gupta, Pradeep Dahiya, Jitendra K Thakur, Rakesh Bhatnagar, Abhinav Grover	Jawaharlal Nehru University, New Delhi National Institute of Plant Genome Research, New Delhi Banaras Hindu University, India

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Session 2 / Hall-5

27.07.2024

Moderator: Prof.Dr. Ulaş Başar Gezgin

Meeting ID: 859 7119 7642 / Passcode: 262728

Ankara Local Time: 12:30 – 14:30

Amsterdam Local Time: 11:30 – 13:30

TITLE	AUTHOR(S)	AFFILIATION
ANALYSIS OF SUSTAINABLE BUILDING CERTIFICATION SYSTEMS IN THE WORLD AND INITIATIVES CONDUCTED IN TURKEY RELATED TO LOCAL CERTIFICATION SYSTEMS	Betül Türkmen Ezgi Çıkrıkçı	İstanbul Beykent University, Türkiye
SEARCHING FOR THE UNSEEN IN EXPERIENCED SPACE: SPATIAL ATMOSPHERE	Ezgi Çıkrıkçı Yasemen Say Özer	İstanbul Beykent University, Türkiye Yıldız Teknik University, Türkiye
ARCHITECTURAL PSYCHOLOGY AND INTERIOR DESIGN: A CHALLENGING INTERSECTION	Ulaş Başar Gezgin Nguyen Thi Bich Van	Istanbul Galata University, Türkiye University of Architecture, Ho Chi Minh City, Vietnam
THE CONTRIBUTION OF ICONIZATION IN INTERIOR DESIGN TO TOURISM IN THE CONTEXT OF ARCHITECTURAL DESIGN	Gülşah KARYAĞDI Aslı Pınar BİKET	İstanbul Beykent University, Türkiye
A STUDY ON THE REUSE OF INDUSTRIAL AREAS: ZONGULDAK EXAMPLE	Mertay ERSOY. Çiğdem BOGENÇ	Karabük University, Türkiye
MUSICAL IMPROVISATION, TURKISH MUSIC, AND SOCIAL STRUCTURE: A PHILOSOPHICAL DISCUSSION	Gönenç Hongur	Van Yüzüncü Yıl University, Türkiye

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Session 3 / Hall-1

27.07.2024

Moderator: Assoc. Prof. Dr. Mehmet DOĞAN

Meeting ID: 859 7119 7642 / Passcode: 262728

Ankara Local Time: 15:00 – 17:00

Amsterdam Local Time: 14:00 – 16:00

TITLE	AUTHOR(S)	AFFILIATION
THE USE OF ARTIFICIAL INTELLIGENCE IN THE DIAGNOSIS/EVALUATION OF SWALLOWING DISORDERS	Şevval CENGİZLİ Mümüne Merve PARLAK	Ankara Yildirim Beyazit University, Türkiye
INDIVIDUALIZATION OF FOREIGN LANGUAGE TEACHING THROUGH THE SYNERGY OF ARTIFICIAL INTELLIGENCE AND CONNECTIVISM: OPPORTUNITIES AND CHALLENGES	Mehmet DOĞAN	Bursa Uludağ University, Türkiye
AN EFFECTIVE FAULT CLASSIFICATION METHOD IN SOLAR PHOTOVOLTAIC MODULES USING CONVOLUTIONAL NEURAL NETWORK	Belkıs Erişti	Mersin University, Türkiye
AI, AND US: AUTHENTICITY AND THE UNCANNY IN THE NEW DIGITAL LANDSCAPE	Arda Karaböcek	İstanbul Beykent University, Türkiye
THE EFFECT OF THE ATTENTION DRAWING METHOD USED WITH A FINGER PUPPET DURING VASCULAR ACCESS ON THE PAIN LEVEL OF CHILDREN IN THE 3-6 YEAR OLD GROUP	Sevgi YAZIM Serap GÜLEÇ KESKİN	Ondokuz Mayıs University, Türkiye
THE EFFECT OF KANGAROO CARE APPLIED TO MOTHERS WITH PREMATURE BABIES IN THE NEWBORN INTENSIVE CARE UNIT ON STRESS LEVELS	Hatice ERGEN Serap GÜLEÇ KESKİN	Ondokuz Mayıs University, Türkiye

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Session 3 / Hall-2

27.07.2024

Moderator: Dr. Blerta Avdia

Meeting ID: 859 7119 7642 / Passcode: 262728

Ankara Local Time: 15:00 – 17:00

Amsterdam Local Time: 14:00 – 16:00

TITLE	AUTHOR(S)	AFFILIATION
INTEGRATING SUSTAINABILITY IN CAMEL FARMING: A HOLISTIC APPROACH	Dr. Maria Chikha Prof. Dr. Tarek Khenenou Dr. Djalel Eddine Gherissi Dr. Soundes Akriche Lamia Berkane Prof. Dr. Sabry Mohamed El-Bahr	Mohamed-Cherif Messaadia University - Souk, Algeria National Research Mordovia State University, Russia University of El Oued, Algeria King Faisal University, Saudi Arabia Alexandria University, Egypt
THE CHALLENGE FOR SUSTAINABLE DEVELOPMENT OF RURAL TOURISM - THE ALBANIA CASE	Dr. Blerta Avdia Dr. Klementina Ngjeci	Logos University College, Tirana, Albania “Scanderbeg” High School, Has, Albania
ENVIRONMENTAL AND HEALTH IMPACTS OF INFORMAL SCRAP METAL RECYCLING: A GLOBAL PERSPECTIVE	Auwal Haruna Ismail, Ahmed Fate Ali	Aminu Kano College of Islamic and Legal Studies, Kano State, Nigeria. Bayero University Kano, Kano State, Nigeria.
BACTERIOLOGICAL ANALYSIS OF LOTIC AND LENTIC SURFACE WATERS IN GBOKO METROPOLIS, BENUE STATE, NIGERIA	Terungwa Vaungwa, Dr (Mrs.) Ebah E.E	Joseph Sarwuan Tarka University Makurdi Benue state
THE EFFECTS OF THE OLIVE HARVEST PERIOD AND THE GENERATION OF OLIVE MILL WASTEWATER ON THE PERFORMANCE OF WASTEWATER TREATMENT PLANT IN CENTRAL MOROCCO	Maria EL OUAZZANI, Abdelmajid HADDIOUI, Naaila OUAZZANI, Ibrahim AZZMI, Mustapha AFDALI	Sultan Moulay Slimane University, Beni Mellal, Morocco. Cadi Ayyad University, Marrakesh, Morocco. National Office of Drinking Water, Zaouit Cheikh, Morocco.
NUTRITIONAL VALORISATION OF CHESTNUT FLOUR ENRICHED WITH ITS BY-PRODUCTS AND THERMAL WATER	Ana Cristina GONÇALVES André LEMOS Maria José ALVES	Vigo University, Faculty of Law, Ourense Campus, Espanha. AquaValor—Centro de Valorização e Transferência de Tecnologia da Água, Portugal
ASSESSMENT OF MICROBIOLOGICAL QUALITY AND SOURCES OF WATER POLLUTION IN THE BUNA RIVER, ALBANIA	Ornela LUKA Klementina PUTO	University of Tirana, Tirana, Albania
SUSTAINABLE, ECO-FRIENDLY TEXTILE DYEING PROCESS USING MADDER EXTRACTS IN A MICROWAVE PROCESS	Oumaima Chajii, Younes Chemchame, Reda Achahboune, Mohamed Dalal, Abdeslam El Bouari	University of Hassan II – Casablanca, Morocco. Technical Center of Textile and Clothing (CTTH), Casablanca, Morocco. Foundation of Hassan II Mosque, Casablanca, Morocco.
CHEMICAL AND MORPHOLOGICAL CHARACTERIZATION OF INDOOR PARTICULATE MATTERS IN SOME URBAN WORKPLACES	Dr. Ismail A. Elhaty	Istanbul Gelisim University, Istanbul, Turkey



Session 3 / Hall-3

27.07.2024

Moderator: Dr. Yvesa Jusaj

Meeting ID: 859 7119 7642 / Passcode: 262728

Ankara Local Time: 15:00 – 17:00

Amsterdam Local Time: 14:00 – 16:00

TITLE	AUTHOR(S)	AFFILIATION
THE IMPACT OF SOCIAL MEDIA MARKETING ON THE BUSINESSES IN ELBASAN DISTRICT	PhD. MIMOZA KOTOLLAKU MSc Ylgersa Cara MSc Erjeta Deda	University of Elbasan "Aleksandër Xhuvani" Elbasan, ALBANIA
ART STATE OF MINE TAILING'S VALORIZATION THROUGH GREEN CIRCULAR ECONOMY: MANAGEMENT, APPLICATIONS, GEOPOLYMER, SYNTHESIS METHODS	Yassine Ballout, Mohammed Elgettafi, Hanane El Harouachi, Dounia Ahoudi, Yassine El Miz, Mohamed Loutou	Mohamed First University (UMP), Morocco Cadi Ayyad University (UCA), Morocco
MICROFINANCE AND POVERTY REDUCTION IN THE WESTERN BALKANS: ASSESSING EFFECTIVENESS AND POLICY IMPLICATIONS	Dr. Yvesa Jusaj Dr. Valmir Zogaj	South East European University, North Macedonia
HARNESSING TECHNOLOGY FOR SUSTAINABLE FISHERIES MANAGEMENT: A KEY DRIVER OF THE BLUE ECONOMY	Vidya Padmakumar Murugan Shanthakumar	EcoDiversity Lab, Bangalore, India
RISK MANAGEMENT IN THE PUBLIC SECTOR IN KOSOVO	Agim BERISHA	Internal Audit Unit-Director of Internal Audit- Kosovo
WOMEN MANAGERS OVER 50 IN BULGARIA – CAREER DEVELOPMENT AND DISCRIMINATION	Katerina Katsarska	Bulgarian Academy of Sciences
THE RIGHT OF WORKERS TO REINSTATMENT IN THE CASES OF UNLAWFUL TERMINATION: A COMPARATIVE APPROACH	MSc. Ilva Hamzaj	School of Magistrates of Albania
IDENTIFICATION AND RANKING OF THE FACTORS AFFECTING EMPLOYEE PERFORMANCE WITHIN AN ORGANIZATION	Saeed Ullah Dr. Rehman Akhtar	University of Engg & Technology Peshawar, Pakistan
OPTIMIZING LOGISTICS PERFORMANCE IN AFRICAN NATIONS: EXPLORING THE IMPACT OF KEY FACTORS	Youssef Rehali, Fatima Touhami, Naima Idouaarabe, Adil Azmi, Nawfal Hammoumi	University of Sultan Moulay Slimane
DISCOVERING BUSINESS GROWTH: EXPLORING REGULATORY KEYS IN MENA'S EASE OF DOING BUSINESS	Youssef Rehali, Fatima Touhami, Naima Idouaarabe, Adil Azmi, Nawfal Hammoumi	University of Sultan Moulay Slimane

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Session 3 / Hall-4

27.07.2024

Moderator: Dr. Felicia ANDREI

Meeting ID: 859 7119 7642 / Passcode: 262728

Ankara Local Time: 15:00 – 17:00

Amsterdam Local Time: 14:00 – 16:00

TITLE	AUTHOR(S)	AFFILIATION
LUNG TUMOR EMERGENCE AND EXTERNAL VARIABLES	Ikram Saliha BENYAHIA, Wefa BOUGHRARA, Fatma BELHOUCINE, Amel ALIOUA BERREBBAH	University of science and technology of Oran Mohamed Boudiaf, Algeria Ecole supérieur des sciences biologiques d'Oran (ESSBO), Algeria
THE STUDY OF IMPACT OF INCANDESCENT AND WHITE COLOR LED ELECTRIC LAMPS ON THE FUNCTIONAL CONDITION OF OCULAR SURFACE AND AUTONOMIC REGULATORY MECHANISMS	Levan Mikeladze, David Delibashvili, Gulnara Tabidze, Luiza Gabunia	Tbilisi State Medical University, Georgia
A CASE OF CRITICALLY LOW PLATELETS COUNT	K. Piskova, R. Nikolova, T. Popova, A. Radinov, I. Ivanova	UH "St. Ivan Rilski", MU-Sofia
3D VISUALIZATION OF OLECRANON FOSSA AND ITS USAGE AS A SEX PREDICTOR	P. Timonov, A. Fasova, I. Braynova, A. Baltadjiev	Medical University – Sofia, Bulgaria
ABUSIVE HEAD TRAUMA IN CHILDREN - A CASE REPORT	P. Timonov, A. Fasova, I. Braynova, I. Novakov, E. Poryazova	Medical University – Sofia, Bulgaria
ANTIBIOTIC-LOADED HYDROGELS FOR THE PREVENTION OF GRAM-POSITIVE AND GRAM-NEGATIVE BACTERIAL INFECTIONS	Ayse Aslıhan Gökaltun	Hacettepe University,Ankara, Turkey, Massachusetts General Hospital, Harvard Medical School, 55 Fruit St., Boston Shriners Hospitals for Children, USA
GLYCOPROTEOMICS TO UNDERSTAND BIOLOGICAL MECHANISMS IN HEALTH AND DISEASE	Dr. Felicia ANDREI	University of Medicine and Pharmacy, Romania
DENTAL DIMENSIONS –APPLICABLE IN FORENSIC MEDICINE OR NOT?	Zdravka Harizanova, Ferihan Popova, Marieta Peycheva, Elena Bozhikova, Zlatizara Todorova, Vyara Zaykova	Medical University of Plovdiv, Bulgaria
PATIENT CARE AND COMPLIANCE ASSESSMENT; ITS ASSOCIATION WITH ADHERENCE TO MEDICAL AND PHYSICAL THERAPY AMONG PAKISTANI PATIENTS WITH RHEUMATIC DISEASE	Momina Ali Dr. Mah-ru-nisa Atif Dr. Lubna shikar Dr. Anum Ijlal	Hujvery University, Lahore



Session 3 / Hall-5

27.07.2024

Moderator: Dr. Karimova Rena Jabbar

Meeting ID: 859 7119 7642 / Passcode: 262728

Ankara Local Time: 15:00 – 17:00

Amsterdam Local Time: 14:00 – 16:00

TITLE	AUTHOR(S)	AFFILIATION
GLOBAL BRAIN DRAIN: AN INVESTIGATION OF POST-GRADUATION MIGRATION INTENTIONS OF PHARMACY STUDENTS IN CYPRUS INTERNATIONAL UNIVERSITY	Yrd. Doç. Dr. Ahmet Sami Boşnak Yrd. Doç. Dr. Nevzat Birand	Uluslararası Kıbrıs Üniversitesi
DEVELOPMENT OF COMPOSITE NANOGEL SYSTEM FOR SIMULTANEOUS DELIVERY OF DOXORUBICIN AND RESVERATROL	Lyubomira RADEVA Yordan YORDANOV Virginia TZANKOVA Krassimira YONCHEVA	Medical University of Sofia, Bulgaria
PAGET'S BONE DISEASE DIAGNOSIS, TREATMENT, RISK FACTORS AND ACCELERATION OF THE DISEASE DUE TO DISRUPTION OF THE ENDOCRINE SYSTEM	Qasimova Gulnara Nisan Prof. Abiyev Huseyn Azizulla Dr. Sadygova Gunel Balarza Dr. Jafarova Zemfira Ibrahim Dr. Karimova Rena Jabbar	Azerbaijan Medical University, Baku, Azerbaijan
EMERGENCY ASSISTANCE DURING THE TREATMENT, DIAGNOSIS AND COMPLICATIONS OF SICKLE CELL ANEMIA, A GENETIC DISEASE THAT DEFORMS OXYGEN-CARRYING BLOOD CELLS	Dr. Karimova Rena Jabbar Dr.Mammadova Naila Chingiz Dr. Sadygova Gunel Balarza Shahmammadova Sevinj Osman Dr. Aliyarov Panah Vilayat	Azerbaijan Medical University, Baku, Azerbaijan
THE MANAGEMENT OF INFLAMMATORY PROCESSES OF ORO - MAXILLO-FACIAL AREA	Dr. Esat Bardhoshi	University of Medicine, Tirana, Albania
INVESTIGATING APOMORPHINE NANOPARTICLES AS AN INNOVATIVE THERAPY FOR MEMORY DISORDERS	Huma Ikram, Hannah Tariq, Muhammad Raza Shah	University of Karachi, Pakistan
STRUCTURE-BASED DRUG REPURPOSING TO INHIBIT THE DNA GYRASE OF MYCOBACTERIUM TUBERCULOSIS	Balasubramani G L, Rinky Rajput, Manish Gupta, Pradeep Dahiya, Jitendra K Thakur, Rakesh Bhatnagar, Abhinav Grover	Jawaharlal Nehru University National Institute of Plant Genome Research Banaras Hindu University, India
GUT DYSBIOSIS IN DOGS WITH SPINAL CORD INJURY: IMPACT OF POLENOPLASMIN	Major Gheorghe GIURGIU, Prof dr med Manole COJOCARU	Deniplant-Aide Sante Medical Center, Biomedicine, Bucharest, Romania Titu Maiorescu University, Faculty of Medicine, Bucharest, Romania

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Session 1 / Hall-1

28.07.2024

Moderator: Dr. Hüseyin KÖSE

Meeting ID: 859 7119 7642 / Passcode: 262728

Ankara Local Time: 10:00 – 12:00

Amsterdam Local Time: 09:00 – 11:00

TITLE	AUTHOR(S)	AFFILIATION
WATER EXPOSURE PERIOD EFFECTS ON THE MOISTURE SUSCEPTIBILITY OF ASPHALT MIXTURES HAVING DIFFERENT AGGREGATE GRADATIONS	Deniz ARSLAN Hüseyin KÖSE	Konya Technical University, Türkiye
LATERAL-TORSIONAL BUCKLING BEHAVIOUR OF WEB-TAPERED MONO-SYMMETRIC I-SECTION CANTILEVERS	Tolga Yılmaz Mustafa Sertçelik	Konya Technical University, Türkiye
COMPARISON OF OLD AND NEW WASTE CONCRETE POWDER AS CEMENT REPLACEMENT MATERIAL	Ayşe TÜRK Ülkü Sultan KESKİN	Konya Technical University, Türkiye
EFFECT OF DIFFERENT GEOMETRIC DESIGNS AND CHANGE OF MATERIALS ON PISTON HEAD THERMAL ANALYSIS	Berkay KARAÇOR İkrairem AVKAN Mustafa ÖZCANLI	Çukurova University, Türkiye
WEIGHT REDUCTION USING ULTRA HIGH STRENGTH STEEL (UHSS) IN SEMI-TRAILER CHASSIS	Tanver TALAS Berkay KARAÇOR Mustafa ÖZCANLI	Koluman Otomotiv Endüstrisi Anonim Şirketi Çukurova University, Türkiye
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Session 1 / Hall-2

28.07.2024

Moderator: Assoc. Prof. Dr. Serap SARIBAŞ

Meeting ID: 859 7119 7642 / Passcode: 262728

Ankara Local Time: 10:00 – 12:00

Amsterdam Local Time: 09:00 – 11:00

TITLE	AUTHOR(S)	AFFILIATION
DEVELOPMENT OF STUDENTS' CREATIVE ABILITIES IN CONDUCTING LESSONS	Aliyeva Maralxanim Tofig gizi	Azerbaijan State Pedagogical University
A "BATTLE OF HONOR" AGAINST THE VIOLATION OF THE PRESUMPTION OF INNOCENCE IN POST-CINEMATOGRAPHIC CINEMA	Serap SARIBAŞ	Karamanoğlu Mehmetbey University, Türkiye
POST-APOCALYPTIC FICTION: METAPHORICAL AND SYMBOLIC ANALYSIS OF THE FILM LEAVE THE WORLD BEHIND, AN EXAMPLE OF CYBER-PANDEMIC DEPICTION	Serap SARIBAŞ	Karamanoğlu Mehmetbey University, Türkiye
EXAMINATION OF THE LEARNING OUTCOMES OF THE TURKEY CENTURY EDUCATION MODEL 2024 SECONDARY SCHOOL 8TH GRADE SCIENCE CURRICULUM ACCORDING TO THE REVISED BLOOM TAXONOMY	Duygu BİLEN İsmail TATLI	Dicle University, Türkiye MEB
COMPARATIVE ANALYSIS OF 2005, 2018 AND 2024 GEOGRAPHY CURRICULUM	Fatih AYDIN Osman ÇEPNİ Sibel TEMİZBAŞ ÖNER	Karabük University, Türkiye Sinop University, Türkiye
DETERMINATION OF THE VIEWS OF TEACHERS WORKING WITH STUDENTS WITH LEARNING DIFFICULTIES ABOUT THE PROBLEMS THEY EXPERIENCE	Kübra Erözdemir Tuğba Pürsün	Turhal Special Education Kindergarten Tokat Gaziosmanpaşa University, Türkiye

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Session 1 / Hall-3

28.07.2024

Moderator: Assoc. Prof. Dr. Melehat GEZER

Meeting ID: 859 7119 7642 / Passcode: 262728

Ankara Local Time: 10:00 – 12:00

Amsterdam Local Time: 09:00 – 11:00

TITLE	AUTHOR(S)	AFFILIATION
DETERMINATION OF PEER BULLYING LEVELS AMONG ELEMENTARY SCHOOL STUDENTS	Ayşenur BAYDUZ Canan DEMİR YILDIZ	Mus Alparslan University, Türkiye
EĞİTİMDE ÖLÇME VE DEĞERLENDİRME: ORTAOKUL ve LİSE ÖĞRETMENLERİNİN TUTUMLARI	Aydın SELLİOĞ	Milli Eğitim Bakanlığı
AN INVESTIGATION OF THE DIFFERENTIATION OF MID-TERM CHANGE RATES OF TEACHERS WORKING IN PRIVATE SCHOOLS COMPARED TO PUBLIC SCHOOLS IN TERMS OF TEACHER, STUDENT AND PARENT REQUESTS	Duygu Yorulmaz	Kırıkkale University, Türkiye
PROBLEMS ENCOUNTERED IN THE DEVELOPMENT OF LANGUAGE SKILLS IN FOREIGN LANGUAGE TEACHING	Enver ESERLİ Gülay EKİCİ	Ministry of National Education, Karabük, Turkey Gazi University, Türkiye
INVESTIGATION OF ARGUMENTATION-BASED SCIENCE LEARNING (ABSL) LABORATORY REPORTS AND OPINIONS OF CHEMISTRY TEACHER CANDIDATES ON STRONG MONO ACID-STRONG MONO BASE TITRATION	Cansu KARAGÜLMEZ Sibel KILINÇ ALPAT	Dokuz Eylul University, Türkiye
TÜRKİYE YÜZYILI MAARİF MODELİ SOSYAL BİLGİLER DERSİ ÖĞRETİM PROGRAMININ VATANDAŞLIK OKURYAZARLIĞI AÇISINDAN İNCELENMESİ	Melehat GEZER	Dicle University, Türkiye
FORMATION OF PEDAGOGICAL COMMUNICATION STYLE OF MODERN UNIVERSITY TEACHERS	Hajizade Huzura Tapdig	Nakhchivan State University, Azerbaijan
RABBI ZACHARIAS FRANKEL AND POSITIVE-HISTORICAL JUDAISM	Dr. Mustafa Şahin	Cambridge Central Mosque, UK

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Session 1 / Hall-4

28.07.2024

Moderator: Dr. Satish Menon

Meeting ID: 859 7119 7642 / Passcode: 262728

Ankara Local Time: 10:00 – 12:00

Amsterdam Local Time: 09:00 – 11:00

TITLE	AUTHOR(S)	AFFILIATION
HOUSING POLICIES IN PORTUGAL: FROM FASCISM TO DEMOCRACY	Francisca Machado Eduardo Fernandes	University of Minho, Portugal
AN EFFICIENT SOCIAL COOPERATIVE IN HUNGARY	Katalin LIPTÁK, Tamás PIRGER	University of Miskolc, Hungary University of Sopron, Hungary
PSYCHOLOGICAL FACTORS UNDERLYING CRIMINAL BEHAVIOR	Dita ÇAPRAZ	University of Sarajevo, Bosnia and Hercegovina
EVALUATION OF THE EFFECTIVENESS OF SEARCH AND RESCUE DOGS IN FINDING SURVIVORS DURING DISASTERS: THE CASE OF SERBIA, CROATIA, AND SLOVENIA	Vladimir M. Cvetković, Nemanja Miljković	University of Belgrade, Serbia Scientific-Professional Society for Disaster Risk Management, Serbia International Institute for Disaster Research, Serbia
LEGAL AND ORGANIZATIONAL FRAMEWORK FOR THE USE OF SEARCH AND RESCUE DOGS IN DISASTERS: A COMPARATIVE ANALYSIS BETWEEN SERBIA, CROATIA, AND SLOVENIA	Vladimir M. Cvetković, Nemanja Miljković	University of Belgrade, Serbia Scientific-Professional Society for Disaster Risk Management, Serbia International Institute for Disaster Research, Serbia
DEVASTATION DUE TO EARTHQUAKE IN THE TOWN OF SHIKA AND IN NOTO PENINSULA ISHIKAWA PREFECTURE OF JAPAN ON JAN 2024 AT A MAGNITUDE OF RICHTER SCALE OF 7.6. AND THEREAFTER ITS CONSEQUENCES IN THE MINDFULNESS OF THE CITIZENS	Dr. Satish Menon Dr Senbagavalli M	SRM University Alliance University , Bangalore, India
THE HISTORICAL DEVELOPMENT OF PROBATION SERVICE: CHALLENGES AND FUTURE PERSPECTIVES	Julia Hoxha Rudina Rama	University of Tirana

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Session 1 / Hall-5

28.07.2024

Moderator: Dr. Raja Mohammad Latıf

Meeting ID: 859 7119 7642 / Passcode: 262728

Ankara Local Time: 10:00 – 12:00

Amsterdam Local Time: 09:00 – 11:00

TITLE	AUTHOR(S)	AFFILIATION
NUMERICAL STUDY OF PHYSIOLOGICAL BLOOD FLOW WITH STRETCHING CAPILLARY ON MHD MICROPOLAR FLUID	Dr. Binyam Zigta	Wachemo University, Ethiopia
ANALYSIS AND OPTIMAL CONTROL OF A FRACTIONAL ORDER SEIR EPIDEMIC MODEL WITH GENERAL INCIDENCE AND VACCINATION	Sara Soulaimani	Chouaib Doukkali University, FS, LabSIPE Laboratory, El Jadida
ĝ**-MAPPINGS IN TOPOLOGICAL SPACES	Dr. Raja Mohammad Latıf	Prince Mohammad Bin Fahd University, Kingdom of Saudi Arabia
ĝ**s-COMPACTNESS IN TOPOLOGICAL SPACES	Dr. Raja Mohammad Latıf	Prince Mohammad Bin Fahd University, Kingdom of Saudi Arabia
MATHEMATICAL AND NUMERICAL ANALYSIS OF A REACTION-DIFFUSION MODEL WITH $P(X)$-GROWTH: APPLICATION TO IMAGE RESTORATION AND ENHANCEMENT	Taourirte Laila, Alaa Nour Eddine, Aqel Fatima, Bendahman Mostafa	University Cadi Ayyad, Morocco University Hassan 1st, Morocco Institut de mathématiques de Bordeaux, France
ANALYSIS OF METH DRUG CRIME MODEL OF USER AND FAMILY ROLE WITH LAW ENFORCEMENT AGENCIES IMPACT IN NIGERIA	Akpienbi Isaac O. Ezra E.T	Federal University Wukari, Nigeria

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Session 2 / Hall-1

28.07.2024

Moderator: Besnik HAJDARI

Meeting ID: 859 7119 7642 / Passcode: 262728

Ankara Local Time: 12:30 – 14:30

Amsterdam Local Time: 11:30 – 13:30

TITLE	AUTHOR(S)	AFFILIATION
IMPROVING EFFICIENCY IN PLANT SPECIES MAPPING AND UAV IMAGE PROCESSING: CASE FROM MOROCCO'S HIGH ATLAS MOUNTAINS USING AN ENHANCED U-NET METHODOLOGY	Sara Badrouss, El Mostafa Bachaoui, Mohamed Jibril Daia Eddine, Hicham Mouncif, Mohamed Biniz	Sultan Moulay Slimane University, Beni Mellal, Morocco.
BENEFITS AND RISKS OF GENERATIVE AI IN CONTENT MARKETING	Khalil Israfilzade	ADA University, Baku, Azerbaijan
A SERIOUS GAME FOR DEAF CHILDREN BASED ON SIGN LANGUAGE	KINANE DAOUADJI Amina BENDELLA Fatima	Université des Sciences et de la Technologie d'Oran Mohamed Boudiaf
DIGITALIZATION OF FINANCE MANAGEMENT WITH THE APPLICATION OF INFORMATION SYSTEMS	Besnik HAJDARI Hasan MLINAKU	University "Isa Boletini" Mitrovica
INTERNET OF THINGS (IOT) ON THE DEVELOPMENT OF AGRICULTURE 5.0: PROSPECTS AND CHALLENGES	Sajjadur Rahman	University of Dhaka

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Session 2 / Hall-2

28.07.2024

Moderator: Zohaib Hassan Sain

Meeting ID: 859 7119 7642 / Passcode: 262728

Ankara Local Time: 12:30 – 14:30

Amsterdam Local Time: 11:30 – 13:30

TITLE	AUTHOR(S)	AFFILIATION
ANALYSIS OF THE TRANSLATION OF THE ROMANTIC LETTERS OF "THE SORROWS OF THE YOUNG WERTHER" BY JOHANN WOLFGANG VON GOETHE FROM GERMAN INTO ALBANIAN	Fatbardha Kume, Prof.as.dr. Ema Kristo	University of Tirana, Albania
THE PRINCIPLE OF DIRECT EFFECT OF EU LAW: THE VAN GEND EN LOOS CASE	Ph.D. PRANVERA BEQIRAJ	Aleksandër Moisiu University, Durrës, Albania
THE PRINCIPLE OF SUPREMACY IN THE JURISPRUDENCE OF THE COURT OF JUSTICE OF THE EU IMPLICATIONS FOR NATIONAL PARLIAMENTS	Ph.D. PRANVERA BEQIRAJ	Aleksandër Moisiu University, Durrës, Albania
VALUING ENDOGENOUS AND THERMAL RESOURCES IN THE PRODUCTION OF HEALTHY FOOD: CHESTNUT BY-PRODUCT FLOUR WITH THERMAL WATER	Ana Cristina GONÇALVES André LEMOS Maria José ALVES	Vigo University, Faculty of Law, Ourense Campus, Espanha AquaValor—Centro de Valorização e Transferência de Tecnologia da Água, Portugal
CONCEPTUAL ANALYSIS OF MODERN EUROSCEPTICISM	Prof. Milena Apostolovska - Stepanoska Prof.Hristina Runcheva -Tasev	Department of Political Science Department, Faculty of Law, North Macedonia
FOSTERING E-LEARNING IN TEACHING-LEARNING: TRANSFORMING FUTURE EDUCATION IN MODERN ERA	Fr. Baiju Thomas	Ramakrishna Mission Vivekananda Educational and Research Institute
EXPLORING CHAT-GPT'S PIVOTAL ROLE IN SHAPING THE LANDSCAPE OF INDUSTRY 4.0	Zohaib Hassan Sain	Superior University, Pakistan
FRIEND OR FOE? ASSESSING THE IMPACT OF PLAGIARISM DETECTION SOFTWARE ON WRITING INSTRUCTION	Zohaib Hassan Sain	Superior University, Pakistan

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Session 2 / Hall-3

28.07.2024

Moderator: Dr. Wadha Alsudairy

Meeting ID: 859 7119 7642 / Passcode: 262728

Ankara Local Time: 12:30 – 14:30

Amsterdam Local Time: 11:30 – 13:30

TITLE	AUTHOR(S)	AFFILIATION
HENNA BEYOND SUPERSTITION: UNPACKING WESTERMARCK'S MISINTERPRETATIONS	Dr. Wadha Alsudairy	University of Essex
HARNESSING ART OF ORATORY AS A VIABLE TOOL FOR ENTREPRENEURSHIP EDUCATION AND IGR IN NIGERIAN TERTIARY INSTITUTIONS	Ajayi Olayemi T., Oginni Yemi	Lead City University, Ibadan, Oyo State, Nigeria
THE DISCOVERY OF ASHAB AL AIKAH IN JORDAN VALLEY- SOUTHERN LEVANT	Mohammed Waheeb	Hashemite University
A CRITICAL ANALYSIS OF ARCHITECTURAL IDENTITY TRANSFORMATIONS ON EPIDAMN BOULEVARD IN DURRES, ALBANIA	PhD. Dorina Papa	University of New York Tirana
MOTIVATION OF FOREIGN LANGUAGE ADULT LEARNERS OF TODAY	Dr. Vjollca Tabaku Hoxha	University of Tirana, Albania

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Session 2 / Hall-4

28.07.2024

Moderator: Lect. Dr. Vuslat Salalı

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TITLE	AUTHOR(S)	AFFILIATION
INVESTIGATION OF NEW GENERATION ADOBE MATERIALS IN THE CONTEXT OF ENVIRONMENTAL SUSTAINABILITY	Betül ALANKUŞ Nilay COŞGUN	Gebze Technical University
SÜRDÜRÜLEBİLİR AKILLI KENTLER İÇİN DEĞER ESASINA DAYALI İMAR UYGULAMA YÖNTEMİNİN GEREKLİLİĞİ	Vuslat Salalı Şaban İnam	Isparta Uygulamalı Bilimler Üniversitesi Konya Teknik Üniversitesi
DOĞAL SIĞIR TÜBERKÜLOZU'NDA AKCİĞER VE İLGİLİ LENF DÜĞÜMLERİNDEKİ GRANÜLOMLARIN PATOMORFOLOJİK VE İMMUNOHİSTOKİMYASAL YAPISI	Özgür ÖZÖNER Sevil ATALAY VURAL	Siirt Üniversitesi Ankara Üniversitesi
COMPARISON OF IMMUNOCYTOLOGICAL, IMMUNOHISTOCHEMICAL AND IN-SITU HYBRIDIZATION METHODS IN SMALL RUMINANT NEONATAL MORTALITY	Sevil ATALAY VURAL Rıfkı HAZIROĞLU Osman KUTSAL Gözde YÜCEL TENEKECİ Arda Selin TUNÇ Yanad ABOU MONSEF Ozan AHLAT Kürşat FİLİKCİ Özgür ÖZÖNER Oya Burçin DEMİRTAŞ	Ankara Üniversitesi Ecole Nationale Vétérinaire de Toulouse / Fransa Harran Üniversitesi Siirt Üniversitesi
EFFECTS OF BORAX AND VARIOUS PLANT EXTRACTS ON THE COMBUSTION LEVEL IN WOOD MATERIALS	Hatice ULUSOY Hüseyin PEKER	Muğla Sıtkı Koçman University, Muğlay, Turkey Çoruh University,Artvin, Turkey
USE OF LAVENDER PLANT EXTRACT ON WOOD MATERIALS AND SURFACE GLOSS CHANGE	Hatice ULUSOY Hüseyin PEKER	Muğla Sıtkı Koçman University, Muğlay, Turkey Çoruh University,Artvin, Turkey

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CONTENT

CONGRESS ID	**I**
SCIENTIFIC COMMITTEE	**II**
PHOTO GALLERY	**III**
PROGRAM	**IV**
CONTENT	**V**

Author	Title	No
Faik Gökalp	THE INVESTIGATION ON THE INHIBITION EFFECTS OF THE MAIN EFFECTIVE COMPOUNDS IN HONEY FOR “5P21” ONCOGENE RECEPTOR	1
Ayşe YILDIRIM	LETTER GROUPS FROM THE PERSPECTIVE OF PRIMARY SCHOOL TEACHERS	9
Džana Rahimić Ramić Minela Kerla	PHILOSOPHICAL FOUNDATIONS OF EDUCATION AND UONEDU AS A SOCIAL INNOVATION	25
Hande Albayrak Aslıhan Aykara	A CRITICAL OVERVIEW OF COMMUNITY-BASED SERVICES IN THE FIELD OF DISABILITY	35
Fatih AYDIN Osman ÇEPNİ Sibel TEMİZBAŞ ÖNER	COMPARATIVE ANALYSIS OF 2005, 2018 AND 2024 GEOGRAPHY CURRICULUM	47
Mohammed, C.M., Idris, U.S.B, Babagana M. Mohammed S., Shuaeeb, A. I.	ARTIFICIAL INTELLIGENCE CHATBOTS AWARENESS AND ACCESSIBILITY FOR LEARNING AMONG SCIENCE PRE-SERVICE TEACHERS IN MINNA, NIGER STATE	61
Dorina Papa	A CRITICAL ANALYSIS OF ARCHITECTURAL IDENTITY TRANSFORMATIONS ON EPIDAMN BOULEVARD IN DURRES, ALBANIA	71
KINANE DAOUADJI Amina BENDELLA Fatima	A SERIOUS GAME FOR DEAF CHILDREN BASED ON SIGN LANGUAGE	80
Adnan SÖYLEMEZ Duygu İLKHAN SÖYLEMEZ	THE ROLE OF BLOCKCHAIN TECHNOLOGY IN PUBLIC ADMINISTRATION	84
Adnan SÖYLEMEZ Duygu İLKHAN SÖYLEMEZ	CREATING AN INCLUSIVE CITY: THE EXEMPLARY BARRIER-FREE PROJECT OF KONYA METROPOLITAN MUNICIPALITY	90
Ajayi, Olayemi T. Oginni, Yemi	HARNESSING ART OF ORATORY AS A VIABLE TOOL FOR ENTREPRENEURSHIP EDUCATION AND IGR IN NIGERIAN TERTIARY INSTITUTIONS	95
Saemira Durmishi Shkëlqim Hidri MitildaGugu, Erlini Kokalla.	KNOWLEDGE OF WOMEN OF REPRODUCTİVE AGE ABOUT THE İMPACT OF TOBACCO USE ON FETAL HEALTH AND DEVELOPMENT	102
Zehra Funda AKBULUT Soner GÜLER	POZZOLANIC MATERIALS IN CONCRETE: ADVANCING SUSTAINABILITY IN CONSTRUCTION	110
Zehra Funda AKBULUT Soner GÜLER	CULTURAL AND TECHNİCAL SİGNİFİCANCE OF COLORED CONCRETE IN CONTEMPORARY CONSTRUCTİON	115
Arda KARABÖCEK	HER, AI, AND US: AUTHENTICITY AND THE UNCANNY IN THE NEW DIGITAL LANDSCAPE	120

FULL TEXTS BOOK

Belkıs YAŞA Naile ANGIN Murat ERTAŞ	EVALUATION OF ANTIOXIDANT ACTIVITY IN *ARONIA MELANOCARPA* (MICHX.) ELLIOT BERRY EXTRACT	127
Fatbardha KUME Ema KRISTO	ANALYSIS OF THE TRANSLATION OF THE ROMANTIC LETTERS OF "THE SORROW OF THE YOUNG WERTHER: BY JOHANN WOLFGANG VON GOETHE FROM GERMAN INTO ALBANIAN	132
Aida Bendo Anxhela Ahmataj	AN OVERVIEW OF REHABILITATION REGIMEN AFTER SURGICAL TREATMENT OF ACUTE ACHILLES TENDON RUPTURES	141
Aida Bendo Anxhela Ahmataj	OVERVIEW OF RISK FACTORS FOR ACHILLES TENDON RUPTURE	146
Ema Kristo Nensi Gjetani	WRITING COMPETENCE IN DAF (GERMAN AS A FOREIGN LANGUAGE) İNSTRUCTİON IN ALBANIA: A COMPREHENSIVE OVERVIEW	151
Florinda TARUSHA Aurela ZISI	PROFESSIONAL DEVELOPMENT NEEDS OF ASSISTANT TEACHERS IN PRE-UNIVERSITY EDUCATION	157
Katerina Katsarska	WOMEN MANAGERS OVER 50 IN BULGARIA – CAREER DEVELOPMENT AND DİSCRIMINATION	165
Ergul Belge Kurutas, Perihan Ozturk, Aslıhan Sağlam	BODY MASS INDEX AND LEVELS OF IRISIN IN SERUM AND URINE OF TURKISH MALE PATIENTS WITH ANDROGENETIC ALOPECIA : PRELIMINARY STUDY	173
Duygu BİLEN İsmail TATLI	EXAMINATION OF THE LEARNING OUTCOMES OF THE TURKEY CENTURY EDUCATION MODEL 2024 SECONDARY SCHOOL 8TH GRADE SCIENCE CURRICULUM ACCORDING TO THE REVISED BLOOM TAXONOMY	179
Müjde SAKAR	ROMANIA IN CHANGING WORLD CONDITIONS; EVALUATION OF LIVE ANIMAL IMPORT AND EXPORT RATES IN AGRICULTURAL POLICIES	185
Belkıs Erişti	AN EFFECTIVE FAULT CLASSIFICATION METHOD IN SOLAR PHOTOVOLTAIC MODULES USING CONVOLUTIONAL NEURAL NETWORK	189
Eti Akyüz Levi	RAISING CLIMATE CHANGE AWARENESS AMONG SECONDARY SCHOOL STUDENTS	198
Hatice ULUSOY Hüseyin PEKER	EFFECTS OF BORAX AND VARIOUS PLANT EXTRACTS ON THE COMBUSTION LEVEL IN WOOD MATERIALS	205
Hatice ULUSOY Hüseyin PEKER	USE OF LAVENDER PLANT EXTRACT ON WOOD MATERIALS AND SURFACE GLOSS CHANGE	211
Yüksel GÖĞEBAKAN Arif Esen BAYKURT	POSTMODERN APPROACHES IN THE CONTEXT OF BİO-CELLULAR REALİSM CANLI HÜCRE GERÇEKÇİLİĞİ BAĞLAMINDA POSTMODERN YAKLAŞIMLAR	217
Sibel TEMİZBAŞ ÖNER Fatih AYDIN Osman ÇEPNİ	THE PLACE OF GEOGRAPHICAL INFORMATION SYSTEMS IN GEOGRAPHY COURSE TEACHING PROGRAM	233
Öznur YALMAÇ Ceylan FİDAN BABAT Muheb ALGSO Emrah KAVAK Arif KIVRAK	THE INHIBITORY EFFECTS OF SOME NOVEL BENZOTHIOPHENE DERIVATIVES ON BUTYRYLCHOLINESTERASE	249

FULL TEXTS BOOK

Can YILMAZ		
Ebru ÇOKAY Serkan EKER	TREATMENT OF URBAN WASTEWATER USING THE ELECTRO-FENTON PROCESS	263
Ebru ÇOKAY Serkan EKER	ENERGY RESOURCES IN TURKEY AND ENVIRONMENTAL EFFECTS OF ENERGY SOURCES	269
Ebru ÇOKAY Serkan EKER	ECO-FRIENDLY COLOR REMOVAL FROM SOAP PRODUCTION WASTEWATER	275
Milena Apostolovska - Stepanoska Hristina Runcheva -Tasev	CONCEPTUAL ANALYSIS OF MODERN EUROSCEPTICISM	281
Ergys Rexha Altin Bulku Kujtim Kapedani	USE OF CORE TRAINING IN THE PREVENTION OF TRAUMA IN SOCCER PLAYERS	286
Deniz S. YORULMAZ-DEMİR Deniz KOÇOĞLU-TANYER	VALIDITY AND RELIABILITY EVALUATION OF THE FAMILY ROUTINES INVENTORY IN TURKISH: A METHODOLOGİCAL RESEARCH	297
Şeyda Kaya Duygu Kansoy Serpil Atlı Eda Sönmez Gürer Taner Daştan	DETERMINATION OF ANTIMIROBIAL ACTIVITY OF LONGEVITY SPINACH (*GYNURA PROCUMBENS*) PLANT	303
Mohammed Waheeb Hashemite University	THE DISCOVERY OF ASHAB AL AIKAHH IN JORDAN VALLEY- SOUTHERN LEVANT	312
RAJA MOHAMMAD LATIF	Ğ **S-COMPACTNESS IN TOPOLOGICAL SPACES	320
RAJA MOHAMMAD LATIF	Ğ **S- MAPPINGS IN TOPOLOGICAL SPACES	342
Blerta Avdia Klementina Ngjeci	THE CHALLENGE FOR SUSTAINABLE DEVELOPMENT OF RURAL TOURISM - THE ALBANIA CASE	366
Duygu İLKHAN SÖYLEMEZ Adnan SÖYLEMEZ	RESTORING HISTORICAL BUILDINGS FOR BARRIER-FREE ACCESS (KONYA ALÂEDDIN MOSQUE)	375
Duygu İLKHAN SÖYLEMEZ Adnan SÖYLEMEZ	ACCESSIBILITY AS A CORNERSTONE OF CULTURAL ENGAGEMENT: LESSONS FROM THE ÇATALHÖYÜK	381
Berkay KARAÇOR İkrairem AVKAN Mustafa ÖZCANLI	EFFECT OF DIFFERENT GEOMETRIC DESIGNS AND CHANGE OF MATERIALS ON PISTON HEAD THERMAL ANALYSIS	386
Serkan EKER Ebru ÇOKAY	BIOGAS PRODUCTION: CURRENT TRENDS AND FUTURE PROSPECTS	402
Zeynep Müjde SAKAR	ECONOMIC MOVEMENT; THE CRIME OF IMMIGRANT TRAFFICKING	408
Enver ESERLİ Gülay EKİCİ	PROBLEMS ENCOUNTERED IN THE DEVELOPMENT OF LANGUAGE SKILLS IN FOREIGN LANGUAGE TEACHING	412
Berna Şencal Oya Sevcan Orak	EŞSİZ DENEYİMİN KEŞFİ: EBEVEYNLERDE BİLİNÇLİ FARKINDALIK	426
Julia Hoxha Rudina Rama	THE HISTORICAL DEVELOPMENT OF PROBATION SERVICE: CHALLENGES AND FUTURE PERSPECTIVES	436
Baiju Thomas	FOSTERING E-LEARNING IN TEACHING-LEARNING: TRANSFORMING FUTURE EDUCATION IN MODERN ERA	442

FULL TEXTS BOOK

Ömer Faruk TEKİN	SOLID WASTE SERVICES IN CITIES IN THE CONTEXT OF MIGRATION AND ENVIRONMENTAL ISSUES: GAZİANTEP METROPOLITAN MUNICIPALITY	457
Nuray GÜZELER Firuza KOBOYEVA Raihana HALIM	FOOD INDUSTRY IN AFGHANISTAN	463
Nuray GÜZELER Firuza KOBOYEVA Raihana HALIM	AFGANİSTAN'IN SÜT ÜRETİMİ VE GELENEKSEL SÜT ÜRÜNLERİ	469
Tolga Yılmaz Mustafa Sertçelik	LATERAL-TORSIONAL BUCKLING BEHAVIOUR OF WEB-TAPERED MONO-SYMMETRIC I-SECTION CANTILEVERS	478
John Ametefe	INTERRELATIONSHIPS AMONG ONLINE TEACHING SELF-EFFICACY, ATTITUDES, KNOWLEDGE, AND CONFIDENCE IN TRANSITIONING FOR CHEMISTRY TEACHERS IN UNIVERSITY OF CAPE COAST AFFILIATE COLLEGES OF EDUCATION	494
Thi Thai Nhat Duy Du Xuan Phu	APPLYING PYTHON TO DESIGN VISUAL AIDS FOR THE TOPIC "PERPENDICULAR RELATIONSHIPS IN SPACE" IN TEACHING AND LEARNING MATHEMATICS AT HIGH SCHOOLS	501
Deniz Arslan Hüseyin Köse	WATER EXPOSURE PERIOD EFFECTS ON THE MOISTURE SUSCEPTIBILITY OF ASPHALT MIXTURES HAVING DIFFERENT AGGREGATE GRADATIONS	513
Xhiljola ABDIHOXHA	NAVIGATING MISUNDERSTANDINGS AND CONFLICTS IN MULTICULTURAL CLASSROOMS: A COMPREHENSIVE LITERATURE REVIEW	520
Terungwa VAUNGWA Esther Eneyi EBAH	BACTERIOLOGICAL ANALYSIS OF LOTIC AND LENTIC SURFACE WATERS IN GBOKO METROPOLIS	530
Adnan ÖZDEMİR	INVESTIGATION OF THERMOLUM KINETIC PARAMETER OF SRB6O10:DY PHOSPHOR SYNTHESIZED BY SOLUTION COMBUSTION SYNTHESIS	537
Tawa Omolade Olusegun Abdulhakeem Oluyinka Iyiola Jesunifemi Miracle Babalola Oluwatomi Jeremiah Dada	MOLECULAR GENOTYPING OF ANOPHELES MOSQUITOES IN ILORIN, KWARA STATE, NIGERIA	544
Khalil Israfilzade	BENEFITS AND RISKS OF GENERATIVE AI IN CONTENT MARKETING	557
LEYLA DİLEK	FUNCTIONAL REFLECTION OF THE BINDING PREPOSITION "YA" IN GAGAUZ TURKISH IN THE SEMANTIC LAYER	563
Ayşenur Kirazlı Oya Sevcan Orak	GEBELİKTE KADIN RUH SAĞLIĞI VE BİLİNÇLİ FARKINDALIK	573
Happy Baglari Rakeiveine David	THE IMPACT OF SELF-EFFICACY ON NORTH-EAST INDIA STUDENT'S ACADEMIC PERFORMANCE	584
Fatih BAŞÇİFTÇİ Serkan ÖRÜCÜ	DESIGNING MEDICAL EXPERT SYSTEM BASED ON LOGICAL REDUCED RULE FOR ASTHMA DIAGNOSIS	596
Pelin ERTÜRKMEN	DETERMINATION OF EPS PRODUCTION, ORGANIC ACID AND ANTIMICROBIAL LEVELS OF SOME LACTIC ACID BACTERIA ISOLATED FROM BUFFALO YOGURT AND MILK	615

FULL TEXTS BOOK

Berkan Demir	THE EFFECT OF GENDER AND RELIGIOSITY ON SUICIDE IDEATION IN A SAMPLE OF TURKISH MUSLIM-MAJORITY YOUTH	622
Gönenç Hongur	MUSICAL IMPROVISATION, TURKISH MUSIC, AND SOCIAL STRUCTURE: A PHILOSOPHICAL DISCUSSION	629
Mertay ERSOY Çiğdem BOGENÇ	ENDÜSTRİ ALANLARININ YENİDEN KULLANIMINA YÖNELİK BİR ÇALIŞMA : ZONGULDAK ÖRNEĞİ	635
İLİNSU DEMİRALP ÖZGÜR EKEN	THE EFFECT OF BIOFEEDBACK TRAINING ON ATHLETIC PERFORMANCE AND PSYCHOLOGICAL WELL-BEING	646
Ilva Hamzaj	THE RIGHT OF WORKERS TO REINSTATMENT IN THE CASES OF UNLAWFUL TERMINATION: A COMPARATIVE APPROACH	655
Şeyda Kaya Ebru Doymaz Beyza Nur Doğanyılmaz Taner Daştan	DETERMINATION OF DNA DAMAGE PROTECTIVE ACTIVITIES OF WATER EXTRACTS OF DİFFERENT PART OF DANDELION (*TARAXACUM OFFİCİNALE*) PLANT	669
Burak BALIK Merve KÜÇÜK	DIGITAL PREFERENCES IN POLITICAL PARTICIPATION: THE CASE OF PLATFORM X	676
Osman Bahadır ÖZDEN Barış GÖKÇE	INVESTIGATION OF FATIGUE LIFE TESTS IN A CRUCIFORM STRUCTURE WITH WELDED JOINT	688
Tuğba ŞANLI Betül KAFKASLIOĞLU YILDIZ Elif IŞIK Yahya Kemal TÜR	INVESTIGATION OF THE BALLISTIC PERFORMANCE OF AL2O3-SM2O3 CERAMICS AND AL2O3 BASED ZRO2 AND SM2O3 ADDED SANDWICH SAMPLES	695
Jonida Bushi Arsilda Aliaj	A REVIEW ON THE ROLE OF FEEDBACK IN FOREIGN LANGUAGE TEACHING	705
Ali VEZİROĞLU İlknur MAYA	EĞİTİM KURUMLARINA YÖNETİCİ SEÇME VE GÖREVLENDİRME UYGULAMALARINA İLİŞKİN OKUL YÖNETİCİLERİNİN VE ÖĞRETMENLERİN GÖRÜŞLERİ	716
Enes SOLAK Ayça ARACI Ayşe ÜNAL Seher ÜLKER	RELATIONSHIP BETWEEN MATURATION LEVEL AND INJURY IN ADOLESCENT ATHLETES	734
Melehat GEZER	TÜRKİYE YÜZYILI MAARİF MODELİ SOSYAL BİLGİLER DERSİ ÖĞRETİM PROGRAMININ VATANDAŞLIK OKURYAZARLIĞI AÇISINDAN İNCELENMESİ	743
Yüksel GÖĞEBAKAN Levent İSKENDEROĞLU	RELEASE OF LEVENT VALLEY GEOPARK HERITAGE INVENTORY AND PREPARATION OF CONSERVATION, SUSTAINABILITY, PROMOTION STRATEGIES AND GEOPARK MANAGEMENT PLAN AND QUESTIONING THE AESTHETIC POSSIBILITIES OF THE VALLEY	749
Katalin Lipták Tamás Pirger	AN EFFICIENT SOCIAL COOPERATIVE IN HUNGARY	760
HAJIZADE HUZURA TAPDIG	FORMATION OF PEDAGOGICAL COMMUNICATION STYLE OF MODERN UNIVERSITY TEACHERS	767
Elif AYDIN YAZICI Kenan DİKİLİTAŞ	TRANSLANGUAGING AS A BILINGUAL EDUCATION PEDAGOGY IN THE EARLY YEARS: A META-SYNTHESIS APPROACH	773

FULL TEXTS BOOK

Volkan ALTUNAL Adnan ÖZDEMİR	DOSIMETRIC USAGE OF SİO2 MATERIAL VIA WELL-KNOWN LUMINESCENCE TECHNIQUES	778
Abdullahi, A., Jamilu Hussaini, Babayemi, A. W.	MODEL FOR THE PREDİCTİON OF FEDERAL GOVERNMENT'S EXPENDITURE AND REVENUE IN NIGERIA	786
Vjollca Tabaku Hoxha	MOTIVATION OF FOREIGN LANGUAGE ADULT LEARNERS OF TODAY	791
Naiba SHAMSHİYEVA Aida GULİYEVA	ORGANIZATIONAL CONFLICTS AND THEIR MANAGEMENT	799
Yasemin Ozdemir Deniz Dolgen M. Necdet Alpaslan	REMOVAL OF OIL&GREASE BY A NEW GENERATION MICROBUBBLE PUMP DISSOLVED AIR FLOTATION SYSTEMS	804
Ömer Faruk TEKİN	THE ROLE OF CITY ADMINISTRATIONS IN SOLVING GLOBAL CLIMATE CHANGE PROBLEMS	810
Duygu ÖZKAN Ozan BÜYÜKYILMAZ	AKADEMİSYEN BAKIŞ AÇISIYLA ÖRGÜTSEL DNA ÖZELLİKLERİ: KARABÜK ÜNİVERSİTESİ'NDE BİR ARAŞTIRMA	816
Çiğdem YILMAZ İlknur MAYA	TEACHERS' OPINIONS ON THE REASONS OF ORGANIZATIONAL SILENCE	828
Neha	CLIMATE CHANGE AND ITS IMPACT ON AGRICULTURE IN INDIA: AREVIEW STUDY	844
PRANVERA BEQIRAJ	THE PRINCIPLE OF DIRECT EFFECT OF EU LAW: *THE VAN GEND EN LOOS* CASE	853
PRANVERA BEQIRAJ	THE PRINCIPLE OF SUPREMACY IN THE JURISPRUDENCE OF THE COURT OF JUSTICE OF THE EU *IMPLICATIONS FOR NATİONAL PARLIAMENTS*	859
Akpienbi Isaac O. Ezra. E T.	ANALYSIS OF METH MODEL OF DRUG CRIME OF USER AND FAMILY ROLE WITH LAW ENFORCEMENT AGENCIES IMPACT IN NIGERIA	864
Ulaş Başar Gezgin Nguyen Thi Bich Van	ARCHITECTURAL PSYCHOLOGY AND INTERIOR DESIGN: A CHALLENGING INTERSECTION	874
Elvin Hajiyev	PUBLIC INVESTMENTS IN THE GREEN ECONOMY: BENEFITS AND CHALLENGES	881
Ahmet Niyazi ÖZKER	RECENT REGIONAL MACROECONOMIC DEVELOPMENTS AND POSSIBLE FINANCIAL RISKS AT THE GLOBAL LEVEL	887
Saeed Ullah Rehman Akhtar	IDENTIFICATION AND RANKING OF THE FACTORS AFFECTING EMPLOYEE PERFORMANCE WITHIN AN ORGANIZATION	899
Emet GÜREL İlkay Burak TAŞKIRAN	SAĞLIK OKURYAZARLIĞI: KAVRAMSAL BİR ÇALIŞMA	908
Semra TETİK	INVESTIGATION OF UNIVERSITY STUDENTS' DECISION-MAKING STYLES IN TERMS OF VARIOUS VARIABLES	917
Semra TETİK	THE RELATIONSHIP BETWEEN UNIVERSITY STUDENTS' EMPATHIC TENDENCIES AND MOTIVATION LEVELS	927
Sevgi YAZIM Serap GÜLEÇ KESKİN	THE EFFECT OF DISTRACTION METHOD ON CHILDREN'S PAIN LEVEL DURING THE VASCULAR ACCESS PROCEDURE: FINGER PUPPET	933
Vuslat Salalı Şaban İnam	SÜRDÜRÜLEBİLİR AKILLI KENTLER İÇİN DEĞER ESASINA DAYALI İMAR UYGULAMA YÖNTEMİNİN GEREKLİLİĞİ	943

FULL TEXTS BOOK

Kıymet Yıldırım	OKULLARDA HAYAT BOYU ÖĞRENME KÜLTÜRÜNE İLİŞKİN ÖĞRETMEN GÖRÜŞLERİ	954
Ayça ARSLAN	EXPLORATION OF A IN-BETWEEN STAGE IN THE ARCHITECTURAL DESIGN PROCESS: DIGITAL ANALYSIS	960
Sina KISACIK Murat YORULMAZ	ÇİN'İN ENERJİ GÜVENLİĞİ STRATEJİSİNDE AKTÖR OLARAK DEVLETİN ROLÜ: ABD VE HİNDİSTAN BAĞLAMINDA KARŞILAŞTIRMA	980
Murat Kaya Ilknur Suer	CELLULAR STRESS CAN LEAD TO ABNORMAL CELL MORPHOLOGY AND GENOMIC INSTABILITY ALTERING THE EXPRESSION OF *CCNE1, PARP1, IGF1R, EEF1A1, AURKB, EIF4E* AND *CDK4* GENES	1000
Şevval CENGİZLİ Mümüne Merve PARLAK	THE USE OF ARTIFICIAL INTELLIGENCE IN THE DIAGNOSIS/EVALUATION OF SWALLOWING DISORDERS	1004
Ayşe TÜRK Ülkü Sultan KESKİN	COMPARISON OF OLD AND NEW WASTE CONCRETE POWDER AS CEMENT REPLACEMENT MATERIAL	1010
Ozan Acar	BİPOLAR BOZUKLUK TANISI BULUNAN VE BULUNMAYAN KİŞİLERDE DUYGUSAL YEME, ALGILANAN STRES VE ALGILANAN SOSYAL DESTEK ARASINDAKİ İLİŞKİNİN İNCELENMESİ	1017
Burak BALIK Mehmet ÇAKAR	IN THE SHADOW OF HUMAN RIGHTS AND JUSTICE: WESTERN POLICIES TOWARDS ISRAEL AND UKRAINE	1027
AHSEN RAYMAN ERGÜN TANER BAYSAL İREM AKBULUT ELİF GÜRBÜZ FATMA BETÜL AŞKIN	INVESTIGATION OF QUALITY CHARACTERISTICS OF INTERMEDIATE MOISTURE DRIED TOMATO SNACK ENRICHED WİTH BAY AND FIG LEAF EXTRACTS	1035
Naile ANGIN Murat ERTAŞ Çağatay TAŞDEMİR	THE POTENTIAL OF NATURAL RESİN DERIVATIVES PRODUCTION IN TÜRKİYE: THE CASE OF KAZDAĞLARI	1044
Fatma Serdaroğlu	VISUALIZING TIME: A CINEMATIC EXPLORATION OF TIME-IMAGE IN *"COCOON"*	1050
MIMOZA KOTOLLAKU Ylgersa Cara Erjeta Deda	THE IMPACT OF SOCIAL MEDIA MARKETING ON THE BUSINESSES IN ELBASAN DISTRICT	1057
Timur Selçuk UNUTMAZ Oya Sevcan Orak	HORTİKÜLTÜREL TERAPİNİN PSİKİYATRİ HEMŞİRELİĞİNDE KULLANIMI	1065
Gülsüm TÜTÜNCÜ	CATO STREET CONSPIRACY IN LONDON	1073
Ahmet TUNÇ Pakize UZUN Fedayi Yağar	BELONGING AND INTEGRATION OF MIGRANTS IN TURKEY: AN EVALUATION IN THE CONTEXT OF HEALTH POLICIES	1085
Nevin Evrim Küçük	VASİLİ VASİLYEVİÇ RADLOV'UN ALTAY'A SEYAHATİNİN 163. YILI MÜNASEBETİYLE	1093
Veysel LİDAR	EVLİLİK VE KADIN: *BLUEBEARD* VE *THE YELLOW WALLPAPER* ADLI ESERLERDE KUŞATILMIŞ KADINLIK	1102
Tanver TALAS Berkay KARAÇOR Mustafa ÖZCANLI	WEIGHT REDUCTION USING ULTRA HIGH STRENGTH STEEL (UHSS) IN SEMI-TRAILER CHASSIS	1112
Mehmet Bulduk Emre Aktaş	WHAT A PAEDIATRIC NURSE SHOULD KNOW ABOUT CONGENITAL HEART DISEASE	1129

Veysel Can		
Eglantina Dervishi; Cecilia Sik-Lanyi; Geraldine Leader; Zeynep Şahin Timar; Özge Mısırlı	ENHANCING SOCIAL INCLUSION FOR INDIVIDUALS WITH AUTISM THROUGH ASSISTIVE TECHNOLOGY	1133
Zeynep Sena OĞUZ Ayşe ÜNAL Ayça ARACI	NEUROCOGNITIVE CHANGES IN GERIATRIC INDIVIDUALS	1147
Aykut Fatih Güven Şaban Türkmen Faruk Karayiğit	SUSTAINABLE ENERGY INTEGRATION IN MICROGRIDS AND HOMER GRID OPTIMIZATION: ENHANCING EFFICIENCY WITH ELECTRIC VEHICLE CHARGING SOLUTIONS	1153
Betül ALANKUŞ Nilay COŞGUN	INVESTIGATION OF NEW GENERATION ADOBE MATERIALS IN THE CONTEXT OF ENVIRONMENTAL SUSTAINABILITY	1172
Aykut Fatih Güven Necat Uzuner	FEASIBILITY AND OPTIMIZATION OF HYBRID ENERGY SYSTEMS IN THE SAKARYA–KARASU REGION: A CASE STUDY	1189
Fatma Selen Ala Çıtlak	A RARE CAUSE OF CHRONIC COUGH: TRACHEOCELE	1209
Əsədova Günay Cahangir qızı	MANAGEMENT ACCOUNTING IN THE HOSPITALITY SECTOR: OPERATING STATEMENTS AND FINANCIAL STATEMENTS	1210
Qasimova Gulnara Nisan Abiyev Huseyn Azizulla Sadygova Gunel Balarza Jafarova Zemfira Ibrahim Karimova Rena Jabbar	PAGET'S BONE DISEASE DIAGNOSIS, TREATMENT, RISK FACTORS AND ACCELERATION OF THE DISEASE DUE TO DISRUPTION OF THE ENDOCRINE SYSTEM	1214
Karimova Rena Jabbar Mammadova Naila Chingiz Sadygova Gunel Balarza Shahmammadova Sevinj Osman Aliyarov Panah Vilayat	EMERGENCY ASSISTANCE DURING THE TREATMENT, DIAGNOSIS AND COMPLICATIONS OF SICKLE CELL ANEMIA, A GENETIC DISEASE THAT DEFORMS OXYGEN-CARRYING BLOOD CELLS	1220
Agbo, D.C.; Okafor, U.; Eze, U.D. and Anyasi, R.O.	BIOREMEDIATION OF WASTEWATER TOWARDS REDUCTION OF WATER POLLUTION	1225
Vladimir M. Cvetković Nemanja Miljković	EVALUATION OF THE EFFECTIVENESS OF SEARCH AND RESCUE DOGS IN FINDING SURVIVORS DURING DISASTERS: THE CASE OF SERBIA, CROATIA, AND SLOVENIA	1237
Vladimir M. Cvetković Nemanja Miljković	LEGAL AND ORGANIZATIONAL FRAMEWORK FOR THE USE OF SEARCH AND RESCUE DOGS IN DISASTERS: A COMPARATIVE ANALYSIS BETWEEN SERBIA, CROATIA, AND SLOVENIA	1254
Sadiq, M.S., Singh, I.P., Ahmad, M.M. and Moses, G.	MULTIDIMENSIONAL POVERTY STATUS CORRELATES OF RURAL HOUSEHOLDS IN KADUNA STATE OF NIGERIA	1269
Dijana Dugonjić Jadranka Đuranović-Miličić Željko Grubješić Tatjana Davidov Slobodan Popović	MANAGEMENT OF THE ECONOMY IN THE CONDITIONS OF RESPECTING THE PROTECTION OF THE NATURAL ENVIRONMENT AND PRIMARY HEALTH PROTECTION OF THE POPULATION AS A CARRIER OF ECONOMIC ACTIVITY	1285
Jadranka Đuranović-Miličić Dijana Dugonjić	PRIMARY HEALTH CARE AS THE BASIS OF ECONOMISATION BETWEEN THE ECONOMY AND	1290

Željko Grubješić Tatjana Davidov Slobodan Popović	HEALTH AND ALL WITH THE GOAL OF IMPROVING THE HEALTH AND WORKING ABILITY OF THE BROAD POPULATION CONSIDERED IN TERMS OF ENVIRONMENTAL PROTECTION	
Tehran Masimov Member Mehmet Akif PEÇE	AZERBAİJAN'S ENERGY RESOURCES AND REGIONAL DEVELOPMENT: THE ROLE OF OIL AND GAS	1295
Adeniyi, B. M; Kyenge, B.A; Adah, C.A; Ogungbemi K; Popoola, S.T; Adeniyi, G.R; & Adeniyi, O.S	INSECTICIDAL AND TOXICITY STUDIES OF HELIOTROPIUM INDICUM LEAF EXTRACTS	1310
Dennis, Igene Moses Monday, UBOGU	ISOLATION AND IDENTIFICATION OF THE AIR MYCOFLORA OF THE JOSEPH SARWUAN TARKA UNIVERSITY, MAKURDI MICROBIOLOGY LABORATORIES	1323
İlyas Kartal Nurşah Elif Nalbat	INVESTIGATION OF MECHANICAL PROPERTIES OF JUTE FIBER REINFORCED POLYESTER BASED COMPOSITES	1331
İlyas Kartal Batuhan Atmaca	INVESTIGATION OF MECHANICAL PROPERTIES OF HAZELNUT SHELL FILLED POLYESTER BASED COMPOSITES	1339
Nida Akdogan Osman AKIN	EVALUATION OF MALWARE DETECTION METHODS AND EMERGING THREATS IN CYBERSECURITY	1348

THE INVESTIGATION ON THE INHIBITION EFFECTS OF THE MAIN EFFECTIVE COMPOUNDS IN HONEY FOR "5p21" ONCOGENE RECEPTOR

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ABSTRACT
Honey is an important food source consumed by humans with its high-energy carbohydrate source and other compounds it contains. It has been an important product for the treatment of many diseases since Egyptian times. Honeybee products, especially honey, pollen, propolis, bee bread, royal jelly and bee venom can be used in the treatment of many diseases. With this treatment method, also known as apitherapy, progress is being made in drug development processes to prevent many diseases and in solving health problems. In addition to its high sugar content, honey is also rich in polyphenolic compounds. Although the ratios of these compounds vary depending on the environment in which the bee grows, they are valuable due to their antioxidant, antibacterial and anticancer effects. The studies are being carried out every day on the chemical properties of the compounds contained in honey and its use in traditional medicine as a subject of scientific research. In this study, the interaction of some of the active substances contained in honey with the cancer receptor (5p21), identified as ligands (Chlorogenic Acid), was investigated by chemical calculation method at the molecular level.
Keywords: Honey, chlorogenic acid, vanillic acid, 5p21, chemical calculation method

INTRODUCTION
Natural honey is widely consumed for its healing effects and contains nearly 200 components. Raw honey contains fructo-oligosaccharides, fructose and glucose; On the other hand, it contains vitamins, minerals, enzymes and many amino acids (Da Silva et all., 2016). The anticancer activity of honey has been tested against various tissue groups and cancer cell lines, including colorectal (Afrin et al.,2017), breast, endometrial, prostate, kidney, oral, and cervical cancer (Waheed et al.,2019).
Flavonoids and phenolic acids are the most important components of honey with known anti-cancer activity. Although a full consensus on the entire mechanism has not yet been reached, different studies have shown that honey provides its anticancer effect by interfering with complex cell signaling pathways by promoting anti-mutagenic, apoptosis, anti-inflammatory and anti-proliferative pathways (Waheed et al,2019).
The compounds in the honey obtained vary depending on the environment in which the honey bee lives. It has been reported that coumaric and ferulic acids are the main components in acacia and buckwheat honey, raspberry and polyfloral forest honey have the highest amount of chlorogenic acid content, and gallic acid and vanillin, the main phenolic acid found in eucalyptus honey, are in honey obtained in areas where buckwheat is grown (Ramanauskiene et al.,2012).
Chlorogenic acid is considered a common phenolic compound found in honey samples (Hajian-Tilaki et all.,2024). In a study, it was emphasized that honey is rich in phenolic acids and flavonoids, which exhibit a wide range of biological effects and act as natural antioxidants, and Vanillic acid was detected in honey analyzed. (Pyrzynska and Biesaga,2009). It has been stated that vanillic acid was found to be the richest ingredient in terms of phenolic content of nine Iranian honeys (Hajian-Tilaki et all.,2024).

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FULL TEXTS BOOK

MATERIAL AND METHOD

The inhibition effect of the polyphenolic compounds in honey as ligands on the interaction with the oncogene receptor "5p21", the bonds that can be formed at the molecular level, and the interaction points have been investigated in many studies, especially with the chemical calculation method docking (Bikadi and Hazai, 2009; Huey et al.,2007; Bikadi et all.,2007; McDonald and Thornton,1994), whose accuracy and reliability gives results very close to experimental data.

RESULTS AND DISCUSSION

The docking scores and Ki values obtained as a result of the interaction of active active compounds in honey with the "5p21" oncogene receptor as ligands, determined by some studies in the literature, are given in Table 1(Bikadi and Hazai, 2009; Huey et al.,2007; Bikadi et all.,2007; McDonald and Thornton,1994).

Table 1. The interaction of Chlorogenic Acid, Ferulic acid, m-Coumaric acid, Gallic acid, Vanillic acid and Vanillin as ligands, for inhibiting 5p21 oncogene receptors

The docking scores of ligands with the reseptör (5p21**)**	**The free energy values of binding (kcal/mol)**	**The inhibition constant, K_i**
Chlorogenic Acid	-6.25	26.12 uM
Ferulic acid	-4.75	331.98 uM
m-Coumaric acid	-4.54	472.32 uM
Gallic acid	-4.84	281.23 uM
Vanillic acid	-4.53	481.10 uM
Vanillin	-3.68	2.00 mM

Looking at the values in Table 1; The inhibitory effects of the specified ligands on the 5p21 receptor, from largest to smallest, are as follows; Chlorogenic Acid > Gallic acid > Ferulic acid > m-Coumaric acid > Vanillic acid > Vanillin.

The bonds formed by the interaction of chlorogenic acid with the 5p21 oncogene receptor are given in Table 2 (Bikadi and Hazai, 2009; Huey et al.,2007; Bikadi et all.,2007; McDonald and Thornton,1994).

Table 2. The bonds formed by the interaction of chlorogenic acid with the 5p21 oncogene receptor

hydrogen bonds	**polar**	**cation-pi**	**other**
SER17 (-0.5973)	LYS117 (-1.8535)	PHE28 (-1.0848)	LYS147 (-0.7869)
ALA146 (-0.5837)	ASN116 (-0.6021)		LEU120 (-0.5818)
THR35 (-0.2707)	ASP119 (-0.5645)		ALA18 (-0.4742)
	ASP30 (-0.4937)		ASP33 (-0.378)
	SER145 (-0.3051)		

FULL TEXTS BOOK

The hydrogen bond formation of Chlorogenic acid with 5p21 oncogene receptor are given in Figure 1 (Bikadi and Hazai, 2009; Huey et al.,2007; Bikadi et all.,2007; McDonald and Thornton,1994)

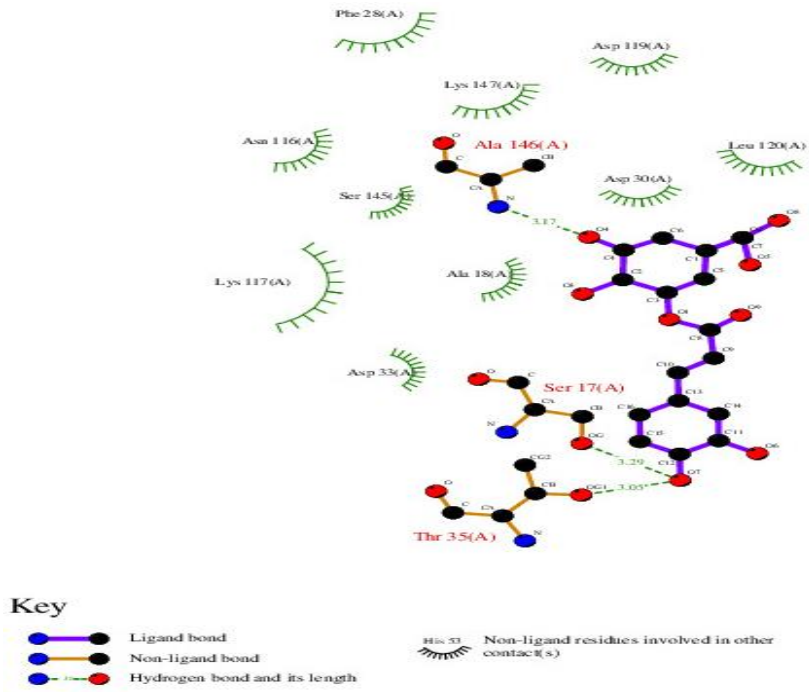


Figure 1. The hydrogen bond formation of Chlorogenic Acid with 5p21 oncogene receptor

As an effective ligand, Chlorogenic Acid 's interaction points with 5p21 oncogene receptor are given in Figure 2 (Bikadi and Hazai, 2009; Huey et al.,2007; Bikadi et all.,2007; McDonald and Thornton,1994).

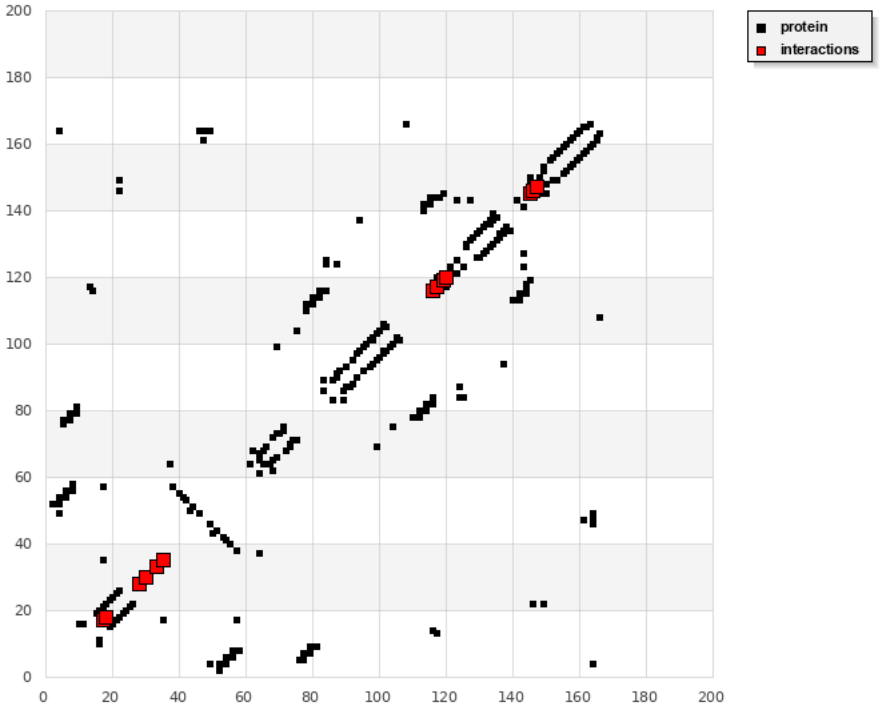


Figure 2. Chlorogenic Acid 's interaction points with 5p21 oncogene receptor

As shown in Figure 2; Chlorogenic Acid 's interaction points with 5p21 oncogene receptor: 17: SER18: ALA28: PHE30: ASP33: ASP35: THR116: ASN117: LYS119: ASP120: LEU145: SER146: ALA147: LYS .

FULL TEXTS BOOK

The bonds formed by the interaction of Vanillic acid with the 5p21 oncogene receptor are given in Table 3 (Bikadi and Hazai, 2009; Huey et al.,2007; Bikadi et all.,2007; McDonald and Thornton,1994) .

Table 3. The bonds formed by the interaction of Vanillic acid with the 5p21 oncogene receptor

hydrogen bonds	polar	hydrophobic	other
LYS147 (-0.6116)	LYS117 (-1.8408)	PHE28 (-1.0301)	ASN116 (-0.3131)
SER145 (-0.3375)	ASP119 (-0.3625)	ALA146 (-0.4241)	
		LEU120 (-0.2523)	

The hydrogen bond formation of Vanillic acid with 5p21 oncogene receptor are given in Figure 3 (Bikadi and Hazai, 2009; Huey et al.,2007; Bikadi et all.,2007; McDonald and Thornton,1994).

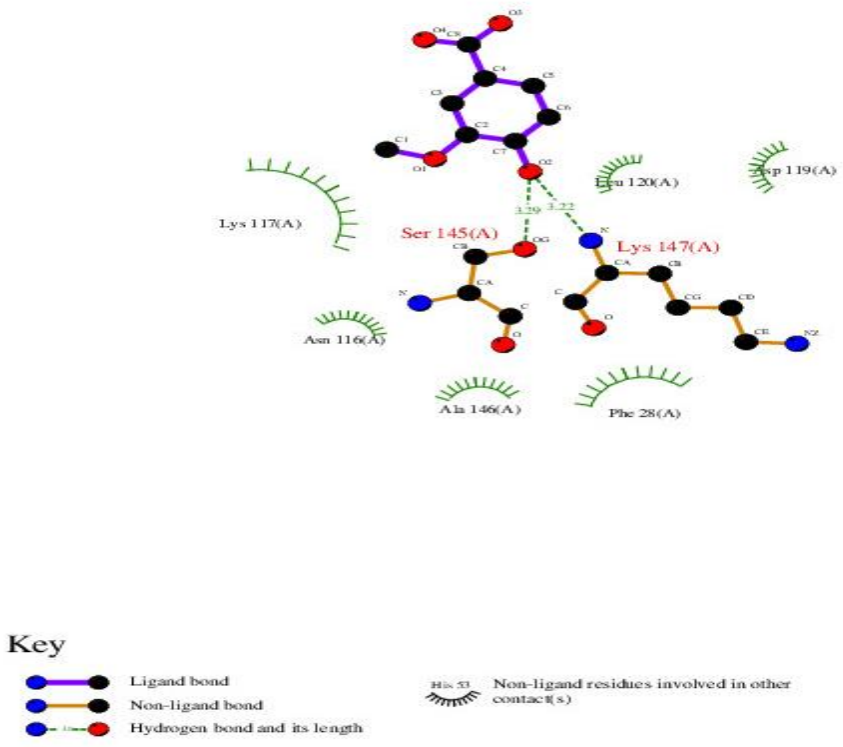


Figure 3. The hydrogen bond formation of Vanillic acid with 5p21 oncogene receptor

The bonds formed by the interaction of Ferulic acid with the 5p21 oncogene receptor are given in Table 4 (Bikadi and Hazai, 2009; Huey et al.,2007; Bikadi et all.,2007; McDonald and Thornton,1994).

Table 4. The bonds formed by the interaction of Ferulic acid with the 5p21 oncogene receptor

hydrogen bonds	polar	hydrophobic	other
LYS147 (-0.6903)	ASP119 (-0.0406)	PHE28 (-1.0809)	LYS117 (-1.7079)
SER145 (-0.3088)		ALA146 (-0.3726)	ASN116 (-0.2438)
		ALA18 (-0.3036)	
		LEU120 (-0.2188)	

FULL TEXTS BOOK

The hydrogen bond formation of Ferulic acid with 5p21 oncogene receptor are given in Figure 4 (Bikadi and Hazai, 2009; Huey et al.,2007; Bikadi et all.,2007; McDonald and Thornton,1994).

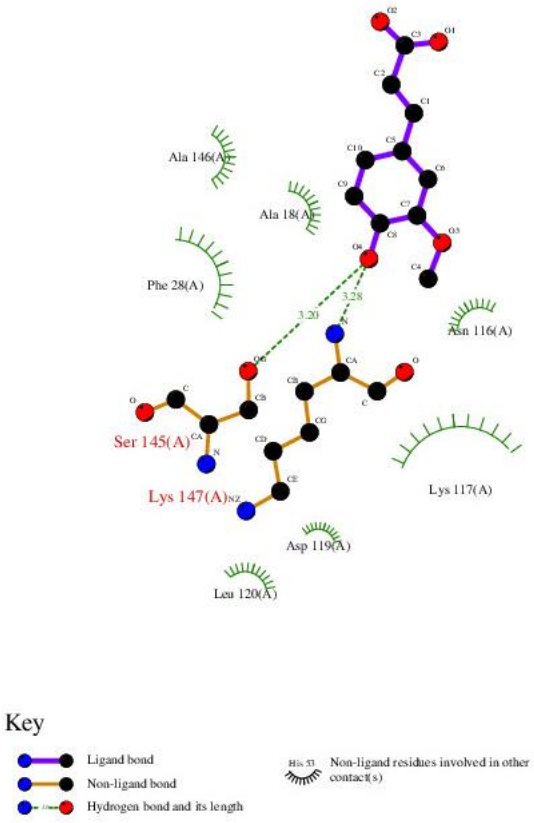


Figure 4. The hydrogen bond formation of Ferulic Acid with 5p21 oncogene receptor

The bonds formed by the interaction of Coumaric acid with the 5p21 oncogene receptor are given in Table 5 (Bikadi and Hazai, 2009; Huey et al.,2007; Bikadi et all.,2007; McDonald and Thornton,1994).

Table 5. The bonds formed by the interaction of Coumaric acid with the 5p21 oncogene receptor

Polar	**hydrophobic**	**other**
LYS117 (-1.6708)	PHE28 (-1.0922)	LYS147 (-0.6254)
ASP119 (-0.4113)	ALA146 (-0.2479)	ASN116 (-0.3949)
		SER145 (-0.3289)
		ALA18 (-0.2802)

The bonds formed by the interaction of Gallic acid with the 5p21 oncogene receptor are given in Table 6 (Bikadi and Hazai, 2009; Huey et al.,2007; Bikadi et all.,2007; McDonald and Thornton,1994).

Table 6. The bonds formed by the interaction of Gallic acid with the 5p21 oncogene receptor

Hydrogen bonds	**polar**	**cation-pi**
ASP33 (-0.637)	LYS16 (-0.5154)	TYR32 (-0.6098)
	SERI 7 (-0.3649)	

FULL TEXTS BOOK

The hydrogen bond formation of Gallic acid with 5p21 oncogene receptor are given in Figure 5 (Bikadi and Hazai, 2009; Huey et al.,2007; Bikadi et all.,2007; McDonald and Thornton,1994).

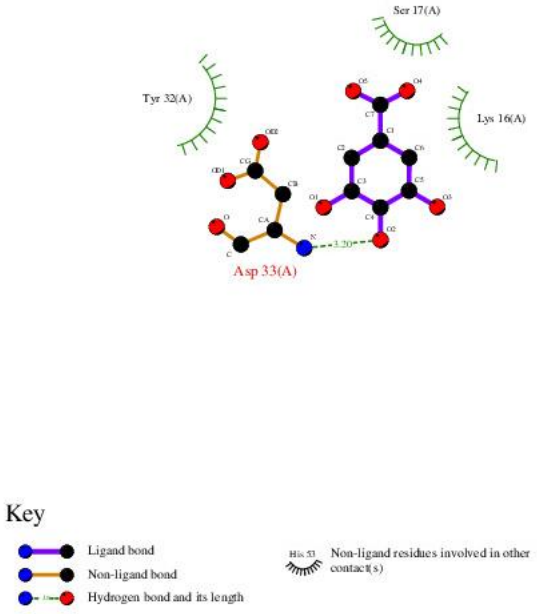


Figure 5. The hydrogen bond formation of Gallic Acid with 5p21 oncogene receptor

The bonds formed by the interaction of Vanillin acid with the 5p21 oncogene receptor are given in Table 7 (Bikadi and Hazai, 2009; Huey et al.,2007; Bikadi et all.,2007; McDonald and Thornton,1994).

Table 7. The bonds formed by the interaction of Vanillin acid with the 5p21 oncogene receptor

Hydrogen bonds	**polar**	**other**
SERI 7 (-0.672)	LYS16 (-0.5589)	ASP33 (-0.5094)
	THR35 (-0.4058)	

The hydrogen bond formation of Vanillin with 5p21 oncogene receptor are given in Figure 6 (Bikadi and Hazai, 2009; Huey et al.,2007; Bikadi et all.,2007; McDonald and Thornton,1994).

FULL TEXTS BOOK

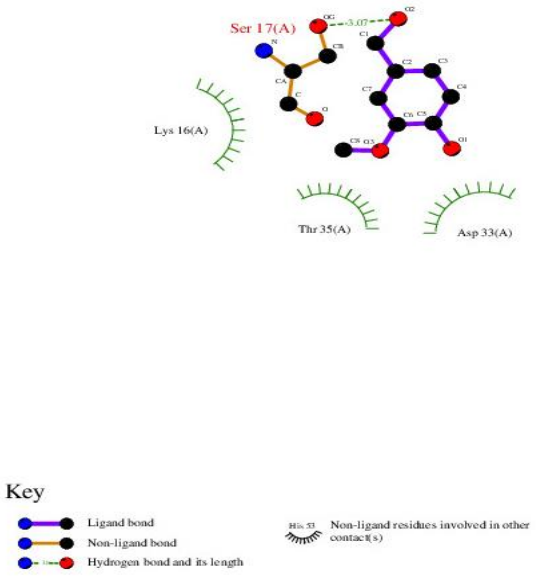


Figure 6. The hydrogen bond formation of Vanillin with 5p21 oncogene receptor

The interaction of the ligands selected as active ingredients in honey with the 5p21 oncogene receptor is important in terms of defining the mechanism of bonds and interaction points that may occur at the molecular level, and this is supported by the studies (Karakaya et al.,2013; Gökalp,2022;2023;2024).

CONCLUSION

In this study, the interaction of the main effective ligands in honey (Chlorogenic Acid, Ferulic acid, m-Coumaric acid, Gallic acid, Vanillic acid and Vanillin) with the 5p21 oncogene receptor was investigated at the molecular level by chemical calculation method docking. Docking scores shows that the ligands selected at the binding energy level have inhibitory properties on the interaction with the relevant receptor. The hydrogen bonds formed between Chlorogenic Acid and the 5p21 oncogene receptor are an indicator of its inhibitory capacity. The data obtained here is important in terms of preventing loss of time and material and being a reference for experimental and clinical studies.

ACKNOWLEDGEMENTS

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SINIF ÖĞRETMENLERININ PERSPEKTIFINDEN HARF GRUPLARI[2]
LETTER GROUPS FROM THE PERSPECTIVE OF PRIMARY SCHOOL TEACHERS

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ÖZET
Sınıf öğretmenlerinin harf gruplarına yönelik görüşlerinin incelendiği bu çalışmada durum çalışması deseniyle yürütülmüştür. Araştırmanın çalışma grubu Yozgat İl Milli Eğitim Müdürlüğü'ne bağlı ilkokullarda görev yapan 22 sınıf öğretmeninden oluşmaktadır. Çalışma grubu belirlenirken ölçüt örnekleme tekniğinden yararlanılmıştır. Bu çalışmada en az iki defa ilk okuma yazma öğretimi gerçekleştiren öğretmenlerin çalışmaya dâhil edilmesi ölçüt olarak belirlenmiştir. Araştırmanın verilerinin toplanması için öncelikle gerekli izinler alınmış ve veriler, araştırmacı tarafından hazırlanan yarı yapılandırılmış görüşme formuyla toplanmıştır. Toplanan verilerin analiz sürecinde betimsel analizden yararlanılmıştır. Araştırma sonucunda; sınıf öğretmenlerinin ilk okuma yazma sürecinde en çok "h", "f", "ğ", "l", "k", "j", g" harflerinin ses çıkarımından dolayı zorlandıkları görülmüştür. Öğretmenlerinin önemli bir kısmı "k" harfinin birinci grupta olmaması, "t" harfinin birinci grupta olması gerektiğini belirtmişlerdir. Ayrıca öğretmenlerin dikte çalışmalarında zorluk yaşadıkları, aile desteğinin yetersiz olması ve öğrenci seviyelerinin veya hazır bulunuşluklarının farklı olmasından dolayı da harf öğretiminde zorlandıkları görülmüştür.
Anahtar Kelimeler: Harf grupları, sınıf öğretmenleri, görüş, ilk okuma yazma

ABSTRACT
This study, which examined the opinions of primary school teachers about letter groups, was conducted with a case study design. The study group of the research consists of 22 primary school teachers working in primary schools affiliated with Yozgat Provincial Directorate of National Education. Criterion sampling technique was used when determining the study group. In this study, the inclusion of teachers who taught first reading and writing at least twice was determined as a criterion. To collect the data of the study, the necessary permissions were first obtained and the data were collected with a semi-structured interview form prepared by the researcher. Descriptive analysis was used in the analysis process of the collected data. As a result of the research, it was seen that primary school teachers had the most difficulty in the first reading and writing process due to the sound production of the letters "h", "f", "ğ", "l", "k", "j", g". A significant portion of their teachers stated that the letter "k" should not be in the first group, and the letter "t" should be in the first group. It has also been observed that teachers have difficulties in dictation studies, have difficulties in teaching letters due to insufficient family support and different student levels or readiness.
Key Words: Letter groups, primary school teachers, opinion, first reading and writing

GİRİŞ
Sosyal bir varlık olan insan için okuma yazma, yaşamını kolaylaştıran en önemli becerilerden birisidir. Okuma yazma becerisi bireylerin günlük hayatta birçok işi rahatlıkla yapabilmeleri ve yaşam kalitelerinin yükseltilmesine önemli katkılar sağlamaktadır (Durna, 2014; Kapur, 2019). Çünkü günümüz şartlarında, bireylerin iş hayatını ve yaşam şartlarını düzenleyebilmesi, kendini topluma ait hissedebilmesi ve katkı sağlayabilmesi, özgür ve katılımcı bir kişiliğe sahip olabilmesi, kendine ait bir

[2] Bu çalışma Sınıf Eğitimi Tezsiz Yüksek Lisans programında dönem projesi olarak sunulmuştur.

FULL TEXTS BOOK

dünya görüşü kazanabilmesinde okuryazar olmasının payı yüksektir (Çelenk, 2007). Aynı zamanda etkili bir iletişim aracı olarak kullanılan okuma yazma becerisi, bireylerin arasındaki sorunları da azalmaktadır (Öz, 1999). Okuma yazma becerisine sahip olan bireyler başkalarının yönlendirmeleriyle değil kendi üst bilişsel farkındalığına göre problemleri fark eder, varsa hatalarını düzeltir ve öz değerlendirmeler yaparak kendi öğrenme sürecini kendisi denetler (Collins, 1994). İlkokul döneminde, öğrencinin; okuduğunu anlama becerilerinin geliştirilmesi ve okuduğunu anlayan, eleştiren, tartışan, bilgiler arasında ilişki kuran ve okuduklarını yorumlayarak yeni anlamlar çıkaran bireyler olarak yetiştirilmesi hedeflenir (Çiftçi ve Temizyürek, 2008). Okuma birçok araştırmacı tarafından farklı yönleri ile ele alınarak ifade edilmiştir. Akyol (2005) okumayı, belli bir amaç doğrultusunda ön bilgilerden hareketle yazar ve okuyucu arasındaki etkileşime dayalı bir anlam kurma süreci olarak tanımlar. Güneş (2007), ön bilgilerden yola çıkarak metindeki bilgileri bütünleştirip yeni anlamlar ortaya çıkarma süreci; Kurudayıoğlu (2011) da, kulak ve ses ile algılanan işaretler ve sembolleri beyinde yorumlayıp değerlendirerek anlama ulaşılma süreci olarak tanımlamaktadır. Yazma; zihinde biriktirilen bilgi, duygu ve düşüncenin düzenlenerek bilişsel düzeye getirilme işi (Flower ve Hayes, 1980) olarak tanımlanır. Bireyler için yazma; hayal dünyası oluşturabilmek, öyküler anlatabilmek, bilgi paylaşımı yapabilmek, kendini keşfedebilmek, yalnızlıkla başa çıkabilmek ve yaşantılarını kayıt altına alabilmek için gerekli ve bir o kadar da önemlidir (Graham, Gillespie ve McKeown, 2013). İlkokulun ilk yıllarından itibaren doğru ve işlevsel yazma etkinlikleri yapılmalı ve yazmaya ağırlık verilerek bu beceri kazandırılmalıdır (Susar-Kırmızı ve Ünal, 2017). Eğitim hayatının temeli olarak nitelenen ilk okuma yazma süreci, kişinin hem akademik hem de sosyal hayatında önemli bir yer tutar (Akyol ve Temur, 2008; Güneş, Uysal ve Taç, 2016). İlk okuma ve yazma becerisi, kişinin kendini geliştirmesini, toplum ile iletişim kurabilmesini, görsel ve yazılı araçları anlamasını, kendini en iyi şekilde yazılı ve sözlü olarak ifade edebilmesini amaçlamaktadır (Bay, 2008). İlk okuma yazma öğretimi süreci yazma ve okuma becerisinin kazandırılmasıyla birlikte; bireylere düşünme, çözümleme, anlama, gruplandırma, sıralama, sorgulama, ilişki kurma, birleştirme ve değerlendirme gibi becerilerin kazandırılmasını da kapsamaktadır (Milli Eğitim Bakanlığı [MEB], 2019). Tüm bu becerilerin temelleri ilk okuma yazma öğretimiyle atılmaktadır. Nasıl ilkokul her şeyin temeli ise, ilk okuma yazma öğrenimi de ilkokulun temelidir (Kavcar, Oğuzhan ve Sever, 1998; Yiğit, 2009). Okuma yazmayı öğrenmek bireyin kendi ayaklarının üstünde durmasını sağlayan bir faaliyettir. Okuryazar olmadan en basit etkinliklerden karmaşık siyasal etkinliklerden, bilimsel teknolojiye, kadar çağdaşlığa ait ne varsa hiç birinden yararlanılamaz. Öyleyse okuma ve yazmada kazandırılacak bilgi, davranışlar ve beceri bireyin mutluluğunu önemli ölçüde belirler (Vural, 2007). Şahin'e (2005) göre ilk okuma yazma öğretiminin asıl amacı, dinleme ve konuşma gibi dil becerilerinden yola çıkarak insanların hayatları boyunca kullanacağı okuma yazma becerilerini öğrencilerin aktif şekilde kazanmalarını sağlamaktır. Diğer deyişle ilk okuma yazma öğretimi, öğrencinin okula başlamadan önce kazandığı konuşma, dinleme, izleme ve anlama becerilerinden hareket ederek sürekli kullanabilecekleri okuma ve yazma eğitimine ilişkin temel bilgi ve becerileri geliştirmeyi amaçlamaktadır (Bıçakçı, 2008; Cemaloğlu ve Yıldırım, 2008; Çelenk, 2007).

Türkiye'de eğitim sisteminin temelini oluşturan ilköğretimle ilgili temel anlayış 1921 yılındaki Maarif Kongresi'nde şekillenmiştir (Değirmenci, 2008). Türkiye'de ilk okuma yazma öğretim yöntemlerinden büyük bir kısmı kullanılmıştır. Bu yöntemlerden günümüzde en çok kullanılanı çözümleme yöntemidir. Buna karşılık ülkemizde kullanılan en eski okuma yazma öğretim yöntemi ses yöntemidir. Baymur (1939) da ülkemizde ilk okuma ve yazma öğretiminde yüzyıllarca "Elifba Cüzü" ve bunun çizdiği öğretim yolunun (harf yöntemi) hüküm sürdüğünü ifade etmekte, "Terkibi" (bireşim) yöntemlerin daha sonra yerini "Tahlili" yöntemlere bıraktığını açıklamaktadır. Nihayetinde 1924 yılında hazırlanan ilkokul programında harf yöntemi yasaklanmış ve kelime ya da ses yöntemleri kullanılmıştır. Bu iki yöntemden hangisinin kullanılacağı öğretmenin seçimine bırakılmıştır (Güleryüz, 2004). 1924 yılından günümüze kadar farklı uygulamalarla ilk okuma yazma süreci ilerlemiştir. 2004-2005 eğitim öğretim yılı Türkçe dersi kapsamında ses grupları altı grupta ele alınmış ve birinci ses grubu: "E, L, A, T", ikinci ses grubu; "İ, N, O, R, M", üçüncü ses grubu; "U, K, I, Y, S, D", dördüncü ses grubu; "Ö, B, Ü, Ş, Z, Ç", beşinci ses grubu; "G, C, P, H" ve altıncı ses grubu; "Ğ, V, F, J" şeklinde belirtilmiştir (MEB, 2005). 2016-2017 eğitim öğretim yılı Türkçe dersi öğretim programı ses grupları tablosunda güncellemelere gidilmiş ve birinci ses grubu: "E, L, A, N", ikinci ses grubu: "İ, T, O, B, U", üçüncü ses grubu: "K, I,

FULL TEXTS BOOK

R, Ö, S, Ü", dördüncü ses grubu: "M, D, Ş, Y, C, Z", beşinci ses grubu: "Ç, G, P, H" ve altıncı ses grubu: "F, V, Ğ, J" şeklinde ifade edilmiştir (MEB, 2017). Ancak 2017- 2018 eğitim-öğretim yılında dik temel harf öğretiminde kullanılan harf grupları ise birinci ses grubu: "E, L, A, K, İ, N", ikinci ses grubu: "O, M, U, T, Ü, Y", üçüncü ses grubu: "Ö, R, I, D, S, B", dördüncü ses grubu: "Z, Ç, G, Ş, C, P" ve beşinci ses grubu: "H, V, Ğ, F, J" şeklinde belirtilmiştir (MEB, 2019). Alanyazında ilk okuma yazma sürecine yönelik yapılan çalışmaların (Sağırlı ve Atik, 2022; Ekici-Calın, 2019; Ferah-Özcan ve Yıldız, 2018; Babayiğit ve Erkuş, 2017; Erbasan ve Erbasan, 2020; Ferah-Özcan ve Özcan, 2016; Çağlar, 2018) olduğu görülmüştür. Ancak ilk okuma yazma sürecindeki harf gruplarıyla doğrudan ilişkili bir çalışmanın yapılmış olması bu çalışmanın özgün değerini oluşturmaktadır. Ayrıca 2018 yılından itibaren uygulanan Türkçe dersi öğretim programının da değişeceğinin bahsedildiği bu dönemde yapılacak bu çalışmanın yayınlanacak programa katkı sunması açısından da önemli görülmektedir. Bu doğrultuda sınıf öğretmenleri perspektifinden harf gruplarına yönelik öğretmen görüşlerinin ele alındığı bu çalışmada aşağıdaki sorulara yanıt aranmıştır:

1. İlk okuma yazma sürecinde en çok zorlandığınız harf ya da harfler nelerdir? Neden?
2. İlk okuma yazma sürecinde birinci gruptaki harf veya harflerle ilgili görüşleriniz nelerdir?
3. İlk okuma yazma sürecinde sesli harflerin verilme sırasını doğru buluyor musunuz? (Cevabınız hayır ise bu sıra nasıl olmalıdır?)"
4. Harf gruplarında yer alan harflerde yer değişikliği yapmak isteseydiniz hangi harf veya harfler hangi grupta olurdu? Neden?
5. İlk okuma yazma sürecinde dikte çalışmaları yaparken zorluk yaşıyor musunuz? Neden?
6. İlk okuma yazma sürecinde harf öğretiminde zorlandığınız durumlar nelerdir?
7. İlk okuma yazma sürecinde harf öğretiminde velilere ve öğretmenlere yönelik önerileriniz nelerdir?

YÖNTEM

Araştırmanın Modeli

Sınıf öğretmenlerinin harf gruplarına yönelik görüşlerinin incelendiği bu çalışmada durum çalışması deseniyle yürütülmüştür. Durum çalışması, bir veya birkaç açıklayıcı durumun nitel olarak derinlemesine bir şekilde araştırılması olarak belirtilmektedir (Hagan, 2006). Bu çalışmada da sınıf öğretmenlerinin ilk okuma yazma sürecindeki harf gruplarına yönelik görüşleri derinlemesine bir şekilde araştırıldığı için durum çalışması deseninden yararlanılmıştır.

Çalışma grubu

Araştırmanın çalışma grubu Yozgat İl Milli Eğitim Müdürlüğü'ne bağlı ilkokullarda görev yapan 22 sınıf öğretmeninden oluşmaktadır. Çalışma grubu belirlenirken ölçüt örnekleme tekniğinden yararlanılmıştır. Ölçüt örnekleme, araştırmacı tarafından oluşturabilen ya da daha önceden belirlenebilen bir dizi ölçütün karşılandığı durumların çalışılması şeklinde belirtilmektedir (Yıldırım ve Şimşek, 2016). Bu çalışmada da en az iki defa ilk okuma yazma öğretimi gerçekleştiren öğretmenlerin çalışmaya dâhil edilmesi ölçüt olarak belirlenmiştir. Çalışma grubuna ait bilgiler Tablo 1'de gösterilmiştir.

Tablo 1. Çalışma Grubuna Ait Bilgiler

		f
Cinsiyet	Kadın	16
	Erkek	6
Eğitim Durumu	Lisans	17
	Yüksek Lisans	5
Kıdem Yılı	0-5 yıl	3

FULL TEXTS BOOK

	6-10 yıl	6
	11-15 yıl	6
	16 yıl ve üstü	7
Kariyer Basamağı	Öğretmen	9
	Uzman öğretmen	13
Kaç defa 1. sınıf okutuldu	2 defa	1
	3 defa	4
	4 defa	8
	5 ve daha fazla	9

Veri Toplama Araçları

Araştırmanın verileri araştırmacı tarafından hazırlanan yarı yapılandırılmış görüşme formuyla toplanmıştır. Daha sonra araştırmanın güvenirliğinin artırılması amacıyla üç öğretim üyesi ve iki sınıf öğretmeninden uzman görüşleri alınmıştır. Alınan görüşler doğrultusunda sorulardaki düzeltmeler yapılarak yarı yapılandırılmış görüşme formuna son hali verilmiştir. Son hali verilen yarı yapılandırılmış görüşme formundaki sorular kullanılarak araştırmanın çalışma grubu dışındaki iki sınıf öğretmeniyle pilot görüşmeler yapılmıştır. Pilot görüşme esnasında soruların anlaşılırlığı ve amacına ulaşılabilirliğiyle ilgili herhangi bir olumsuzluk yaşanmamıştır. Bu şekilde görüşme esnasında ortaya çıkabilecek olumsuzlukların önceden belirlenmesiyle araştırmanın güvenirliğinin artırılması amaçlanmıştır.

Verilerin Toplanması ve Analizi

Araştırmanın verilerinin toplanması için öncelikle gerekli izinler alınmıştır. Daha sonra katılımcılarla 22 Şubat ile 29 Mart 2024 tarihleri arasında ders saatleri dışında görüşmeler gerçekleştirilmiştir. Görüşmeler gerçekleştirilirken veri kayıplarının önlenmesi için ses kayıt cihazı kullanılmıştır. Ancak bazı sebeplerden dolayı öğretmenlerin bir kısmı tarafından ses kayıt cihazının kullanılması uygun görülmemiş olup bu görüşmelerde araştırmacı tarafından yazılı notlar tutulmuştur. Ayrıca yazı notlar görüşmeler sonucunda katılımcılarla paylaşılmış ve herhangi bir veri kaybının yaşanmaması için eklemek istedikleri başka görüşlerin olup olmadığı sorularak görüşme sonlandırılmıştır. Katılımcılarla gerçekleştirilen görüşmeler ortalama 15 dakika sürmüştür. Ses kayıt cihazıyla kayıt altına alınan görüşmeler transkript edilmiş ve yazılı notlarla ile tutulan birlikte analiz sürecine hazır hale getirilmiştir. Analiz sürecinde betimsel analizden yararlanılmıştır. Ekiz'e (2015) göre bu analiz, araştırma esnasında kullanılan görüşme, gözlem ya da belge vb. veri toplama araçlarındaki soru veya konu temelinde gerçekleştirilen analiz türüdür. Analiz esnasında veriler araştırmacılar tarafından ayrı ayrı analiz edilmiş, analiz sonucunda güvenirliği sağlamak için Miles ve Huberman'ın (1994) kodlama güvenirliği formülünden yararlanılmıştır. Analiz sonucundaki araştırmacılar arasındaki kodlama uyumunun % 94 olduğu görülmüştür. Elde edilen verilerden ortaya çıkan bulgular, katılımcıların görüşme formundaki sorulara verdikleri yanıtlardan gerçekleştirilen doğrudan alıntılarla desteklenmiştir. Katılımcılar $Ö_{1,2,}$….. şeklinde kodlanmıştır.

BULGULAR

Çalışmanın bu bölümünde, ilk okuma yazma sürecinde harf gruplarına yönelik sınıf öğretmenleriyle yapılan görüşmelerden elde edilen verilerin analiz edilmesiyle ortaya çıkan bulgular sunulmuştur.

Sınıf öğretmenlerine "İlk okuma yazma sürecinde en çok zorlandığınız harf ya da harfler nelerdir? Neden?" sorusu sorulmuş olup öğretmenlerin verdikleri yanıtların analizinden ortaya çıkan bulgular Tablo 2'de gösterilmiştir.

FULL TEXTS BOOK

Tablo 2. Sınıf Öğretmenlerinin İlk Okuma Yazma Sürecinde En Çok Zorlandığı Harf veya Harflere İlişkin Görüşleri

Zorluk yaşanılan harf/harfler?	**Neden?**	**Öğretmenler**	**f**
"h", "f", "ğ", "l", "k", "j", "g"	Ses çıkarımının zor olması	$Ö_{1,2,3,4,5,7,9,10,11,12,14,15,16,19,20,,21}$	16
"b"-"d"	Yazımının karıştırılması	$Ö_{1,2,6,13,15,16,17,18,19,21,22}$	11
"y", "g", "ğ", "j", "s", "ş"	Yazım biçiminin zor olması	$Ö_{6,11,17}$	3
"ğ"-"g", "n"-"m", "ı"-"i", "o"-"ö", "u"-"ü", "c"-"ç", "s"-"ş"	Yazım benzerliklerinin olması	$Ö_{5,21,22}$	3
"b", "d", "k"	Hece oluşturmanın zor olması	$Ö_{9,12}$	2
"y", "n", "l"	Ses çıkarımının diğer harflerle karışması	$Ö_{13,14}$	2
"r"	Dil yapısının ses çıkarımına uygun olmaması	$Ö_{16}$	1
"e", "l", "a", "k", "i", "n"	İlk okuma yazma mantığının kavranamamış olması	$Ö_{8}$	1

Tablo 2'ye göre, sınıf öğretmenlerinin ilk okuma yazma sürecinde en çok (f=16) "h", "f", "ğ", "l", "k", "j", "g" harflerinin ses çıkarımından dolayı zorlandıkları görülmüştür. Ayrıca öğretmenler; b-d harflerinin yazımının karıştırılmasından (f=11), "y", "g", "ğ", "j", "s", "ş" harflerinin yazım biçimlerinin zor olmasından (f=3), "ğ"-"g", "n"-"m", "ı"-"i", "o"-"ö", "u"-"ü", "c"-"ç", "s"-"ş" harflerinin yazım benzerliklerinin olmasından (f=3), "b", "d", "k" harfleriyle ilgili hece oluşturmanın zor olmasından (f=2), "y", "n", "l" harflerinin ses çıkarımının diğer harflerle karışmasından (f=2), "r" harfinin dil yapısının ses çıkarımına uygun olmamasından (f=1) ve "e", "l", "a", "k", "i", "n" harfleriyle ilk okuma yazma mantığının kavranamamış olmasından (f=1) dolayı ilk okuma yazma sürecinde zorluklarla karşılaştıklarını ifade etmişlerdir. Sınıf öğretmenlerinin ilk okuma yazma sürecinde en çok zorlandığı harf veya harflere ilişkin görüşlerinden yapılan alıntılardan bazıları şunlardır:

"ğ", "j", "b", "d" harflerinde zorlandım. İç Anadolu Bölgesinde görev yaptığımdan çocukların ağız özelliği "ğ" ve "j" harflerini çıkarmakta zorlandıklarını görüyorum. "b" ve "d" sesleri ise kapalı heceleri söylemesi zor olduğu için öğrenmeleri güçleşiyor." (Ö9)

"En çok zorlandığım harf "g" harfidir. Hem yazdırması hem de sesi çıkarması zor oldu." (Ö11)

Sınıf öğretmenlerine "İlk okuma yazma sürecinde birinci gruptaki harf veya harflerle ilgili görüşleriniz nelerdir?" sorusu sorulmuş olup öğretmenlerin verdikleri yanıtların analizinden ortaya çıkan bulgular Tablo 3'te gösterilmiştir.

Tablo 3. Sınıf Öğretmenlerinin İlk Okuma Yazma Sürecinde Birinci Gruptaki Harf veya Harflerle İlişkin Görüşleri

Görüşler		**Öğretmenler**	**f**
"k" harfi olmamalı	Ses çıkarımının zor olması Harf yazımının zor olması Hece oluşturmanın zor olması	$Ö_{3,4,5,7,9,10,16,18,21}$	9
"l" ve "n" harfleri bir arada olmamalı	Ses çıkarımının karışması	$Ö_{6,13,14,16,17}$	5

FULL TEXTS BOOK

"k" ve "t" harfleri yer değişmeli	Ses çıkarımının zor olması Hece oluşturmanın zor olması	$Ö_{1,2,11,12}$	4
"t", "ç" veya "s" harf/harfleri olmalı	Ses çıkarımının kolay olması	$Ö_{9,15,19}$	3
"n" harfi olmamalı	Ses çıkarımının zor olması	$Ö_{7,8}$	2
"l" harfi olmamalı	Kelime oluşturmanın zor olması Ses çıkarımının zor olması	$Ö_{15,22}$	2
"n" ve "m" harflerinin yeri değişmeli	Ses çıkarımının zor olması Kelime oluşturmanın kolay olması	$Ö_{20}$	1
Bütün sesli harfler olmalı	İlk okuma yazmanın daha kolay olması	$Ö_{7}$	1

Tablo 3'e göre, sınıf öğretmenlerinin ilk okuma yazma sürecinde birinci gruptaki harf veya harflere ilişkin görüşleri incelendiğinde, en fazla (f=9) görüşün "k" harfi olmamalı şeklinde olduğu görülmüştür. Bunun nedeni olarak da öğretmenler; ses çıkarımının, harf yazımının ve hece oluşturmanın zor olduğunu belirtmişlerdir. Ayrıca öğretmenler ilk okuma yazma sürecinde birinci gruptaki harf veya harflere ilişkin; "l" ve "n" harfleri bir arada olmamalı (f=5), "k" ve "t" harfleri yer değişmeli (f=4), "t", "ç" veya "s" harf/harfleri olmalı (f=3), "n" harfi olmamalı (f=2), "l" harfi olmamalı (f=2), "n" ve "m" harflerinin yeri değişmeli (f=1) ve bütün sesli harfler olmalı (f=1) şeklinde görüşlerde bulunmuşlardır. Sınıf öğretmenlerinin ilk okuma yazma sürecinde birinci gruptaki harf veya harflerle ilişkin görüşlerinden yapılan alıntılardan bazıları şunlardır:

"Sesli harflerin hepsi ilk grupta olabilirdi. Çocuk sesli harfi öğrenip sonra diğer harflere geçilebilirdi. "k"nın yazımı zor bir harf olduğu için ilk gruptan çıkarılabilirdi. "n" harfi çıkabilirdi çünkü ses çıkarımının zorluğundan tam anlaşılmadığı için birleştirmesi zor oluyor."(Ö7)

"Birinci grupta öncelikle "l" ve "n" harfleri çok karışıyor. Yani harflerin seslerini çıkarırken öğrenciler zorlanıyor. Bundan dolayı bu harfler aynı grubun içinde olmamalı." (Ö13)

Sınıf öğretmenlerine "İlk okuma yazma sürecinde sesli harflerin verilme sırasını doğru buluyor musunuz? (Cevabınız hayır ise bu sıra nasıl olmalıdır?)" sorusu sorulmuş olup öğretmenlerin verdikleri yanıtların analizinden ortaya çıkan bulgular Tablo 4'te gösterilmiştir.

Tablo 4. Sınıf Öğretmenlerinin İlk Okuma Yazma Sürecinde Sesli Harflerin Verilme Sırasına İlişkin Görüşleri

Sesli harflerin verilme sırasını	**Olması gereken sıra**	**Öğretmenler**	**f**
Evet, doğru buluyorum	-	$(Ö_{1,2,3,5,6,8,9,10,11,12,14,16,17,18,19,20,21})$	17
Hayır, doğru bulmuyorum	"e", "a", "i", "o", "u", "ö", "ü", "ı"	$(Ö_{4})$	1
	"a", "e", "ı", "i", "o", "ö", "u", "ü"	$(Ö_{7,15})$	2
	"e", "a", "i", "o", "u", "ü", "ö", "ı"	$(Ö_{13})$	1
	"e", "a", "i", "ı", "o", "ö", "u", "ü"	$(Ö_{22})$	1

Tablo 4 'e göre, sınıf öğretmenlerinin ilk okuma yazma sürecinde sesli harflerin verilme sırasına ilişkin görüşleri incelendiğinde; öğretmenlerin büyük bir çoğunluğunun sesli harflerin verilme sırasını doğru

FULL TEXTS BOOK

bulduğunu (f=17) ifade ettikleri görülmüştür. Ancak beş öğretmenin ise sesli harflerin; "e", "a", "i", "o", "u", "ö", "ü", "ı" (f=1), "a", "e", "ı", "i", "o", "ö", "u", "ü" (f=2), "e", "a", "i", "o", "u", "ü", "ö", "ı" (f=1) ve "e", "a", "i", "ı", "o", "ö", "u", "ü" (f=1) şeklinde verilmesi gerektiğini vurgulamışlardır. Sınıf öğretmenlerinin ilk okuma yazma sürecinde sesli harflerin verilme sırasına ilişkin görüşlerinden yapılan alıntılarından bazıları şunlardır:

"Doğru buluyorum." (Ö19)

"Evet, sıralama uygundur."(Ö11)

Sınıf öğretmenlerine "Harf gruplarında yer alan harflerde yer değişikliği yapmak isteseydiniz hangi harf veya harfler hangi grupta olurdu? Neden?" sorusu sorulmuş olup öğretmenlerin verdikleri yanıtların analizinden ortaya çıkan bulgular Tablo 5'te gösterilmiştir.

Tablo 5. Sınıf öğretmenlerinin harf gruplarında yer alan harf veya harflerdeki yer değişikliğine ilişkin görüşleri

Görüşler		**Öğretmenler**	**f**
"t" harfi birinci grupta olmalı	Ses çıkarımının daha kolay olmasından dolayı	$Ö_{1,2,7,12,14,15,16}$	7
"k" harfi ikinci grupta olmalı	Ses çıkarımındaki zorluktan dolayı	$Ö_{2,3,4,7,10,12}$	6
"m" ile "n" ve/veya "b" ile "d" harfleri uzak gruplarda olmalı	Yazımının ve ses çıkarımının karışmasından dolayı Yazım benzerliklerinden dolayı	$Ö_{5,8,9,16,17,20}$	6
"n" harfi ikinci grupta olmalı	Ses çıkarımındaki karışıklıktan dolayı	$Ö_{6,14,16,20,21}$	5
"m" harfi birinci grupta olmalı	Ses çıkarımının daha kolay olmasından dolayı	$Ö_{3,10,20,21}$	4
"d" harfi ikinci grupta olmalı	Ses çıkarımındaki karışıklıktan dolayı	$Ö_{13,18,21}$	3
Birinci gruptaki k ve n harfleri yer değişmeli	Ses çıkarımındaki zorluktan dolayı	$Ö_{11}$	1
"ç" harfi ikinci grupta olmalı	Ses çıkarımının daha kolay olmasından dolayı	$Ö_{14}$	1
"z" harfi birinci grupta olmalı	Ses çıkarımının daha kolay olmasından dolayı	$Ö_{19}$	1
"b" harfi dördüncü grupta olmalı	Ses çıkarımındaki karışıklıktan dolayı	$Ö_{22}$	1

Tablo 5'e göre sınıf öğretmenlerinin ilk okuma yazma sürecinde harf gruplarında yer alan harf veya harflerdeki yer değişikliğine ilişkin görüşleri incelendiğinde, öğretmenlerin önemli bir kısmı (f=7) ses çıkarımının daha kolay olmasından dolayı "t" harfinin birinci grupta olması gerektiğini ifade etmiştir. Ayrıca öğretmenler harf gruplarında yer alan harflerdeki yer değişikliğine ilişkin; "k" harfi ikinci grupta olmalı (f=6), "m" ile "n" ve/veya "b" ile "d" harfleri uzak gruplarda olmalı (f=6), "m" harfi birinci grupta olmalı (f=4), "n" harfi ikinci grupta olmalı (f=5), "d" harfi ikinci grupta olmalı (f=3), birinci gruptaki "k" ve "n" harfleri yer değişmeli (f=1), "ç" harfi ikinci grupta olmalı (f=1), "z" harfi birinci grupta olmalı (f=1) ve "b" harfi dördüncü grupta olmalı (f=1) şeklinde görüşte bulunmuşlardır. Sınıf öğretmenlerinin harf gruplarında yer alan harf veya harflerdeki yer değişikliğine ilişkin görüşlerinden yapılan alıntılardan bazıları şunlardır:

FULL TEXTS BOOK

"Karıştırıldığını düşündüğüm "m" ile "n" ve "b" ile "d" harfleri yazımdan olsun ses çıkarımından olsun birbirinden uzaklaştırmak gerekir."(Ö17)
"d" ve "b" seslerini aynı gruba koymazdım. Çok karıştırıldığı için farklı gruplara koyardım. "t" harfini de çıkarımının kolay olmasından dolayı sesinin ilk grupta olsun isterdim. Ayrıca ilk gruptaki "n" harfi de "l" harfi ses çıkarımındaki karışıklıktan dolayı ikinci grupta olabilirdi. "(Ö16)

Sınıf öğretmenlerine "İlk okuma yazma sürecinde dikte çalışmaları yaparken zorluk yaşıyor musunuz? Neden?" sorusu sorulmuş olup öğretmenlerin verdikleri yanıtların analizinden ortaya çıkan bulgular Tablo 6'da gösterilmiştir.

Tablo 6. Sınıf Öğretmenlerinin İlk Okuma Yazma Sürecinde Dikte Çalışmalarında Zorluk Yaşama Durumlarına İlişkin Görüşleri

Zorluk yaşama durumu		**Öğretmenler**	**f**
Evet yaşadım	Harf birleştirme mantığının oturmamış olması	$Ö_{1,2,3,6,7,8,9,10,11,13,17,20,21}$	17
	Harflerin tam öğrenilememiş olması	$Ö_{5}$	
	Sınıf mevcutlarının fazla olması	$Ö_{12}$	
	Aile desteğinin yetersiz olması	$Ö_{16}$	
	Öğrencilerin fazla devamsızlık yapması	$Ö_{19}$	
Hayır yaşamadım		$Ö_{4,14,15,18,22}$	5

Tablo 6'ya göre sınıf öğretmenlerinin ilk okuma yazma sürecinde dikte çalışmalarında zorluk yaşama durumları incelendiğinde, öğretmenlerin büyük çoğunluğunun (f=17), zorluk yaşadıklarını ifade ettikleri görülmüştür. Ancak beş öğretmen ise dikte çalışmalarında zorluk yaşamadıklarını ifade etmişlerdir. Dikte çalışmalarında zorluk yaşayan öğretmenlerinde, harf birleştirme mantığının oturmamış olması, harflerin tam öğrenilmemiş olması, aile desteğinin yetersiz olması, öğrencilerin fazla devamsızlık yapmaları ve sınıf mevcutlarının fazla olmasından dolayı zorluk yaşadıkları görülmüştür. Sınıf öğretmenlerinin ilk okuma yazma sürecinde dikte çalışmalarında zorluk yaşama durumlarına ilişkin görüşlerinden yapılan alıntılardan bazıları şunlardır:
"Dikte çalışmasında zorluk yaşıyorum çünkü sınıfta her öğrenci aynı şekilde harfleri birleştirmeyi çözemiyor, aynı öğrenmeyi sağlayamıyor. Tam öğrenme gerçekleşmeyen öğrenciler süreci zorlaştırıyor."(Ö6)
"Dikte çalışmaları yaparken harflerin birleşme mantığının öğrencilerce anlaşılmaması durumunda zorlanıyorum, ancak mantık oturdukça dikte kolay gelmeye başlıyor."(Ö8)

Sınıf öğretmenlerine "İlk okuma yazma sürecinde harf öğretiminde zorlandığınız durumlar nelerdir?" sorusu sorulmuş olup öğretmenlerin verdikleri yanıtların analizinden ortaya çıkan bulgular Tablo 7'de gösterilmiştir.

Tablo 7. Sınıf Öğretmenlerinin İlk Okuma Yazma Sürecinde Harf Öğretiminde Zorlandıkları Durumlara İlişkin Görüşleri

Harf öğretiminde zorlanılan durumlar	**Öğretmenler**	**f**
Aile desteğinin yetersiz olması	$Ö_{1,12,13,15,16,21}$	6
Öğrenci seviyelerinin veya hazır bulunuşluklarının farklı olması	$Ö_{1,9,15,16,21}$	5
Ailelerin yanlış okuma yazma öğretimi yapması	$Ö_{4,17,20,22}$	4

FULL TEXTS BOOK

Harf birleştirme mantığının oturmamış olması	$Ö_{3,8,10}$	3
Dikte çalışmasında	$Ö_{5,11}$	2
Seslerin çıkarılmasında zorluk yaşanması	$Ö_{2}$	1
Harf benzerliklerinin olması	$Ö_{6}$	1
Sesin çıkarılması ve harfin yazımının zor olması	$Ö_{7}$	1
Zorlandığı bir durum yok	$Ö_{14,18,19}$	3

Tablo 7'ye göre sınıf öğretmenlerinin ilk okuma yazma sürecinde harf öğretiminde en çok (f=6) aile desteğinin yetersiz olmasından dolayı zorlandıkları görülmüştür. Ayrıca öğrenci seviyelerinin veya hazır bulunuşluklarının farklı olması (f=5), ailelerin yanlış okuma yazma öğretimi yapması (f=4), harf birleştirme mantığının oturmamış olması (f=3), dikte çalışmasında (f=2), seslerin çıkarılmasında zorluk yaşanması (f=1), harf benzerliklerinin olması (f=1), sesin çıkarılması ve harfin yazımının zor olması (f=1) şeklinde görüşte bulundukları da görülmüştür. Ancak üç öğretmenin ise harf öğretiminde zorlandığı bir durumun olmadığını ifade ettikleri görülmüştür. Sınıf öğretmenlerinin ilk okuma yazma sürecinde harf öğretiminde zorlandıkları durumlara ilişkin görüşlerinden yapılan alıntılardan bazıları şunlardır:

"Aile desteği yoksa okuma yazma sürecinde zorluk yaşıyoruz. Ayrıca bazen çocuğun hazır bulunuşluğu da yetersizse o zaman da sıkıntı yaşıyoruz." (Ö1)

"Evde aile desteği olmadığında ya da okul öncesi eğitimi olmayan öğrencilerde harf öğretiminde zorlandım."(Ö15)

Sınıf öğretmenlerine "İlk okuma yazma sürecinde harf öğretiminde velilere ve öğretmenlere yönelik önerileriniz nelerdir?" sorusu sorulmuş olup öğretmenlerin verdikleri yanıtların analizinden ortaya çıkan bulgular Tablo 8 ve 9'da gösterilmiştir.

Tablo 8. Sınıf Öğretmenlerinin İlk Okuma Yazma Sürecinde Harf Öğretiminde Velilere Yönelik Önerilerine İlişkin Görüşleri

Velilere yönelik öneriler	**Öğretmenler**	**f**
Öğretmene destek olmalı	$Ö_{1,5,6,7,9,10,12,13,14,15,16,17,18,19,20}$	15
Sabırlı olmalı	$Ö_{2,6,7,13,15,16}$	6
Öğrenciye destek olmalı	$Ö_{8,11,18,21,22}$	5
Yanlış okuma yazma öğretimi yapmamalı	$Ö_{3,4}$	2
Öğrencisinin yapabileceklerini iyi bilmeli	$Ö_{1}$	1

Tablo 8'e göre sınıf öğretmenlerinin ilk okuma yazma sürecinde harf öğretiminde velilere yönelik en çok (f=15) öğretmene destek olunması şeklinde öneride bulundukları görülmüştür. Ayrıca velilere yönelik; sabırlı olmalı (f=6), öğrenciye destek olmalı (f=5), yanlış okuma yazma öğretimi yapmamalı (f=2) ve öğrencisinin yapabileceklerini iyi bilmeli (f=1) şeklinde görüşte bulundukları ortaya çıkmıştır. Sınıf öğretmenlerinin ilk okuma yazma sürecinde harf öğretiminde velilere yönelik önerilerine ilişkin görüşlerinden yapılan alıntılardan bazıları şunlardır:

"Bolca sabır, acele etmemelerini önerebilirim. Ayrıca bu süreçte öğretmene gerekli destek sağlanmalı." (Ö7)

"Veliler, öğretmenle destek halinde olmalı." (Ö20)

FULL TEXTS BOOK

Tablo 9. Sınıf Öğretmenlerinin İlk Okuma Yazma Sürecinde Harf Öğretiminde Öğretmenlere Yönelik Önerilerine İlişkin Görüşleri

Öğretmenlere yönelik öneriler	Öğretmenler	f
İlk okuma yazma sürecinde acele edilmemeli	$Ö_{1,3,5,6,7,9,10,11,15,19}$	10
Farklı materyaller kullanmalı	$Ö_{14,15,20,21,22}$	5
Veli ile işbirliği yapmalı	$Ö_{3,4,8,17,18}$	5
Veliler okuma yazma öncesinde ve sürecinde bilgilendirilmeli	$Ö_{2,4,12,17}$	4
Öğrencilerin bireysel farklılıklarına dikkat etmeli	$Ö_{13,16}$	2
Teknolojik araçlardan faydalanılmalı	$Ö_{22}$	1

Tablo 9' a göre sınıf öğretmenlerinin ilk okuma yazma sürecinde harf öğretiminde öğretmenlere yönelik en çok (f=10) ilk okuma yazma sürecinde acele edilmemeli şeklinde öneride bulundukları görülmüştür. Ayrıca öğretmenlere; farklı materyaller kullanmalı (f=5), veli ile işbirliği yapmalı (f=5), veliler okuma yazma öncesinde ve sürecinde bilgilendirilmeli (f=4), öğrencilerin bireysel farklılıklarına dikkat etmeli (f=2) ve teknolojik araçlardan faydalanılmalı (f=1) şeklinde önerilerde bulunulmuştur. Sınıf öğretmenlerinin ilk okuma yazma sürecinde harf öğretiminde öğretmenlere yönelik önerilerine ilişkin görüşlerinden yapılan alıntılardan bazıları şunlardır:

"Öğretmen arkadaşlarıma tavsiyem bol materyalli ders etkinlikleri harf öğretimini kolaylaştırıyor. Bu şekilde yapabilirler."(Ö14)

"Öğretmenler, okuma ve yazma gibi çok yönlü bir öğretim işini acele etmeden, kaygılanmadan, sabırla yürütebilirler."(Ö9)

TARTIŞMA, SONUÇ VE ÖNERİLER

Sınıf öğretmenlerinin ilk okuma yazma sürecinde en çok "h, f, ğ, l, k, j, g" harflerinin ses çıkarımından dolayı zorlandıkları görülmüştür. Ayrıca öğretmenler; "b-d" harflerinin yazımının karıştırılmasından; "y, g, ğ, j, s, ş" harflerinin yazım biçimlerinin zor olmasından; "ğ-g, n-m, ı-i, o-ö, u-ü, c-ç, s-ş" harflerinin yazım benzerliklerinin olmasından; "b, d, k" harfleriyle ilgili hece oluşturmanın zor olmasından; "y, n, l" harflerinin ses çıkarımının diğer harflerle karışmasından; "r" harfinin dil yapısının ses çıkarımına uygun olmamasından ve "e, l, a, k, i, n" harfleriyle ilk okuma yazma mantığının kavranamamış olmasından dolayı ilk okuma yazma sürecinde zorluklarla karşılaştıklarını belirttikleri sonucuna ulaşılmıştır. Sağırlı ve Atik (2022) tarafından yapılan çalışmada, bazı öğretmenlerin "b-d, ç-ş" gibi söylenişleri benzer harflerin öğretim sırasının birbirine yakın olmasının zorluk yaşadıklarını ve öğrencilerde kafa karışıklığına neden olduğunu belirttikleri sonucuna ulaşılmıştır. Babayiğit (2012) tarafından yapılan çalışmada da bazı harflerin birbirine karıştırılarak yazıldığı sonucuna ulaşılmıştır. Çağlar (2018) da "l ve n" seslerinin aynı grupta yer almasının fonetik yakınlığından dolayı okuma yazma sürecinde karışıklığa neden olduğunu ve sesleri birbirine yakın olan harflerin de aynı grupta yer almamasına dikkat edilmesi gerektiğini belirtmiştir. Bayraktar'ın (2006) çalışmasında da öğretmenler, öğrencilerin en çok "k, s, ş ve z" harflerinin yazımında zorluk yaşadıklarını vurgulamışlardır. Ferah-Özcan ve Özcan (2016) tarafından yapılan çalışmada öğrencilerin bir kısmının "r" harfi gibi harflerin seslerinin tamamını çıkartamamasından kaynaklı sorunlar yaşadığını belirtmiştir. Alanyazında yapılan çalışmalara (Sağırlı ve Atik, 2022; Babayiğit, 2012; Çağlar, 2018; Bayraktar, 2006; Ferah-Özcan ve Özcan, 2016) bakıldığında çalışmanın sonucunu destekler nitelikte olduğu görülmektedir.

Sınıf öğretmenlerinin önemli bir kısmı ilk okuma yazma sürecinde ses çıkarımının, harf yazımının ve hece oluşturmanın zor olmasından dolayı "k" harfinin birinci grupta olmaması gerektiğini ifade ettikleri sonucuna ulaşılmıştır. Öğretmenler; ses çıkarımının karışmasından dolayı "l" ve "n" harflerinin bir arada

FULL TEXTS BOOK

olmaması, ses çıkarımının ve hece oluşturmanın zor olmasından dolayı "k ve t" harflerinin yer değiştirmesi, ses çıkarımının kolay olmasından dolayı "t, ç veya s" harf/harflerinin birinci grupta olması gerektiğini belirtmişlerdir. Ayrıca birinci gruptaki harflerle ilgili; "n ve l" harflerinin olmaması, "n ve m" harflerinin yerinin değişmesi ve bütün sesli harflerin olması gerektiği öğretmenler tarafından ifade edilmiştir. Sağırlı ve Atik (2022) tarafından yapılan çalışmada benzer şekilde ilk grupta yer alan "k" harfinin bazı öğrenciler için zorlayıcı olabildiği ve "t" harfinin ise daha kolay kavrandığı için ilk grupta yer alması gerektiği sonucuna ulaşılmıştır. Başar ve Tanış-Gürbüz'ün (2020) çalışmalarında ilk grupta yer alan "l ve n" harflerinin karıştırıldığı ve "n ve m" harflerinin birbirine yakın gruplarda olmasından dolayı öğrencilerin zorlandığı ortaya çıkmıştır. Bu karışıklık giderilmesi için harf gruplarının yeniden düzenlenmesi gerektiği vurgulanmıştır. Ferah-Özcan ve Yıldız'ın (2018) çalışmalarında da harflerin öğretim sırasının değiştirilmesi ve sesli harflerin sürecin başında verilmesi gerektiği belirtilmiştir.
Sınıf öğretmenlerinin büyük çoğunluğu, ilk okuma yazma sürecinde sesli harflerin verilme sırasını doğru bulduklarını belirtmişlerdir. Sesli harflerin verilme sırasını doğru bulmadıklarını belirten öğretmenler ise sıralamanın; "e, a, i, o, u, ö, ü, ı", "a, e, ı, i, o, ö, u, ü", "e, a, i, o, u, ü, ö, ı", "e, a, i, ı, o, ö, u, ü" şeklinde olması gerektiğini ifade etmişlerdir. Babayiğit (2012) tarafından yapılan çalışmada sesli harflerin verilme sırasının "a, e, ı, i, o, ö, u, ü" şeklinde olması gerektiği belirtilmiştir. Ayrıca harflerin öğretim sırasının esnek tutulması ve öğrencilerin kolay öğrendiği sesli harflerin öncelikle öğretilebileceği vurgulanmıştır. Çağlar'ın (2018) çalışmasında da harf öğretimi esnasında sesli harflerin öğretiminin öne alınmasıyla birlikte sesli harflerle oluşturulabilecek hece ile sözcük oluşturmanın kolaylaştığı sonucuna ulaşılmıştır.

İlk okuma yazma sürecinde sınıf öğretmenlerinin harf grupları veya harflerde ilgili yapmak istedikleri değişikliğin en fazla, ses çıkarımının daha kolay olmasından dolayı "t" harfinin birinci grupta olması değişikliğidir. Öğretmenler bu değişikliklerle ilgili; ses çıkarımındaki zorluktan dolayı "k" harfi ikinci grupta olmalı, yazımının ve ses çıkarımının karışmasından ve yazım benzerliklerinden dolayı "m ile n ve/veya b ile d harfleri" uzak gruplarda olmalı, ses çıkarımının daha kolay olmasından dolayı "m" harfi birinci grupta olmalı, ses çıkarımındaki karışıklıktan dolayı "n" ve "d" harfleri ikinci grupta olmalı şeklinde görüş belirtmişlerdir. Ayrıca öğretmenler birinci gruptaki "k" ve "n" harfleri yer değişmeli; ç harfi ikinci, z harfi birinci ve b harfi dördüncü grupta olmalı şeklinde görüşte bulundukları sonucuna ulaşılmıştır. Sağırlı ve Atik'in (2022) çalışmalarında seslendirmeleri birbirine yakın olan "b-d" ile "m-n" harflerinin okurken sıklıkla karıştırıldığını sonucuna ulaşılmıştır. Alanyazında yapılan çalışmalar (İflazoğlu-Saban ve Yiğit, 2011; Acat ve Özsoy, 2006; Ferah-Özcan ve Özcan, 2016; Başar ve Tanış-Gürbüz, 2020; Ferah-Özcan ve Yıldız, 2018; Ekici-Calın, 2019; Çağlar, 2018) çalışmanın bu bulgusunu destekler niteliktedir.

İlk okuma yazma sürecinde sınıf öğretmenlerinin büyük bir çoğunluğunun; harf birleştirme mantığının oturmamış olması, harflerin tam öğrenilememiş olması, sınıf mevcutlarının fazla olması, aile desteğinin yetersiz olması ve öğrencilerin fazla devamsızlık yapmasından dolayı dikte çalışmalarında zorluk yaşadıkları sonucuna ulaşılmıştır. Ayrıca öğretmenlerin bir kısmının da dikte çalışmalarında zorluk yaşamadıkları belirttikleri görülmüştür. Ferah-Özcan ve Özcan (2016) çalışmalarında öğretmenler, dikte sürecinde öğrencilerin sesletimi benzer olan ve ayırt edilmesi zor olan harfleri karıştırmalarından dolayı dikte sürecinin zorlaştırdığını ifade etmişlerdir. Ayrıca harfleri tam anlamıyla öğrenememiş öğrencilerin dikte sürecinde sesli harfleri yazmama eğiliminde oldukları sonucuna ulaşılmıştır. Babayiğit'in (2012) çalışmasında da öğrencilerin bir kısmının dikte çalışmasında bazı harfleri birbirine karıştırmalarından dolayı öğretmenlerin dikte çalışmalarında zorluk yaşadıklarını belirttikleri görülmüştür. Ayrıca sınıf mevcutlarının kalabalık olması (Sağırlı ve Atik, 2022; Ekici-Calın, 2019; Ferah-Özcan ve Yıldız, 2018; Babayiğit ve Erkuş, 2017), devamsızlıklarının fazla olması (Sağırlı ve Atik, 2022; Babayiğit ve Erkuş, 2017), ailenin ilgisiz olması veya destek sağlamaması (Erbasan ve Erbasan, 2020; Ekici-Calın, 2019;

Sağırlı ve Atik, 2022; Ferah-Özcan ve Yıldız, 2018; Babayiğit ve Erkuş, 2017; Ferah-Özcan ve Özcan, 2016; Çağlar, 2018) gibi durumların ilk okuma yazma sürecinde yaşanılan zorlukların nedenleri arasında olduğu görülmektedir.

İlk okuma yazma sürecinde sınıf öğretmenlerinin; aile desteğinin yetersiz olması, öğrenci seviyelerinin veya hazır bulunuşluklarının farklı olması, ailelerin yanlış okuma yazma öğretimi yapması, harf birleştirme mantığının oturmamış olması, dikte çalışması, seslerin çıkarılmasında zorluk yaşanması, harf benzerliklerinin olması, sesin çıkarılması ve harfin yazımının zor olmasından dolayı harf öğretiminde zorlandıkları görülmüştür. Ayrıca öğretmenlerin bir kısmı ise harf öğretiminde zorlandıkları bir durumun olmadığını belirtmişlerdir. Öğretmenlerin aile desteğinin yetersiz olduğu durumlarda ilk okuma yazma sürecinde zorlandıklarına yönelik alanyazında birçok çalışmanın (Erbasan ve Erbasan, 2020; Ekici-Calın, 2019; Sağırlı ve Atik, 2022; Ferah-Özcan ve Yıldız, 2018; Babayiğit ve Erkuş, 2017; Ferah-Özcan ve Özcan, 2016; Çağlar, 2018) olduğu görülmüştür. Yangın (2009) ise yaptığı çalışmada ilk okuma yazma sürecinde hazırbulunuşluğun, okuma ve yazma başarılarında belirleyici bir etken olduğu sonucuna ulaşılmıştır. Yapılan çalışmalarda (Sağırlı ve Atik, 2022; Başar ve Tanış-Gürbüz, 2020; Erbasan ve Erbasan, 2020; Ferah-Özcan ve Yıldız, 2018; Babayiğit ve Erkuş, 2017; Ferah-Özcan ve Özcan, 2016) da öğrencilerin hazırbulunuşluk düzeylerinin yetersiz olması, öğretmenlerin ilk okuma yazma sürecinde karşılaştıkları sorunlardan biri olarak görülmektedir. Ayrıca öğretmenler, ailelerin harfleri yanlış seslendirmeden kaynaklı sorunlarla da karşılaştıkları görülmüştür (Kılıç ve Geçit, 2022; Sağırlı ve Atik, 2022; Erbasan ve Erbasan, 2020; Ekici-Calın, 2019).

Sınıf öğretmenleri ilk okuma yazma süreci harf öğretiminde velilere; öğretmene destek olması, sabırlı olması, öğrenciye destek olması, yanlış okuma yazma öğretimi yapılmaması ve öğrencisinin yapabileceklerini iyi bilmesi önerilerinde bulundukları sonucuna ulaşılmıştır. Ayrıca sınıf öğretmenleri, meslektaşlarına da ilk okuma yazma sürecinde acele edilmemeli, farklı materyaller kullanılmalı, veli ile işbirliği yapılmalı, veliler okuma yazma öncesinde ve sürecinde bilgilendirilmeli, öğrencilerin bireysel farklılıklarına dikkat edilmeli ve teknolojik araçlardan faydalanılmalı önerilerinde bulundukları görülmüştür. Özbaş'ın (2013) yaptığı araştırmada, birinci sınıf velilerinin eğitime gereksinimleri olduğu, veli eğitiminin veli-çocuk arasında olumlu bağlar kurmasına katkı sağladığı sonucuna ulaşılmıştır. Çocuklar vakitlerinin büyük bir kısmını ailesiyle geçirdiği için, çocukların eğitiminde ebeveynlerin kilit bir rolü bulunmaktadır (Isaacs, 2012). Ailelerin kilit rolünün yanında çocuklarına verecekleri desteğin de doğru bir şekilde gerçekleşmesi son derece önemlidir. Ancak ailelerin ilk okuma yazma sürecinde yanlış öğretimde bulundukları birçok çalışma (Kılıç ve Geçit, 2022; Adıgüzel ve Karacabey, 2010; Yiğit, 2009) sonucunda ortaya çıkmıştır. Ayrıca bu çalışmanın sonuçları, alanyazındaki çalışmaların (İflazoğlu-Saban ve Yiğit, 2011; Babayiğit ve Erkuş, 2017; Yılar, 2004; Erbasan ve Erbasan, 2020; Ferah-Özcan ve Özcan, 2016; Demir ve Ersöz, 2016; Ferah-Özcan ve Yıldız, 2018; Babayiğit, 2012) sonuçlarıyla benzerlik göstermektedir.

Çalışmanın sonuçları doğrultusunda aşağıdaki önerilerde bulunulmuştur:

- "h", "f", "ğ", "l", "k", "j", "g" harflerinin ses çıkarımının zor olmasından dolayı bu harflerin son gruplarda yer almasına yönelik düzenleme yapılması önerilebilir.
- Seslendirmesi birbirine benzeyen "b-d" gibi harflerin yazımının karıştırılmasının önüne geçmek için bu harfler arasında daha uzun zaman aralığı olacak şekilde gruplarında yeniden düzenleme yapılmalıdır.
- Ses çıkarımının daha kolay olmasından dolayı "t" harfi birinci grupta olmasına yönelik düzenleme yapılması önerilebilir.

FULL TEXTS BOOK

- Ailelere ilk okuma yazma öğretimi hakkında bilgi vermek ve aileler tarafından yapılan yanlış müdahaleleri önlemek amacıyla eğitim öğretim yılı başında veli toplantısı yapılmalı ayrıca yıl içerisinde de sık sık veli toplantıları yapılarak aileler ilk okuma yazma süreci hakkında bilgilendirilmelidir.
- İlk okuma yazma sürecinde mümkün olduğunca fazla materyale yer verilmeli ve bu süreçte teknolojik araçlardan yararlanılması öğretmenlere önerilebilir.

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FULL TEXTS BOOK

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EXTENDED ABSTRACT

INTRODUCTION

For humans, who are social beings, reading and writing is one of the most important skills that makes life easier. Reading and writing skills make important contributions to individuals' ability to do many tasks in daily life easily and to improving their quality of life (Durna, 2014; Kapur, 2019). Because in today's conditions, being literate has a high share in individuals' ability to organize their business life and living conditions, to feel like they belong to society and to contribute, to have a free and participatory personality, and to gain a worldview of their own (Çelenk, 2007). Early reading and writing skills aim to improve one's self, to be able to communicate with the society, to understand visual and written tools, and to express oneself in the best way, both written and verbal (Bay, 2008).

METHOD

This study, which examined the opinions of primary school teachers about letter groups, was conducted with a case study design. A case study is defined as an in-depth qualitative investigation of one or several explanatory cases (Hagan, 2006). The study group of the research consists of 22 primary school teachers working in primary schools affiliated with Yozgat Provincial Directorate of National Education. Criterion sampling technique was used when determining the study group. Criterion sampling is defined as studying situations in which a set of criteria that can be created by the researcher or determined in advance are met (Yıldırım and Şimşek, 2016). In this study, the inclusion of teachers who taught primary reading and writing at least twice was determined as a criterion. The data of the research were collected with a semi-structured interview form prepared by the researcher. Descriptive analysis was used in the analysis process of the collected data. According to Ekiz (2015), this analysis includes interviews, observations or documents, etc. used during the research. It is a type of analysis performed on the basis of questions or topics in data collection tools.

RESULT and DISCUSSION

It was observed that primary school teachers had the most difficulty in the first reading and writing process due to the sound production of the letters "h, f, ğ, l, k, j, g". In addition, teachers; Confusing the spelling of the letters “b-d”; Because the spelling of the letters "y, g, ğ, j, s, ş" is difficult; The letters "ğ-g, n-m, ı-i, o-ö, u-ü, c-ç, s-ş" have similarities in spelling; Because it is difficult to form syllables with the letters "b, d, k"; It was concluded that they stated that they encountered difficulties in the first reading and writing process because the sound production of the letters "y, n, l" was mixed with other letters. In the study conducted by Sağırlı and Atik (2022), it was concluded that some teachers stated that they had difficulties in the close teaching order of letters with similar pronunciations, such as "b-d, ç-ş", and that it caused confusion in students. Çağlar (2018) also stated that the sounds "l and n" being in the same

FULL TEXTS BOOK

group causes confusion in the reading and writing process due to their phonetic closeness, and care should be taken to ensure that letters with similar sounds are not included in the same group.

It was concluded that a significant part of the primary school teachers stated that the letter "k" should not be in the first group because it is difficult to produce sounds, write letters and form syllables in the first reading and writing process. Similarly, in the study conducted by Sağırlı and Atik (2022), it was concluded that the letter "k" in the first group may be challenging for some students, and the letter "t" should be included in the first group because it is easier to understand. In the studies of Başar and Tanış-Gürbüz (2020), it was revealed that the letters "l and n" in the first group were confused and the students had difficulty because the letters "n and m" were in groups close to each other. It was emphasized that the letter groups should be rearranged to eliminate this confusion.

The majority of primary school teachers stated that they found the order in which vowels were given in the first reading and writing process correct. Teachers stated that they did not find the order in which the vowels were given correctly; “e, a, i, o, u, ö, ü, ı”, “a, e, ı, i, o, ö, u, ü”, “e, a, i, o, u, ü, ö They stated that it should be in the form of ", ı", "e, a, i, ı, o, ö, u, ü". In the study conducted by Babayiğit (2012), it was stated that the order of giving the vowels should be "a, e, ı, i, o, ö, u, ü".

In the first reading and writing process, the most common change that primary school teachers want to make regarding letter groups or letters is to have the letter "t" in the first group because it is easier to make sounds. Teachers are concerned about these changes; It was concluded that they agreed that the letter "k" should be in the second group due to the difficulty in sound extraction, and the letters "m and n and/or b and d" should be in distant groups due to the confusion of spelling and sound extraction and the similarities in spelling. In the study of Sağırlı and Atik (2022), it was concluded that the letters "b-d" and "m-n", which have similar vocalizations, are often confused while reading. Studies in the literature (İflazoğlu-Saban and Yiğit, 2011; Acat and Özsoy, 2006; Ferah-Özcan and Özcan, 2016; Başar and Tanış-Gürbüz, 2020; Ferah-Özcan and Yıldız, 2018; Ekici-Calın, 2019; Çağlar, 2018) supports this finding of the study.

In the first reading and writing process, primary school teachers; It has been observed that they have difficulties in teaching letters due to insufficient family support, different student levels or readiness, incorrect reading and writing teaching by families, not having the logic of combining letters, practicing dictation, difficulty in making sounds, letter similarities, making sounds and writing letters are difficult. . There are many studies in the literature indicating that teachers have difficulty in the first reading and writing process when family support is insufficient (Erbasan and Erbasan, 2020; Ekici-Calın, 2019; Sağırlı and Atik, 2022; Ferah-Özcan and Yıldız, 2018; Babayiğit and Erkuş, 2017; Ferah- Özcan and Özcan, 2016; Çağlar, 2018).

FULL TEXTS BOOK

PHILOSOPHICAL FOUNDATIONS OF EDUCATION AND UONEDU AS A SOCIAL INNOVATION

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ABSTRACT
The generally known definition of science, according to which science is a body of knowledge that is rationally explained and reliably applied, fully corresponds to the research conducted in this paper. The main purpose of this paper is to show how knowledge and education are fundamental elements of the creation and development of the world of technology and advanced technologies, modern science and modern reality in general. In this sense, the question of the source of the meaning of knowledge, which is found in the Greek term *techne*, and the application of modern education models, which are applied and developed in the UONEDU organization, are essential questions that define the modern world of science, education and technology. Therefore, the intention here is to show what are the philosophical premises of modern science and modern society, the world of technology and advanced technologies, and why the application and integration of different scientific fields in order to achieve the same goal is the key, with all the challenges of modern science, society and technology pose - what is the knowledge? Understanding the meaning of the Greek term techne - production of knowledge, which gives meaning to nowadays term technique, and the transfer of knowledge in a specific, sudden and non-standard conditions of education, show the importance of social sciences in modern science and the real world - the world of modern science and modern technology and truth.
Keywords: knowledge, techne, online education

Introduction

Knowledge, skills and coping in real situations are common strengths of education. Furthermore, knowledge and education are fundamental elements of the creation and development of the world of technique and advanced technologies, then modern science and modern reality in general, in such a way that knowledge has its original meaning in skill, skill, creation and production according to certain rules. So, on the basis of knowledge, it was produced, that is, technique was created, and the development of advanced technologies is the result of actions from the sphere of knowledge, rather than from the sphere of use. In this sense, the Greek term techne is the fundamental term of both technique and advanced technologies, as well as contemporary science and contemporary reality, because techne, with its multiple meanings, is closest to the term episteme-knowledge. Techne is understood and means practical knowledge created in the sphere of production, not in the sphere of what nature created. Therefore, concretely knowing how to produce technical means according to certain rules and regulations and practically use them in the development of technology, modern science and reality, to produce codes that we input when using technology, is a work of human knowledge, not a work of technique.
In this way, it is shown here that the source of the meaning of knowledge, which is found in the Greek term techne and its application in modern education, is the model that is applied and developed in the UONEDU organization. In our modern society and modern science, the concept of techniques and advanced technologies that influence our formation and participation in modern reality, the basic philosophical premises that enable us today are contained in the concept of knowledge as the Greeks understood and used that term - techne, as an expression that gives today's term knowledge the

FULL TEXTS BOOK

possibility of understanding and the meaning of the world of technology and the reality that we produce, and in this way we show the fundamental human trait - production, not use, so techne not technique. Returning therefore to the meaning of the term techne and its understanding is a key determinant of understanding, interpretation and critical review of today's issues, i.e., issues of contemporary science, contemporary reality, technique and advanced technologies, as integral parts of the life of contemporary man and contemporary society and its contemporary reality in general. Knowledge and its practical application are what influence human reality, science and the world of (technological) development, and by no means the technical use of the knowledge thus produced.

The meaning, perspectives and possibilities of application of the mentioned questions and activities of the UONEDU organization in this direction will be analyzed and discussed in this paper.

The source the meaning of knowledge and philosophical foundation of education

The original meaning of the Greek term *techne* is achieved only by returning to the meaning of this term as it was understood and used by the Greeks. Here, in this paper, it is especially important for us to deal, first of all, with the understanding of the meaning of the term techne, because it is the term that gives meaning to today's term technique and technology, and is inextricably linked to the terms knowledge (*episteme*) and production (*phronesis*). Furthermore, by understanding the meaning of techne, an understanding of construction, production and produced, as well as built and built reality is achieved. Understanding the Greek word techne, dealing with its original meaning as well as the changes that have occurred in its meaning is necessary and unquestionably an integral part of human everyday life.

What the Greeks meant when they say techne is today used synonymously with the word technique, which is absolutely wrong, but for education and the production of knowledge, in a certain sense is dangerous. Namely, today's term technique owes its meaning to the term techne, which primarily refers to art, craft, skill and art, in contrast to the term technique, which primarily refers to the use of means produced by skill and art. In the broadest sense, techne is *a set of certain procedures and the application of means to achieve some useful ends*. The understanding of techne is actually reflected in the resourcefulness and ability to produce. The meaning of techne is in what is a practical skill, which means that techne is knowledge, but also the application of principles that are involved in the production of objects and the achievement of goals, that is, techne is the application of principles in practical sciences and *a human skill that is based on principles and ability to learn*. Techne is skill, creation and art, craft, arrangement and education. Thus, techne is finding one's way in creativity and education, in the rules of production, creation, taking away in production in such a way that the taking away is determined by planning and rules, (for more details see: Rahimić Ramić, 2024.). Precisely because of these determinants, techne is not only one of the concepts of Greek philosophy, but, perhaps, it is also a fundamental concept of philosophy, but also of understanding man's reality and position in today's technical and technological world.

Understanding what the Greeks meant by the term techne refers to the ability of man, that is, to the ability of man to produce. In this way, techne does not mean exactly the same thing as art today. Techne implies production skills, knowledge for making an object. Thus, in understanding techne (a way to know, to know), a necessary understanding of the term's *episteme and phronesis* (as a type of knowledge) is required. Techne is a word that for the Greeks means both art and craft. Here techne should be understood as a way of knowledge, and in this sense techne is closest to the Greek term *episteme*. As techne means managing something according to certain rules and certain regulations. This definition specifically means that techne can be used as a word that refers to our practical ability. This is exactly the basic intention of this work, our practical ability in education, concrete innovative, practical knowledge for the production and use of new methods and techniques, especially online education. In ancient times, techne was understood as episteme, that is, both words, techne and episteme,

FULL TEXTS BOOK

are names for knowledge. Therefore, today it is necessary to understand and know the original meaning of the term techne if we want to successfully deal with knowledge, education, educational norms in any bio field, but also with the issue of technique and technological progress, which today occupies everyone on the planet. Techne is the kind of knowledge by which we know how to produce something according to certain production rules. For the Greeks, techne means having knowledge, and that kind of knowledge that allows us to navigate something according to certain rules, and this understanding, or the way the Greeks understood techne, refers to our overall practical ability, to all that what we can do on real things. Therefore, this production, in addition to being in accordance with rules and regulations, is also in accordance with correct reasoning. The necessity of interpreting these words to understand the meaning of techne is shown in defining what techne is, which is the skill, knowledge, skill that is based on the knowledge of the rules, and in this way, it is knowledge and it is action in creation which (action) deals with *phronesis*.

The common property of virtue and techne is the ability to learn. "Common characteristics of techne: 1. Techne means useful, 2. Each techne serves a specific purpose - medicine maintains health, agriculture provides food, etc., 3. techne is based on the knowledge of an expert who manages all the means necessary for the purpose, 4. every techne can be taught, only what can be taught has the right to be called techne. Taken together, these characteristics form a theory of science, a science understood as techne, whose ultimate goal is practical use, not theoretical knowledge". (Zhmud, 2006.)

When working on researching the meaning of the term techne, what should always be kept in mind is that it is the term that gives meaning to today's term technique. In understanding the meaning of the term techne, the essential fact is shown that philosophy's interest in technique did not arise with the emergence of the word technique itself and all that is implied by that term today. Philosophical interest in technique has its origin in the term techne, which has significantly different, broader, more comprehensive definitions than the term technique, which primarily refers to abilities in creation - skill, which certainly refers to its first term - production according to rules. However, the first definition of the term techne leads us to Aristotle's *Nicomachean Ethics*: “Let there be five ways by which the soul attains truth by means of sayings or negatives, and these are: art, science, prudence, wisdom, intelligence”. (Aristotle, 1958.). As it was immediately pointed out here, techne is fundamentally connected with the concept of episteme, and in that way, it is decisive both for science and education, as well as for technique and perfecting the development of new technologies. "Phronesis and techne are two ways of what we would call practical, different from theoretical, knowledge. Following Plato, Aristotle called the kind of knowledge that is theoretical - and therefore, for him, neither practical nor productive - episteme". (Dunne,1993.)

Since the time of the ancient thinkers, who determined and positioned techne alongside knowledge and practical ability, in a certain way, we are obliged to protect the meaning of the term techne and adapt its use to its meaning in the world of technology and life with technological progress, to which techne gave meaning. On this track, the horizon from which it is possible to understand Heidegger's point of view on the meaning of techne and technique is undoubtedly the understanding of the term techne among the Greeks. His point of view is determined and directed towards what is the correct understanding of techne, which includes and implies a return to the source of this concept. Heidegger's point of view on technique is, so to speak, "insurance" against the wrong understanding of technique, which is based on Heidegger's return to the meaning of the term techne. In this, it can be said, it is ensured that today's term technique is not confused with the meaning of the term techne, but also the possibility of researching the basic features of human reality is given. In Heidegger's understanding of technique, there is no place for the synonymous use of the terms techne and technique, because his understanding leads to an understanding of the exact opposite, that is, to the definition of techne as knowledge and skill, as art and as truth, as skill and familiarity with production. Technique is not meant the way techne is meant. Therefore, it is important to point out that the understanding of man's essence cannot be determined by

FULL TEXTS BOOK

technique, because his fundamental characteristic is the ability to produce and create, in which man's essence is recognized. Heidegger's understanding of techne as knowledge and as production, in the technical world of making, gives us back the possibility of thinking and defining human habitation as technical habitation and knowledge and not adoption, production and not making. Therefore, knowing his opinion on the issue of techne and the phenomenon of techniques proves to be necessary in our real world, where we can hardly imagine everyday life without the use of technical means. Furthermore, in the mentioned definitions of techne and technical, we see the way in which it is only possible to talk about the definition of human reality, without this reality being equated with what is making and without being deprived of the possibility of production. This did not deprive man of his fundamental characteristic, production, and at the same time his essence, which is in creation, was preserved.

It is precisely in this planetary role of technique and new technological achievements that the issue of battle and metaphysics is completely forgotten. In his opinion, the most prominent and original philosopher of the 20th century, who stood out for his contributions to phenomenology, hermeneutics, metaphysics and existentialism, is trying to save all this. It is important to note that in his opinion, it is not about any kind of opposition to technique and technological achievements, but rather a fight, so to speak, that will take the opinion on the path of distinguishing between the term techne and technique and show that today's term technique owes its meaning to the term techne. Therefore, technique can only be understood as a memory of techne, but it cannot mean production or knowledge, but only the use of something that is already finished, in which truth cannot occur. The issue that today concerns everyone on the planet, that is, the issue of technique and new technology, is never neutral, nor should it be understood as such. On the contrary, it strives to rule and absolutely determine our world of life, the way we behave towards the world and participate in our reality. The constant imposition of new challenges and expectations that we manage and master the technique, in everyday life and the performance of business tasks, shows that we are working on the accommodation of thinking, skill and production knowledge, which is equal to what it means to understand something and know how to navigate something , in the "second plan", and highlighting in the "first plan" what is technique, which is the use of what is produced by skill, knowledge, understanding, i.e. by techne. "Careful dealing with things, in which we recognize them as something that is special to us, (German: Zuhanden), is part of our understanding everyday life". (Zovko, 2009.)

The importance of techne for Heidegger is reflected in the understanding of the modern world and the origin of technology. In understanding the term technique, he reveals the key distinction between techne and technique. In this way, Heidegger's "starting point for understanding the question of technique is determined by the understanding of techne as that by means of which any art can be transmitted", and "modern technique as revealing disclosure", for him, is not a mere human work. (Heidegger, 1972). In this context of Heidegger's demanding and difficult philosophical thought, the possibility of understanding our reality and our participation in the construction of our real world opens up for us or during studies. For us, thinking is a mental activity that helps us solve problems, deal with situations, understand the circumstances and, in accordance with this understanding, take an action to move forward. For us, thinking also means having an opinion, having the impression that something is a certain way. Thinking means reasoning, the process of arriving at certain conclusions through a series of statements. Thinking is "a means of mastery". (Dalle Pezze, 2006). Therefore, we can conclude here: The negative meaning attached to the concept of technical and technology, which can be understood as the legacy of modernity, is neither a result nor the legacy to which Heidegger's thought is attached. On the contrary, Heidegger's thought is related to the meaning of techne as the skill of production and the ability to create something new.

FULL TEXTS BOOK

Online education

Online learning has evolved with technology. The availability of the Internet has made online education the largest distance learning sector (Evans and Haase, 2001), that to open space for development and improvement of skills of production and the ability to create something new. Clarke and Hermens (2001) singled out the factors that influenced the development of distance learning in general: the growing need for through lifelong learning and changes, platforms are formed, a more sophisticated communication system is developed, as well as the technological infrastructures necessary for online learning, which are firmly established through improvements in bandwidth, as well as the presence of computers in the household, the technological standard, computers in school and at work , and the adaptive nature of technology. Beaudoin (2000) believes that online education has gone through three phases: correspondence education, technologically assisted education and network education, which differ in how the teaching is designed and delivered in time and space. Taylor (2001), on the other hand, believes that online education can be traced through five different levels or generations:

1. Correspondence education - which is based on printing and postal delivery.
2. Multimedia model - which combines print, audio tapes, video tapes and CDs; here students bought material, listened, read and completed all activities (with support and feedback) independently, i.e., without a leader. E.g., learning a foreign language by listening to tapes in combination with a workbook.
3. Tele-learning model - synchronous communications using available technologies, such as video conferencing in order to provide educational programs.
4. Flexible learning model - which uses interactive media via the Internet; this includes communication by computer.
5. The current, fifth generation is the so-called model of intelligent flexible learning - the main difference between the fifth and fourth generations is that the fifth generation has "access to institutional processes and resources... [in the model of intelligent and flexible learning, an adaptive electronic interface is provided, through which students, staff and other actors can interact with the university]' (Taylor, 2001, p. 10). Each previous generation was not replaced by the next, but new models were developed. For example, correspondence has been influenced by forms of communication and tools. Forms of communication were developed along with educational institutions and organizations (schools, religious institutions, clubs, associations and associations), while tools were the main instruments supporting that communication, such as pen, pen, paper, typewriters and machines.

The earliest form of distance education is the correspondence education model. Correspondence education in developed countries is more than a hundred years old and was created under the influence of private initiatives and concern of individuals for their own education. Correspondence education referred to connections between national ministries and institutes on the one hand and universities and/or colleges on the other. Their correspondence was related to educational research projects, training, and delivery of results. Demiray and İşman (2002) believe that this model developed depending on various factors, the most influential of which were education level, geographical area, age and profession. Their correspondence was related to educational research projects, training, and delivery of results to ministries and institutes. That communication referred to only one type of media - correspondence, shipment.

The second generation is often referred to in the literature as a model of one-way communication (Demiray and İşman, 2002) and the so-called multimedia model (Taylor, 2001). This one the model is characterized by various innovations in the field of learning and teaching. The first innovation in teaching took place through the radio, when the capacity of formal schools could not accommodate all the applications of people, who lived in small villages and towns. The government did not have the money to establish formal schools in every village and town. For these purposes, educators came up with the idea of using radio for teaching and education. Thus, radio was used as support for the formal system in Great Britain (BBC radio, since 1920) and in China (since 1929). In the USA, it began to be

FULL TEXTS BOOK

used in the classroom since 1930, later also in other countries (Lawrence and Malachi, 1975). The limitations of this education were reflected in the absence of images and communication. In addition to radio, television was also used for the purpose of distance education. The first television experiment was in 1874, when Paul Nipkow invented and demonstrated a mechanical system for direct wire transmission (Lawrence and Malachi, 1975). In the same year, Viladamir Zworykin received the first patent for television.

From 1950, the production of educational programs and the use of TV in correspondence education began. What limited this education was the absence of interaction between the participants, as well as limitations related to the development of this media instrument. Just like with radio and TV, engineers put a lot of effort into perfecting the mechanical and technical part of these devices, and making them available to every household. After the Second World War, radio and television stations became an integral part of correspondence education, especially in developed countries, which ushered in a revolution in telecommunications technology.

Next was the innovation of Charles Wedemeyer, who as president of the corresponding center and a pioneer in the field of independent and distance learning, in 1960, demonstrated his Articulated and Instructional Media Project. This project was based on the deconstruction of the teacher specialization process, through the employment of specialists, who will work in teams with teachers, and connecting with different media to deliver a high-quality program, intended exclusively for individual work or a program, which is intended for only one medium (Wedemeyer and Childs, 1961). With this act, he called on the university administration to provide an opportunity for autonomous learning to its students.

Wedemeyer's vision was an idea what would be today called open and online teaching. His idea was later incorporated into the first, public, open teaching university of online teaching - the Open University of the United Kingdom. This university was the inspiration for the opening of similar universities in America, Japan and India.

The next generation is a model of flexible learning, which begins with the application of information and communication. The author uses the terms - articulation and connection

technology in teaching, i.e., the use of audio and video interactive systems. This is the beginning of the flexible learning model. Furthermore, the introduction of computers and the Internet at the end of the 20th century influenced the spread and use of online learning. This marks the beginning of the fifth generation of so-called learning. model of intelligent flexible learning.

UONEDU as a Social Innovation

The Association of Online Educators - UONEDU is a non-governmental organization that was founded in 2017 (UONEDU, 2017, 1) and is organized by the innovations of educators with the aim to develop online education from scratch in undeveloped society with limited recourses, and all in order to overcoming barriers and obstacles in conditions where education is disabled, limited or moved outside predefined spatial, classroom or campus spheres, to give a chance to improve human recourses in education, to reduce levels of power of experts and give the chance for citizens to take an active part in creation of educative programs (UONEDU, 2017, 2). In the literature, this initiative is found as social innovation, which is understood as new ideas or initiatives that make it possible to meet our society's challenges in areas such as the environment, education, employment, culture, health, economic development and to achieve social goals (Vinals & Rodriguez, 2013). Organization for Economic Co-operation and Development and Eurostat (2018), social innovation refers to new idea, new solution, or new design that makes a social impact in terms of conceptual, process, product, or organizational change, which aims to improve the lives of individuals and communities. Not, just that they bring change, these innovations are contributing to a new paradigm of learning and sharing knowledge as well as interactions and socio-psychological development of participants (Klimczuk, A., Butkeviciene, E., & Kerla, M. (2022). Active citizens can contribute to social problems solving through different initiatives

FULL TEXTS BOOK

and projects that serve education and social goals, but also opening an arena for the development of social innovations as production of new knowledge (*techne*) using all available modern technique and technology. In this manner, citizens are participating the modern world into which they *have been thrown.*

The UONEDU organization itself has 3 main anchors: 1) create a bridge from formal education to continuing education of all members; 2) train teachers to teach their teaching projects online (seminars, webinars, courses); 3) connect educators, encourage them to innovate, science and practical solutions, as well as involvement in academic contributions in the field of distance education and improvement of formal education.

UONEDU Models of education

Program type	Description and feature
training of educators	Course 1. Introduction to Online Education, link: https://www.udemy.com/course/introduction-to-online-education-and-online-teaching/ Course 2. How to Motivate Students? link: https://www.udemy.com/course/teach-online-how-to-motivate-your-students/ Course 3. Online Language Teaching Methods, link: https://www.udemy.com/course/teach-online-language-teaching-methods/ Course 4. Leadership and How to Lead in the Online Space, link: https://www.udemy.com/course/teach-online-leadership-and-how-to-lead-your-students/
webinars	1. Online Education Webinar 2. Dispelling Myths about Online Education 3. Leading Online Educators and "Editing" Social Groups 4. Webinar on Online Leadership 5. Methodological Guidelines for Organizing and Conducting Distance Learning in the Specific Circumstances 6. Parents and Online Learning 7. Management of Online Educators on Online Platforms
conferences	The first UONEDU conference "UONEDU" (2018). Second UONEDU conference "Challenges of online teaching in 2019" (2019). The third UONEDU conference "Online innovations, patents, models, approaches, methods and techniques in education and for education" (2020). Fourth UONEDU conference "Global context of education: experiences and perspective" (2021). Fifth UONEDU conference "Traditions and trends in online education (2022). Sixth UONEDU conference "Position of educators in global education" (2023).
other types of programs	e-mail courses, mobile learning, demo-demonstrations, workshops, public discussions

Source: Kerla & Rahimic Ramic (2024)

The specificity of this organization is that it is an integrative model, in which, from formal education through the training model, members lead to independence, who then create their own courses, train other members and present their developed models at the annual conference, contributing both practically and academically. Thus, they constitute the social innovation of citizens by offering transnational cooperation and academic exchange of knowledge, socializing and networking, as well as

FULL TEXTS BOOK

bringing to the table models, representations, organization and the way in which small-scale organizations are thrown and could be recognized in the world.

The biggest challenge of such organizations is to secure their place in society in such a way that they are recognizable and have an influence on formal policy makers, considering that they are in the field of innovation and that they necessarily need to have their voice. The most obvious way is to make their evidence that policy makers can use for their actions and inclusions in the systems.

Wiseman (2005, 2010) and Rogers (2003) guiding educational policymakers to use evidence for educational policymaking for Global contexts and international context. They are bringing and pointing three fundamental macro theoretical approaches that explain why evidence either is or should be used to inform or guide educational policymaking: a) the technical-functional perspective – suggests that educational policymakers use evidence to find the most effective and successful ways to address important educational issues and problems, the goal most often being increased student learning and effective classroom teaching at the least possible expense, b) the sociopolitical perspective - shape policymakers' decisions and approaches to educational issues or problems and models for policymaking that exist and become slowly institutionalized as part of many organizational systems, c) the institutional or organizational perspective.

Types of certificates issued by UONEDU are the following:

Type of certificate	About certificate
CEFR Certificate	The certificate guarantees that the candidate has successfully completed the course in which the total result of the obtained test points is verified according to the CEFR (The Common European Framework of Reference for Languages) methodology for languages.
Certificate of presentation and participation in the conference	The certificate is issued to the presenters of topics at the conference
Training Certificate	The certificate guarantees that the participant has successfully completed 4 training courses on the partner platform Udemy, and thus acquires the right and license for online teaching on reference online platforms.

Source: Kerla & Rahimic Ramic (2024)

The importance of the UONEDU model in addressing challenges in online education and promoting social innovation is its specificity of this organization of citizens and experts in integrative model, in which, from formal education through the training model, members are led to independence, who then create their own courses, train other members and present their developed models at the annual conference, contributing both practically and academically. Thus, they constitute the social innovation of citizens by offering transnational cooperation and academic exchange of knowledge, socializing and networking, as well as bringing to the table models, representations, organization and the way in which small-scale organizations are thrown and could be recognized in the world, making their evidence as its own system, and possibility that policy makers can use for their actions and inclusions in the systems.

Conclusion

The main purpose of this paper is to show how knowledge and education are fundamental elements of the creation and development of the world of technology and advanced technologies, modern science and modern reality in general. In this sense, the question of the source of the meaning of knowledge,

which is found in the Greek term *techne*, and the application of modern education models, which are applied and developed in the UONEDU organization, are essential questions that define the modern world of science, education and technology. We tried to point out the following: that small-scale organizations even without university preparation and training and without an advanced level of technique use, without training in local lifelong learning centers, and only with a high level of openness, solidarity and interest in online training programs and with the skill that produces and does not use ready-made knowledge, they can overcome challenges in specific and sudden conditions of education and readily respond to challenging tasks, as well as make a great contribution in their local communities, and share and show solidarity with colleagues from all over the world , i.e. to build the world into which they were "thrown."

What are the philosophical premises of modern science and modern society, the world of technology and advanced technologies, and why the application and integration of different scientific fields in order to achieve the same goal is the key, with all the challenges of modern science, society and technology pose - what is the knowledge? So, the importance of the UONEDU model in addressing challenges in online education and promoting social innovation is its specificity of this organization of citizens and experts in integrative model, in which, from formal education through the training model, members are led to independence, who then create their own courses, train other members and present their developed models at the annual conference, contributing both practically and academically.

Understanding the meaning of the Greek term techne - production of knowledge, which gives meaning to nowadays term technique, and the transfer of knowledge in a specific, sudden and non-standard conditions of education, show the importance of social sciences in modern science and the real world - the world of modern science and modern technology and truth. It can be concluded that in UONEDU model, they constitute the social innovation of citizens by offering transnational cooperation and academic exchange of knowledge, socializing and networking, as well as bringing to the table models, representations, organization and the way in which small-scale organizations are thrown and could be recognized in the world, making their evidence as its own system, and possibility that policy makers can use for their actions and inclusions in the systems. In that manner the negative meaning attached to the concept of technical and technology, which can be understood as the legacy of modernity, is neither a result nor the legacy to which Heidegger's thought is attached. On the contrary, Heidegger's thought is related to the meaning of techne as the skill of production and the ability to create something new.

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FULL TEXTS BOOK

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A CRITICAL OVERVIEW OF COMMUNITY-BASED SERVICES IN THE FIELD OF DISABILITY

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ABSTRACT

In Turkey, it is difficult to state that a complete transition to community-based services in the field of disability can still be achieved and that these institutions can be used functionally enough. Community-based services for people with disabilities include care and rehabilitation, employment, personal assistance to support independent living and support services for daily living activities such as bathing, dressing and eating. In Turkey, institutions such as day care homes, community mental health centres, hope houses, rehabilitation centres, sheltered workplaces can be listed as community-based institutions. However, there are question marks about the functioning, prevalence, accessibility and effectiveness of these organisations in achieving their goals.

This study is basically structured in line with the following questions:

Why are community-based services for people with disabilities not sufficiently developed and widespread?

Why are large confinement-based care and rehabilitation institutions still prevalent?

It is important to discuss the answers to these questions with Foucault's concepts of power, biopolitics and confinement. Foucault considers 'power' as a way of directing the behaviour of individuals or groups, that is, as a problem of management, and emphasises that in an environment where there is no freedom and resistance, one cannot speak of power, but only of domination. According to Foucault, who first addressed the relationship between body and power in the context of 'being the other', the pressure exerted by power on the body of the other is explained by the concept of 'bio-politics'. Foucault describes all institutions established by the power in the name of healing bodies as the disciplining and normalising mechanisms of the state. According to him, there is no clear and precise explanation of the concepts of normal and abnormal, and the legal system and the medical system decide together who is normal and who is abnormal and who determines the standards for this. Faucault characterises institutions such as prisons, asylums, hospitals, schools, etc. as institutions of 'closure' in order to subject individuals to certain norms by controlling and classifying them.

In this study, firstly, information will be given about Turkey's transition to community-based services in the field of disability, and then community-based services will be evaluated within the framework of titles such as care, health, employment and rehabilitation. As a result, the above research questions will be discussed in terms of the concepts of power, biopolitics and confinement.

Keywords: Disability, Community-based Services, Power, Biopolitics, Confinement.

GİRİŞ

Engelli bireylerin ve ailelerinin engellilere yönelik hizmetlerinden yararlanma süreçleri açısından bakıldığında, tıpkı engelliliğe ilişkin modellerde görüldüğü üzere ahlaki modelden medikal modele ve sonrasında ise sosyal modele doğru bir ilerleme olduğu görülmektedir. Engelliliği bir günahın veya hatanın sonucu olarak gören ahlaki modelden, iyileştirilmesi gereken bir hastalık olarak gören medikal modelle ve sonrasında da toplumla bütünleşmesi gerektiğini savunan sosyal modelle uyumlu biçimde engelli bireylere yönelik hizmetler biçimlenmiştir. Örneğin Orta Çağ Avrupası'nda psikososyal engellilik şeytan girmesi olarak değerlendirilmekte, hastalar tedavi edilmek yerine toplumdan uzaklaştırılmakta ve tımarhane ismi verilen büyük hastanelerde tutulmaktaydılar. 17. yüzyılın sonlarına

FULL TEXTS BOOK

doğru Fransız bir doktor olan Phillippe Pinel, çalıştığı hastanede hastaların zincirlenmesini yasaklamış ve tımarhaneleri hastaneye dönüştürmüştür (Weiner, 2008). Dünyada ve Türkiye'de engellilik konusunda süreç içerisinde farklı bakış açıları ve değişimler meydana gelmiştir.

Bu nedenle çalışmada öncelikle tarihsel gelişim sürecinde engellilik alanında toplum temelli hizmetlerin nasıl olduğuna ilişkin bir çerçeve sunulmuş ardından Türkiye'de engellilik alanındaki toplum temelli hizmetlerin neler olduğu ve nasıl yapılandığına ilişkin bilgilere yer verilmiştir. Bu hizmetlerin gelişim sürecindeki zorluklar ise Foucault'nun iktidar, biyopolitika ve kapatılma kavramlarıyla tartışılmıştır.

TARİHSEL GELİŞİM SÜRECİNDE TÜRKİYE'DE ENGELLİLİK ALANINDAKİ TOPLUM TEMELLİ HİZMETLER

Engelli bireyler için toplumla bütünleşme onlarca yıldır savunulmaktadır. 1950'lerden başlayarak, Amerika Birleşik Devletleri ve Avrupa'daki kurumsuzlaştırma hareketi, yatarak tedavi gören engelli hastaların toplum içinde yaşama hakkına sahip olduğunu öne sürmüştür (Dumont & Dumaont, 2008). Engelli örgütü koalisyonları engellilik siyaseti, erişim ve temsille ilgili konularda kampanya yürüterek ve doğrudan eylem taktiklerinden yararlanarak ülkelerin dikkatini çekmiştir. Bu yıllarda engelli grup ve organizasyonları "biz olmadan bize dair hiçbir şey olmamalı" yaklaşımını benimsemişlerdir. Bu çalışmalarla birlikte engelli bireylerin oluşturduğu örgütler, toplum temelli bakım anlayışına geçilerek yerel yönetimlerin bağımsız yaşam hizmetleri sunmaya başlamasını sağlamıştır (Shakespeare & Watson, 2011: 392-393).

Örneğin 20. yüzyılın ortalarına doğru ruhsal hastalıkların biyopsikososyal doğası anlaşılmaya başlanmış ve ruh sağlığı hizmetlerindeki eksiklikler görülmeye başlanmıştır. 31 Ekim 1963'te ABD başkanı J. F. Kennedy tarafından Ruhsal Hastalığı Olanlar İçin Kurumlar ve Toplum Ruh Sağlığı Merkezleri Kuruluşu Yasası imzalanmış ve akıl hastanelerinin kapatılıp yerine ruh sağlığı merkezleri kurulması planlanmıştır (Cutler, Bevilacqua & McFarland, 2003; Doğan, 2016). Bu doğrultuda Ekim 1965'te Florida'da ilk ruh sağlığı merkezi kurulmuştur (Cutler, Bevilacqua & McFarland, 2003). Toplum temelli ruh sağlığı modeli, sağlık reformu ile birlikte kısa sürede başta İtalya olmak üzere hemen hemen tüm Avrupa ülkelerinde yaygınlaşmış ve uygulanmaya başlanmıştır (T. C. Sağlık Bakanlığı, 2011). 1970'li yılların sonunda ise özellikle gelişmekte olan ülkelerde rehabilitasyon hizmetlerini teşvik etmek amacıyla Toplum Temelli Rehabilitasyon (TTR) kavramı ele alınmaya başlamıştır (Baysal, 2019: 73).

2006 yılında Birleşmiş Milletler, engelli bireylerin toplum içinde yaşama ve toplum destek hizmetlerine erişim hakkını resmi olarak ilan etmiştir (United Nations, 2006). Ancak kurumsuzlaştırma ve toplum temelli hizmetler aradan geçen bu kadar yıl içinde henüz yeterince gelişmemiştir. Henman ve Foster (2015)'ın belirttiği gibi pek çok gelişmiş ülkede, engellilik hizmetlerinin sağlanması kurumsal bakımdan toplum temelli bakıma ve kurumsal finansmandan kişiselleştirilmiş finansmana doğru önemli dönüşümler geçirilmesine rağmen engelli desteği sağlamak hükümetler için bir zorluk olmaya devam etmektedir.

Toplum temelli hizmetler, "engelli bireyin, ailesi ve yaşadığı toplumun da katılımıyla toplum hayatına uyumu kolaylaştırmayı hedefleyen bir yaklaşım, bir stratejidir" (Aydın, 2005a: 2). Toplum temelli hizmetleri aracılığıyla toplumla bütünleşme ve yeterli desteği sağlanmasıyla toplum içinde yaşayan engelli bireylerin bağımsızlığı en üst düzeye çıkarılabilir. Toplum temelli hizmetler, engelli bireyler için taşıdığı önemin yanı sıra bakım verenler için de hayati önem taşımaktadır (Chan ve diğ., 2022). Engelli kişilerin kendi hayatlarının kontrolünü ele geçirmesi ve her türlü hizmette belirleyici bir rol oynaması toplum temelli hizmetlerin ana amaçlarındandır (Miles, 1996: 515). Hartley ve diğ., (2009) tarafından yapılan araştırmaya göre, toplum temelli hizmetler yoluyla engelli bireylerin bağımsızlıklarında artış, hareketliliklerinde gelişme ve iletişim becerilerinde iyileşme görülmüştür.

Toplum temelli hizmetlerde engelli kişilerin, engelli bireylere sahip aileler ve sivil toplum örgütlerinin birlikte hareket etmesi gerektiği gibi eğitim, sağlık, mesleki ve sosyal hizmet alanlarındaki hizmetlerin çoklu -disipliner ve çoklu-sektörel bir anlayışla sunulması gereklidir (Bölükbaşı, 2004:10).Toplum

FULL TEXTS BOOK

temelli destek hizmetleri arasında merkez tabanlı, ev tabanlı, geçici bakım, bakıcı yardımı ve mali sübvansiyon hizmetleri yer almaktadır (Chan ve diğ., 2022).

Türkiye'de hizmetlere bakıldığı zaman ev tabanlı hizmetleri umut evleri, aktif yaşam merkezleri adı altında gündüz bakım hizmetleri, geçici misafir bakım hizmetleri, evde bakım yardımı desteği olarak sıralayabiliriz. 2008 yılında ev tipi sosyal hizmet birimi sayılan Umut Evleri ile engelli kişilerin 4-6 kişilik evlerde toplumsal hayata aktif olarak katılmaları sağlanıp gerekli bakımlarının yapılması hedeflenmiştir (Engelli ve Yaşlı Hizmetleri Genel Müdürlüğü, 2019:18). Ancak Türkiye'de 152 tane umut evi bulunduğu ve 843 engelli bireyin bu hizmetten yararlandığı belirtilmektedir. Yine ev tabanlı hizmetlerden biri olan bakıma ihtiyacı olan ve ekonomik yoksunluk içinde bulunan ağır engelli ya da tam bağımlı bireylere yönelik evde bakım yardımı hizmeti 2006'da uygulamaya girmiştir. Yaklaşık 536 bin kişiye evde bakım yardımı hizmetinden yararlandığı belirtilmektedir (ASHB, 2 Aralık 2021).

Aktif yaşam merkezlerinde engelli bireylerden ailesi yanında bakımı sağlananların tam veya yarı zamanlı olarak gündüz hizmet verilmektedir. Bu merkezlerde engelli bireyin öz bakım ihtiyaçları ve eğitim, sosyal, kültürel ve sportif faaliyetlerle toplumsal hayata katılım ihtiyaçları giderilmektedir. Ayrıca engelli bireylerin ailelerine danışmanlık hizmeti verilmektedir Bu kapsamda; 2022 yılında toplam 134 aktif yaşam merkezinden 1.622 engelli birey hizmet almaktadır (ASHB, 2022).

Mali sübvansiyon hizmetleri kapsamında ASHB tarafından sunulan hizmetler 2022 sayılı Kanun Kapsamındaki Engelli Aylıkları ve Engelli Yakını Aylıkları, Engelli İhtiyaç Yardımları, Engelli Öğrencilerin Ücretsiz Taşınması gibi hizmetler sıralanabilir. Bu hizmetlerden 2022 sayılı engelli aylığı olarak bilinen yardım engel oranı en az % 40 olan engellilere ve özel gereksinim düzeyi en az hafif düzeyde olan çocukların yakınlarına aylık bağlanması olarak sunulmaktadır. 2022 yılında, Engelli (%70 Ve Üzeri) Aylığı kapsamında 279.816 kişi, Engelli (%40-%69) Aylığı kapsamında 348.289 kişi, Engelli Yakını Aylığı (18 Yaş Altı) kapsamında 100.812 kişiye ödeme yapıldığı belirtilmektedir. Engelli ihtiyaç yardımları yoksul ve engelli vatandaşların topluma uyumunu kolaylaştıracak her türlü araç gereç ihtiyaçlarının karşılanmasına yönelik bir programdır ve 2022 yılında 1.113 kişi bu hizmetten yararlanmıştır. Engelli öğrencilerin ücretsiz taşınması ise özel eğitime gereksinim duyan engelli öğrencilerin okullarına ücretsiz olarak ulaşımlarını içermektedir. Ücretsiz taşıma kapsamında 2022 yılında, 117.661 öğrenci yararlanmıştır.

Toplum temelli hizmetlerle ilgili olarak engelli bireylerin istihdamı konusunda Türkiye'de kota yönteminin yanı sıra diğer istihdam modellerinden ise korumalı iş yeri modeli uygulanmaktadır. Buna göre Türkiye'de 2022 yıl sonu itibarıyla 15 korumalı iş yerinde 132 engelli birey istihdam edildiği belirtilmektedir. Bunun yanı sıra kendi işini kurma hibe desteği verilen proje sayısı 67 olmuştur. (ASHB, 2022).

Kamunun yanı sıra yerel yönetimlerin çalışmaları merkez, ev tabanlı, bakım ve mali sübvansiyon konusundaki çalışmalarda büyük bir boşluğu tamamlamaktadır. Bu konuda çalışmalar engelli bireylerin ve ailelerinin sosyo-demografik özelliklerine ve gereksinimlerine ilişkin veri tabanı oluşturulabilmesi, sunulacak hizmetlerin belirlenmesi ve geliştirilmesi, gereksinimine göre tıbbi rehabilitasyon, fizyoterapi, ortez, protez, tekerlekli sandalye vb. araç-gereç gereksinimlerinin belirlenmesi, psikolojik destek, eğitim desteği, rekreasyon, ev içi erişilebilirlik açısından gerekli olanakların sağlanması, sosyal destek, ayni ve nakdi yardım, eğitsel rehabilitasyonu açısından eğitim desteği ve özel eğitim çalışmaları, grup çalışmaları, yasal haklar, engellinin ev yaşamının kolaylaştırılması konularına ağırlık veren küçük grup eğitimleri gibi sıralanabilir (Aydın, 2016:92).

FULL TEXTS BOOK

Merkez tabanlı toplum temelli hizmetler kapsamında özellikle toplum ruh sağlığı merkezleri öne çıkmaktadır. Dünya'da ve Türkiye'de engelli bireylere yönelik toplum temelli hizmetlerin odağına bakıldığında, özellikle ruh sağlığı konusunun ön plana çıktığı görülmektedir. Ruhsal hastalığı bulunan bireylere yönelik hizmetlerin ise ağırlıklı olarak kurum temelli olduğu, toplum temelli ruh sağlığı yaklaşımının oldukça yeni olduğu ve henüz yeterince gelişmediği görülmektedir.

Kurum temelli ruh sağlığı modeli/yaklaşımı, koruyucu önleyici çalışmaları ve rehabilitasyon hizmetlerini içermemekte, bu nedenle de bireylerin hastalığa yakalanmalarını önleme, sosyal işlevselliklerini ve iyilik hallerini artırma ve sürdürme gibi konularda yetersiz kalmaktadır (Bilge ve diğ., 2016). Toplum temelli ruh sağlığı modelinde ise temel hedef, hastalığı olan bireyin mümkün olduğunca ailesinin yanında yaşamını sürdürmesidir. Bunun mümkün olmadığı durumlarda da yine hastalığı olan birey toplumun bir parçası olarak yaşayabileceği bir yere yerleştirilmelidir (Alataş ve diğ., 2009).

Türkiye'de 2006 yılında yayınlanan Ulusal Ruh Sağlığı Politikası metni ile toplum temelli ruh sağlığı çalışmaları hız kazanmıştır. Bu metinde ruh sağlığı sisteminin toplum temelli olması, birinci basamak sağlık hizmetlerine dahil edilmesi, ruh sağlığı alanında yeni yasaların çıkarılması ve rehabilitasyon çalışmalarının yapılması gibi hedefler yer almıştır (Alataş, Karaoğlan, Arslan & Yanık, 2009; Karasu & Yelken, 2013).

Kurum/hastane temelli modelde hastanın yalnızca tedavi gereksinimi ön planda tutulmakta ve diğer sorun alanlarına ilişkin müdahale geliştirilememektedir. Bu nedenle Avrupa Birliği 2009 Türkiye İlerleme Raporu'nda ruh sağlığı konusundaki ilerlemenin sınırlı olduğundan söz edilmiş, kurumsallaşmaya alternatif olarak toplum temelli hizmetlerin oluşturulması ve ayrıca çocuk ve gençlerin sağlıklarının korunması için özel çaba gösterilmesi gerektiği üzerinde durulmuştur (Avrupa Toplulukları Komisyonu, 2009). Türk Psikiyatri Derneği ve Türk Psikologlar Derneği gibi meslek kuruluşları ve Ruh Sağlığında İnsan Hakları Girişimi Derneği gibi hak temelli sivil toplum örgütleri de yine aynı şekilde Türkiye'deki ruh sağlığı politikalarında değişikliğe gidilmesi gerektiğini ifade etmiştir. Bu fikirler doğrultusunda 2006'da Sağlık Bakanlığı tarafından yayınlanan T.C. Ulusal Ruh Sağlığı Politikası metninde "toplum temelli ruh sağlığı sistemine geçilmesi, bu sistemin genel ruh sağlığı sistemine ve birincil basamak sağlık hizmetlerine entegre edilmesi, toplum temelli rehabilitasyon çalışmalarının yapılması, ruh sağlığı hizmetlerinin kalitesinin artırılması, ruh sağlığı alanına ilişkin yasaların çıkarılması, hasta haklarının savunulması, ruh sağlığı alanında eğitim, araştırma ve insan gücünün artırılması" gibi konulara yer verilmiştir (Yılmaz, 2012).

2008 yılında Türkiye'de ilk Toplum Ruh Sağlığı Merkezi Bolu ilinde pilot uygulama olarak hizmet vermeye başlamıştır (Alataş, Karaoğlan, Arslan & Yanık, 2009; Karasu & Yelken, 2013). Ulusal Ruh Sağlığı Eylem Planı 2011-2023'te de belirtildiği üzere, Türkiye ruhsal hastalığı olan bireylerin için bütüncül bir ruh sağlığı sistemi kurmak amacıyla toplum temelli ruh sağlığı sistemine geçmeyi hedeflemiştir. Ancak toplum temelli ruh sağlığı modeline tamamen geçilmeden önce, olanakların henüz yetersiz olması nedeniyle kısa vadede "toplum-hastane denge modeli"nin uygulanacağı belirtilmiştir. 2009'da Sağlık Bakanlığı toplum-hastane denge modeli kapsamında Toplum Ruh Sağlığı Merkezleri açma kararı almıştır. Toplum Ruh Sağlığı Merkezleri projesi oluşturulurken Finlandiya, İtalya, İngiltere, Almanya ve Hollanda'nın sistemleri yerinde incelenmiştir (Alataş ve diğ., 2009). Bu merkezlerle yapılan pilot çalışmalar sonucunda 2011'de yayınlanan Toplum Ruh Sağlığı Merkezlerinin Kurulması ve Çalıştırılmasına Dair Yönerge ile Toplum Ruh Sağlığı Merkezlerinin amacı ve kapsamı belirlenmiş, kurulacak merkezler standardize edilmiş, merkezin çalışma esasları ve çalışacak olan personelin görev tanımı yapılmıştır (T. C. Sağlık Bakanlığı, 2014).

Toplum temelli ruh sağlığı sistemi İngiltere'de psikiyatri hemşireleri üzerine kurulmuştur. Almanya sisteminde görev ve sayı bakımından sosyal hizmet uzmanı ön plandadır. Türkiye'de ise sistem psikiyatristler üzerine kurulu olup daha sonra psikiyatri hemşireleri ve son olarak psikologlar ile sosyal hizmet uzmanları gelmektedir (Bahar ve Savaş, 2013). Toplum Ruh Sağlığı Merkezlerinde çalışan ruh

FULL TEXTS BOOK

sağlığı ekibi psikiyatri uzmanı, psikolog, psikiyatri hemşiresi, sosyal çalışmacı, ergoterapist, uğraş terapisti ve diğer yardımcı personelden oluşmaktadır (Mitchell & Patience, 2002). Bu ekip, gerektiğinde hizmetleri hastanın yaşadığı alana götürmektedir. Amaç, bu bireylerin yaşadıkları ortamda takip ve tedavilerinin yapılmasıdır. Bu şekilde hastalığı olan bireylerin toplumdan dışlanmadan, birlikte yaşamaları hedeflenmektedir (T.C. Sağlık Bakanlığı, 2011).Bu doğrultuda, toplum ruh sağlığı hizmetlerinin temel amacı psikososyal engellilerin işlevselliğini en üst seviyeye getirmek ve bunun devamlılığında kendilerine yardımcı olmaktır (Ayhan, 2016). Türkiye'de 2022 yılı itibarıyla 195 adet Toplum Ruh Sağlığı Merkezi (TRSM) bulunmaktadır (Sağlık Bakanlığı, 2021).

Toplum ruh sağlığı hizmetleri, ruh sağlığını geliştirici, ruhsal sorunları önleyici ve tedavi edici, hasta haklarını gözeten hizmetlerdir. Bu hizmetler açısından danışmanlık, sağlık eğitimi, vaka yönetimi gibi görevler önemlidir. Hastayı değerlendirme, bakım planı oluşturma, iyileştirme faaliyetlerini planlama ve uygulama, onu bu sürece dahil etme gibi çalışmalar yapılmaktadır (Bilgin & Özaslan, 2018; Eren, 2018; Hallaç ve diğ., 2014).

Literatüre bakıldığında, toplum temelli ruh sağlığı hizmetlerinin etkilerine ilişkin az sayıda da olsa bazı araştırma bulguları dikkat çekmektedir. Randomize kontrollü bir çalışmada; toplum ruh sağlığı merkezlerinde uygulanan kriz planının yatış sayılarını azalttığı bulunmuştur (Henderson & diğ. 2004). Ruchlewska ve arkadaşlarının yaptığı başka bir çalışma da bu çalışmayı destekler niteliktedir (Ruchlewska ve diğ., 2014). Toplum ruh sağlığı merkezlerinde verilen hizmetlerin, şizofreni hastalığı olan bireylerin yaşam kalitesini ve işlevselliğini belirgin oranda artırdığı, yeti yitimini büyük ölçüde azalttığı saptanmıştır. Bu nedenle toplum ruh sağlığı merkezlerinin Türkiye'de yaygınlaştırılması faydalı olacaktır (Ensari & diğ., 2013). Yapılan benzer çalışmalar da bu bulguları destekler niteliktedir (Özdemir, Şafak & Örsel, 2017; Şahin & Elboğa, 2019).

Toplum temelli hizmetlerin yanı sıra engellilere yönelik kurumsal bakım hizmetleri de yaygın bir şekilde devam etmektedir. 2022 yılında toplam 107 adet yatılı bakım ve rehabilitasyon merkezinde 7.387 engelli bireye hizmet sunulmaktadır. Ayrıca geçici bakım hizmeti kapsamında bu merkezlerde talep halinde yılda 30 güne kadar ücretsiz bakım hizmeti sunulmaktadır. Engelli bakımı ve rehabilitasyonu konusunda kamunun sunduğu hizmetlerdense özel bakım ve rehabilitasyon kuruluşlarının sayısı oldukça fazladır. 2022 yılında toplam 305 özel engelli bakım merkezinde 26.766 engelli bireye bakım hizmeti sunulduğu belirtilmektedir (ASHB, 2022).

Bu çalışmadaki hizmetlerin dağılımına ilişkin bilgilerde görüleceği üzere toplum temelli hizmetlerin sayısı ve dolayısıyla yararlanan bireylerin sayısı kurum temelli bakım kuruluşlarına göre çok azdır. Dünyadaki toplum temelli hizmetler değerlendirildiğinde, engelli bireylerin sosyal yaşamlarının gelişmesi, bağımsızlıklarının artırması, kültürel vb. etkinliklere erişimlerinin artması, ailelerinin desteklenmesi gibi konularda gelişmelerin olmasına katkı sunduğu görülmektedir. Ancak bu gelişmelere rağmen toplum temelli hizmetler yaygın değildir. Hali hazırda Türkiye'de toplum temelli hizmetlerin işlevselliğine dair bir bilgi de bulunmamaktadır. Bu yüzden toplum temelli hizmetlerin işleyişinin de değerlendirilmesi gereklidir.

Tüm bu hizmetlerin planlanmasında ve sunulmasında bedensel, görme, zihinsel, işitme ve konuşma engelli bireylerin ve ayrıca kesişimsellik açısından çocuk, kadın ve yaşlı engellilerin göz önünde bulundurulması önemlidir. Yine bu hizmetler açısından insan haklarının ve kapsayıcılığın, erişilebilirlik, bağımsız yaşam ve eşit ve tam katılım gibi temel kavramların gözetilmesi gerekmektedir.

ENGELLİLİK ALANINDA TOPLUM TEMELLİ HİZMETLERİN GELİŞİMİNE FOUCAULT'NUN İKTİDAR, BİYOPOLİTİKA VE HAPSETME/KAPATMA KAVRAMLARIYLA BAKMAK

Bir önceki başlıkta görüleceği üzere dünyada ve Türkiye'de toplum temelli hizmetlere geçiş çok geç sağlanmıştır. Engelli bireylere yönelik toplum temelli hizmetler hala yeterince gelişmemiş ve

FULL TEXTS BOOK

yaygınlaşmamıştır. Ayrıca hapsetmeye dayalı büyük bakım ve rehabilitasyon kurumları hala yaygındır. Bu iki konu çalışmad Foucault'nun iktidar, biyopolitika ve kapatılma kavramlarıyla tartışılmaktadır.

Modern toplumda insan akıl ile hareket eden ve "norm"lara uyarak devletin gelişimini sağlayan birey olarak ele alınmaktadır. Modern insan da işte bu yüzden çalışan, üreten, sağlıklı, akılcı, ilerlemeye açık, normlara tabi tutulan ve itaatkâr bireydir. Bu göstergeleri yerine getiremeyen bireyler "öteki"dir. Örneğin engelliler, bu göstergeleri sağlayamadıkları düşünüldüğü için toplumdan dışlanması, kapatılması gereken tehlikeli bireyler olarak algılanmaktadır (Şimşek, 2014). Bu çerçeveden engellilik konusu ele alındığında bireyin bedeninde ve aklında olan bozukluklara vurgu öne çıkmakta ve bu bozukluklar nedeniyle engelli bireyler toplumdan dışlanmaktadır. Bu dışlanmayı toplumdaki bireylerin davranışlarında görebileceğimiz gibi toplumun inşası olarak hizmetlerin yapılanmasında da görebilmekteyiz.

XX. yüzyılın ikinci çeyreğinde çeşitli topluluklar, hareketler, düşünceler modernitenin düzeni ve çelişkilerini eleştirmeye başlamışlardır. Bunun ardından ortaya çıkan postmodernist anlayış çerçevesinde ise modernitede var olan politik, ekonomik ve sosyal alanlardaki uygulamaların tartışılmasının yanı sıra yenilikler yapılmaya başlanmıştır (Şimşek, 2014). Bu yüzden postmodern dönemde akıl ve beden üzerinden gerçekleştirilen düzenlemeleri tartışan sosyologlardan biri olarak Micheal Foucault'un çalışmalarına bakılmalıdır.

Foucault çalışmalarında modernitenin bireylerin ve toplumun üzerindeki etkisi ve yeni iktidar ilişkisini tıp, delilik, beden, iktidar, disiplin, cezalandırma, hapishane gibi konuları ele alarak açıklamaya çalışmıştır. Bu açıklamalarında iktidarın bedenleri ve dolayısıyla yaşam pratiklerini çeşitli araçlar, kurumlar ve kişiler aracılığıyla nasıl düzenlediğini ve disipline ettiğini görmemizi sağlar. Foucault iktidarın her yerde olduğunu ve modern toplumda beden üzerinde çeşitli uygulamalarla üretiminin gerçekleştirildiğini belirtir.

Foucault, 'iktidar'ı bireylerin ya da grupların davranışlarını yönlendirmenin bir yolu, yani bir yönetim sorunu olarak ele alır ve özgürlüğün ve direnişin olmadığı bir ortamda iktidardan değil, ancak tahakkümden söz edilebileceğini vurgular (Saraçoğlu, 2022). Foucault'a göre devletten kaynaklanan iktidarın yanı sıra iktidar, ailedeki, okuldaki ve/veya iş yerindeki ilişkiler olarak mikro düzeydeki ilişkiler içinde de vardır (Foucault, 2015:44). İktidarın işlemesi konusunda devletin etkisi görünmeksizin, mikro ilişkilerin içine yerleşik bir biçimde aşağıdan yukarıya doğru bir ilerleme görülür (Karakurt Acar, 2023).

Foucault hükümranlık, disipliner ve yönetimsellik modeli olmak üzere üç iktidar modeli tanımlamıştır. Karakurt Acar (2023) hükümranlık modelinin Klasik Çağ olan XVII. yüzyılın ortasından XVIII. yüzyılın sonuna kadar, disipliner modelin XVIII. yüzyılın sonlarında, yönetimsellik modelinin ise XIX. yüzyılın ortasından itibaren görülebileceğini belirtir. Engellilik ve hastalıklar konusunda kullanılan tekniklerden yola çıkarak bu iktidar modellerinin nasıl işlediği anlaşılabilir. Örneğin Foucault'nun çalışmalarında ele aldığı cüzzam, veba ve çiçek hastalıklarına karşı üretilen çözümlerde bu görülebilir. Orta Çağ'da cüzzamlıların toplumdan dışlanması hükümranlık modeline örnek gösteribilir. XVI. ve XVII.yüzyılda vebaya karşı insanları kapatan, sınırlayan karantina uygulamaları disipliner modele bir örnektir. XVIII.yüzyılda çiçek hastalığının nüfusta ölüm ve bulaş riskinin, hastalığın etki ve yayılımının hesaplanması ve bu hastalığa yönelik müdahaleler ve aşılama pratikleri ise yönetimsellik modelinin toplumsal düzene nasıl etki ettiğini gösteren bir örnektir (Karakurt Acar, 2023). Foucault, cüzzamın kademeli olarak ortadan kalkmasının ardından serseriler, yoksullar, suçlular, deli ve zührevi hastaların da aynı süreçlerden geçtiğini belirtmiştir. Buna göre de örneğin psikososyal engellilerin Orta Çağ ve Rönesans boyunca hükümranlık modeli kapsamında cüzzamlılar gibi dışlanarak sürgüne ve hapse maruz bırakıldığını vurgulamıştır. Bunun tarihteki en önemli görünümü "deli gemileri"dir. Daha sonra ise XVII. yüzyılda "deli gemileri"nin yerini tımarhane, hastane, hapishane gibi özel kurumsallaşmış kurumlar almıştır ve deliler bu kurumlarda hapsedilmiş/kapatılmış/izole edilmişlerdir. Ancak Foucault bu kapatmanın amacının disipliner model kapsamında kamu düzenini sağlamak olduğunu belirtmiştir.

FULL TEXTS BOOK

XVIII. yüzyılın sonunda ise yönetimsellik bağlamında tıp bilimi delilik kavramını açıklığa kavuşturmuş ve XIV. yüzyılda "deli" kavramı zihinsel hastalık tanısı olan bireye dair bir kavram olarak kullanılmaya başlanmıştır. Ancak deli bedenler yine de yönetimsellik kapsamında toplumun düzenini bozan anormal sayılan insanlar olarak aynı normalleştirme, iyileştirme, ıslah yöntemlerine maruz bırakılmıştır (Foucault, 2006; Pangaliyeva, 2023).

Yukarıda ifade edilen bu iktidar modellerinin amaçları, yöntem veya tekniklerine dayanan devlet aygıtları olarak kurumlar ortaya çıkarmıştır. Engellilik açısından baktığımızda Foucault, iktidar tarafından bedenleri iyileştirme amacıyla kurulan tüm kurumları ve bu kurumların işleyiş düzenini, bu düzendeki iktidar sahiplerini devletin disipline etme ve normalleştirme mekanizmalarının bir parçası olarak nitelendirmektedir. Buna göre Foucault XVIII. Yüzyılda kurumlardaki üretken iktidar tekniklerinin norma göre işlediğini ve bu toplumsal işleyişte ise zorlama ile değil doğallaştırarak uygulanan iktidar bulunduğunu belirtmiştir. Buna göre normun işlevi, dışlamak ve reddetmek yerine olumlu bir müdahale ve dönüşüm tekniğinin kullanıldığı bir tür normatif proje çerçevesinde ilerler (Foucault, 2003; Karakurt Acar, 2023). Dolayısıyla normun işlevi artık dışlamaya engel olmak için müdahalelerle dönüşümü sağlamak olarak ifade edilebilir. Bu noktada engellilik alanındaki tıbbi modelin bireyleri çeşitli tedavi yöntemleriyle "norm"a uygun hale getirme girişimleri öne çıkmaktadır. Revel'in (2012) ifade ettiği gibi norm, ıslah ve terbiye amacıyla sağlık, beslenme, hijyen, gündelik yaşam pratikleri, çalışma hayatı gibi alanlarda sağlıklı olanı olmayanı, normal olanı olmayanı ya da bir başka değişle anormal olanı belirler ve bu ayrım sonucunda sağlıklı ve normal bir toplumun empoze edilmesini sağlar. Bu noktada öne çıkan "biyopolitika" kavramı ise modernleşen toplumlarda nüfusun yaşam süreçlerinde etkili olan "sağlık, hijyen, doğum oranı, yaşam süresi gibi karakteristik fenomenlerin" nasıl bir şekilde mantığa dayandırılarak topluma empoze edildiğini ifade eder (Foucault, 2015).

Foucault iktidarı ise "öteki" olarak modern toplumda dezavantajlı konuma yerleştirilen grupların bedenine yönelik her türlü baskı, eziyet etme, kontrol altına alma, gözlemleme, üzerinde çeşitli deneyimler yapma, izole ederek dışlama" faaliyetlerini içeren biyo-politika kavramıyla yani yönetimsellik modeliyle açıklar. Örneğin bedenleri terbiye ve disipline etme konusunda tımarhanelerdeki/akıl hastanelerindeki işleyiş, düzen ve disiplin ile hasta tedavi edilmeye çalışılır. Bu düzende "anormal" kişiler görünmeyecek şekilde çoğunlukla şehirlerin dışında bir konumda veya etrafı duvarlarla çevrili büyük, geniş kapalı kuruluşlarda doktorun hakimiyetinde normalleştirilmeye çalışılır. Doktor bedeni bu düzende iktidar sahibi olarak akıl hastanesinde ilişki ağlarının nasıl olacağını belirler, iş akışlarını ve çalışma düzenlemeleri yaparak diğer personel ve "üzerinde çalışılan deliler arasındaki ilişkiyi belirler. Buna göre akıl hastanelerine kapatılan deli bedenler, hapishaneye konulan bedenlerle aynı kaderleri paylaşmaktadırlar. Burada iktidar olan doktorlar tüm yetkileriyle deli bedenler üzerinde çeşitli uygulamalar, deneyler yapabilirler. İktidarın sınıflandırma sisteminde topluma uymayanların normalleştirilmesi için bireyler, tıbbın verdiği iyileştirme kararıyla modern iktidarın getirdiği akıl hastaneleri, rehabilitasyon merkezleri, özel okullar gibi kurumlara kapatılarak toplumdan izole edilmiştir. Modern yönetimin bu işlemlerini ise Foucault "Büyük Kapatma" olarak ifade etmektedir (Foucault, 2006). Bu perspektifle bazı engel türleri dikkate alındığında engelli bireyler üzerinde her ne kadar birçok tedavi ve rehabilitasyon yöntemi denense de sağlık, gündelik yaşam, çalışma hayatı gibi alanlarda modern toplumun "norm"larına göre bir düzenleme ve "normalleştirme, iyileştirme" uygulamasına yanıt alınamamaktadır. Buradan yola çıkarak şu soru gündeme gelmektedir:

- Toplum temelli hizmetlerin gelişmemesinin ve yaygınlaşmamasının sebebi tüm çabalara rağmen "normalleşmenin" sağlanamaması ve bu kişilerin görünürlüğünün kısıtlanmasının istenmesi midir?
- Hapsetmeye dayalı büyük bakım ve rehabilitasyon kurumlarının hala yaygın olmasının bir sebebi, normalleştirme konusundaki başarısızlığın sonucunda engelli bireylerin "toplumsal düzeni bozan" ve kapatılması/hapsedilmesi/izole edilmesi gerekenler kategorisine yerleştirilmeleri midir?

FULL TEXTS BOOK

Foucault biyopolitika kavramıyla iktidarın işleyişindeki değişime vurgu yaparak hükümranlık döneminde öldürerek icra edilen iktidarın yerine yaşam hareketlerini kontrol eden ve düzenleyen bir yerde konumlanan "ayarlama iktidarı" aldığını belirtir (Foucault, 2004: 252). Buna göre üretim için nüfus hareketlerinin ve bedenlerin uygunlaştırılması ve yaşam hareketlerinin tarihsel süreçlerle bütünleştirilmesi gereklidir. Bedenlerin denetimli bir biçimde üretim aygıtı içerisinde yer alması ve nüfus olaylarının ekonomik süreçlere göre ayarlanması amacında olan biyopolitika, liberal ekonominin ve kapitalizmin gelişmesine katkıda bulunmaktadır (Foucault, 2003). Dolayısıyla engelli bireyler bu yapı içerisinde topluma maliyeti olan kişilerdir ve yapılan her türlü müdahale bireylerin üretim aygıtı içerisine dahil olmalarını sağlamaya odaklanırken bu anlamda toplumsal maliyetinin de fazla olmaması gerekir.

Liberal ekonomik açıdan engellilik ile ilgili olarak biyopolitikaya bakıldığında özellikle "bir nüfusta hakim olan hastalıkların yapısı, doğası, yayılımı, süresi" gibi süreçler biyo-iktidarla birlikte "fiziksel anlamda güçlerin eksilmesi, çalışma süresinin azalması ve buna bağlı üretimdeki eksiklik ve tüm bunların yanı sıra mal olabileceği tedavilerin de yol açtığı ekonomik maliyetlerin süreğen faktörleri" (Foucault, 2004:249) gibi parametrelerle analiz edilir. Bu parametreler nüfus göstergelerinin dinamik alanı içerisinde anlamlandırılır ve buna yönelik politika ve hizmetlerin yapılandırılmasında bu parametreler dikkate alınmaktadır. Bu parametrelerin engellilik alanındaki politika ve hizmetlerin yapılandırılmasında temelde kullanıldığı ifade edilebilir.

- Bu parametrelerden yola çıkarak toplumda sağlamcı anlayışın baskın olmasından kaynaklı engelli bireylere yönelik politika ve hizmetlerin yapılanmasında da engelli bireylerin "güçsüz, çalışamayan, üretime katkı sağlayamayan, tedavi maliyeti yüksek olan kişiler olarak görülmesi" bu alana yeterince odaklanılmamasına mı neden olmaktadır?

Foucault'nun bir dersinde kullandığı "beden, biyopolitik bir gerçeklik; tıp, biyopolitik bir stratejidir" (Foucault, 2001: 137) ifadesi tıp ve siyaset buluşmasına dair önemli bir noktaya işaret etmektedir. Arpacı (2016) bu ifadeyle tıbbi bilgi ve pratiklerin modern siyaset içindeki kritik konumuna işaret eder. Ayrıca tüm toplumsallığı içinde bedenin inşasındaki stratejik rolün tartışılmasının ardından beden ve nüfus politikalarının bir tıbbileştirme sürecine işaret eder. Foucault tıbbileştirme ile normalleştirme arasında ilişkiye dikkat çeker ve tıbbi bilginin sürekli bir biçimde "normallik" nosyonlarına başvurduğunu belirtir (Foucault, 2006: 57). Bu sayede Tıbbın sunduğu normatif bilgi sonucunda tıbbın toplumsal normların inşası, iktidarın uygulanması ve bedenleri normalleştirme işlevi öne çıkar. Arpacı (2016) Foucault'un bu konudaki açıklamalarını, modern toplumların inşasında tıbbi söylemin devletleşmesi ile devlet pratiğinin tıbbileşmesinin de birbirinden ayrılamayacağını vurgulayarak ifade etmiştir. Modernleşen Batı'da biyolojik yaşamın siyasetin nesnesine dönüşmesi bu ilişki çerçevesinde anlaşılması gerektiğini öne çıkarmıştır (Arpacı, 2016). Dolayısıyla aslında bedenler üzerindeki bu çalışmaları tıp ve siyaset ilişkisi bağlamında da okumak gereklidir. Bu yüzden sağlık politikalarının nasıl yapılandırıldığına bakılmalıdır. Bu durum şu soruları gündeme getirmektedir:

- Engellilik alanında toplum temelli hizmetlerin gelişmemesi ve yaygınlaşmamasında tıp alanının iktidar öznesi doktorların siyasete ve sağlık politikalarına olan etkisi üzerinde ne kadar durulmaktadır?
- Tıp alanının iktidar öznesi doktorların ve karar vericilerin engellilik alanında toplum temelli hizmetlere yönelik bakış açısı nasıldır? Bu hizmetlerin gelişmesini gerekli bulmakta mıdırlar?

Bu ilişkiye ek olarak Foucault, "delilerin, anormallerin" akıl hastanelerine kapatılmasında, normal ve anormal olanın ve onun standartlarının belirlenmesinde iktidar sahibi olan hukuk ve tıp alanlarının iş birliğini öne çıkarır (Foucault, 2006). Ailenin deli ya da anormal bedenlere bakım sorumluluğu konusunda ise psikiyatri ve hukuk ailenin yükünü hafifleten konumundadır. Çünkü hastalık ve tedavi söylemiyle deliyi ailenin sorumluluğundan alır ve kapatmanın yasal olarak meşrulaştırılmasıyla aileyle psikiyatri arasında güçlü bir bağ ve doğal ortaklıklar oluşur. Psikiyatrist bu sayede hastalığın ailedeki etkilerine de müdahale eden konumuna geçmiştir (Karakurt Acar, 2023). Bu bilgiler ışığında, toplum temelli hizmetlerin artmasıyla birlikte "engellilerin" yanı sıra "aile üyelerinin" de bu hizmetlere

FULL TEXTS BOOK

erişilebilirliğinin artmasının sağlanacak olması, hizmet alan kitlesinin de artması demektir diyebiliriz. Bu perspektifle ele alındığında şu soru gündeme gelmektedir:

- Toplum temelli hizmetlerin gelişmemesinde "engelliler, aile üyeleri ve toplumdaki diğer bireyler"den oluşan hizmet alan kitlesinin genişlemesinin maliyeti mi düşünülmektedir?

SONUÇ ve ÖNERİLER

Bu çalışmada yapılan literatür taramasında dünyada ve Türkiye'de toplum temelli hizmetlere geçişin çok geç sağlandığı ortaya çık mıştır. Bunun yanı sıra engelli bireylere yönelik toplum temelli hizmetlerin hala yeterince gelişmemiş ve yaygınlaşmamış olmasına ve hapsetmeye dayalı büyük bakım ve rehabilitasyon kurumlarının hala yaygınlığına dikkat çekilmiştir. Toplum temelli hizmetlerin sayısı ve dolayısıyla yararlanan bireylerin sayısı kurum temelli bakım kuruluşlarına göre çok az olduğu, toplum temelli hizmetlerin işlevselliğine dair bir bilgi de bulunmadığı ortaya çıkmıştır. Bu yüzden toplum temelli hizmetlerin işleyişinin de değerlendirilmesi gerektiği vurgulanmıştır.

Çalışmada engellilik alanındaki toplum temelli hizmetlere dair bu tespitler Foucault'nun iktidar, biyopolitika ve kapatılma kavramlarıyla tartışılmıştır. Foucault'un iktidarın hükümranlık, disipliner ve yönetimsellik modellerinden yola çıkarak engellilik alanındaki çalışmaların gelişimi değerlendirilmiştir. Buna göre günümüzde engelli bireyler üzerinde her ne kadar birçok tedavi ve rehabilitasyon yöntemi denense de sağlık, gündelik yaşam, çalışma hayatı gibi alanlarda modern toplumun "norm"larına göre bir düzenleme ve "normalleştirme, iyileştirme" uygulamasına yanıt alınmadığı durumlar ve toplumdaki hakim sağlamcı anlayış dikkate alınarak engelli bireylere yönelik politika ve hizmetlerin yapılanmasının şekillendiği ortaya çıkmıştır. Buradan yola çıkarak toplum temelli hizmetlerin gelişmemesinin ve yaygınlaşmamasının sebebinde tüm çabalara rağmen "normalleşmenin" sağlanamamasının etkisi vurgulanmıştır. Hapsetmeye dayalı büyük bakım ve rehabilitasyon kurumlarının hala yaygın olmasının bir sebebi olarak ise normalleştirme konusundaki başarısızlığın sonucunda engelli bireylerin "toplumsal düzeni bozan" ve kapatılması/hapsedilmesi/izole edilmesi gerekenler kategorisine yerleştirilmelerine dair bir varsayım öne sürülmüştür. Bu noktada toplumdaki sağlamcı bakışın değişmesine ve engelli bireylerin "norm"a uymayan "anormal" kategorisinden çıkartılmasına ve çeşitlilik anlayışının yerleşmesine yönelik çalışmalara ağırlık verilmesi önemlidir.

Birçok ülkede toplum temelli rehabilitasyon uygulamalarının hayırseverlik yaklaşımının izlerini taşıdığı ve bu durumun da engelli bireylerin sosyal olarak içerilmesini engelleyen önemli bir etken olduğu düşünülmektedir (Ayalew ve diğ., 2020). Bu da yine engelliliğin normal dışı, anormal bir durum olarak görülmesiyle oldukça bağlantılıdır. Toplumsal normlara uymayan, bu normların dışında olan bireyler, acınası durumda olan bireyler olarak görülmektedir ve onlara iyilik yapma yoluyla 'sağlam' insanların görevlerini yerine getirmiş olacakları algısı hakimdir.

Çalışmada Foucault'un iktidarın yönetimsellik modelinde öne çıkan biyoiktidarın nüfus hareketlerinin ve bedenlerin üretim için elverişli hale getirilmesi amacındaki liberal ekonomi ve kapitalizm vurgusuna dikkat çekilmiştir. Buradan hareketle engelli bireylere yönelik her türlü müdahale bireylerin üretim aygıtı içerisine dahil olmalarını sağlamaya odaklanılması kapsamında değerlendirilirken, bunun bazı durumlarda ekonomik maliyetinin de fazla olması ise bir başka sorunu gündeme getirmektedir. Özellikle engellilik alanındaki toplum temelli hizmetlerin gelişimi ve yaygınlığı ile ilgili sorunlara ekonomik "maliyet/yük" açısından değerlendirmelerin üzerinde durulması gerektiği ortaya çıkmıştır. Bu "maliyet/yük" anlayışından yola çıkarak engelli bireylere yönelik politika ve hizmetlerin yapılanmasında da sağlamcı bakışın bir yansıması olarak engelli bireylerin "güçsüz, çalışamayan, üretime katkı sağlayamayan, tedavi maliyeti yüksek olan ve tüketici konumda olan kişiler olarak görülmesi"nin bu alana yeterince odaklanılmamasında etkisi sorgulanmıştır. Bu noktada Burcu (2007)'nun da belirttiği üzere, toplumsal yaşamda yalnızlık ve sosyal dışlanma riskleriyle karşılaşma olasılığı yüksek olan engelli bireyler açısından onların üretici, yaratıcı yanlarıyla toplum tarafından

FULL TEXTS BOOK

içselleştirilmelerini sağlayacak olanakların verilmesine ve düzenlemelerin yapılmasına yönelik kapsayıcı politikalar üretmek, geliştirmek ve bunların işlerlik kazanmasını sağlamak gerekmektedir.

Engellilik alanında iktidarın ana öznesi olarak tıp ve siyaset ilişkisi bağlamında sağlık politikalarının yapılandırıldığı vurgusu yapılmıştır. Bu vurgudan yola çıkarak engellilik alanında toplum temelli hizmetlerin gelişmemesi ve yaygınlaşmamasında tıp alanının iktidar öznesi doktorların siyasete ve sağlık politikalarına olan etkisi üzerinde durulması gerektiği düşünülmektedir. Bu yüzden tıp alanının iktidar öznesi doktorların engellilik alanında toplum temelli hizmetlere yönelik bakış açısının keşfedilmesi gereklidir. Bu bakış açısının toplum temelli hizmetlerin gerekliliği, verimliliği, toplumsal maliyeti azaltacak olması yönünde olması toplum temelli hizmetlerin gelişmesinde önemli bir konudur. Doktorların yanı sıra toplumun engellilik ve özellikle psikososyal engellilik hakkında bilgilendirilmesine ve bilinçlendirilmesine yönelik çalışmaların, ayrımcılığı önlemeye yönelik çalışmaların artırılması, yetersiz sosyal politikaların geliştirilmesi gerekmektedir (Gözen ve Buz, 2020). Toplum temelli hizmetlerin artmasıyla birlikte toplumda yer alan "engellilerin" yanı sıra "aile üyelerinin" de hizmetlere erişilebilirliğin artmasının sağlanacak olması hizmet alan kitlesinin de artması demektir. Buradan yola çıkarak çalışmada toplum temelli hizmetlerin gelişmemesinde "engelliler, aile üyeleri ve toplumdaki diğer bireyler"den oluşan hizmet alan kitlesinin genişlemesinin maliyetinin etkisi sorgulanmıştır. Burada toplum temelli hizmetlerin gelişmesi halinde engelli bireylerin hastaneye gereksiniminin azalması ve dolayısıyla bakım yükünün azalması, engelli bireylerin ve ailelerin biyo-psiko-sosyal açıdan sağlığı, ekonomik durumları gibi açılardan yaşamlarındaki iyileşmelerin maliyeti düşüren sonuçlar doğuracağı fikri öne çıkartılmalıdır.

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FULL TEXTS BOOK

2005, 2018 VE 2024 COĞRAFYA DERSİ ÖĞRETİM PROGRAMLARININ KARŞILAŞTIRILMALI ANALİZİ
COMPARATIVE ANALYSIS OF 2005, 2018 AND 2024 GEOGRAPHY CURRICULUM

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ÖZET
Bu çalışmada 2005, 2018 ve 2024 Coğrafya Dersi Öğretim Programlarının karşılaştırılmalı olarak analizinin yapılması amaçlanmıştır. Nitel araştırma yöntemlerinden biri olan doküman analizinin kullanıldığı bu çalışmada programlar öğrenme alanı-ünite, ders süresi, kazanım sayısı, değer, beceri ve okuryazarlıklar başlıkları altında incelenerek, programların benzerlikleri ve farklılıkları ortaya konmaya çalışılmıştır. Elde edilen veriler tablolaştırılmış ve betimsel analizleri yapılmıştır. Araştırma sonucunda 2024 Coğrafya Dersi Öğretim Programında önemli birçok yenilik gözlemlenirken, programlarda yer alan kazanım sayılarında önemli ölçüde düşme saptanmıştır. 2005 ve 2018 programlarında değer sayıları aynı kalırken, 2024 programına yeni değerler eklendiği, okuryazarlıklara değinildiği görülmektedir. Daha önceki programlarda olmayan mekânsal düşünme becerisinin 2024 programında yer alması, aynı zamanda coğrafi bilgi sistemlerine verilen önemin artması da gözlemlenen diğer yeniliklerdir. 2024 programıyla eğitimdeki değişen ihtiyaçlara ve teknolojik çağa uyum sağlama konusunda önemli adımlar atılmış olacaktır.
Anahtar Kelimeler: Coğrafya dersi öğretim programı, kazanım, değer, coğrafi beceri

ABSTRACT
This study aims to provide a comparative analysis of the 2005, 2018 and 2024 geography curricula. In this study, in which document analysis, one of the qualitative research methods, was used, the programmes were examined under the headings of learning area-unit, course duration, number of outcomes, values, skills and literacies, and an attempt was made to reveal the similarities and differences of the programmes. The data obtained were tabulated and descriptive analyses were carried out. As a result of the research, while many important innovations were observed in the 2024 Geography Curriculum, there was a significant decrease in the number of outcomes in the programmes. While the number of values remained the same in the 2005 and 2018 programmes, it can be seen that new values have been added to the 2024 programme and literacy has been mentioned. The inclusion of spatial thinking skills in the 2024 programme, which were not included in the previous programmes, and the increased importance given to geographical information systems are other innovations observed. The 2024 programme takes important steps to adapt to the changing needs of education and the technological age.
Keywords: Geography curriculum, achievement, value, geographical skills

GİRİŞ
Eğitim, bilim ve teknolojinin hızla ilerlediği, küresel boyutlara ulaştığı bir dönemde köklü değişiklikler geçirmiş ve çağın beklentilerine uygun hale getirilmiştir. Toplumların ihtiyaçlarına

FULL TEXTS BOOK

yanıt veremeyen mevcut öğretim programları, eğitim programlarının yenilenmesine yol açmıştır. Bu programlar, öğrenme ve öğretme süreçlerini yönlendiren temel kılavuzlardır. Demirel (2010), eğitim programını öğrenme deneyimlerini sağlamak için planlanmış etkinliklerin düzeneği; öğretim programını ise belirli bir ders veya konunun öğretimini içeren tüm etkinlikler şeklinde tanımlamıştır. Öğretim programları, öğrenme sürecinde belirlenen istendik davranışların hangi yöntemler ve araç-gereçler kullanılarak en etkili şekilde nasıl kazandırılabileceğini bulduğumuz kılavuzlardır (Gözütok, 2003). Öğrencilerin bilgiye daha hızlı erişmelerini, kritik düşünme becerilerini geliştirmelerini ve küresel sorunlara çözüm odaklı yaklaşabilmelerini sağlamak amacıyla tasarlanmışlardır.

Cumhuriyetin ilanından günümüze kadar ülkemizde birçok dersin öğretim programında görüldüğü gibi coğrafya dersi öğretim programında da önemli değişiklikler yaşanmıştır. Yaşanan bu değişiklikler bazen kapsamlı bir şekilde olmuş, bazen de sınıf bazında haftalık ders saatlerini düzenleme şeklinde kendini göstermiştir (Göcen, 2021). İlk uygulanan coğrafya öğretim programı 1924 yılında hazırlanmış, ders saatlerinde değişiklikler yapılarak 1934 ve 1938 yıllarında program güncellenmiştir (Geçit, 2008; Türker, 2019). Coğrafya dersi öğretim programında önemli bir dönüşüm 1941'de düzenlenen I. Türk Coğrafya Kongresi'nde yaşanmıştır. Kongrede alınan öneriler ve kararlar doğrultusunda 1942 Coğrafya Dersi Öğretim Programı (CDÖP) hazırlanarak, önceki programlardan daha detaylı bir yapıya sahip olmuştur. Bu tarihten sonra coğrafya dersi öğretim programı 1957, 1971, 1973, 1982, 1983, 1992 yıllarında yeniden düzenlenmiştir.

2005 yılında köklü değişiklikler yapılarak yapılandırmacı bir öğretim yaklaşımıyla hazırlanmıştır. Program uygulamaya konduktan sonra, 2010, 2011 ve 2014 yıllarında revize edilmiş ve 2017 yılına kadar geçerliliğini sürdürmüştür. 2014 revizyonunda 10. sınıf coğrafya dersinin 2+2 şeklinde olan ders saatinin seçmeli kısmı kaldırılmış ve öğretim programındaki toplam kazanım sayısı düşmüştür. 2017 ve 2018 yıllarında Millî Eğitim Bakanlığı, öğretim programlarını yeniden güncelleme kararı almıştır. 2018 yılında yapılan bu güncellemelerin ardından yenilenen coğrafya öğretim programı, 2018-2019 eğitim-öğretim yılında uygulanmaya başlanmıştır. Yapılan değişiklikle kazanım ifadeleri, sıralaması, açıklamaları değiştirilerek yeni kazanımlar programa eklenmiştir (Şahin, 2019). 2024 Coğrafya Dersi Öğretim Programında 2005 ve 2018 öğretim programlarına nazaran kazanım sayısında önemli ölçüde düşme olsa da haftalık ders süresinde değişikliğe gidilmemiştir. Bu kapsamlı değişikliklerin ışığında, 1924-2024 yılları arası coğrafya dersi öğretim programlarında coğrafya derslerinin isimleri ve haftalık ders saati dağılımı aşağıdaki gibidir.

Tablo 1. 1924-2024 Yılları Arası Coğrafya Dersi Öğretim Programlarında Coğrafya Derslerinin İsimleri ve Haftalık Ders Saatleri

Coğrafya Dersi	Ders	Sınıf	Haftalık Ders Saati
1924	Umumi Coğrafya	Lise 1	1
	Büyük ve Komşu Memleketler Coğrafyası	Lise 2	1
	Türkiye Coğrafyası	Lise 3 (Fen ve Edebiyat Alanı)	1
1938	Umumi Coğrafya	Lise 1 (Fen Alanı)	2
	Büyük ve Komşu Memleketler Coğrafyası	Lise 2 (Fen Alanı)	2
	Türkiye Coğrafyası	Lise 3 (Fen Alanı)	1
		Lise 3 (Edebiyat Alanı)	1

FULL TEXTS BOOK

1942	Genel Coğrafya	Lise 1	2
	Devletler Coğrafyası	Lise 2	2
	Türkiye Coğrafyası	Lise 3	1
1957	Coğrafya	Lise 1	2
	Ülkeler Coğrafyası	Lise 2	2
	Türkiye Coğrafyası	Lise 3 (Fen Alanı)	1
		Lise 3 (Edebiyat Alanı)	2
1971	Genel Coğrafya	Lise 1	2
	Ülkeler Coğrafyası	Lise 2 (Fen ve Edebiyat Alanları)	1
	Ülkeler Coğrafyası	Lise 3 (Fen ve Edebiyat Alanları)	1
1973	Genel Coğrafya	Lise 1	2
	Ülkeler Coğrafyası	Lise 2	2
	Türkiye Coğrafyası	Lise 3	2
1982	Genel Coğrafya	Lise 1	2
	Türkiye'nin Coğrafi Bölgeleri	Lise 2	2
	Türkiye'nin Ekonomik Yapısı	Lise 3	2
1983	Genel Coğrafya	Lise 1	2
	Türkiye'nin Coğrafi Bölgeleri	Lise 2	2
	Türkiye'nin Ekonomik Yapısı	Lise 3	2
1985-1987 Arası	Genel Coğrafya	Lise 1	2
	Türkiye'nin Coğrafi Bölgeleri	Lise 2	2
	Türkiye'nin Ekonomik Yapısı	Lise 3	2
1987-1988 Arası	Genel Coğrafya	Lise 1	2
	Türkiye'nin Coğrafi Bölgeleri	Lise 2 (Fen Alanı)	-
		Lise 2 (Edebiyat-Sosyal Alanı)	3
	Türkiye'nin Ekonomik Yapısı	Lise 3 (Fen Alanı)	-
		Lise 3 (Matematik Alanı)	-
		Lise 3 (Edebiyat- Sosyal Alanı)	3
1992	Genel Coğrafya	Lise 1	2
	Türkiye'nin Coğrafi Bölgeleri	Lise 2 (Fen Alanı)	-
		Lise 2 (Edebiyat-Sosyal Alanı)	2
		Lise 2 (Matematik Alanı)	2
	Türkiye'nin Ekonomik Yapısı	Lise 3 (Fen Alanı)	-
		Lise 3 (Edebiyat-Sosyal Alanı)	2
		Lise 3 (Matematik Alanı)	2
2005	Coğrafya	9. sınıf	2
	Coğrafya	10. sınıf	2

FULL TEXTS BOOK

	Coğrafya	11. sınıf	2 ya da 4
	Coğrafya	12. sınıf	2 ya da 4
2018	Coğrafya	9. sınıf	2
	Coğrafya	10. sınıf	2
	Coğrafya	11. sınıf	2 ya da 4
	Coğrafya	12. sınıf	2 ya da 4
2024	Coğrafya	9. sınıf	2
	Coğrafya	10. sınıf	2
	Coğrafya	11. sınıf	2 ya da 4
	Coğrafya	12. sınıf	2 ya da 4
Kaynak: Kaya (2012); Karabağ, Şahin ve Şahin, (2021) 'den yararlanılarak oluşturulmuştur.			

Tablo 1 incelendiğinde 1924'ten 2005 yılına kadar geçen sürede liselerde okutulan coğrafya derslerinin "Genel Coğrafya, Devletler/ Ülkeler Coğrafyası ve Türkiye Coğrafyası" isimleri altında okutulmuştur. Sadece 1971 taslak programında "Türkiye Coğrafyası" dersi kaldırılmıştır. 1992 yılında CDÖP'ün uygulanmaya başlamasından 4 ay sonra "Ders Geçme ve Kredili Sisteme" geçilmiş, genel liseler fen bilimleri alanı, sosyal bilimler alanı, Türkçe-Matematik alanı, yabancı dil alanı, spor ve sanat alanı olmak üzere altı alana ayrılmıştır (Kaya, 2012). 1992 "Ders Geçme ve Kredili Sisteme" göre lise coğrafya derslerinin haftalık ders çizelgesi Tablo 2'de gösterilmiştir.

Tablo 2. Ders Geçme ve Kredili Sisteme Göre Lise Coğrafya Derslerinin Haftalık Ders Çizelgesi

Alan	Ders Adı	Kredisi	Zorunlu / Seçmeli
Fen Bilimleri	Coğrafya 1-2	2-2	Zorunlu
Türkçe-Matematik	Coğrafya 1-2	2-2	Zorunlu
Sanat (Resim-Müzik)	Coğrafya 1-2	2-2	Zorunlu
Spor	Coğrafya 1-2	2-2	Zorunlu
Sosyal Bilimler	Coğrafya 1-2	2-2	Zorunlu
	Türkiye Coğrafyası 1—2	2-2	Seçmeli
	Türkiye Beşerî ve Ekonomik Coğrafyası 1-2	6	Seçmeli
	Ülkeler Coğrafyası 1-2	4-4	Seçmeli
Yabancı Dil	Coğrafya 1-2	2-2	Seçmeli
	Türkiye Coğrafyası 1	6	Seçmeli
	Ülkeler Coğrafyası 1	6	Seçmeli
Kaynak: Kaya (2012)			

2005 yılından itibaren "Coğrafya" adı altında derslerin okutulduğu görülmektedir. Yapılandırmacı öğretim anlayışıyla sarmal yapıda düzenlenen CDÖP, kendini tekrar eden kazanımlardan ve açıklamalardan meydana gelmektedir. Sınıflar arası ilişkilendirme oldukça önemlidir. Öğrencinin merkeze alındığı, bilgiyi ezber yoluyla değil yaparak yaşayarak yapılandırdığı bir program tasarlanmıştır. Çağın bilgi-iletişim teknolojilerinin coğrafya konularının öğretiminde kullanılmasını destekleyerek Coğrafi Bilgi Sistemleri'nin (CBS) uygulanması bazı kazanımlarda önerildiği görülmektedir (MEB, 2005).

2024 CDÖP ise sade, tekrardan uzak, dikey bağlantılı bir yaklaşımla öğrencilerin bütünsel gelişimini desteklemekte ve gerçek hayatla güçlü bağlar kurmayı hedeflemektedir. Beceri temelli yaklaşımıyla daha güçlü bir toplum oluşturmayı amaçlamaktadır. Değişen ihtiyaçlar ve bilimsel

FULL TEXTS BOOK

gelişmeler, coğrafya öğretim programının güncellenmesini zorunlu kılmıştır. Program, coğrafi alan becerilerini odak alırken, diğer bilimsel beceriler, kavramsal beceriler, sosyal ve duygusal öğrenme becerileri ve okuryazarlık becerilerini de içermektedir. Programda yer alan öğretme-öğrenme yaşantıları; öğrencilere bütüncül bir bakış açısı kazandıran, kalıcı öğrenmeyi destekleyen, farklı öğretim yöntem ve tekniklerini kullanan ve disiplinler arası ilişkileri görmeyi kolaylaştıran bir çerçevede sunulmaktadır (MEB, 2024).

Sonuç olarak, eğitim programları, hızla değişen bilim ve teknoloji çağında toplumsal ihtiyaçlara yanıt verebilmek için sürekli yenilenmek zorundadır. Türkiye'deki coğrafya öğretim programları da bu değişime uyum sağlayarak, 1924 yılından günümüze kadar önemli değişimler geçirmiştir. Özellikle 2005, 2018 ve son olarak 2024 yıllarında yapılan güncellemeler, coğrafya eğitiminde yapılandırmacı ve beceri temelli yaklaşımları ön plana çıkarmıştır. Bu programlar, öğrencilerin coğrafi bilgi ve becerileri günlük hayatta etkili bir şekilde kullanabilmelerini, eleştirel düşünme ve problem çözme yeteneklerini geliştirmelerini hedeflemektedir. 2024 Coğrafya Dersi Öğretim Programı, öğrencilerin bütünsel gelişimini destekleyerek onları geleceğe daha donanımlı bireyler olarak hazırlayacaktır.

Araştırmanın Amacı

Bu araştırmada 2005, 2018 ve 2024 Coğrafya Dersi Öğretim Programlarının öğrenme alanı-ünite, ders süresi, kazanım sayısı, değer ve beceri başlıkları altında karşılaştırılmalı olarak analizinin yapılması amaçlanmıştır.

YÖNTEM

Araştırma nitel araştırma yöntemlerinden biri olan doküman analizi ile incelenmiştir. Belge tarama olarak da adlandırılan doküman incelemesi, mevcut kayıt ve belgelerden veri toplama tekniğidir (Karasar, 2022). Hem basılı hem de elektronik dokümanların elde edilmesi, gözden geçirilmesi, sorgulanması ve analiz edilmesini sağlayan sistematik bir işlemdir (Bowen, 2009). 2005, 2018 ve 2024 yıllarında Milli Eğitim Bakanlı Talim Terbiye Kurulu Başkanlığı tarafından hazırlanan coğrafya dersi öğretim programları araştırmanın veri kaynağını oluşturmaktadır. Ulaşılan veriler betimsel analiz tekniği ile analiz edilmiştir.

BULGULAR

2005, 2018 ve 2024 Coğrafya Dersi Öğretim Programlarının Öğrenme Alanı / Ünite Açısından Değerlendirilmesi

Coğrafya dersi öğretim programları sınıf düzeyine göre incelenerek aşağıdaki şekilde tablolaştırılmıştır.

Tablo 3. 2005 – 2018- 2024 Coğrafya Dersi Öğretim Programlarının Öğrenme Alanı / Ünite Karşılaştırması

	2005 Coğrafya Dersi Öğretim Programı Öğrenme Alanları	2018 Coğrafya Dersi Öğretim Programı Üniteleri	2024 Coğrafya Dersi Öğretim Programı Üniteleri
1	Doğal Sistemler	Doğal Sistemler	Coğrafyanın Doğası
2	Beşerî Sistemler	Beşerî Sistemler	Mekânsal Bilgi Teknolojileri
3	Mekânsal Bir Sentez: Türkiye	Küresel Ortam: Bölgeler ve Ülkeler	Doğal Sistemler ve Süreçler
4	Küresel Ortam: Bölgeler ve Ülkeler	Çevre ve Toplum	Beşerî Sistemler ve Süreçler
5	Çevre ve Toplum		Ekonomik Faaliyetler ve Etkileri

FULL TEXTS BOOK

6	Coğrafi Beceriler ve Uygulamalar		Afetler ve Sürdürülebilir Çevre
7			Bölgeler, Ülkeler ve Küresel Bağlantılar
Kaynak: MEB, Coğrafya Dersi Öğretim Programı, 2005-2018-2024			

2005 Coğrafya Dersi Öğretim Programı bütünsel yaklaşıma uygun olarak 6 öğrenme alanından meydana gelmektedir. Bu öğrenme alanlarından biri olan "Coğrafi Beceriler ve Uygulamalar" öğrenme alanı diğer öğrenme alanları ile ilişkilendirilmiş, bu öğrenme alanına yönelik herhangi bir kazanım yer almamıştır. 2018 CDÖP'nda ise 2005 programından farklı olarak kazanımlara "ünite başlığı" altında yer verilmiştir. "Doğal Sistemler, Beşerî Sistemler, Küresel Ortam: Bölgeler ve Ülkeler, Çevre ve Toplum" öğrenme alanları ünite olarak değiştirilerek 2018 CDÖP'nda yerini almıştır. "Mekânsal Bir Sentez: Türkiye" öğrenme alanına 2018 öğretim programında yer verilmemiştir.

2024 programında ise ünite sayısı yediye çıkmıştır. "Mekânsal Bilgi Teknolojileri" ünitesi eklenerek daha önceki programlarda (2005-2018) kazanımların içinde önerilen Coğrafi Bilgi Sistemlerinin 2024 programında kullanımı üzerine odaklanılmıştır. Bu durum coğrafya eğitiminin günümüz teknolojik gelişmelerine uyum sağlama çabasında olduğunu göstermektedir. Öğrencilerin coğrafya biliminin teknolojiyle entegrasyonunu anlamalarını ve bu teknolojileri kullanma becerilerini geliştirmelerini sağlayacaktır. Çevre ve Toplum ünitesi, 2005 ve 2018 programlarında yer almış, 2024 programında ise "Afetler ve Sürdürülebilir Çevre" olarak yeniden adlandırılmıştır. Bu değişiklik, çevresel sürdürülebilirlik ve afet yönetimi konularına verilen önemi vurgulamaktadır. Öğrencilerin çevresel sorunları anlama ve bu sorunlara çözüm bulma becerilerini geliştirmelerine olanak sağlayacaktır. 2005 ve 2018 programlarında "Küresel Ortam: Bölgeler ve Ülkeler" başlığı kullanılırken, 2024 programında "Bölgeler, Ülkeler ve Küresel Bağlantılar" başlığı kullanılmıştır. İsim değişikliği, küresel bağlantılara verilen önemi göstermektedir. Hem 2005-2018 programları hem de 2024 programı, bölgeler ve ülkeler arasındaki bağlantılara odaklanarak öğrencilerin küresel farkındalığını artırmayı hedeflemektedir. Bu üniteler, coğrafi, ekonomik, kültürel ve politik bağlantıları inceleyerek öğrencilerin küresel perspektif kazanmalarını sağlayacaktır. 2005 ve 2018 programlarında ekonomik faaliyetler "Beşerî Sistemler" ünitesinin bir parçası olarak işlenmiştir. 2024 programında ise "Ekonomik Faaliyetler ve Etkileri" isimli yeni bir ünitenin yer alması, bu konuların daha kapsamlı ve ayrıntılı bir şekilde işlenmesine olanak tanıyacaktır.

2005, 2018 ve 2024 Coğrafya Dersi Öğretim Programlarının Kazanım Sayıları ve Ders Sürelerine Göre Karşılaştırılması

Tablo 4. 2005 Coğrafya Dersi Öğretim Programının Ünitelerine Göre Kazanım Sayıları ve Süresi

ÖĞRENME ALANI	Kazanım Sayısı							Ders Saati					
	9. Sınıf	10. Sınıf (2 saat)	10. Sınıf (4 saat)	11. Sınıf (2 saat)	11. Sınıf (4 saat)	12. Sınıf (2 saat)	12. Sınıf (4 saat)	9. Sınıf	10. Sınıf	11. Sınıf (2 saat)	11. Sınıf (4 saat)	12. Sınıf (2 saat)	12. Sınıf (4 saat)
Doğal Sistemler	15	5	7	3	4	2	3	-	-	-	-	-	-
Beşerî Sistemler	3	6	10	5	7	3	4	-	-	-	-	-	-

FULL TEXTS BOOK

Mekânsal Bir Sentez: Türkiye	7	8	13	6	10	9	12	-	-	-	-	-	-
Küresel Ortam: Bölgeler ve Ülkeler	3	3	3	4	6	6	9	-	-	-	-	-	-
Çevre ve Toplum	3	3	3	9	14	7	11						
TOPLAM	**31**	**25**	**36**	**27**	**41**	**27**	**39**	**72**	**72**	**72**	**144**	**72**	**144**
Kaynak: 2005 CDÖP													

Tablo 5. 2018 Coğrafya Dersi Öğretim Programının Ünitelerine Göre Kazanım Sayıları ve Süresi

ÜNİTE	Kazanım Sayısı						Ders Saati					
	9. Sınıf	10. Sınıf	11. Sınıf (2 saat)	11. Sınıf (4 saat)	12. Sınıf (2 saat)	12. Sınıf (4 saat)	9. Sınıf	10. Sınıf	11. Sınıf (2 saat)	11. Sınıf (4 saat)	12. Sınıf (2 saat)	12. Sınıf (4 saat)
Doğal Sistemler	13	17	2	4	1	2	47	36	4	12	2	12
Beşerî Sistemler	4	12	15	20	12	17	15	24	41	76	33	82
Küresel Ortam: Bölgeler ve Ülkeler	3	1	7	9	9	11	5	4	17	40	31	38
Çevre ve Toplum	2	4	5	7	2	4	5	8	10	16	6	12
TOPLAM	**22**	**34**	**29**	**40**	**24**	**34**	**72**	**72**	**72**	**144**	**72**	**144**
Kaynak: 2018 CDÖP												

FULL TEXTS BOOK

Tablo 6. 2024 Coğrafya Dersi Öğretim Programının Ünitelerine Göre Öğrenme Çıktı Sayıları ve Süresi

ÜNİTE	Öğrenme Çıktı Sayısı						Ders Saati					
	9. Sınıf	10. Sınıf	11. Sınıf (2 saat)	11. Sınıf (4 saat)	12. Sınıf (2 saat)	12. Sınıf (4 saat)	9. Sınıf	10. Sınıf	11. Sınıf (2 saat)	11. Sınıf (4 saat)	12. Sınıf (2 saat)	12. Sınıf (4 saat)
1. Coğrafyanın Doğası	3	1	1	1	1	1	6	4	6	6	6	6
2. Mekânsal Bilgi Teknolojileri	3	2	1	1	1	1	10	6	12	12	12	12
3. Doğal Sistemler ve Süreçler	4	5	2	2	2	3	20	18	16	16	12	18
4. Beşerî Sistemler ve Süreçler	4	2	1	2	1	2	16	8	6	12	8	16
5. Ekonomik Faaliyetler ve Etkileri	1	3	2	5	1	3	4	10	14	34	8	20
6. Afetler ve Sürdürülebilir Çevre	3	4	1	3	3	6	8	16	6	22	14	32
7. Bölgeler, Ülkeler ve Küresel Bağlantılar	1	1	1	5	1	4	4	6	8	36	8	34
TOPLAM	**19**	**18**	**9**	**19**	**10**	**20**	**72**	**72**	**72**	**144**	**72**	**144**

Kaynak: 2024 CDÖP

2005 Programı öğrenme alanlarına göre ayrılmış ve her sınıf düzeyinde belirli sayıda kazanım belirlenmiş ancak öğrenme alanlarına ne kadar süre ayrılacağı önerisinde bulunulmamıştır.

2018 Programında ünitelerin işlenmesi için ders saatlerinin önerildiği görülmektedir. Üniteler için önerilen ders saatlerine bakıldığında coğrafya dersinin zorunlu olduğu sınıf seviyelerinde (9. sınıflarda 47 ders saati; 10. sınıflarda 36 ders saati) "Doğal Sistemler" ünitesine daha fazla süre ayrıldığı, seçmeli ders olarak okutulan 11. sınıf (12 ders saati) ve 12. sınıfta (12 ders saati) ise ders sürelerinin azaldığı görülmektedir. "Beşerî Sistemler" ünitesine ayrılan ders süresinin en fazla olduğu sınıf seviyeleri 4 saat seçmeli ders olarak okutulan 12. sınıf (82 ders saati) ve 11. sınıf (76 ders saati) olarak göze çarpmaktadır. "Küresel Ortam: Bölgeler ve Ülkeler" ünitesine ayrılan süre 11. Sınıf (40 ders saati) ve 12. Sınıf (38 ders saati) seviyelerinde daha fazladır. "Çevre ve Toplum" ünitesine ayrılan süre incelendiğinde en fazla 4 saat seçmeli ders olarak okutulan 11. sınıflarda (16 ders saati) olduğu görülmektedir.

2024 programında yeni eklenen ünitelerle birlikte, öğrenme çıktı sayıları ve ders saatlerinde yeniden bir düzenleme yapılmıştır. İlk ünite olan "Coğrafyanın Doğası" ünitesine ayrılan süre 10. sınıf hariç (4 ders saati) diğer sınıf seviyelerinde (6 ders saati) eşittir. "Mekânsal Bilgi Teknolojileri" ünitesine

FULL TEXTS BOOK

seçmeli ders olarak okutulan 11. ve 12. sınıflarda ayrılan süre daha fazladır. "Doğal Sistemler ve Süreçler" ünitesine önerilen sürenin en fazla olduğu sınıf seviyesi zorunlu ders olarak okutulan 9. sınıf (20 ders saati) ve seçmeli ders olan 12. sınıftır (18 ders saati). "Beşerî Sistemler ve Süreçler" ünitesine ayrılan ders süresinin en çok 9. ve 12. sınıflarda (16 ders saati) olduğu görülmektedir. "Ekonomik Faaliyetler ve Etkileri" ünitesine önerilen ders saatinin en fazla olduğu sınıf seviyesinin 11. Sınıf (34 ders saati) olduğu dikkati çekmektedir.

Tablo 7. 2005, 2018 ve 2024 Coğrafya Dersi Öğretim Programlarının Toplam Kazanım Sayıları Açısından İncelenmesi

	2005 CDÖP				2018 CDÖP				2024 CDÖP			
	9. Sınıf	10. Sınıf	11. Sınıf (4 saat)	12. Sınıf (4 saat)	9. Sınıf	10. Sınıf	11. Sınıf (4 saat)	12. Sınıf (4 saat)	9. Sınıf	10. Sınıf	11. Sınıf (4 saat)	12. Sınıf (4 saat)
Kazanım sayısı	31	36	41	39	22	34	40	34	19	18	19	20
Toplam	147				130				76			
Kaynak: MEB, Coğrafya Dersi Öğretim Programı, 2005-2018-2024												

9. ve 10. sınıflarda zorunlu, 11. ve 12. sınıflarda dört saat seçmeli ders olarak okutulan Coğrafya Dersi Öğretim Programlarını karşılaştırdığımızda; 2005 yılında programda 147 kazanım olduğu görülürken 2018 yılında kazanım sayısının 130'a düştüğü, 2024 yılı programında ise 76 kazanıma düştüğü görülmektedir. Millî Eğitim Bakanlığı'nın 2024 yılında bütün öğretim programlarında yaptığı gibi coğrafya dersi öğretim programında da sadeleştirme çalışmasına gittiği bu durumun sebebidir. Her sınıf seviyesinde kazanımlarda dengeli bir dağılımın olduğu görülmektedir. Kazanımların ünitelerdeki yerlerinde ve sınıf seviyelerinde de değişiklikler bulunmaktadır. Örneğin; coğrafya biliminin konusu ve bölümleri ile ilgili kazanım 2018 programında "Doğal Sistemler" ünitesi başlığı altında yer alırken, 2024 programında "Coğrafyanın Doğası" ünitesi altında yer almaktadır. 2018 programında 9. sınıflarda "Beşerî Sitemler" ünitesinde yer alan yerleşme coğrafyası ile ilgili kazanımlar 2024 programında 10. sınıf seviyesinde işlenecektir. 2005 ve 2018 öğretim programlarında "Doğal Sistemler" ünitesi altında verilen kazanımlar 2024 programında "Coğrafyanın Doğası, Mekânsal Bilgi Teknolojileri, Doğal Sistemler ve Süreçler" ünitelerine dağıtılmıştır.

FULL TEXTS BOOK

2005, 2018 ve 2024 Coğrafya Dersi Öğretim Programlarının Değerler Açısından Karşılaştırılması

Tablo 8. 2005, 2018 ve 2024 Coğrafya Dersi Öğretim Programlarının Değerler Açısından İncelenmesi

2005 Coğrafya Dersi Öğretim Programı	2018 Coğrafya Dersi Öğretim Programı	2024 Coğrafya Dersi Öğretim Programı
Dayanışma	Sevgi	Adalet
Hoşgörü	Özdenetim	Aile Bütünlüğü
Bilimsellik	Vatanseverlik	Çalışkanlık
Sevgi	Sorumluluk	Dostluk
Saygı	Dostluk	Duyarlılık
Duyarlılık	Saygı	Dürüstlük
Vatanseverlik	Yardımseverlik	Estetik
Barış	Dürüstlük	Mahremiyet
Estetik	Adalet	Merhamet
Sorumluluk	Sabır	Mütevazılık
		Özgürlük
		Sabır
		Sağlıklı Yaşam
		Saygı
		Sevgi
		Sorumluluk
		Tasarruf
		Temizlik
		Vatanseverlik
		Yardımseverlik

Kaynak: MEB, Coğrafya Dersi Öğretim Programı, 2005-2018-2024

2005 programında toplam 10 değer varken, 2018 programında bu sayı aynı kalmıştır ancak bazı değerler değişmiştir. 2024 programında ise değerler listesi daha da genişlemiş ve 20 değere yer verilmiştir. Bu durum zaman içinde eğitim programlarının öğrencilere kazandırmak istediği değerlerin çeşitlendiğini ve arttığını göstermektedir. "Sevgi, Saygı, Sorumluluk ve Yardımseverlik" değerleri, her üç dönemde de vurgulanan ortak değerlerdir. Bu değerlerin sürekli olarak programlarda yer alması, bunların coğrafya eğitimi açısından önemli olduğunu göstermektedir. "Hoşgörü ve Estetik" değerleri 2005 ve 2024 programlarında bulunurken, 2018 programında yer almamaktadır. 2024 programına eklenen yeni değerler arasında "Aile Birliği, Çalışkanlık, Dürüstlük, Merhamet, Misafirperverlik, Mütevazılık, Özgüven, Sağlıklı Yaşam, Tasarruf ve Temizlik" bulunmaktadır. Bu değerler, öğrencilerin kişisel gelişimlerine ve toplumsal sorumluluklarına yönelik önemli katkılar sunacaktır. 2005 programında "Bilimsellik ve Duyarlılık" gibi değerler varken, bu değerler sonraki programlarda yer almamaktadır. 2018 programında eklenen "Doğa Sevgisi, Özdenetim, Vatana Sevgisi, Adalet ve Sabır" gibi değerler, çevre bilinci ve kişisel sorumlulukların önemini vurgulamaktadır. 2024 programında daha fazla kişisel ve toplumsal değerlerin eklenmesi, öğrencilerin hem birey olarak hem de toplumsal bir varlık olarak gelişmelerine önem verildiğini göstermektedir.

FULL TEXTS BOOK

2005, 2018 ve 2024 Coğrafya Dersi Öğretim Programlarının Beceriler Açısından Karşılaştırılması

Tablo 9. 2005, 2018 ve 2024 Coğrafya Dersi Öğretim Programlarının Beceriler Açısından İncelenmesi

KAZANIM SAYISI															
COĞRAFİ BECERİLER	**9.SINIF CDÖP**			**10.SINIF CDÖP**			**11.SINIF CDÖP**			**12.SINIF CDÖP**			**TOPLAM**		
	2005	2018	2024	2005	2018	2024	2005	2018	2024	2005	2018	2024	2005	2018	2024
Coğrafi Gözlem	14	6	1	10	6	1	4	5	1	19	6	2	47	23	5
Arazide Çalışma	6	3		10	6		9	3		8	2		33	14	
Coğrafi Sorgulama	24	12	2	29	13	3	42	16	4	36	17	4	131	58	13
Zamanı Algılama	8	2	5	4	5	1	4	3	-	5	6	-	21	16	6
Değişim ve Sürekliliği Algılama	13	4	2	20	9	2	9	8	2	18	7	2	60	28	8
Harita Becerileri	16	10	6	20	12	6	4	11	5	16	13	6	56	46	23
Tablo, Grafik ve Diyagram Hazırlama ve Yorumlama	8	3	7	18	5	5	28	7	4	20	7	3	74	22	19
Kanıt Kullanma	15	10	1	14	11	1	18	6	-	16	5	-	63	32	2
Mekânsal Düşünme	-	-	4	-	-	4	-	-	4	-	-	4	-	-	16
TOPLAM	104	50	28	125	67	23	118	59	20	138	63	21	485	239	92

Kaynak: MEB, Coğrafya Dersi Öğretim Programı, 2005-2018-2024

Tablo incelendiğinde 2005 ve 2018 programlarında coğrafi beceriler aynı kalırken, 2024 öğretim programında coğrafi becerilerde değişikliklere gidilmiştir. Coğrafi gözlem ve Arazide Çalışma becerileri 2024 programında tek bir başlık altında birleştirilerek "Coğrafi Gözlem ve Saha Çalışması" adını almıştır. Zamanı algılama becerisi 204 programında "Zamanı Algılama ve Kronolojik Düşünme" adını alarak beceriler arası ilişkiler başlığı altında önerilmiştir. Kanıt Kullanma becerisinin adı "Kanıta Dayalı Sorgulama ve Araştırma" şeklinde değiştirilmiş ve beceriler arası ilişkiler başlığı altında önerilmiştir. 2024 öğretim programında önerilen coğrafi beceriler arasına "Mekânsal Düşünme**"** becerisi eklenmiştir. Mekânsal düşünme becerisinin 2024 programına eklenmesi ile öğrenciler coğrafi bilgi ve becerilerini geliştirmelerine katkıda bulunabilir. Aynı zamanda onların mekânsal analiz ve problem çözme yeteneklerini güçlendirebilir. Eğitimde yapılan bu tür yenilikçi değişiklikler, öğrencilerin coğrafya alanında daha donanımlı bireyler olarak yetişmesine olanak tanıyacaktır.

FULL TEXTS BOOK

"Coğrafi Sorgulama" ve "Kanıt Kullanma" becerileri her üç yılda da en yüksek kazanım sayısına sahip beceriler olarak öne çıkmaktadır. Bu durum, coğrafya eğitiminde analitik düşünme ve veri kullanma becerilerine verilen önemi göstermektedir. Bu beceriler, öğrencilerin sadece coğrafi bilgiyi öğrenmekle kalmayıp, aynı zamanda bu bilgiyi analiz etmelerini ve yorumlamalarını sağlayacaktır. Kazanım başına düşen coğrafi becerilere baktığımız zaman genel bir azalma trendi görülmektedir. Kazanım sayılarındaki azalma, eğitim programlarının daha odaklı ve derinlemesine bilgi aktarımı yapmaya yönelik olduğu anlamına gelebilir. Belirli becerileri öğrencilerin daha iyi anlamalarına ve uygulamalarına olanak tanıyabilir. Aynı zamanda kazanım sayılarında görülen azalma da bu durumun sebeplerinden biri olabilir.

Tablo 10. 2024 Coğrafya Dersi Öğretim Programı Sosyal-Duygusal Öğrenme Becerileri
Kendini Tanıma (Öz Farkındalık), Kendini Düzenleme (Öz Düzenleme), Kendine Uyarlama (Öz Yansıtma), İletişim, İş Birliği, Sosyal Farkındalık Uyum, Esneklik, Sorumlu Karar Verme
Kaynak: MEB, Coğrafya Dersi Öğretim Programı, 2024

Coğrafya dersi öğretim programına eklenen sosyal-duygusal öğrenme becerileri, öğrencilere geniş bir perspektif kazandırmayı ve yaşamları boyunca kullanabilecekleri önemli yetiler geliştirmeyi amaçlamaktadır. Bu becerilerin coğrafya dersleriyle ilişkilendirilmesi, öğrencilerin sadece coğrafya bilgilerini ve anlayışlarını geliştirmekle kalmayacak, aynı zamanda kişisel gelişimlerine, toplumsal becerilerine ve küresel vatandaşlar olarak gelişmelerine yardımcı olabilecek sosyal-duygusal becerilerini de kazanmalarına katkıda bulunacaktır.

2005, 2018 ve 2024 Coğrafya Dersi Öğretim Programlarının Okuryazarlıklar Açısından Karşılaştırılması

Tablo 11. 2005, 2018 ve 2024 Coğrafya Dersi Öğretim Programlarının Okuryazarlıklar Açısından İncelenmesi		
2005	**2018**	**2024**
-	-	Bilgi Okuryazarlığı Görsel Okuryazarlık Dijital Okuryazarlık Kültür Okuryazarlığı Veri Okuryazarlığı Sürdürülebilirlik Okuryazarlığı Finansal Okuryazarlık Vatandaşlık Okuryazarlığı Sanat Okuryazarlığı
Kaynak: MEB, Coğrafya Dersi Öğretim Programı, 2024		

FULL TEXTS BOOK

2005 ve 2018 yılı öğretim programlarında okuryazarlıklara değinilmemişken, 2024 programında 9 farklı okuryazarlık ele alınmıştır. *"Bilgi okuryazarlığı, görsel okuryazarlık, veri okuryazarlığı, dijital okuryazarlık"* gibi çağın gerektirdiği becerilere odaklanıldığı görülmektedir. Bu okuryazarlıklar öğrencilerin bilgiye erişiminde, verileri yorumlamalarında, dijital araçları etkili bir şekilde kullanmalarında ve küresel sorunlara duyarlı bir şekilde yaklaşmalarında daha hazırlıklı olmalarını sağlayabilir. Program, sadece akademik bilgiye odaklanmak yerine kültürel, sürdürülebilirlik, finansal, vatandaşlık ve sanat gibi farklı okuryazarlık alanlarına da değinmektedir. Bu yaklaşım, öğrencilerin daha geniş bir perspektifle dünyayı anlamalarına ve çeşitli beceriler geliştirmelerine olanak tanıyacaktır.

SONUÇ

Araştırmada 2005, 2018 ve 2024 Coğrafya Dersi Öğretim Programlarında yer alan öğrenme alanları/üniteler, kazanım sayıları ve ders süreleri, coğrafi beceriler ve değerler karşılaştırmalı olarak incelenmiştir. 2005 Coğrafya Dersi Öğretim Programı, bütüncül bir yaklaşımla altı öğrenme alanından oluşmaktadır. Bu alanlardan biri olan "Coğrafi Beceriler ve Uygulamalar" diğer öğrenme alanlarıyla ilişkilendirildiği için bu alana özel kazanımlar belirlenmemiştir. 2018 Coğrafya Dersi Öğretim Programı'nda ise kazanımlar "ünite başlıkları" altında toplanmıştır. "Doğal Sistemler, Beşerî Sistemler, Küresel Ortam: Bölgeler ve Ülkeler, Çevre ve Toplum" öğrenme alanları ünite olarak yeniden düzenlenmiş ve 2018 programına eklenmiş, "Mekânsal Bir Sentez: Türkiye" öğrenme alanına ise yer verilmemiştir.

2024 programında, ünite sayısı yediye çıkartılmıştır. Coğrafi Bilgi Sistemlerinin kullanımına odaklanan "Mekânsal Bilgi Teknolojileri" ünitesi programa eklenmiştir. 2005 ve 2018 programlarında yer alan "Çevre ve Toplum" ünitesi, 2024 programında "Afetler ve Sürdürülebilir Çevre" olarak yeniden adlandırılmıştır. 2005 ve 2018 programlarında "Küresel Ortam: Bölgeler ve Ülkeler" başlığı kullanılırken, 2024 programında bu başlık "Bölgeler, Ülkeler ve Küresel Bağlantılar" olarak değiştirilmiştir. 2005 ve 2018 programlarında ekonomik faaliyetler "Beşerî Sistemler" ünitesinin bir parçası olarak ele alınırken, 2024 programında "Ekonomik Faaliyetler ve Etkileri" adında yeni bir ünite oluşturulmuştur. Modern dünyada ekonomik faaliyetlerin önemi ve etkileri giderek artmaktadır. 2024 programındaki bu değişiklik, öğrencilerin günümüz ekonomik sistemlerini ve bu sistemlerin çevre ve toplum üzerindeki etkilerini daha iyi anlamalarını sağlayacaktır. 2005 ve 2018 programları daha temel ve belirli öğrenme alanlarına odaklanırken, 2024 programı modern yaklaşımlar ve güncel konular ekleyerek daha kapsamlı bir eğitim hedeflemiştir. Bu değişiklikler, öğrencilerin hem temel coğrafi bilgi ve becerilerini geliştirmeyi hem de günümüz dünyasında karşılaşacakları karmaşık sorunları anlamalarını ve çözmelerini sağlayacaktır.

2005 programı, öğrenme alanlarına göre ayrılmış ve her sınıf düzeyinde belirli sayıda kazanım belirlenmiş ancak öğrenme alanlarına ne kadar süre ayrılması gerektiği konusunda bir öneri sunulmamıştır. 2018 programında ise üniteler için ders saatleri önerilmiştir. Bu ders saatlerine bakıldığında, "Beşerî Sistemler" ünitesine ayrılan sürenin diğerlerinden daha fazla olduğu görülmektedir. 2024 programında ise yeni ünitelerin eklenmesiyle birlikte, öğrenme çıktıları ve ders saatlerinde yeniden bir düzenleme yapılmıştır. Bu düzenlemede, "Bölgeler, Ülkeler ve Küresel Bağlantılar" ile "Ekonomik Faaliyetler ve Etkileri" ünitelerine ayrılan sürenin daha fazla olduğu dikkat çekmektedir.

2005 Coğrafya Dersi Öğretim Programında 147 kazanım bulunurken, 2018 yılında bu sayı 130'a düşmüş ve 2024 programında ise 76'ya kadar inmiştir. Millî Eğitim Bakanlığı'nın 2024 yılında tüm öğretim programlarında olduğu gibi coğrafya dersi öğretim programında da sadeleştirme çalışması yapması bu azalmanın sebebidir.

2005 programında toplam 10 değer bulunurken, 2018 programında bu sayı aynı kalmış ancak bazı değerler değiştirilmiştir. 2024 programında ise değerler listesi genişleyerek 20 değeri içermektedir. "Sevgi, Saygı, Sorumluluk ve Yardımseverlik" değerleri her üç programda da ortak vurgulanan

FULL TEXTS BOOK

değerlerdir. "Hoşgörü ve Estetik" değerleri 2005 ve 2024 programlarında yer alırken, 2018 programında bulunmamaktadır. 2024 programına eklenen yeni değerler arasında "*aile birliği, çalışkanlık, dürüstlük, merhamet, misafirperverlik, mütevazılık, özgüven, sağlıklı yaşam, tasarruf ve temizlik*" bulunmaktadır.
2005 ve 2018 programlarında coğrafi beceriler benzer kalırken, 2024 öğretim programında değişikliklere gidilmiştir. Coğrafi Gözlem ve Arazide Çalışma becerileri, 2024 programında tek bir başlık altında "Coğrafi Gözlem ve Saha Çalışması" olarak birleştirilmiştir. Zamanı Algılama becerisi, 2024 programında "Zamanı Algılama ve Kronolojik Düşünme" adını alarak, beceriler arası ilişkiler başlığı altında önerilmiştir. Kanıt Kullanma becerisinin adı "Kanıta Dayalı Sorgulama ve Araştırma" olarak değiştirilmiştir. 2024 programında önerilen coğrafi beceriler arasına "Mekânsal Düşünme" becerisi eklenmiştir. Kazanım başına düşen coğrafi becerilere baktığımızda genel bir azalma eğilimi görülmektedir. Kazanım sayılarındaki azalma, eğitim programlarının daha odaklı ve derinlemesine bilgi aktarımı yapmaya yönelik olduğunu gösterebilir.
2005, 2018 ve 2024 yıllarındaki coğrafya dersi öğretim programlarının karşılaştırmalı analizi, 2024 programının daha geniş bir yelpazede kişisel ve toplumsal gelişime vurgu yaparak önceki programlardan ayrıldığını ortaya koymaktadır. 2024 coğrafya dersi öğretim programı, öğrencilerin dijital okuryazarlıklarını ve analitik düşünme yeteneklerini artırarak, onları 21. yüzyılın gereksinimlerine daha iyi hazırlamayı hedeflemektedir. Bu program, aynı zamanda değerler eğitimine daha fazla önem vererek, öğrencilerin hem bireysel hem de toplumsal sorumluluklarının farkında bireyler olarak yetişmelerine katkıda bulunmaktadır. Böylece, eğitimdeki değişen ihtiyaçlara ve teknolojik çağa uyum sağlama konusunda önemli adımlar atılmış olacaktır.

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FULL TEXTS BOOK

ARTIFICIAL INTELLIGENCE CHATBOTS AWARENESS AND ACCESSIBILITY FOR LEARNING AMONG SCIENCE PRE-SERVICE TEACHERS IN MINNA, NIGER STATE.

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ABSTRACT
The study is to examine artificial intelligence chatbots awareness and accessibility for learning among science pre-service teachers' in Minna, Niger state**.** The objectives were to determine the awareness level of pre-service teachers, determine the accessibility and availability of artificial intelligence chatbots, determine the difference in pre-service teachers' awareness and determine the difference in pre-service teachers' access towards artificial intelligence chatbots based on their gender. The study was guided by four research questions and two hypotheses were formulated to guide the study. The research adopted the descriptive survey research. Population of the study comprise of 197 500 level students from science education and educational technology. One hundred and twenty-seven (127) questionnaires were distributed base on Krejce and Morgan (1970) sample size determination. Data collected was analyzed using descriptive and inferential statistics. From the findings, pre-service teachers had high awareness and accessibility level toward artificial intelligence chatbots for learning. Analysis revealed that the male pre-service school teachers have a higher mean rank of 68.13 compared to the female pre-service school teachers having 55.93 and analysis revealed that the male pre-service school teachers have the highest accessibility mean rank of 70.32 compared to the female pre-service school teachers having 51.65. The result found awareness among pre-service school teachers was statistically not significant (U 1459.000, p = .076) and the difference between male and female pre-service teacher accessibility towards artificial intelligence chatbots for learning was statistically significant at U 1275.000 P = .007. Provide students with information about the benefits, functionalities, and ethical considerations associated with AI chatbot technologies, Integrate AI chatbots into the curriculum to expose students to their capabilities and encourage their usage and Ensure that students have access to clear and concise information about AI chatbots, including how they work, their limitations, and the data privacy measures in place.
Keyword: Artificial Intelligence Chatbots, Awareness, Accessibility & Pre-service Science Teachers

Introduction

Technology has altered the look and function of society as the world is becoming digitalized day by day. It can be stated that if one of the aims of science is to solve the problems encountered by human beings, the other is to offer a long and healthy life by raising the living standards (Moll, 2019). Technology has overtaken the world and all industries, wherever we go, we see technology is been used and as technologies became advanced so did many industries, slowly with time many industries adapted their work style with technology (madushan 2023). From healthcare, finance, food service to education technology usage gradually increased to the point where without the technology these industries could no longer operate. In aspect to education traditional on-class has been the most effective way of learning for a very long time.

Technology has been so helpful in making education easy due to it prompt advancement(Seufert et al., 2021). Technology has made teaching and learning activities easy for both the learners and the teachers through various diversity of innovations. Learners can acquire knowledge at distance through technology and the can get lots of information from it. Technology has been significant in opening up new possibilities for educational practices and improving the research and learning outcome of pre-service teachers.

FULL TEXTS BOOK

There are various kinds of teaching and learning technologies that are emerging and are changing the way of teaching and learning. These technologies include argmental reality (AR), and simulation, adaptive learning, virtual reality, video streaming, cloud computing and artificial intelligent (AI). Artificial intelligence has gained significant audience in recent years and has become an important factor in how different industries and services operate. Artificial intelligence (AI) has the potential to transform the field of education, and its applications are becoming increasingly prevalent (UNESCO, 2019). There various types of artificial intelligence such as robot machine, self-driven cars, drones, e-learning platforms, conversational software (AIchatbots) e.t.c. These has really made our daily life easy and also made mode of operating some mechanical activities easy.

In the field of education, AI-powered chatbots are emerging as a new and innovative way to interact with students and enhance their learning experience. (Lund & Wang, 2023), said AI chatbots are artificial intelligences system that are capable of maintaining a conversation with a user in natural language and simulating the way a human being will behave as a conversational partner. They are computer programming software that serve as a tutors or responding platforms in which they gives answers to questions asked. Artificial Intelligence (AI) has been significantly changing the structure of the educational system exponentially increasing the availability of cutting-edge tools utilized in learner's everyday lives (Hrastinski et al., 2019). They improve academic performance of students by providing additional study materials, recommend relevant resources and provide solution to assignments given through enhanced engagement and interaction.

There are various varieties of AI chatbots, which pre-service teachers need to have strong awareness and access too and can be used for research and learning purposes, such as Bing, ChatGPT, Google Bard and YouBot.This state-of-the-art technology has also considerably influenced educational practices, and efforts are constantly being made to incorporate AI chatbots into teaching and learning. For several decades, educators have utilized AI chatbots techniques to advance learning management systems, assessment instruments, and other learning support tools in various subjects (Hwang and Tu, 2021). In education, the concept of an intelligent computer program that acts as personal assistant, or a tutor, is not new. While industrial models of AIs are widely available, education lags behind in the adaptation of intelligent machines to support learning (Kurshan, 2016).

Awareness of AI systems varies according to their pedagogical belief, teaching experience, prior experience using educational technology, and the effectiveness and necessity of a particular technology, all of which can influence their willingness to adopt new educational technology (Gilakjani et al., 2013; Ryu and Han, 2018). Despite these educators' positive expectations of AI, pre-serve teachers first need to learn how to use technology and, most importantly, how to successfully integrate it into their curricula. They also need to understand the importance of AI and the affordances that it can bring to instruction so that they are open to integrating advanced technology into their lessons. Additionally, a great number of teachers and school officials have not yet experienced AI-based learning support and might simply recognize it as slightly more advanced educational technology, which can underestimate the AI's role in the classroom. Consequently, before a successful application of an AI support system into education, it becomes necessary for teachers to first utilize it themselves so that they can fully understand how it can scaffold learning (Cheng &Tsai, 2019). The utilization of the technology depends on how accessible the technologies are to them.

The accessibility of AI technology particularly chatbots has given the pre-service teachers access to large amount of information, engagement, communication, improved assessment, evaluation and efficient use of time (Bersin, 2023). This gives the students more opportunities to learn on their own and gain more access to varieties of information needed for adequate understanding of the subject matter concepts.Additionally, when students use technology in an exploratory/inquiry sense, they are actively engaged in their learning because they are interacting with their preferred medium of learning (Center for Educational Innovation, 2019). While technology enhances the learning environment, the

FULL TEXTS BOOK

technological advancements of the late 20th and early 21st centuries have created an environment in which technology has become increasingly intertwined with curriculum and pedagogy (Gilakjani et al., 2013; Ryu and Han, 2018).

Today, pre-serve teachers are in the midst of a pedagogical revolution: "pre-service teachers need to be explicitly taught how the unique affordances of technology can be used to enrich subject domains for specific learners and about interactions among pedagogy, content, and technology to develop their technological pedagogical content knowledge" (Clark, 2013). Easy access to the AI chatbots can make it easy for the pre-service teachers to write lesson plan, lesson note and gain more knowledge on teaching methodology. There are AI chatbot that requires subscription before gaining access to use it while there are free AI platforms that can be easily accessible to use.

Pre-serve teachers need to learn not only how to use technology but also how to successfully integrate it into their curricula. Also, in order to be open to integrating advanced technology into their lessons, teachers need to understand the importance of educational technology and the affordances that it can bring to instruction (Tallvid, 2016). Furthermore, when it comes to AI, a great number of teachers and school officials have not yet experienced AI-based learning support and might simply recognize it as slightly more advanced educational technology.

Statement of the problem

The education sector is constantly evolving to meet the changing needs of students, and one of the latest technological advancements is the emergence of Artificial Intelligence (AI)-powered chatbots. In recent years, AI chatbots have been increasingly deployed in education to provide personalized student support, quickly answer student inquiries, and streamline administrative tasks. However, teachers' difficulties in integrating AI technology into the classroom is still present today; a large number of educators neglect the effective integration of artificial intelligence in their classrooms and fail to prepare their students for success in a technology driven society (Clark, (2013). A longstanding problem is that many schools possess digital applications, yet their use is constrained by educators who use outdated teaching models that do not optimally embrace or utilize technology. Moreover, anxiety brought about by using new technologies can act as a burden and hinder teachers' efforts to introduce Artificial Intelligence (AI) on-site (Su & Yang, 2022). Despite all these AI potentials in education, teachers are yet to adopt and implement AI. Perhaps, this might be due to low level of awareness and accessibility of AI's relevance in education. A great number of pre-service teachers still view the implementation of technology in the classroom negatively due to the risk that AI Chatbots will produce texts with plausible-sounding but incorrect information (Anders, 2023). Multiple key challenges include copyright issues, biasness, fairness, excessive reliance on AI Chatbot by students and teachers, lack of expertise in integrating this technology in teaching and learning, the difficulty of distinguishing model-generated from student-generated answers, cost of training and maintenance, data privacy and security, and sustainable usage. Furthermore, AI Chatbot operates differently from search engines like Google as it doesn't scan the internet for up-to-date information, and its knowledge is limited to what it acquired before September 2021. Therefore, its inconsistent factual precision has been acknowledged as a notable drawback. Academic integrity is probably the most discussed challenge AI Chatbot will pose to education (Lund & Wang, 2023).

While the use of AI has been increasing exponentially in other fields, this has not been the case in education, little studies have been done to explore the awareness and accessibility about artificial intelligence such as Adebayo *et al*, (2021) who explored university Students' Awareness of, Access to, and use of Artificial Intelligence for Learning in Kwara State and Ukoh and Nicholas (2022) who examined AI Adoption for Teaching and Learning of Physics. However, none of these researches examined student's awareness and accessibility on the use of AI chatbots for learning and research. The absence of research on this subject creates a gap in the existing literature that needs to be filledwith the

FULL TEXTS BOOK

main objective is to assess the awareness and accessibility to artificial intelligence particularly among pre-service teacher for learning.

Research objectives

The general aim of the study is to examine science education pre-service teachers' awareness and accessibility to artificial intelligence chatbot for learning. The specific objectives were to:

1. determine the awareness level of pre-service teachers towards artificial intelligence chatbots.
2. determine the accessibility and availability of artificial intelligence chatbots learning tools to pre-service teachers.
3. determine the difference in pre-service teachers' awareness towards artificial intelligence chatbots based on their gender.
4. determine the difference in pre-service teachers' access towards artificial intelligence chatbots based on their gender.

Research questions

The following research questions would help in achieving the stated objectives of the study:

1. What is the level of awareness among pre-service teachers towards artificial intelligence chatbots for learning?
2. What is the level of accessibilityamong pre-service teachers toward artificial intelligence chatbots for learning?
3. What is the difference in the awareness of male and female pre-service teachers towards artificial intelligencechatbots for learning?
4. What is the difference in the accessibility of male and female pre-service teachers towards artificial intelligence chatbots for learning?

Research hypothesis

Ho1: there is no significant differencebetween male and female pre-service teacher awareness towards artificial intelligence chatbots for learning.

Ho2: There is no significant difference between male and female pre-service teacher accessibility towards artificial intelligence chatbots for learning.

Research methodology

Research design

The research adopted in this study is descriptive survey research. This involve the use of questionnaires to access pre-service teachers in the institution of study area concerning their awareness and accessibility toward artificial intelligence chatbotsfor learning, if there is differences in their awareness towards artificial intelligence chatbots based on their gender and if there is any differences in their accessibility to artificial intelligence chatbots based on their gender.

Population of the study

The population for this research work consists of 500l students of school of science and technology education, Federal University of Technology, Minna, Niger state. The school comprises of department of science education, department of educational technology, department of industrial technology education and the department of library and information technology. As at the period in which this research was carried out, the available targets are 500l students of department of science education and the 500l students of educational technology.

FULL TEXTS BOOK

The 500l of the department of science education consists of one hundred and seventeen (117) students while the 500l of the department of educational technology consist of eighty (80) students. So, the entire population used for this research study is one hundred and ninety-seven (197) students.

Sample and Sample Technique

The sample of the study were drawn from the entire population of the study using purposive sampling technique. For the purpose of this study, one hundred and twenty-seven (127) questionnaires were distributed. The sample used was adequate for the study base on Krejce and Morgan (1970) required sample computation, since the entire population of the study is one hundred and ninety-seven (197).

Research instrument

The instrument used for data collection in this research study is a structured research questionnaire. The questionnaire is titled "Pre-service teachers' awareness and accessibility to artificial intelligence chatbots for learning". This questionnaire was divided into two (2) sections. The first section examines the personal data of the students. The second section of the questionnaire examine the awareness and accessibility, each item is to be responded by preferred option using five (5) point-ranting scale of: SD (strongly disagreed) = 1, D (Disagreed)=2, U (Undecided)=3, A (Agreed)= 4 and SA (Strongly Agreed) = 5.

Validation of Instrument

In order to ascertain the validity of the instrument used for this research study, the questionnaire was validated by experts in the field of science education department. All observation raised on the instrument was corrected and approved by the researcher's supervisor before it was administered to the respondents.

Reliability of Instrument

To ascertain the reliability of the instrument of the research study, pilot test was carried out on students who were not part of the main study.
The reliability check showed a coefficient of 0.78 Cronbachalpha.

Method of Data Collection

The questionnaires for this research study were administered to the respondents in the selected institution area of study. The respondents were provided with instructions on how to complete the questionnaires. The questionnaire was distributed and were completed before returned immediately by the respondents. There is high return-rate of one hundred percent (100%) of the questionnaires.

Method of Data Analysis

Data collected was analyzed using descriptive (mean and standard deviation) and inferential (Mann whitney) statistics.The mean value of 3.0 was used as the decision rule, the mean value of 3.0 and above was accepted and values below were rejected. Hypothesis was tested at 0.05 level of significance using statistical package for social sciences (SPSS).

FULL TEXTS BOOK

Result and Analysis

Table 1: Analysis of result on level of awareness among pre-service teachers towards artificial intelligence chatbots for learning

S/NO.	Items	Mean	Std. Deviation	Decision
1	I am familiar with the AI software tools used in research and learning	4.43	.752	Accepted
2	I have a good knowledge of what Artificial intelligence (AI) is.	4.16	.995	Accepted
3	Phones, tablets and computers are part of AI tools used for the purpose of learning and research	4.46	.815	Accepted
4	AI is the next big thing to provide solutions to existing educational problems in learning and research	4.18	.955	Accepted
5	I have attended an AI training for research and learning several times	2.77	1.323	Rejected
6	I have a proper understanding of how AI chatbots works.	3.73	1.171	Accepted
7	There is privacy and data security when using AI chatbots in an educational context	3.78	1.007	Accepted
8	AI chatbots provide unique articles which is safe from plagiarism	3.76	1.074	Accepted
9	Students can have access to information by interacting with chatbots faster than interacting with lecturers	4.13	.873	Accepted
10	Chatbots could be used to assess and analyze students' level of understanding	3.87	1.101	Accepted
	Grand mean	3.93	1.00	

Table 1 shows the mean response of the level of awareness among pre-service teachers towards artificial intelligence chatbots for learning. From the findings in the table, majority of the respondents agreed to the statements.The grand mean response to all the statements is 3.93 with standard deviation of 1.00, considering the benchmark which is 3.00. This indicates a high awareness level among pre-service school teachers towards artificial intelligence chatbots for learning.

Table 2: Analysis of result on the level of accessibility among pre-service teachers toward artificial intelligence chatbots for learning

S/NO.	ITEMS	Mean	Std. Deviation	Decision
11	We have learning AI tools included in our school curriculum for teaching and research	2.99	1.400	Rejected
12	There is need to increase the number of available AI tools in my school	3.94	1.167	Accepted
13	We have AI tools in our classroom dedicated to research and learning	2.73	1.360	Rejected
14	I usually download AI tools for the smooth learning and research purpose in my school	3.73	1.269	Accepted
15	I believe the current AI resources in our school are sufficient enough for the purpose of teaching and research	2.99	1.366	Rejected
16	Full access to the department internet facility enables the usage of AI chatbots	3.56	1.239	Accepted
17	As students we are being provided individualized learning materials using chatbot	3.14	1.308	Accepted

FULL TEXTS BOOK

18	Students can obtain information about their tasks, deadlines and important events using chatbot in my school	3.59	1.237	Accepted
19	We interact our lecturers using chatbots in lecture halls	2.82	1.383	Rejected
20	We write assignments using chatbots in my school	2.97	1.408	Rejected
	Grand mean	3.25	1.31	

Table 2 shows the mean response of the level of accessibility among pre-service teachers toward artificial intelligence chatbots for learning. From the findings in the table, respondents showed agreement to five items (12, 14, 16, 17, 18) and they were not in agreement with five items (11, 13, 15, 19, 20). The grand mean response to all the statements is mean = 3.25 with standard deviation of 1.31, considering the benchmark which is 3.00. This indicates a moderate accessibility level among pre-service school teachers towards artificial intelligence chatbots for learning.

Table 3: analysis of on the difference in the awareness of male and female pre-service teachers towards artificial intelligence chatbots for learning?

	GENDER	N	Mean Rank
Awareness	Male	84	68.13
	Female	43	55.93
	Total	127	

Table 3 presents the result on Mann-Whitneyranking of the difference between male and female pre-service school teachers awareness. Analysis revealed that the male pre-service school teachers have the highest mean rank of 68.13 compared to the female pre-service school teachers having 55.93.

Table 4: analysis on the difference in the accessibility of male and female pre-service teachers towards artificial intelligence chatbots for learning?

	GENDER	N	Mean Rank
Accessibility	Male	84	70.32
	Female	43	51.65
	Total	127	

Table 4 presents the result on Mann-Whitneyranking of the difference between male and female pre-service school teachers accessibility. Analysis revealed that the male pre-service school teachers have the highest accessibility mean rank of 70.32 compared to the female pre-service school teachers having 51.65.

Testing of hypothesis

Hypotheses 1: there is no significant difference between male and female pre-service teacher awareness towards artificial intelligence chatbots for learning.

Table 5: Mann-Whitney Test

GENDER	N	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon WZ	Sig.
Male	8468.13	5723.00				
			1459.000	2405.000	-1.773.076	
Female	4355.93	2405.00				

Significant at ≤ 0.05

FULL TEXTS BOOK

Table 5: presents the result on the difference between male and female pre-service school teachers awareness. Analysis revealed that the male pre-service school teachers have the highest mean rank of 68.13 compared to the female pre-service school teachers having 55.93. Mann Whitney U test analysis. From this data, it can be concluded that awareness among pre-service school teachers was statistically not significant (U 1459.000, p = .076). This result indicates that there is difference in awareness level between the male and female pre-service school teachers.

Hypotheses 2: There is no significant difference between male and female pre-service teacher accessibility towards artificial intelligence chatbots for learning.

Table 6: Mann-Whitney Test

GENDER	N	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	Z	Sig.
Male	8470.32	5907.00					
				1275.000	2221.000	-2.708	.007
Female	4351.65	2221.00					

Significant at ≤ 0.05

Table 6 presents the result on the difference between male and female pre-service school teachers accessibility. Analysis revealed that the male pre-service school teachers have the highest accessibility mean rank of 70.32 compared to the female pre-service school teachers having 51.65. Mann-Whitney U analysis on difference between male and female pre-service teacher accessibility towards artificial intelligence chatbots for learning was statistically significant at U 1275.000 P = .007.

Discussion of Findings

The grand mean response to all the statements is 3.93 with standard deviation of 1.00, considering the benchmark which is 3.00. This indicates a high awareness level among pre-service school teachers towards artificial intelligence chatbots for learning. This finding is supported by the findings of Owolabi*et al*., (2021) who examined the awareness of academic about artificial intelligence and their perception of its relevance in managing university libraries in Nigeria. The findings revealed that high awareness level of AI technologies, particularly in library operations. The study participants see artificial intelligence technologies as tools to send them back to the labor market if the library managements adopt AI for library operations.

The grand mean response to all the statements is mean = 3.25 with standard deviation of 1.31, considering the benchmark which is 3.00. This indicates a moderate accessibility level among pre-service school teachers towards artificial intelligence chatbots for learning. This finding equally supports the findings of (Ikedinachi, et al., 2019) who stated that knowledge about and access to AI among students is one of the long-term consequences of increasing the emergence of AI technological devices for educational purposes.

Analysis revealed that the male pre-service school teachers have the highest mean rank of 68.13 compared to the female pre-service school teachers having 55.93. Mann Whitney U test analysis. From this data, it can be concluded that awareness among pre-service school teachers was statistically not significant (U 1459.000, p = .076). This result indicates that there is no difference in awareness level between the male and female pre-service school teachers. This finding is supported by the findings of Adebayo et al., (2021) who observed that gender does not influence university students' awareness of, access to, and competency in the use of AI for learning.

Analysis revealed that the male pre-service school teachers have the highest accessibility mean rank of 70.32 compared to the female pre-service school teachers having 51.65. Mann-Whitney U analysis on difference between male and female pre-service teacher accessibility towards artificial intelligence chatbots for learning was statistically significant at U 1275.000 P = .007. This finding negates the position of Zawacki-Richter et al., (2019) who reported that students' gender has a significant impact

FULL TEXTS BOOK

on all educational actors in general and in particular on artificial learning intelligence. The researcher stressed that innovation, incorporation, and implementation of emerging technologies are highly gender sensitive. In fact, the researcher reported that women and girls are poorly positioned to benefit from the use of AI because they have less access to specific scientific and technical education and education in general.

Conclusion

The study was under taken to examine science education pre-service teachers' awareness and accessibility to artificial intelligence chatbot for learning. The study found pre-service teachers had high awareness and accessibility level toward artificial intelligence chatbots for learning.The result found awareness among pre-service school teachers was statistically not significant (U 1459.000, p = .076) and the difference between male and female pre-service teacher accessibility towards artificial intelligence chatbots for learning was statistically significant at U 1275.000 P = .007.

Recommendation

1. Provide students with information about the benefits, functionalities, and ethical considerations associated with AI chatbot technologies. This will help students understand how AI chatbots can enhance their learning experience and empower them to utilize these tools effectively.
2. Integrate AI chatbots into the curriculum to expose students to their capabilities and encourage their usage.
3. Ensure that students have access to clear and concise information about AI chatbots, including how they work, their limitations, and the data privacy measures in place. This will address any concerns or misconceptions students may have and promote transparency in the use of AI chatbot.
4. Design learning activities that require students to interact with chatbots, solve problems, and engage in collaborative learning. This hands-on experience will enhance students' understanding of how AI chatbots can support their learning goals.

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FULL TEXTS BOOK

A CRİTİCAL ANALYSİS OF ARCHİTECTURAL IDENTİTY TRANSFORMATİONS ON EPİDAMN BOULEVARD İN DURRES, ALBANİA

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ABSTRACT

This study examines the architectural transformations of Epidamn Boulevard in Durres, Albania, built between the 1930s and 1940s. Originally called Castel Boulevard, and later known as Commerce Road and Mussolini Boulevard, today's Epidamn Boulevard has been a key urban axis that contributed to Durres' development as a modern city. It transformed and modernized the old organic Ottoman town, serving as the primary connection between the port and the new main city square.

This paper critically examines recent architectural changes on Epidamn Boulevard, interventions on the reinvention of 1930s Italian styles and contemporary interventions. It evaluates how modern additions interact with and influence the boulevard's urban identity. The methodology involves archival research, historical photographic evidence, literature review, and current observations to trace changes in design, usage, and cultural significance over time. The study highlights how political, social, and economic shifts have impacted the boulevard's architectural landscape, transforming urban identity, despite most buildings being protected as second-category monuments for they external architectonical value. The analysis extends to the boulevard's aesthetic evolution, considering artistic aspects such as form, decoration, and spatial dynamics introduced by new interventions. By offering a critical perspective on these interventions, the study assesses their impact on the boulevard's aesthetic and cultural landscape. This analysis contributes to the broader discourse on heritage preservation and the challenges of maintaining architectural integrity amid urban development pressures.

Keywords: Epidam Boulevard, Italian influenced architecture, modern interventions

Introduction

Epidamn Boulevard in Durrës is a central traditional axis within the city center. At the beginning of the 20th Century, Durrës, like many other Albanian cities, inherited a medieval appearance. The small ottoman city, build over the various historical layers, featured an organic layout surrounded by massive walls. The conception of Epidamn Boulevard's began in earnest after the independence and the Italian occupation in 1918 and particularly gained momentum after the 1926 earthquake, due to which were destroyed many old buildings in the central area. This period was marked also by agreements with the Italian government, which spurred socio-economic revitalization, the flourishing of sea routes, and the construction of a new port between 1928 and 1934 (Beja, 2012). This era of urban development in Durrës was further accelerated by the establishment of King Zog's monarchy from 1924 to 1939. Significant urban planning initiatives were undertaken to modernize the city, with the Italian administration introducing a comprehensive plan attributed to Italian architects Bosio and Carmigiani to transform the old Ottoman city.

Epidamn Boulevard was one of the key projects of this plan, intended to serve the newly constructed harbor and connect it with the Jalli Gate and the new main city square, while also presenting a modern image to visitors (Miho, 2003). The boulevard's construction began in 1927, prompted by the 1926 earthquake, and continued until 1929. The project led to the demolition of old houses and the creation of a typical fascist front for the city with 2-3 story neoclassical and modern monumental buildings. However, traditional Ottoman houses were preserved in the back parts. This transformation was not only an aesthetic endeavor but also a political and cultural one, reflecting the broader ambitions of the Italian regime to impose a new identity on Durrës.

FULL TEXTS BOOK



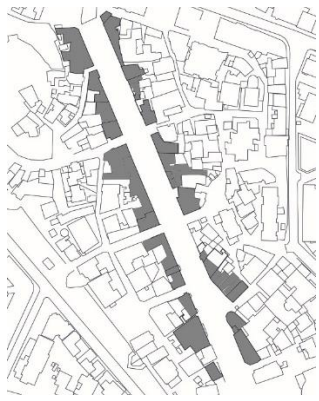


Figure 1 Durres after the 1926 earthquake (source: _)
Figure 2 Areal picture of Durres between 1930-40 (source: Archive IGM)
Figure 3 Buildings contributing in the image of the boulevard in the 90s (source: authors)

In recent years, the boulevard has seen several changes, maintaining its morphological original character. However, recent architectural interventions have begun to alter its identity, posing challenges to heritage preservation and urban integrity. This paper aims to explore the architectural transformations of Epidamn Boulevard, focusing on the influence of Italian design between the 1920s and 1940s, and critically analyze the recent interventions that have reshaped its identity. By examining historical records, architectural blueprints, and contemporary interventions, this study seeks to contribute to the discourse on heritage preservation and urban development.

Literature Review: Restoration Theories on Interventions in Uniform Urban Contexts

In uniform and consolidated urban environments, the restoration of a single building must consider the integrity of the broader urban context. Key restoration theories applicable in this setting include stylistic restoration and contextual restoration.

A stylistic restoration approach, as advocated by Viollet-le-Duc, involves the reinvention of historical architectural styles to maintain the cultural and historical integrity of urban environments. Viollet-le-Duc argued for restoration that could recreate a building's completeness, even if it never historically existed in that form, while Ruskin favored conservation without significant alterations (Viollet-le-Duc, 1990; Ruskin, 1880). The 1964 Venice Charter emphasized maintaining the authenticity and integrity of heritage sites in restoration efforts. It advocates for respecting the historical and cultural significance of monuments and integrating historical elements with contemporary needs in a way that is sensitive to the surrounding environment and cultural context (ICOMOS, 1964).

More recent studies highlight the importance of "contextual restoration," which respects original architectural language and materials while incorporating modern techniques and functions. This approach ensures harmonious integration of new constructions or interventions with historical surroundings, preserving the aesthetic and cultural continuity of urban spaces (Jokilehto, 1999; Feilden, 2003). Such practices safeguard heritage while enhancing the urban fabric, making historical sites relevant and functional in contemporary settings (Ashworth, 2011). The contextual restoration approach emphasizes sensitivity to the surrounding environment and cultural context, balancing historical integrity with modern adaptability.

The Architectural Style of Epidamn Boulevard buildings

The architectural style along Epidamn Boulevard is predominantly modern architecture, influenced by the principles of Italian rationalism. However, there are also Neoclassical and Eclectic style buildings, constructed before 1926 (Capeli et al., 2014), that have been integrated into the boulevard, or modern

FULL TEXTS BOOK

buildings with only few decorative elements. Archival records, historical photographs, literature, and architectural blueprints provide valuable insights into the design of the boulevard's buildings. By analyzing these records, we can trace the characteristics of both types and understand the overall design strategy of the boulevard.

Modernist buildings on the boulevard are aligned and feature simple volumetric forms and symmetrical compositions and usually lack ornamentation. Some buildings consist of a stereometric volumes extending in 2-3 floors, while others have a more pronounced central volume that extends to a third level, or are scaled on one side to create a continuity with the other facades in the row. This character creates a sense of grandeur, reflecting the Fascist regime's ideals. Characteristic elements of the facades include large rectangular or round arched windows and doors, as well as balconies. They create repetition and rhythm in the façade (Fig. 4).

Ground floors are typically higher and present large windows or doors in support of commercial activities. The entrances to residential part on the upper levels is often symmetrically placed in the center or on both sides of the facade. For buildings situated at corners, the main entrances are often located symmetrically on the side facade. This symmetry extends to the placement of windows, doors, and balconies. In these buildings we find the use of modern materials such as concrete, glass, and steel. Steel is used for balusters in the balconies and for doors decorations. Bricks are used as decorative materials only in a few cases, to cover part of the façade. Some of this building present roofs while other are terraced.



Figure 4 Analyses of rationalist style buildings in Epidamn Boulevard, Durres

Neoclassical buildings or eclectic buildings in Epidam Boulevard are often symmetrical, with balanced proportions that create a sense of harmony and order and are more imposing. These structures frequently feature columns or pilasters, or various orders. In the basement, but also in the upper level of the façade

FULL TEXTS BOOK

are used intricate stone works such as ashlar stones to highlight the corners of the building, or arches or volumes. The entablature usually presents a flat pediment with a decorated balustrade or undulated shapes pediments in one case and cornice typically adorned with classical motifs such as dentils (Fig. 5).

Neoclassical buildings on Epidamn Boulevard are distinguished by their symmetry and balanced proportions, which create a sense of harmony and order. These structures are often imposing, with features that emphasize grandeur. The buildings frequently feature columns or pilasters, adding a classical element to the facade. Intricate stonework, such as ashlar stones, is commonly used in both the basement and upper levels of the facade. These stones often highlight the corners of the building, adding a sense of solidity and craftsmanship. The entablature typically presents a flat pediment adorned with classical motifs such as dentils. In some cases, the pediment might feature undulated shapes, providing visual interest. Decorated balustrades often crown the buildings, or surround balconies, adding a refined, ornamental touch. Neoclassical buildings sometimes have windows surmounted by triangular pediments or arches with keystones, which serve as strong visual focal points (Fig. 5).



Figure 5 Neoclassical building analyses of facade and decorative elements

Most of the buildings in the boulevard have shutters on the upper levels, as they serve residential functions.

The ornamentation of facades on Epidamn Boulevard varies significantly between modern and Neoclassical buildings. Modern buildings tend to have minimal decorative elements, with balconies typically featuring simple plastered walls and straightforward linear iron railings that emphasize clean lines and functionality. In contrast, Neoclassical buildings boast more intricate details (Fig. 6).

In neoclassical buildings the architectonic order is rarely used. Instead, are used pylons that decorate the spaces between openings with various ashlar construction techniques that imitate stone such as rusticate ashlar, with stonelike blocks with a roughened surface and deeply recessed joints, chamfered ashlar, with edges that are beveled or chamfered and smooth-faced ashlar with moldings around doors and windows, and covering a large part of the façade.

FULL TEXTS BOOK



Figure 6 Columns and pilaster in Epidam Boulevard buildings

Balconies, as the most prominent components of the façade, in neoclassical buildings often have classical balusters with spindle-shaped designs, adding a sense of elegance and historical reference. The railings frequently incorporate geometric patterns such as circles, repetitive small arches, and other classical motifs, reflecting the Neoclassical emphasis on order, repetition and symmetry. Additionally, these balconies are supported by corbels, which can be simple or intricately carved depending on the style, adding an extra layer of detail and craftsmanship to the overall design. Modern buildings present mostly balconies with simple iron rails, geometric patterns or lack any type of decorations (Fig. 7).

The buildings along Epidamn Boulevard feature two primary types of windows and doors: rectangular and round-arched. These elements are arranged either singularly or in pairs or triplets which is very rare, contributing to the facade's rhythm and harmony. In modern buildings, windows are large and well-defined, typically without frames, emphasizing clean lines and maximizing natural light. Neoclassical buildings, on the other hand, exhibit more decorative features surrounding their windows and doors. These include pilasters, ashlar, pediments, ornate keystones, and other classical motifs. The windows are often framed with detailed moldings and may include mullions, adding to the elegant and refined aesthetic typical of neoclassical architecture (Fig.8).

FULL TEXTS BOOK



Figure 7 Decorative elements of balconies and balusters of Epidamn boulevard buildings (Source: Author)



Figure 8 Windows and doors of Epidamn boulevard buildings (Source: Author)

Recent Interventions: Discussion and Conclusions

Over the decades, the buildings along Epidamn Boulevard have undergone various transformations in response to changing political regimes, economic conditions, and cultural shifts. Following the 1990s, numerous commercial activities were renewed, and bars were opened on the upper levels or rooftops of these buildings. During this period, interventions had minimal impact on the facades, though some

proposals included additions to the rooftops. These interventions, while altering the façade proportions, were minimal and primarily executed using glass and steel/aluminum coverings.



Figure 9 Additions on Epidam boulevard Builidngs (Source: Authors)

In recent years, Epidamn Boulevard has experienced a wave of contemporary architectural interventions. After the 90, especially during the 2000, in the terraces of existing buildings were added new structure, for commercial use, mainly bars and restaurants. These interventions were usually set back from the plan of the facade and were implemented mainong with light structures in steel/ aluminum and glass, being transparent and indistinguishable, and allowing a change of proportions in building's façade perception. These interventions consist mainly in one floor plan and are implemented with a minimal style. However, in some cases due to the extended high of the added volume, these interventions result very pronounced.

Recently, the municipality has recently intervened in the facades, plastering and painting them as part of a project to renew the urban fronts of the city center. As a result, the facades of the buildings have been preserved in good condition, although many of the buildings themselves require restoration and, in some cases, complete reconstruction.

However, a series of private interventions, restorations, and new constructions have significantly transformed the character of the boulevard's architecture. These changes have often resulted in the replacement of existing buildings with larger structures characterized by an eclectic and exaggerated style. These new buildings are typically hotel structures. These changes have altered the boulevard's architectural landscape, impacting its historical integrity and cultural significance.

Some contemporary interventions have attempted to preserve and reinvent the Italian styles of the 1930s, blending historical elements with modern design principles. These reinvention raises questions about authenticity, heritage preservation, but on the other hand seem more appropriate and adapt well in this historically significant context.

To illustrate these dynamics, specific case studies of modern interventions along Epidamn Boulevard will be examined, such as the Anfitheater Hotel and Veliera Hotel. The Anfitheater Hotel has utilized existing architectural elements and proportions but added an additional level that is not fully visible from the boulevard due to its recessed design. This non-invasive technique of adding volumes to buildings has been employed in other previous interventions as well.In Veliera hotel was used mostly a conservative approach in the façade, reproposing the original façade. But still there are some orientations towards stylistic restoration, as there are some decorations in the façade which are totally reinvented or reinvention of elements inside the same style. Still, they are not so significant to change the whole image of the building (Fig.10).

FULL TEXTS BOOK



Figure 10 Conservative approach in restoration with small hints of stylistic restoration

Other interventions, primarily reconstructions, have radically reinvented both the architectural style of the buildings and the character of the boulevard through a pseudo-historicism approach (Fig.11). These interventions showcase a maximalist eclectic style, blending diverse influences that deviate from traditional boulevard architecture. Rather than adhering to historical accuracy, these designs imitate various historical styles, ultimately transforming the visual identity of the boulevard.



Figure 11 A pseudo-historicism approach in reconstruction of Boulevard Epidamn buildings.

Conclusions and critical perspective

Heritage preservation in rapidly developing urban areas presents numerous challenges. However, from a sustainable development perspective, it is crucial to preserve the urban identity and the city image of consolidated areas, as exemplified by Epidamn Boulevard in Durres. To maintain the historical integrity of Epidamn Boulevard, specific guidelines should be established for any modifications to facades.

In cases of new additions, it is important to use light and reversible materials such as steel, aluminum, and glass. These materials ensure that new additions do not obscure the existing architectural style. Recessed additions should be promoted to minimize the visual impact on the boulevard's skyline. This technique allows for the creation of new functional spaces without significantly altering the historical facade proportions. Additionally, the use of glass blends well with existing structures and maintains a minimalistic appearance, reducing visual intrusion on the historical facades.

As regarding the restoration of the existing façade, is important to preserve original façade, to ensure that the visual appeal of the boulevard is sustained over time. In case its necessary to replace elements in the façade such as windows and doors, they must be similar to the existing in visual terms. This will help maintain the historical identity of the buildings.

In case of new constructions due to the degradation and very bad conditions of the buildings, its important to use the stylistic approach in order to have a contextual architecture. So, it possible to reinvent the neoclassical or rational stile of the existing building, being faithful to its architecture and to the context of the boulevard style.

FULL TEXTS BOOK

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FULL TEXTS BOOK

A SERIOUS GAME FOR DEAF CHILDREN BASED ON SIGN LANGUAGE

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ABSTRACT
This work aims to create a serious game, which presents a new means of communication between the tutor and the hearing-impaired child. Behavioral problems in hearing-impaired children due to lack of communication constitute an embarrassing situation. The proposed solution is in the form of a serious game based on Arabic and French sign language. For the realization of this game we used two methods of communication and learning, the Picture Exchange Communication System "PECS" and the Applied Behavior Analysis "ABA" method, used especially for the education and learning of autistic children. This game consists of reinforcing learning in a simple and attractive way, so the deaf child does not get bored while learning. The knowledge to be taught to children are respectively; learning letters, words, numbers and arithmetic operations (addition and subtraction), we used a very familiar games like puzzle, hidden object and others.
This work was tested in a center for non-communicating children's, the tutors appreciated the behavioral improvement of deaf children, during work sessions.
Keywords : Serious games, Apprenticeship, hard of hearing, Applied Behavior Analysis, PECS, Arabic sign language (LSA), French sign language (LSF)

INTRODUCTION
Technology represents the most important and innovative revolution that has marked humanity over all these years. Relying on it has become necessary in many fields, such as the design of educational content which constitutes a primordial phase in the teaching process, according to Kanika Budhwar, technology plays a major role in all areas mainly in the education sector [1]. It intervenes for the transmission of knowledge, to convey messages in attractive and fun ways, such as serious games, according to Wong et al serious games encompass a wide range of content intended for education [2]. All these studies reinforce that the use of technology for disabled children is necessary and useful at the same time and sometimes it can be challenging, taking as an example children with hearing impairment according to the testimonies of people in the domain their education is difficult, and it requires a lot of effort and patience especially since they may sometimes suffer from visual-spatial cognitive deficits, [3]. So making games for these children represents a plus in the field of computer programming education. Therefore we decided to target this category of disabled children in our work wich aims to ensure the learning of Arabic and French sign language for deaf and mute children.

DEAFNESS AND NON-VERBAL MEANS OF COMMUNICATION
People with hearing disorders are encountered with a serious problem in their daily interactions due to their inability to communicate with others effectively and this prompted the use of new methods of communication, for example sign language wich is a visual-gestural language. According to fischer [4] sign language is communicated through a gestural/visual channel rather than vocal/auditory. It is used particularly by the deaf and available in several languages, French Sign Language (LSF), Arabic Sign

FULL TEXTS BOOK

Language (LSA) and American Sign Language (LSA)...etc. Manual communication (use of hands, orientation of fingers, arms or body), is the means used to convey meaning in sign language. We can also cite MAKATON which represents a communication and language assistance program which was developed in the 1970s by speech therapist Margaret Walker, this language is used by a large community of users of different ages and abilities. , The signs used are taken from British Sign Language (BSL). Another means used for communication and education is learning based on images such as the PECS method, created by Bondy & Frost, is a pictorial system, developed for children suffering from communicative impairment [5] it involves the physical exchange of images to communicate with another person for the purpose of asking or commenting.

RELATED WORKS

Several works have been carried out in the field of computer research intended for deaf children, Nahid Nasiri and his team have created a serious game in which deaf children can learn to pronounce specific words that they are supposed to know before the age of 7 years [6]. Cano and his team created a serious game for hearing-impaired children called MECONESIS designed for children between 7 and 11 years old by taking into consideration a set of aspects, such as challenges/learning, interaction, and rewards, [7]. The authors of this work presented a new serious game in sign language for deaf children aimed at raising their awareness in a fun way about the necessary precautions during the anti-covid-19 epidemic [8].

SYSTEM ARCHITECTURE

The system architecture is divided into two stages, the first is based on learning via an image-based course related to sign language, the aim of this stage is to familiarize deaf children with the different signs of language while learning, the second stage is an acquisition stage carried out in the form of exercises, it consists of reinforcing learning in a simple and attractive way so that the deaf children does not get bored while learning.

Our system is designed to teach deaf children; letters, words, numbers and arithmetic operations (addition and subtraction).

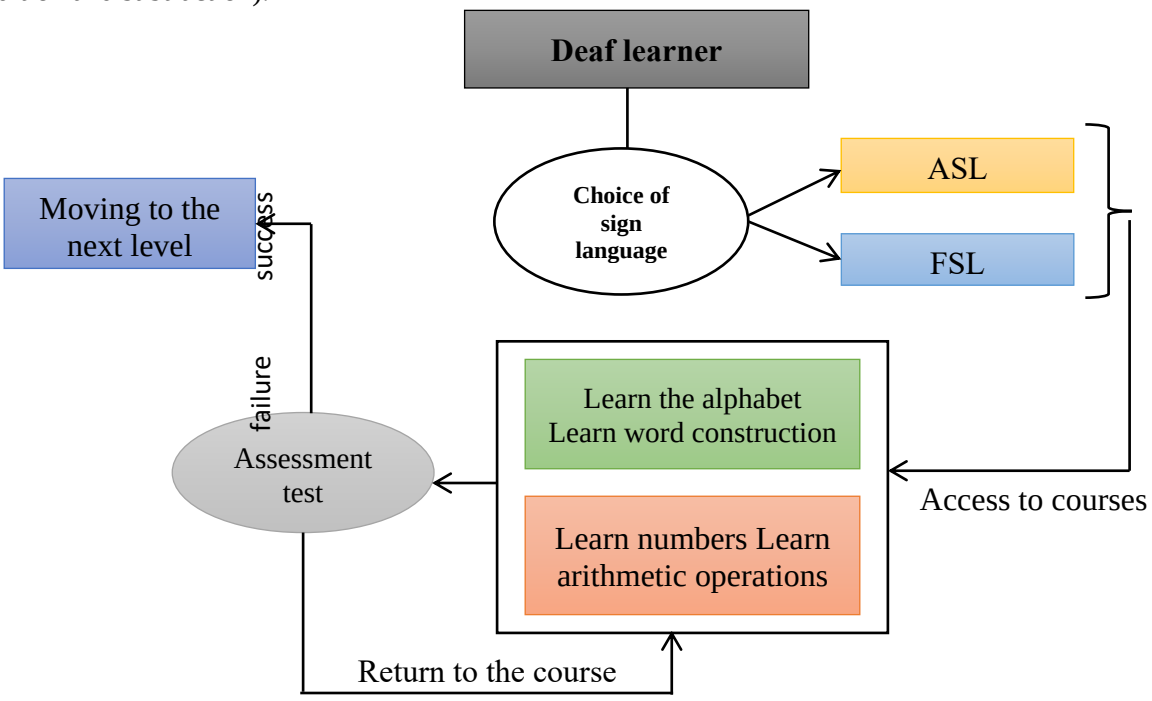


Fig 1. General system architecture

FULL TEXTS BOOK

GAMES DESCRIPTION

The type of games presented in this work are inspired by games previously designed for ordinary children, such as puzzles, hidden objects, car racing, etc., but in sign language version, therefore the Communication with the child is done through images and each activity includes a lesson and an evaluation test presented in the form of a mini game.

First the child must choose his learning language Arabic or French in sign language, then he must choose the desired learning activity, after that the child must choose between lessons and tests, the lessons are presented in different contexts (object, fruit, animals) so that the child does not get bored.

LEARNING SIGN LANGUAGE

This stage is about learning the language and is carried out in the form of lessons.

Category of games for the Arabic Sign language ASL

The puzzle game in our work is designed to teach Arabic letters. It consists of two levels. The player cannot move to the second level before he successfully completes the first one. It depends on presenting to the player a picture of a letter in sign language, in addition to three different written letters, where he must put together the parts of the picture and identify the correct written letter corresponding to it (Fig 2 and Fig 3).), The duration of the game is limited to 60 seconds.

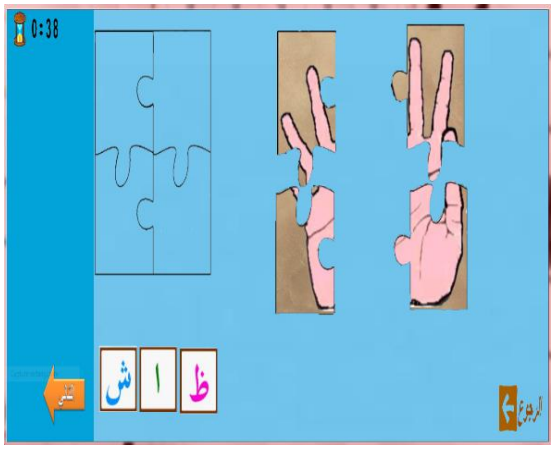


Fig 2. level 1 puzzle game

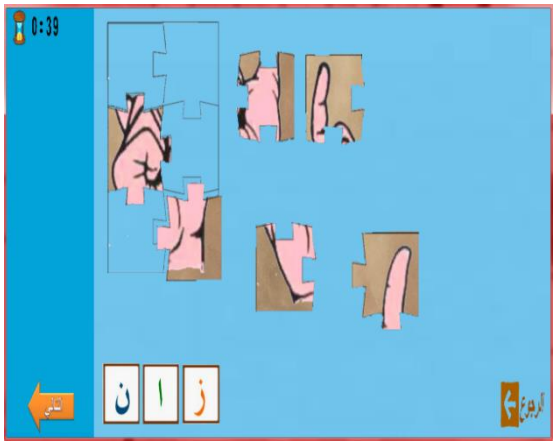


Fig 3. level 2 puzzle game

Category of games for the French Sign language FSL

In this game, the player must help the child find his missing puppy by identifying the correct written French letter corresponding to the image of the sign letter appearing in the game background (Fig 4)



Fig 4. Learning game for French Sign Language FSL

CONCLUSION AND PERSPECTIVES

Normal children gradually learn with their five senses, while deaf children live in a silent world where gestures are the only way for them to learn, develop, and interact with their surroundings and society in general.

Given the technological development we are experiencing today, it has become necessary to rely on it in teaching children with disabilities, for example serious games, which are considered one of the most promising solutions in terms of educating deaf children, because it enable them to communicate with others and obtain the appropriate education for them and also it facilitate their effective integration in their community.

We relied on two teaching methods, ABA "Applied Behavior Analysis" and PECS "Pictures Exchange Communication System", which ensured remarkable learning and education of deaf children. Collecting the different signs was the most crucial point for the creation of our game. This game was tested by deaf children in a specialized education center for deaf children, where the tutors appreciated and approved the game.

As a perspective we aim to add other educational activities, develop another version of the game in 3D and add the learning of other sign languages, as well as make the game multiplayer by adding collaborative scenarios.

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FULL TEXTS BOOK

THE ROLE OF BLOCKCHAIN TECHNOLOGY IN PUBLIC ADMINISTRATION

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ABSTRACT

Public administration is undergoing processes whereby blockchain technology is believed to be a breakthrough system that provides transparency, accountability, and efficiency. The present paper presents a few case studies from all over the world concerning the functionality and benefits of blockchain technology. Beginning with a brief introduction to blockchain technology, it underlines decentralized, immutable, and secure parameters as the main features.

It helps cage fraud, saves administrative costs, and makes procedures more efficient by providing transparent and secure records of transactions. Contrariwise, Estonia's e-Residency program is applying blockchain-based digital identity to avoid interacting with criminals.

This means that interoperability, easy scaling, and regulatory compliance should be the goals, especially when considering blockchain on a broad scale. Indeed, this will only be achieved through combined efforts of governments, technology providers, and regulators. The paper, thus, calls for standard protocols and comprehensive educational and training programs to make the application of blockchain technology smooth.

It simply means that despite the great opportunities blockchain technology offers toward making public administration better, solving the challenges occasioned by this technology is of essence. Therefore, strategic collaboration, backed by facilitative legal and regulatory frameworks and broad stakeholder education, would be required if the full transformational power of blockchain technology were to be realized in its entirety. In the final analysis, this would make government operations transparent, efficient, and reliable, hence a promising future of public administration.

Keywords: blockchain technology, public administration, transparency, digitalization

1. INTRODUCTION

Blockchain technology is generally a decentralized, immutable ledger that transparently and securely records and verifies transactions (Syedhasnaatabbas, 2024). It makes use of cryptographic methods, data decentralization, and the formation of immutable ledgers that assure the integrity and security of data (Ravikiran, 2024).

The fact that blockchain technology is capable of eliminating a central authority or entity makes this a potential avenue for enhancing the reliability and security level of concerned services on which people and societies depend. There is greater transparency in digital record tamper-proof ownership with no central controlling authority (Lykidis et al., 2021). This reduces the possibility of discrepancies or ulterior motives. Those applying for identification documents or requesting property records would not need to sweat over whether decisions provided the highest levels may have implications that made the lowest levels of information less trustworthy (Syedhasnaatabbas, 2024)(Lykidis et al., 2021).

The very concept of establishing transparency and security as the very foundations is a novelty, as it introduces life into the most accessible and transparent record, like a sunny day without clouds and clearly forever; this kind of idea opens up scope for a wide range of applications. It is the ability of people to trace the movement of goods across borders, check if the money in their pockets is authentic, and validate if each person in authority they meet is genuine that builds the bedrock of everyday trust in incremental fashion (What Is Blockchain on AWS?, n.d.). Blockchain technology has huge potential for transforming public administration with respect to radical improvements in transparency, accountability,

FULL TEXTS BOOK

and efficiency. In that regard, blockchain technology is in a position to reform the way public institutions collect, store, and process data, thus reducing problems associated with data integrity and security and eventually building trust between citizens and public institutions.

There are many potential use cases for blockchain in public management, most of which have a high impact on several aspects of government operations.

This case, which enabled the so-called overposting by the state government of South Tyrol in Northern Italy, in combination with a corporation from Germany—SAP—alone exemplifies how blockchain technology can be used to increase the efficiency of very complex administrative processes (Sillaber, 2020). The case study focused on cell tower construction, involving a large number of players: government agencies, telecommunication operators, and citizens. Traditionally, the process for constructing cell towers is cumbersome, usually associated with large volumes of documentation, manual authorization procedures, and a lack of transparency. This can lead to delays, inefficiencies, and corruption. The state government of South Tyrol and SAP used blockchain technology to develop a platform for all administrative procedures involved in the construction of cell towers. This tool is called "Blockchain for Tower Construction," and it was developed with the idea of digitalizing and automating the whole process, starting from the planning stages right through to the final approval stage (Icoadmin, 2023). The blockchain technology could significantly reduce public expenditure by providing a means of digitization, access, and efficiency to services towards citizens.

Privacy issues are, therefore, very critical in the context of e-government services since most of the services being rendered call for the processing of sensitive personal data, whose protection from unauthorized access is paramount (Bustamante et al., 2022). It is of essence to ensure the security of the data at all instances of its entire life cycle, from the time of collection to the time of storage and processing. Accordingly, proper measures should be taken to rule out any possibility of unauthorized access, theft, and misuse of the data, conditioned by Lykidis et al. (2021). There has to be a striking balance between transparency and privacy throughout every aspect of blockchain solution implementation in public administration.

The intrinsic nature of blockchain technology is that of transparency and integrity; sometimes, these principles are contradictory to the need to protect sensitive information and preserve individuals' privacy. On the other hand, blockchain technology can provide an immutable, transparent record of transactions and data that, without question, will help avoid fraud and corruption and boost accountability in public administration. Moreover, it can result in enhanced trust in the government and the involvement of people with more efficiency in the decision-making process. The potential of blockchain technologies for changing public administration is huge and diversified across a wide number of domains.

The role of blockchain in public administration will be aimed at being analyzed in this paper by going through the various aspects related to its applications, benefits, and challenges with the help of an in-depth study of available literature supported by case studies. This paper therefore contributes to this rapidly increasing production of literature on blockchain in public administration through the synthesization of existing knowledge and detection of research gaps. It also seeks to enlighten policymakers and public administrators in authorities considering block chain solution implementation with valuable insights in this area. Blockchain technology potentially has the capacity to bring in more transparent, effective, and trustworthy government operations.

Governments have to take seriously a blockchain-based system for improving public services and citizen participation. For instance, blockchain can be utilised in the development of secure and transparent voting systems to protect electoral processes. Blockchain-based supply chain management systems can, besides, be used by governments to set a trace on the distribution of commodities and services, hence decreasing the possibility of fraud and corruption. This would further enhance the efficiency of government activities. The automation of processes and the reduction in the need for intermediaries that

FULL TEXTS BOOK

blockchain makes possible will cause streamlining in various services offered by the government, accordingly reducing time consumption and cost quadrant involved with them. For example, blockchain-based land registration systems can help governments speed up the process of property ownership transfer, consequently reducing the requirement for intermediaries and increasing the speed of transactions.

Yet, there exist some major challenges to its successful implementation of blockchain technology in public administration.

The major challenge is regarding the need for an apt and rigorous legal and regulatory framework. The working of blockchain technology itself is not dependent upon any existing legal and regulatory frameworks; this tends to produce confusion and ambiguity. Clear guidelines and regulations from governments need to be issued on the usage of this technology to ensure blockchain, given how it will be deployed, runs in tandem with their goals and values as stated. In addition, it requires specialized skills. The successful implementation of blockchain technology requires special expertise that the government needs to cater to through training, and it will ensure that enough professionals are hired who have had training in implementing and managing blockchain solutions. Moreover, governments have to make sure that their IT infrastructure can support blockchain technology.

Taken together, blockchain technology can open many opportunities for transforming public administration in aspects concerning transparency, effectiveness, and reliability. However, to finally establish this, it requires a perfect plan backed by a legal and regulatory regime, which itself must have firsthand preceded a competent workforce. With applications, benefits, and challenges quantified, the paper elucidates insights for policymakers and public administrators eyeing blockchain solution adoption.

2. BENEFITS OF BLOCKCHAIN IN PUBLIC ADMINISTRATION

Blockchain technology holds the potential to change public administration with added transparency, accountability, and efficiency. It can also help governments and public institutions engender trust, protect data, and reduce costs. In addition, blockchain technology can help in reducing corruption, improving land and property registry systems, and protecting data with a robust use of encryption mechanisms. Not only that, blockchain can automate and secure transactions, cut down fraud, facilitate communication among the far-flung administrative bodies, and whatnot.

However, there exist a couple of challenges—legal and organisational—to the full implementation of blockchain in public administration. It is incumbent upon governments and organisations to provide requisite adjustments at these two levels of challenges for the full deployment of blockchain technology benefits.

In a nutshell, blockchain technology has the potential to make far-reaching changes in public sector operations across the globe, paving the way for much improvement in transparency, accountability, and efficiency. The immutability of blockchain records, the security of their transactions, and automatization itself can convey huge gains for the security, transparency, and efficiency of both public institutions and citizens.

3. CASE STUDIES

The case studies represent applications and impacts of blockchain technology in various domains of public administration: e-residency, food safety, healthcare, supply chain management, voting, and drug traceability. Case studies illustrate that blockchain technology has huge potential for making public services more efficient, secure, and transparent, and can solve many challenges governments and organizations face.

Estonia's e-Residency Program

FULL TEXTS BOOK

It is undeniable that when it comes to the digitization of public services or adoption of blockchain technology, Estonia stands at a highly pioneering position. The country has been able to make reasonable headway in integrating blockchain technology into several aspects of public administration, including the implementation of e-residency, identity verification, and voting systems (Bitton, 2022).

E-residency is a program designed to help non-citizens get a foothold in Estonia so that they can access a range of digital services pertaining to establishing and managing a business, filing taxes, or gaining access to healthcare services. It has had remarkable success, with more than 50,000 e-residents having been signed up since the program's launch in 2015 (Abaku et al., 2022).

Besides, Estonia has developed a blockchain-based identity verification system where citizens can verify their identities online at their own convenience and safety. It finds incorporation into various public services, including the tax authority, police, and healthcare system, among many others (Idefy.Admin, 2023).

State Government of South Tyrol, Italy

They partnered with SAP to overcome the cumbersome administrative process related to building and modifying cell towers. Quite often, mounds of paperwork dampen the spirit, and you end up holding back simply because that red tape will be exhausting to work through. Hence, the decision to implement the new-age technology provided by blockchain in the interest of more easily and effectively administered business was taken (Talapina, 2020).

The key goal of this action plan was to provide more accessible and open administrative governance, with the short-term goal to restore public confidence. The intention was to make a proof to the public that the public institution was capable of things that are brought to completion within the required time frame. This is a major step forward (Treiblmaier & Sillaber, 2020).

This case study, therefore, provides evidence that new ways of managing public services must be conceived of. The use of blockchain is not the goal, just a way for its potential to be completely realized and for our lives to be enriched. It is, therefore, encouraging to see how South Tyrol is taking the lead in exploring new paths to help improve its administrative process.

Denmark

The Danish Tax Administration has cooperated with a private company called Nets to establish a new digital solution: Vehicle Wallet. Via this innovative system, blockchain technology will ensure safe and decentralized storage of critical vehicle data in a decentralized, public ledger and further decentralized storage for the same (Nascimento et al., 2021).

What are the implications of this development, then? The system provides for a uniform and reliable way of tracking information related to vehicles. Irregularities or fraudulent activity can thus easily be identified. This will ensure that information provided is accurate and reliable.

This initiative is part of a much larger, more complex system. Denmark is working on applying blockchain technology to various processes with the goal of saving money on operations and eventually eradicating the use of repetitive manual labor. This would make the procedures more streamlined, so convenience improves for all stakeholders in these processes (Nascimento et al., 2021).

Probably the greatest kudos to Denmark has to be in embracing blockchain technology and implementing it in a bid to increase the efficiency and streamlining of its taxation apparatus. The objective is how innovative solutions can improve the quality of our daily lives.

Real Estate Management System

A blockchain-based real estate management system (REMS) has been developed. As a result, it has turned out to be feasible to implement this innovation and thus prove the possibility of its work in other fields of public administration. This is a very promising development (WEF Blockchain Toolkit, n.d.).

This then calls for the question of the exact nature of the REMS's role. The system makes it easy for the issuance of documents to the citizens in a more efficient manner. It is also widely acknowledged that paperwork may usually be quite annoying and wearisome to finalize. The system, therefore, makes that

FULL TEXTS BOOK

task easier, hence increasing the efficiency in the disbursement of services in the public arena. The purpose is to make the process easier for all parties involved and thus enhance efficiency in public service delivery (Block chain toolkit, WEF, n.d.).

However, it has other advantages conferred by the system. In addition, blockchain technology is in use in property and land registry systems. All these initiatives are meant for people to acquire their due rights and to minimize chances of corruption; all of it is done to strike a balance between efficiency and equity. In fact, case studies go on to enumerate hundreds of use scenarios of blockchain technology in the public administration stream. The purpose here is the same: to enhance transparency, efficiency, and government processes. Accordingly, the most important thing then becomes transparency in our systems and belief in the way they are operated by the public. Confidence in working systems, therefore, is paramount to the public (Abodei et al., 2019).

It is refreshing, therefore, to witness the actualization of blockchain technology in projects with aims of seeking efficiency and transparency in processes of public administration. Incremental changes are to be introduced to strive for optimal outcomes.

4. CONCLUSION

It has been shown that blockchain technology is able to solve some of the století-inherited problems of governmental activity—bringing more transparency, efficiency, and trust into the process. This overview enables case studies and research on the possible benefits resulting from the implementation of blockchain technology within a number of areas, starting from digital identity management and land registry flow to voting systems and aid distribution processes. On the other hand, one should not turn a blind eye to the challenges this may potentially pose. Any implementation of blockchain technology in public administration will have to take into consideration the technological, organizational, and institutional factors involved. To achieve broader diffusion, a number of key issues must be identified and addressed in the blockchain technology, related to scalability, interoperability, and regulatory compliance. Critical concerns of security and privacy, more so where sensitive data is kept—like voting systems—then become imperative. That is why rigorous testing and robust measures in security are the most important things to be implemented before large-scale application of blockchain tech.

Another important aspect to be taken into consideration when talking about blockchain is environmental: in particular, the energy use of this technology. Specifically, in relation to the imperatives that governments have to follow with respect to sustainability, it is of paramount importance to be able to measure and reduce as much as possible the energy use of blockchain systems. Therefore, examining more energy-efficient consensus mechanisms and using renewable energy sources for blockchain operations could, therefore, play an important role in attacking this challenge.

The potential for blockchain technology is huge, despite these challenges, within the context of public administration. It acts as the enablement factor for smart governments, focused on efficiency, transparency, and citizen-oriented services. The technology can create transparent, immutable records that have the potential to fight corruption and increase accountability within the government sector.

A number of key strategic objectives ought to be pursued to take the development of blockchain technology ahead in the final analysis within the context of public administration. These would seriously require detailed research and development, transparent regulatory frameworks, and enhanced institutional capacity in government organizations. It is very important that governments, technology providers, and academic institutions come together to facilitate innovation and knowledge.

In other words, even though blockchain technology has the potential to improve public administration, what is required is a cautious and strategic approach. Balancing innovation with risk assessment is very critical. If the intrinsic strengths of blockchain are harnessed and intrinsic weaknesses overcome in its implementation, then it should be possible to evolve public administration relevant to a digitized world. This will result, overall, in more open, effective, and reliable government operations.

FULL TEXTS BOOK

The application of blockchain technology in public administration is in its very infant stage, and there is so much yet to be observed. Future research should accordingly focus on the long-term implications, strategies for the surmounting of the barriers to adoption, and societal impacts while applying blockchain-enabled government services. Blockchain can reshape the relationship between governments and citizens into a new epoch of public administration, typified by increased trust, efficiency, and democratic participation in the process of evolution. A bright future is surely ahead.

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FULL TEXTS BOOK

CREATING AN INCLUSIVE CITY: THE EXEMPLARY BARRIER-FREE PROJECT OF KONYA METROPOLITAN MUNICIPALITY

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ABSTRACT

This "Exemplary Barrier-Free City Project" has been initiated by Metropolitan Municipality for making disabled persons a part of the city life in more ways than one. Under the scope of a protocol signed with the Prime Ministry's Disabled Persons Administration in 2008, this project forming a series of arrangements and investments enables the moving around the city much easier and safer for disabled people. Winning first prize at the 'Barrier-Free City Idea and Project Competition' by the Union of Municipalities of Turkey, the visions drawn by the project remain from this wide array toward the development of disabled individuals' living spaces. Acknowledged to be a best performing project by the Ministry of Family and Social Services in 2021—which, as long as a best performance is stated in funding and commendation decisions to be effective for its impacts—the initiative covers 17 districts of Konya. It includes connections of many hospitals and improvements related to key routes, like the Konya Station-Alaaddin Hill axis and the Mevlana Cultural Centre. Among them are the presence of public establishments' sidewalks and entrances to the premises having no barriers, the availability of more than 114 kilometers in length of barrier-free public roads, 210 acoustic signaling systems at busy pedestrian crossings, and 61 low-floor buses among the city transportation fleet used for servicing passengers with limited mobility. Efforts to support the visually impaired also ensure their independent and safe movement within the city. It is pioneering works for Turkey with the project, and Konya not only for prominent representative of love and tolerance but the life quality of the disabled people has been risen with sociocultural participation. This project being exemplary in other cities with accessible and well-designed social life has a potential for more expanded life quality levels for the disabled people, also increasing social contribution.

Keywords: Barrier-free city project, Konya Metropolitan Municipality, disabled transport, acoustic signalling, social cohesion.

1. INTRODUCTION

In this context, a barrier-free environment is not only planned for people with disabilities, but an exemplary city that will become a symbol for all the other cities to make everyone's life easier. The urban environment creates a great many restrictions for disabled people to involve themselves in social, economic, or cultural activities, and this inconceivably leads to negative implications. Realizing and detecting these problems for a long time, the Konya Metropolitan Municipality initiated the "Exemplary Barrier-Free City Project," which was supportive of enabling people with disabilities to move freely and safely within the city. This will be based on universal design and powered by inclusivity, which in the end allows everyone to have a principal access to any public space and service, regardless of their individual capability.

It all started in 2008 when a protocol was signed with the Prime Ministry's Disabled Persons' Administration. This basic protocol has paved the way for an overall series of arrangements and investments where the biggest target was to remove the physical and social barriers in the city, thus integrating this segment into the active urban life and creating a quality lifestyle for the impaired people.

FULL TEXTS BOOK

Among the remarkable successes of the project was the first-place award at the 'Barrier-Free City Idea and Project Competition' that the Union of Municipalities of Turkey organized. The award was presented in recognition of the project's originality and its potential to be used as a model for other cities. In 2021, it also received a further award by the Ministry of Family and Social Services for its tremendous impact and contribution to giving funding to further develop the project.

The "Sample Barrier-Free City Project" among the 17 districts in Konya includes a series of upgrading infrastructure and accessibility. High priority roots are Konya Station - Alaaddin Hill axis and Mevlana Cultural Centre. In those areas, there are barrier-free public roads, 114 kilometers of accessible roads, 210 acoustic signaling systems on the high roots of the pedestrians, 61 low floor buses that allow passenger carrying with restricted movements.

In addition to the physical changes, the project has been involved in provisions for the visually disabled with a view to allowing them to make independent movements within the city in a very secure manner. In particular, the sidewalks and public building entrances are changed to make sure that they have no barriers and can, therefore, be easily accessed by the disabled persons in search of services offered in the facility or just basic community participation.

It is unique to Konya and, for that matter, Turkey, in being physically accessible and in introducing the culture of sensitivity and empathy. The image of the city as one of the leading ones not only of love and tolerance but also of the lives of disabled people within is showcased by it. The quality of life of those residents has increased, which is a demonstration of how deep inclusive urban design can touch socio-cultural participation.

Projects like the Exemplary Barrier-Free City Project have, effectively, turned out to be a model of success elsewhere. Its success goes further to underline the essence of fully constituted and community-involved planning in developing a space that effectively accommodates the need of all citizens. Successes like those in Konya, as other cities catch on, bring the potential to make life that much better for people living with disabilities around the world. This project does not only increase social contribution but also helps in creating a healthy and interactive society where all individuals have the opportunity to perform.

2. THEORETICAL FRAMEWORK OF URBAN INCLUSIVITY AND ACCESSIBILITY

Urban inclusivity is replete with accessibility, as a multifaceted concept that is interlinked with the physical layout of the cities and the socioeconomic factors as well as the cultural dynamisms that shape urban life. The 'presidium' plays a fundamental role in this context: by 'presidium', one refers to the constants and active presence of such an economic activity in its facilities, acting like a landmark for a person to pass. This contains not necessarily deter micro-criminal activities, but it could positively impact on citizens' peripheral perceptions by making passersby feel safe (Caselli et al., 2024).

The level of urban inclusivity and accessibility goes beyond the drawing boards and the implementation of other different systems and infrastructures that will guarantee the citizens have access without fear into the city. For example, the development of a Geographic Information System (GIS) database will be functional in mapping and spatial analysis of key urban components: mobility, built-up spaces and open spaces, and morphological/functional and environmental aspects (Caselli et al., 2024). This all-inclusive data model will be important in understanding and improving transparency on how urban accessibility can further be improved.

The Middleware Data Acquisition Component for Accessibility will be to create interfaces for acquiring information from GPS devices and Smart Sensors Networks. This aspect should ensure scalability and availability of the system, reliability in data delivery, and interoperability with different kinds of sensors and technologies (Mora et al., 2017). Moreover, it enables us to realize a scalable system that can address increased computing needs due to the number of citizens interacting with the system and the size of the smart sensor network distributed (Mora et al., 2017).

FULL TEXTS BOOK

Accessibility theory is being operationalized through increased case studies across different geographic, governance, and economic contexts. Some examples are the online platform out of Chicago designed to visualize place-based accessibility in the city, evaluations in Bogota around the principle of affordability, and open tools used in Cairo and Kigali to gain new insights about accessibility (Tomer & Gutman, 2018). Sharing results across these case studies can then further spur new cross-disciplinary approaches in a bid to improve spatial access and rectify accessibility-based spatial injustices.

More pointedly, the design of streets and public spaces is highlighted as a key consideration in ensuring that all users, from pedestrians to cyclists, are properly accommodated. Urban designers and landscape architects can bring new ideas into the planning process for streets that are more sensitive to the needs of all users. For example, lowering city speed limits can significantly lessen the severity of accidents, leading to an even more humane and civil environment (Matz, 2022).

Essentially then, inclusivity in urban spaces will thus also cover extending an environment welcome to all age sets and capabilities. This has equally moved to the forefront among organizations, such as the World Bank, which insists on the need to make cities age-ready and universally accessible (Arai, 2024). Projects like Viet Nam Scaling Up Urban Upgrading Project insist that features and amenities of urban infrastructure should be made inclusive and accessible to persons with disabilities and the senior population (Arai, 2024).

3. THE KONYA EXEMPLARY BARRIER-FREE CITY PROJECT

The Konya Metropolitan Municipality has initiated what it calls the "Exemplary Barrier-Free City Project" in an attempt to really integrate the disabled comprehensively into urban life. This ambitious project, which is implemented within the framework of a protocol signed with the Prime Ministry's Disabled Persons Administration in 2008, includes a wide area of regulation and investments to let disability into the city be easy and safe. The project encompasses the adjustment of public infrastructure through various activities, like fixing lowered curbs, providing ramps, and improving the public transport system in the area to make it also accessible. These are augmented with the creation of an extensive networked barrier-free road and pathway, coupled with the introduction of acoustic signaling systems at busy intersections to assist the partially sighted pedestrians (Konya Büyükşehir Belediyesi, 2008a).

In addition to this, the project implements inclusive policies and practices in the diversification of public services, beyond the physical infrastructure improvements. For example, new constructions in public buildings are characterized by universal design features to ensure that such constructions create an environment that is appealing to all users. The existing buildings are retrofitted to rid off any barrier that hinders access to them. Public spaces, parks, and recreational areas have been redefined to set characteristics of features that have the capacity to cater to different abilities of people, thus facilitating them in using and fully enjoying these areas comfortably (Konya Büyükşehir Belediyesi, 2008a).

In addition, community mobilization is being done towards awareness creation for a culture of inclusivity. Educational programs, as well as workshops, sensitize the general public, municipal staff, and service providers on the needs of the disabled and their rights. The approach is all-inclusive, ensuring that the said city becomes accessible not only physically but also socially. The "Exemplary Barrier-Free City Project" refers to a comprehensive effort that addresses physical and social barriers for people with disabilities and that will insure a city built for all, enabling everyone to equally partake in urban life.

Konya Metropolitan Municipality speeds up its work and turns the city into a model of accessibility and inclusiveness. The mayor has repeatedly stated the existence of 12% of the disabled in the total population of 75 million in Turkey, hence the unflinching determination of the municipality to construct a barrier-free Konya. The Mayor explained that there was a need to change societal attitudes towards disability: the essence of inclusiveness actually should go beyond legal and institutional provisions and

FULL TEXTS BOOK

requires a mindset. He gave an argument that views of disabled individual citizens in name only reflect a much deeper societal impairment and such should be addressed (Konya Büyükşehir Belediyesi, 2008b).

For his part, the Mayor said that the government has taken a very big step lately, considering the considerable work done recently, especially since most of the problems faced earlier have been effectively addressed in light of the strong partnership between the state and the community. He explained that within the last eight years, the municipality has initiated actions that conform to international practices on having no curb or median in this city larger than 8-10 centimeters. The move fits into a larger strategy to transform Konya into a global city and a pioneer in the field of barrier-free urbanism. Stressing that the best approach is one marked by anticipatory disability empathy and sensitivity, the Mayor praised the government's work and pointed out Konya's pioneering work in instituting accessibility protocols with Istanbul. An ongoing promise is to make Konya one of the world's leading barrier-free cities by 2023. This shall represent the example of that kind of inclusive urban planning to be emulated globally (Konya Büyükşehir Belediyesi, 2008b).

Konya Metropolitan Municipality's 'Barrier-Free City Konya Accessibility Master Plan Project' came first in 'Barrier-Free City Idea and Project Competition' held by Union of Municipalities of Turkey. Speaking after the protocol signing ceremony at the Metropolitan Municipality Stone Building Culture and Art, Deputy Mayor Mustafa Uzbaş said that they aim for truly social inclusion of every citizen classified generally as disadvantaged in all areas of life. Uzbaş said this project represented the efforts for raising standards by the municipality toward better access networks in the most used public space, such as places of worship, government buildings, roads, social spaces, and parks, of special importance to the disadvantaged groups (Konya Büyükşehir Belediyesi, 2024).

In 2021, the Ministry of Family and Social Services found the project exemplary and rewarded it, funded it, and praised it. With facilities having numerous hospital connections in 17 districts of the city, from the Konya Station-Alaaddin Hill axis to the Mevlana Cultural Centre, the project is set to improve the life of disadvantaged groups within its scope. The detailed presentation also included representatives of local disability associations (Konya Büyükşehir Belediyesi, 2024).

5. CONCLUSION

The "Exemplary Barrier-Free City Project," undertaken by the Konya Metropolitan Municipality, represents a good example of the strength that inclusive urban planning harnesses and the transformative spiral of changing lives among disabled persons. It has handled the physical and social barriers that exclude people with a disability from the knowledge economy, making sources and opportunities fully available to every person. This initiative speaks to universal design and inclusivity, making sure that public and service places can be accessed by everyone, irrespective of their ability.

Its success is measured by the number of awards the project has already received, among them being the first place at the 'Barrier-Free City Idea and Project Competition' realized under the Union of Municipalities of Turkey. The project was rewarded by the Ministry of Family and Social Services in 2021 and assures its innovative approach alongside the possibility to serve as a model not only for other cities in Turkey but perhaps also in other parts of the world. Thanks to this refurbishment, almost 114 kilometers of accessible roadways were created, alongside 210 acoustic signaling systems and 61 low-level buses, raising the quality of life and safety for disabled people in Konya.

The project is also concerned with the support of the visually impaired and ensuring the free entrance in the public buildings and services. This really proves that the implementation of inclusivity is full. Sensitization as well as formation of an attitude of empathy and sensitivity in the communities further strengthens the impact tendencies that this project has on the community. The commitment made by the Mayor to change society's attitude toward disability and to make a social and physically accessible city can be now a benchmark for other municipalities.

FULL TEXTS BOOK

The example of the "Exemplary Barrier-Free City Project" in Konya ideally illustrates how positive changes in the lives of physically disabled people can result from inclusive urban design. This has helped lots to make Konya a better city for its disabled population, besides also serving as a precedent for other cities to build more inclusive and just urban spaces. Success of the project emphasizes the part where comprehensive planning is needed, community stakeholders are involved, and follow-through with commitments to design cities according to universal principles for all. Success in this matter means normalization for disabled people other than in a better world quality of life, thus creating an inclusive and cohesive society.

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FULL TEXTS BOOK

HARNESSING ART OF ORATORY AS A VIABLE TOOL FOR ENTREPRENEURSHIP EDUCATION AND IGR IN NIGERIAN TERTIARY INSTITUTIONS

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ABSTRACT
The salient need for innovation, job creation, technical skills, among others, propelled the conception of entrepreneurship education in Nigeria by the President Obasanjo-led administration in 2006; while it was mandatorily injected into all tertiary institutions in 2007/2008 session. Therefore, with the impacts of entrepreneurship trainings, though rated to be effective so far, yet with the few vocational skills being employed by governments, NGOs and stakeholders to expose the youths to entrepreneurship, this is already signaling danger of toxic competition. Hence, it beckons for immediate integration of more vocational skills to augment the existing ones which are already becoming congested by the available massive benefactors across the nation. In the wake of this, the study seeks to canvass public speaking otherwise known as oratory, as a viable vocational skill that can also be maximized to further achieve the aim and objectives of entrepreneurship education in Nigeria. This will materialize the reduction of the torrent of youths bombarding the existing few vocational skills amidst lethal rivalries. This study is moored on the dialogic theory of public speaking. It seeks to inform the feasibility of public speaking as a viable vocational skill through which entrepreneurship education can be made to be more effective. It recommends, among others, that asides training students, the art of public speaking could also be maximized from the perspective of having a hub for oratory which could serve as internally generated revenue for institutions; especially the poorly funded Nigerian tertiary institutions
Keywords: Oratory, Internally Generated Revenue, Entrepreneurship Education, Vocational Training

1.0 Introduction

Entrepreneurship education has become a critical component of the educational landscape in Nigeria, driven by the pressing need for innovation, job creation, and the development of technical skills (Emeritus, 2023). In response to these imperatives, the President Obasanjo-led administration introduced entrepreneurship education in 2006 (Ajayi, 2019), mandating its implementation in all tertiary institutions in the 2007/2008 academic session. Over the years, this educational initiative has demonstrated its effectiveness, equipping students with essential entrepreneurial skills. However, the approach to entrepreneurship education in Nigeria has predominantly revolved around the dissemination of vocational skills, which are critical but also somewhat limited in scope.

As Nigeria's population burgeons (United Nations, nd), the demand for entrepreneurship education has surged. Various stakeholders, including governments, non-governmental organizations (NGOs), and educational institutions, have intensified their efforts to provide this education to meet the growing demand. Yet, the continuous reliance on a narrow set of vocational skills raises concerns about an emerging threat of toxic competition among students. The existing vocational skills have become overcrowded, primarily due to the increasing number of beneficiaries across the nation. This presents a unique challenge, and it is essential to explore innovative approaches to supplement existing entrepreneurship education methods effectively.

This study aims to explore an alternative perspective, one that seeks to introduce a novel dimension to entrepreneurship education in Nigerian tertiary institutions. We propose to investigate the role of public speaking, or oratory, as a valuable vocational skill that can significantly contribute to the attainment of the goals and objectives of entrepreneurship education in Nigeria. By incorporating oratory into the

FULL TEXTS BOOK

curriculum, we hope to reduce the pressure on the limited array of vocational skills currently available, thereby alleviating the challenges of intense competition and broadening the scope of entrepreneurship education.

The foundation of this research is built upon the dialogic theory of public speaking, emphasizing the importance of effective communication and dialogue in education and society. Additionally, we draw from the theory to explore how the development of oratory skills can enhance students' personal attributes, such as confidence, leadership, and interpersonal skills, which are vital for entrepreneurship. The study seeks to evaluate the feasibility of integrating public speaking as a vocational skill that can enhance entrepreneurship education, thereby reducing the strain on existing offerings. In addition to its potential to alleviate competition among students, public speaking holds the promise of fostering well-rounded entrepreneurs capable of addressing various challenges and opportunities. Furthermore, this study suggests that public speaking can go beyond being merely a student training component and also serve as a source of internally generated revenue for institutions, particularly in the context of poorly funded Nigerian tertiary institutions.

This introduction sets the stage for a comprehensive exploration of the role of oratory as a tool for enhancing entrepreneurship education in Nigerian tertiary institutions. In the following sections, we will delve into the theoretical underpinnings of our research, the practical implications of integrating public speaking, and the potential benefits of this approach. The study also provides recommendations for the implementation of oratory training in the context of entrepreneurship education, aiming to contribute to the ongoing discourse on educational innovation and economic development in Nigeria.

1.2. Research Questions

The following are the research questions for this study on the role of oratory in entrepreneurship education in Nigerian tertiary institutions:

1. How does the integration of public speaking, oratory, impact the effectiveness of entrepreneurship education in Nigerian tertiary institutions, specifically in terms of students' communication and leadership skills development?

2. What are the potential benefits and challenges associated with incorporating oratory into the entrepreneurship curriculum, and how can these challenges be mitigated to enhance the overall educational experience?

3. To what extent can the development of oratory skills serve as a source of internally generated revenue for Nigerian tertiary institutions, and what are the strategies for implementing and sustaining oratory hubs within the educational system?

These research questions will guide the study and help to explore the impact and feasibility of incorporating oratory in entrepreneurship education while considering both the benefits and challenges.

2.0. Literature Review

Entrepreneurship education in Nigeria has been a subject of growing importance due to the nation's need for economic diversification, job creation, and the nurturing of young innovators (Omeje, et al 2020; Kamar, 2021; Mukhtar, et.al. 2018). In response to these imperatives, the introduction of entrepreneurship education in Nigerian tertiary institutions, mandated in the 2007/2008 academic session, was a significant step. However, the predominantly vocational approach to entrepreneurship education has become congested, and there is a pressing need to explore innovative methodologies. This

FULL TEXTS BOOK

literature review aims to shed light on the potential of integrating oratory, specifically public speaking, as a valuable tool in entrepreneurship education.

The emphasis on vocational skills in entrepreneurship education has been a dominant theme in the Nigerian context. Ramasamy, & Pilz, (2020) underscored the importance of equipping students with practical skills in their studies. The studies argued that a focus on vocational training has indeed yielded results, yet the surging demand and overcrowding of these skills indicate the necessity for diversification.

Oratory, particularly public speaking, is a skill recognized globally as crucial for effective communication, leadership, and confidence. It has also been theorized that students who excelled in public speaking demonstrated increased self-assuredness and effective communication, both vital attributes for budding entrepreneurs (Herachwati, et.al. 2023; Hidayah, & Puspitasari, 2023; Hidayanti, 2023). Their findings highlight the potential benefits of introducing oratory as a complementary skill set in entrepreneurship education.

Adebayo (2018) explored the impact of public speaking on entrepreneurial development within the Nigerian university context. His research found a strong positive correlation between public speaking proficiency and entrepreneurial success. Adebayo's work underscores the argument that oratory skills can have a direct impact on students' abilities to pitch their business ideas, network, and convey their vision effectively to potential investors and partners.

The literature reviewed here provides essential insights into the role of oratory, particularly public speaking, in enhancing entrepreneurship education within Nigerian tertiary institutions. Existing research highlights the potential benefits of introducing oratory as an additional skill set to alleviate the overcrowding of vocational skills, enhance students' personal attributes, and foster a conducive environment for entrepreneurial dialogues. Additionally, the concept of oratory as a source of internally generated revenue has far-reaching implications for the financial stability of educational institutions.

These findings lay the groundwork for the subsequent sections of this study, which will delve into the practical implications of integrating oratory within entrepreneurship education and provide recommendations for its effective implementation.

2.1. Theoretical Framework

The Dialogic Theory of public speaking, developed by Mikhail Bakhtin, emphasizes the importance of dialogue in public discourse. This theory suggests that the goal of public speaking is not just to convey information but to create a dynamic, interactive environment where both the speaker and the audience engage in a meaningful exchange of ideas. The speaker's role is to foster interaction and encourage audience participation, transforming the traditional monologue into a dialogic experience.

In entrepreneurship education, this theory enhances communication skills, crucial for pitching ideas and negotiating. It also promotes an interactive learning environment, preparing students for real-world scenarios where engaging with stakeholders is vital. Additionally, the theory fosters shared understanding and collaboration, essential for appreciating diverse viewpoints in entrepreneurship.

3.0. Methodology

The research adopted a qualitative research design to provide a nuanced and in-depth exploration of the research questions. This qualitative approach will involve conducting semi-structured interviews with a diverse range of participants, including students, faculty members, and key stakeholders within Nigerian tertiary institutions. The interviews will delve into their first-hand experiences, unique perspectives, and valuable insights related to the integration of oratory in entrepreneurship education. By using thematic analysis, the study will meticulously examine the interview data to uncover recurring themes, patterns, and rich qualitative data. This method is expected to offer a comprehensive and accurate understanding

FULL TEXTS BOOK

of the impact, feasibility, and benefits of incorporating oratory within the entrepreneurship education curriculum.

4.0. Results and Findings

Here are the results and findings of the study, aligning with the research questions and the methodology employed:

Research Question 1: How does the integration of oratory impact the effectiveness of entrepreneurship education in Nigerian tertiary institutions, particularly in terms of students' communication and leadership skills development?

The integration of oratory in entrepreneurship education has had a notable impact on students' communication and leadership skills. Through qualitative data analysis of interviews with students, it became evident that those who received oratory training reported significant improvements in their communication abilities. They expressed increased self-confidence in delivering pitches, presentations, and engaging in dialogues with potential stakeholders. Moreover, students recognized the value of oratory in enhancing their leadership attributes, emphasizing that it had helped them in leading group discussions, managing teams, and becoming more effective decision-makers. This aligns with the Dialogic Theory of public speaking, which underscores the importance of dialogue and interaction in public discourse, and its relevance to entrepreneurship education was confirmed through these findings.

Research Question 2: What are the potential benefits and challenges associated with incorporating oratory into the entrepreneurship curriculum, and how can these challenges be mitigated to enhance the overall educational experience?

The study revealed several benefits associated with incorporating oratory into the entrepreneurship curriculum. Students reported that oratory training led to improved presentation skills, better articulation of ideas, and increased self-assurance when pitching business concepts. Faculty members expressed that students who had undergone oratory training exhibited higher engagement levels during classroom discussions and group activities. However, some challenges were identified, primarily related to the resource-intensive nature of oratory training and the need for qualified trainers. To mitigate these challenges, the study suggests a phased implementation of oratory programs and collaboration with external experts in oratory to optimize resource utilization and address the skills gap.

Research Question 3: To what extent can the development of oratory skills serve as a source of internally generated revenue for Nigerian tertiary institutions, and what are the strategies for implementing and sustaining oratory hubs within the educational system?

The study found that the development of oratory skills has the potential to serve as a source of internally generated revenue for Nigerian tertiary institutions. The qualitative data indicated that when institutions established oratory hubs that were open to external participants, they could generate revenue through training programs, workshops, and hosting public speaking events. However, the successful implementation and sustainability of these oratory hubs depend on careful planning, investment in infrastructure, and marketing efforts to attract external participants. Furthermore, partnerships with organizations interested in public speaking skills could enhance the financial viability of such initiatives. The study's findings suggest that the integration of oratory in entrepreneurship education has had a positive impact on students' communication and leadership skills. The benefits are evident, but the challenges related to resource allocation and training quality need to be addressed. Additionally, oratory programs can indeed serve as a source of internally generated revenue for tertiary institutions, but successful implementation and sustainability require strategic planning and partnerships. These results emphasize the potential of oratory as a valuable tool in entrepreneurship education and highlight avenues

FULL TEXTS BOOK

for enhancing the educational experience while simultaneously contributing to institutional revenue generation.

5.0. Discussion

The study reveals important insights into using oratory as a tool in entrepreneurship education in Nigerian tertiary institutions. It finds that incorporating oratory significantly enhances students' communication and leadership skills. Students who received oratory training reported improved confidence and presentation abilities, aligning with the Dialogic Theory of public speaking, which emphasizes interaction and dialogue. These skills are crucial for entrepreneurship, helping students articulate ideas, engage with stakeholders, and lead effectively. The study also explores the benefits and challenges of integrating oratory into the curriculum. Benefits include better presentation skills, increased student engagement, and self-confidence. Challenges include the need for qualified trainers and infrastructure. The study recommends a phased implementation of oratory programs and collaboration with external experts to optimize benefits and address challenges. Furthermore, the study examines the potential of oratory hubs as a source of internally generated revenue for institutions. These hubs could offer training programs, workshops, and events, attracting external participants and generating revenue. However, successful implementation requires careful planning, investment, and marketing. Partnerships with organizations interested in public speaking can also enhance financial viability. The implications are significant for financially constrained Nigerian tertiary institutions. Establishing oratory hubs could enhance financial sustainability and contribute to developing oratory skills in society. This approach aligns with the government's emphasis on internally generated revenue for educational institutions. Overall, integrating oratory in entrepreneurship education can enhance students' skills and institutional sustainability, addressing broader societal needs for effective communication and leadership.

6.0. Conclusion and Recommendations

6.1. Conclusion:

The study highlights the potential of oratory as a tool for enhancing entrepreneurship education in Nigerian tertiary institutions. Integrating oratory into the curriculum improves students' communication and leadership skills, aligning with the Dialogic Theory of public speaking. Students reported enhanced abilities in effective communication, persuasive presentation, and meaningful dialogue. While the benefits include increased student engagement, challenges like the resource-intensive nature of oratory training were noted. A phased implementation and collaboration with external experts are recommended to optimize benefits and address these challenges. Additionally, oratory hubs can generate revenue through training programs and events, contributing to financial sustainability and the development of oratory skills in society, aligning with the government’s emphasis on internally generated revenue in educational institutions.

6.2. Recommendations

Firstly, Nigerian tertiary institutions should incorporate oratory training into entrepreneurship education to develop students’ communication and leadership skills. This inclusion ensures a balanced education that prepares students for entrepreneurial challenges by enhancing their ability to articulate ideas clearly and lead effectively.

Secondly, institutions should partner with external oratory experts to provide specialized training and improve program quality. These collaborations can offer valuable insights and enhance curriculum development by bringing in seasoned professionals with a wealth of experience and practical knowledge.

FULL TEXTS BOOK

Thirdly, adequate resources, including funding and infrastructure, should be allocated to support oratory programs. Specialized training spaces and qualified trainers are essential for delivering high-quality education, as they provide the necessary environment and expertise for effective learning.

Fourthly, effective marketing and outreach efforts are crucial for attracting external participants to oratory programs, optimizing revenue generation, and ensuring sustainability. By promoting these programs widely, institutions can draw interest from a broader audience, including professionals seeking to enhance their communication skills.

Fifthly, the government should support oratory integration in education through policies, incentives, and funding. This support helps address resource challenges and promotes program implementation by providing a supportive framework and necessary financial backing.

Lastly, ongoing research and evaluation are necessary to assess the impact and effectiveness of oratory programs, ensuring continuous improvement and relevance. By regularly reviewing these programs, institutions can adapt to changing educational needs and maintain high standards of quality in oratory education.

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FULL TEXTS BOOK

KNOWLEDGE OF WOMEN OF REPRODUCTİVE AGE ABOUT THE İMPACT OF TOBACCO USE ON FETAL HEALTH AND DEVELOPMENT

Ph.D.(c) Saemira Durmishi, Prof. As. Dr Shkëlqim Hidri, Dr. MitildaGugu, Msc Erlini Kokalla.

ABSTRACT

Introduction

Smoking is widespread in Albania, as well as in other countries, significantly affecting public health and economic and social well-being. Despite increased access to information about its negative effects, some individuals ignore the associated health risks.

Although smoking poses numerous threats to the developing fetus, it is the most common addiction among women of reproductive age (1). Smoking during pregnancy poses a significant risk to the health of the mother and child. Psychosocial interventions and nicotine replacement therapy appear to be effective in helping pregnant women quit smoking (2).

In addition to the health risks that maternal exposure to tobacco smoke in pregnancy poses to women, it is a cause of significant fetal morbidity and mortality. In pregnancy, maternal exposure to secondhand smoke can arise because women either smoke or are passively exposed to secondhand smoke (3). The level of knowledge in society about the harmful impact of smoking is systematically increasing. However, there are still many people who ignore warnings and prohibitions about smoking (4).

Smoking during pregnancy is causally linked to many adverse health outcomes. For pregnant women, these include an increased risk of obstetric complications, eg, higher rates of miscarriage, ectopic pregnancy, placental abruption, placenta previa, preterm labor, and preterm delivery, compared to nondrinkers—tobacco (2).

Smoking by women of reproductive age during pregnancy is the leading preventable cause of many adverse outcomes, including maternal, fetal, and infant morbidity and mortality (US Department of Health and Human Services 2014). In particular, maternal smoking during pregnancy increases the risk of birth complications, including preterm birth, low birth weight, and sudden infant death syndrome (Berlin 2017). It has long-term effects on the child, including problems with behavior and chronic health conditions in adulthood (5).

Tobacco use is widely recognized as one of the major threats to global health. While tobacco use is stable or declining in most high-income countries, it is increasing in many low- and middle-income countries (6). Smoking is the most important preventable cause of many adverse pregnancy outcomes. Some women continue to smoke during pregnancy even though the harmful effects are evident (7).

Healthcare professionals and the healthcare environment play a central role in protecting pregnant and postpartum women and their babies from tobacco-related harm. Therefore, quitting smoking, even late in pregnancy, can lead to improved outcomes for both mothers and babies. Most doctors who work with pregnant women (such as midwives, general practitioners, and obstetricians) perceive tobacco treatment as part of their role (8).

The aim of the study:

To assess the knowledge that women of reproductive age have about the impact of smoking on the development of the fetus.

Specific objectives of the study

1. Identification of smoking prevalence of the study population.
2. Measuring the knowledge of women about the smoking impact on fetal health and development.

FULL TEXTS BOOK

3. Exploring the association between sociodemographic factors and knowledge levels.
4. Assessing women's motivation to quit smoking during pregnancy.

Study type: This is a cross-sectional study conducted in the city of Vlora over 1 year (March 2023 - March 2024).

Characteristics of the population: The study included 215 women of reproductive age. The population was reached at the primary healthcare centers.

Data collection: The data were collected by using a standardized questionnaire with 2 sections;

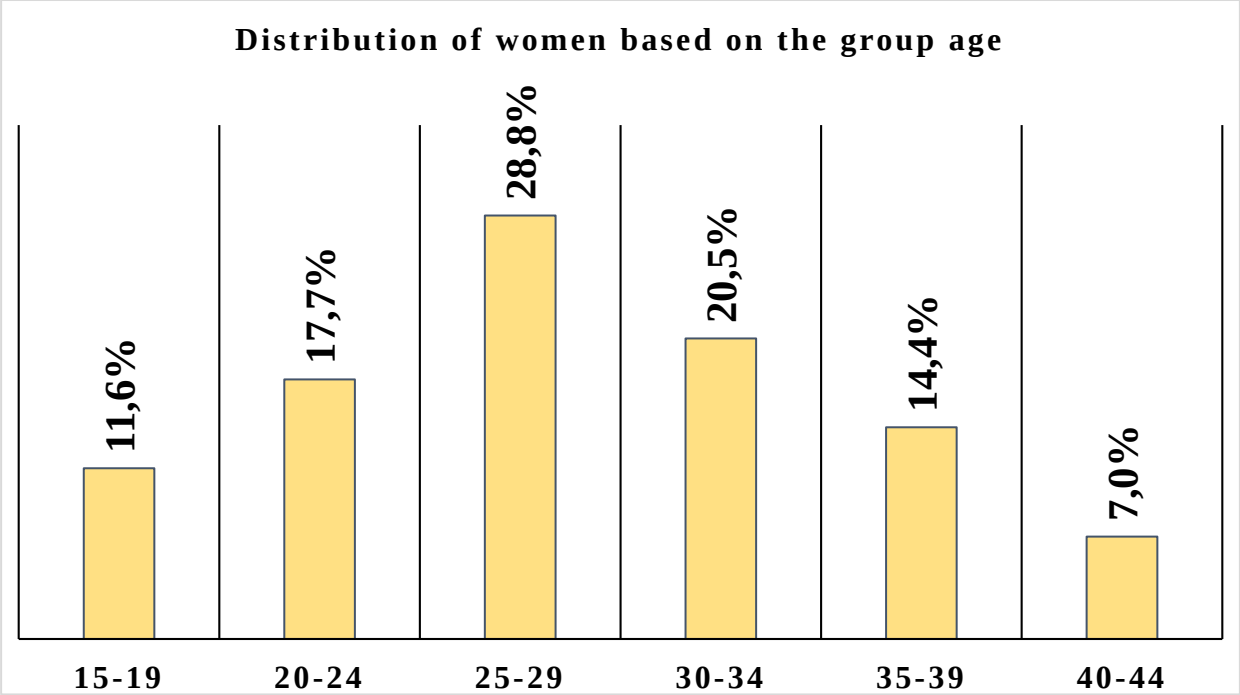
a) Socio-demographic characteristics and

b) Assessment of the knowledge including 8 questions.

Data analysis: The final database was created in Excel, and the data were then exported and analyzed to SPSS version 22. The categorical data were presented as counts and percentages, and the results were visualized using graphs. The association between categorical variables was assessed using the Fisher and Chi-Square test.

Results:

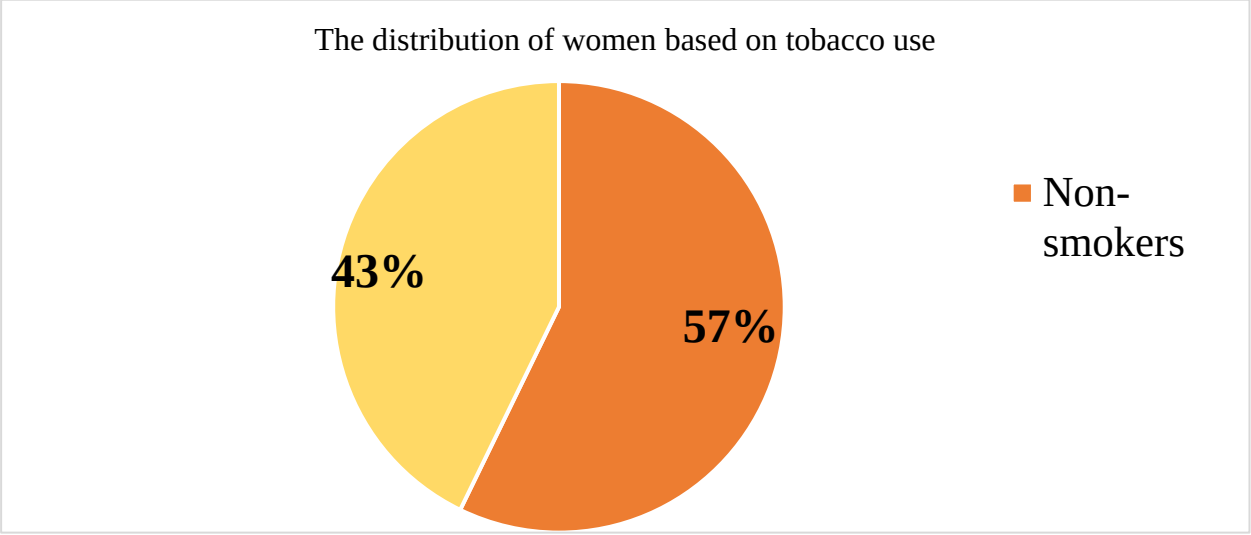
Graphic 1



The study found that the majority of women were in the 25-29 age group at 28.8%, followed by the 30-34 age group at 20.5%, and the 20-24 age group at 17.7%.

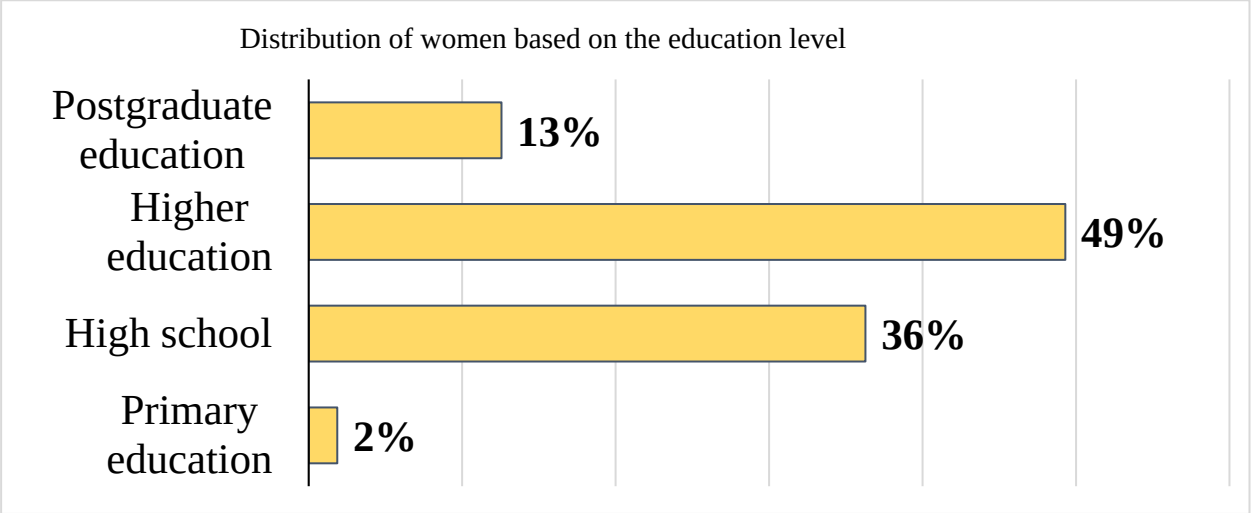
FULL TEXTS BOOK

Graphic 2



Among 215 women, 43% (92) of them were smokers and 58% (123) did not smoke.

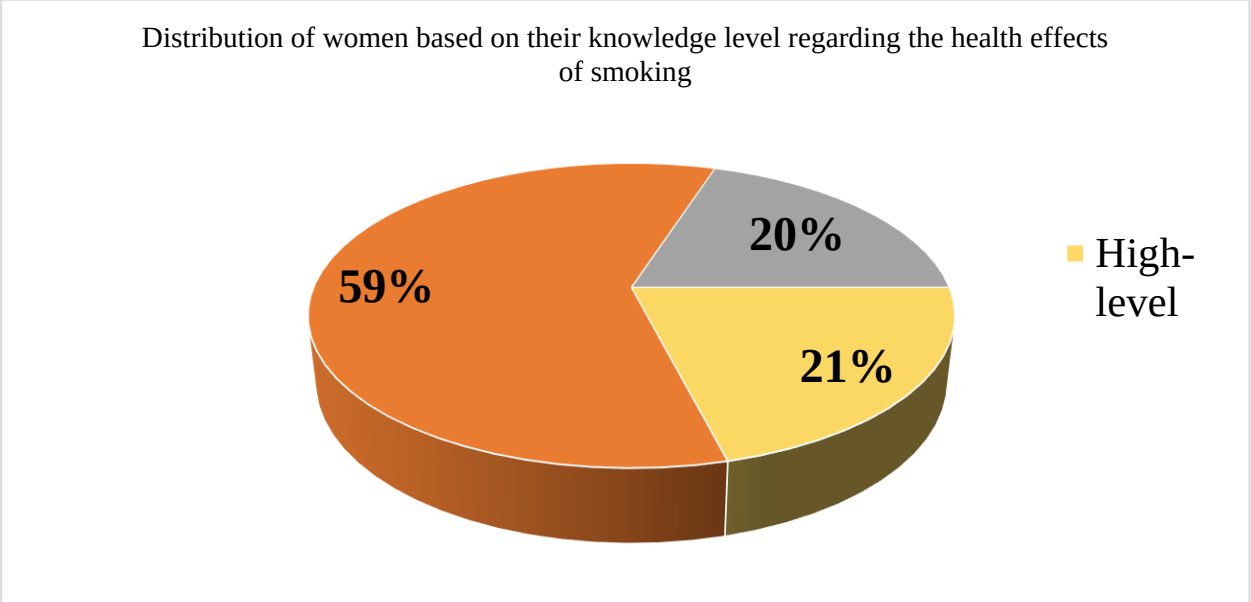
Graphic 3



In terms of education, the study showed that 49% of the women had higher education, 36% had a high school diploma, 13% had completed postgraduate education, and only 2% had finished only primary education.

FULL TEXTS BOOK

Graphic 4

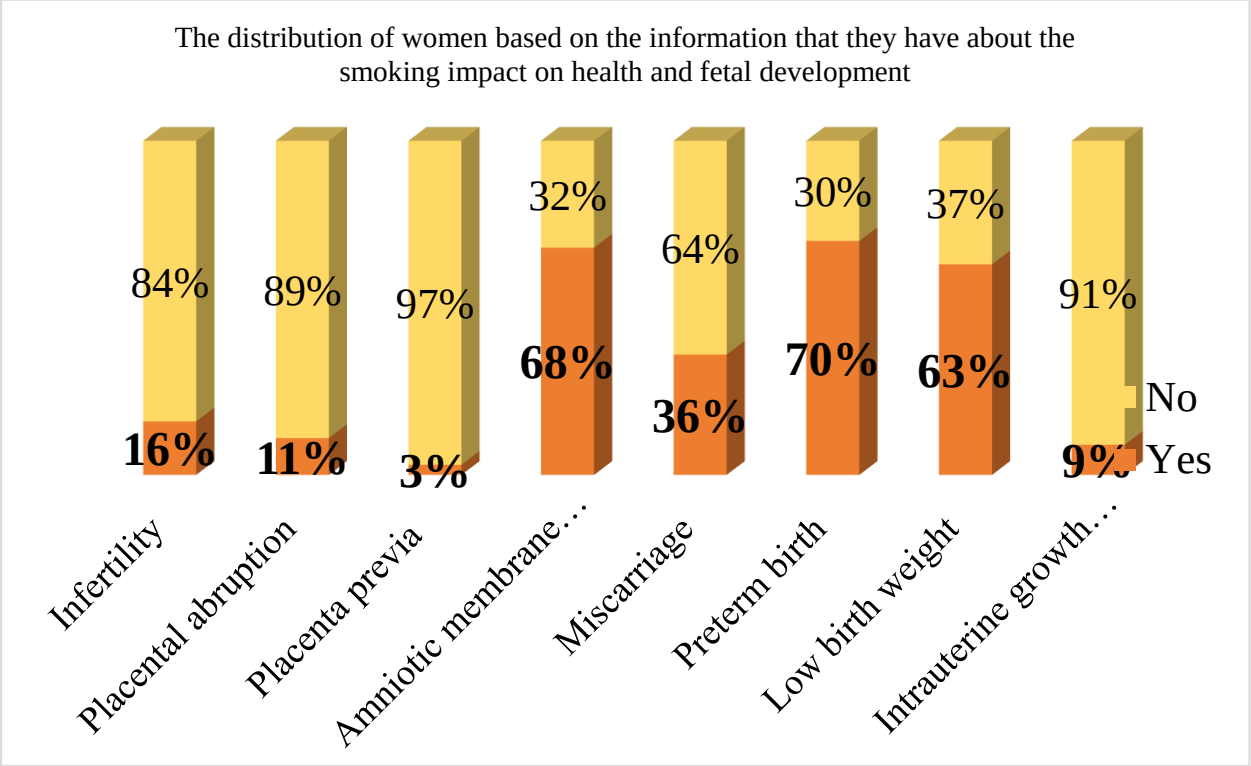


This chart illustrates the distribution of knowledge levels among the 215 women surveyed regarding the effects of smoking during pregnancy. Based on the study's findings it results that;

- 59% of the women (127 out of 215) have an average level of knowledge (5-6 correct answers).
- 21% of the women (45 out of 215) have a high level of knowledge (more than 6 correct answers).
- 20% of the women (43 out of 215) lack any information on this topic (fewer than 3 correct answers).

FULL TEXTS BOOK

Graphic 5



Based on the information provided:

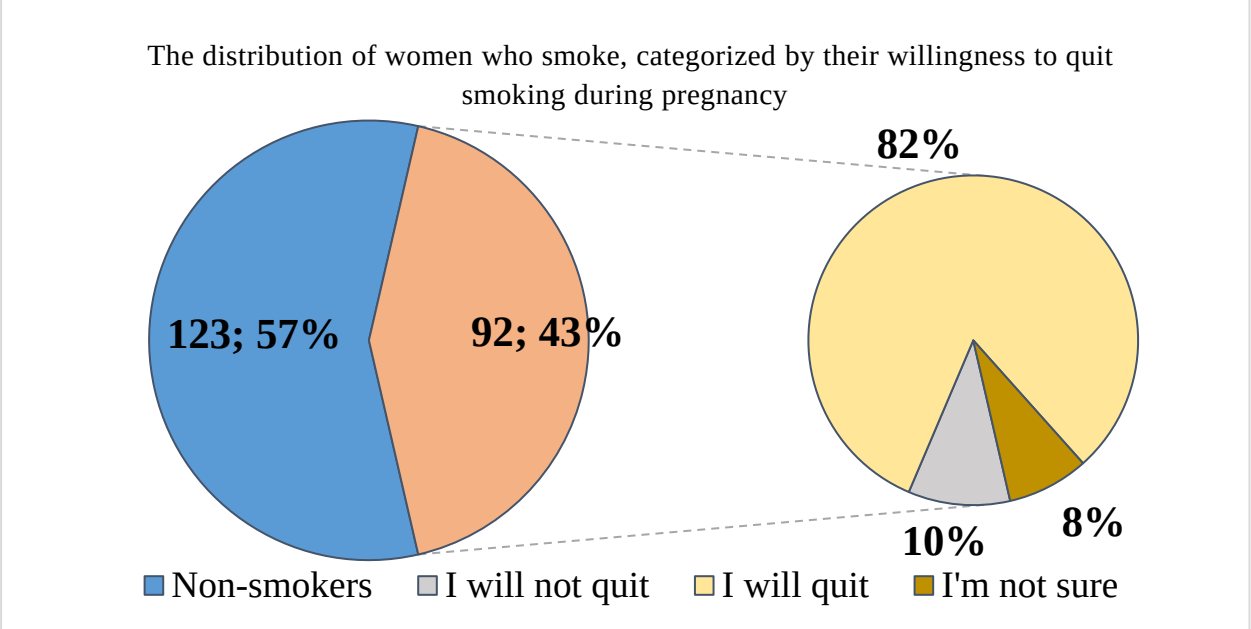
- 16% of women are aware that smoking could cause infertility.
- 11% of women know that smoking could cause placental abruption.
- 3% of women are informed about the risk of placenta previa due to smoking.
- 9% of women are aware of the association between smoking and intrauterine growth restriction.

In contrast, awareness of other health issues related to smoking during pregnancy is higher:

- 70% of women know about the link between smoking and preterm birth.
- 68% of women are aware that smoking can lead to amniotic membrane rupture.
- 63% of women know about the risk of low birth weight associated with smoking.
- 36% of women are informed about the association between smoking and miscarriage.

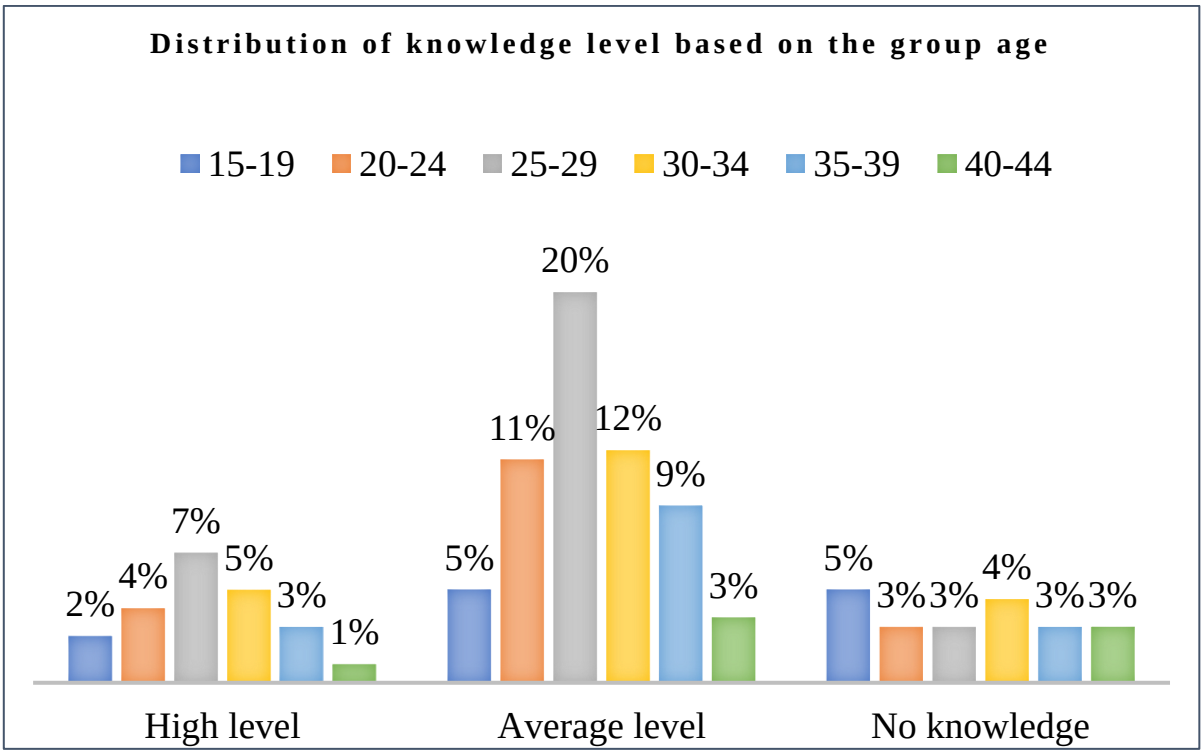
These percentages reflect varying levels of awareness among women regarding the specific health risks that smoking can pose to both maternal health and fetal development during pregnancy.

Graphic 6

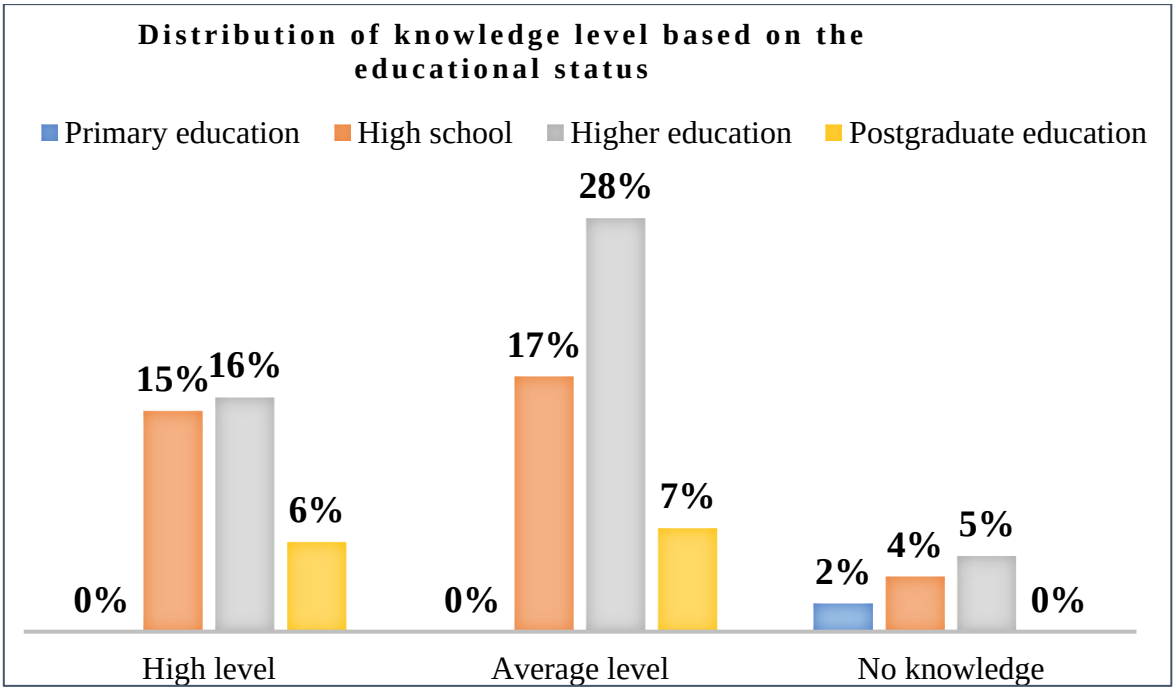


Among the 92 women who smoke, 82% have indicated that they plan to quit smoking during pregnancy, 10% intend to continue smoking, and 8% have not yet decided what they will do.

The association between age/educational level and knowledge level



FULL TEXTS BOOK



These charts demonstrate that the women who are most informed about the impact of smoking during pregnancy are those with a higher education diploma and those aged 25-29 years. Conversely, the women who are less educated and aged 15-19 years are less informed. These findings are statistically significant with a *p value= 0.049* for the age and *p=0.037* for the educational level.

Conclusions and Recommendations

Most women possess an average level of knowledge regarding the increased risks and adverse pregnancy outcomes associated with smoking during pregnancy. Additionally, age and educational level are significant factors that affect the level of knowledge women have about the impact of smoking during pregnancy.

- Healthcare providers should work to educate women comprehensively about the risks associated with smoking during pregnancy and the benefits of quitting for both maternal and fetal health.
- Healthcare providers should maintain a strong focus on encouraging women to quit smoking throughout the entire pregnancy, not just during the first trimester.
- Health professionals need to be more proactive in identifying smokers and providing support to quit smoking during pregnancy. Multidisciplinary smoking cessation interventions for pregnant smokers are warranted.

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FULL TEXTS BOOK

POZZOLANIC MATERIALS IN CONCRETE: ADVANCING SUSTAINABILITY IN CONSTRUCTION

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ABSTRACT

Replacing traditional Portland cement (PC) with supplementary cementitious materials (SCMs) is a smart move to cut down on carbon dioxide (CO_2) emissions from cement production. This switch is a big step towards making construction, especially concrete production, more sustainable. Concrete is a crucial material in building, with over 10 billion cubic meters produced yearly, making it the second most used substance worldwide after water. Concrete comprises cement, water, aggregate (gravel or sand), and other additives. It starts soft and gets stronger as it hardens over time. The challenge with regular concrete is that PC, the primary binding ingredient, produces a lot of CO_2 during its production, which harms the environment and health. To tackle this, we must start using SCMs instead of PCs in concrete. Materials like blast furnace slag (GBFS), silica fume (SF), and fly ash (FA) are examples of SCMs. They come from different industrial processes and are great at reducing the environmental impact of making PCs. Mixing these materials into concrete is a smart way to make the construction industry more eco-friendly.

Keywords: Green concrete, carbon emissions, sustainable construction, pozzolanic materials.

1. INTRODUCTION

In today's fast-paced industrial world, our increasing energy needs have raised severe environmental concerns due to our heavy reliance on fossil fuels. To tackle this, we're finding ways to use waste materials in different ways, aiming for sustainable development and a cleaner environment. Take concrete, for example – it's everywhere, from homes and malls to bridges and dams. But it's time for a change in how we make it, to make it more sustainable. With people focusing more on sustainable living, resources becoming scarcer, and the urgent need to cut carbon dioxide (CO2) emissions, the construction industry needs some fresh ideas. One primary culprit in CO2 emissions is the production of Portland cement (PC), which accounts for about 5% of the world's CO2 emissions [1-3]. The traditional way of making PC, using fossil fuels, releases about one ton of CO2 for every ton of clinker produced – that's a lot! But there's hope. We can reduce these emissions significantly by replacing some concrete cement with mineral additives like ground granulated blast furnace slag (GBFS) or silica fume (SF). These additives have unique properties that help reduce CO2 emissions from cement production, making our environment cleaner and more sustainable. These mineral additives, known as Supplementary Cementitious Materials (SCMs), are essential in making concrete [4-6]. Using fly ash (FA) instead of some of the PC affects how fresh and hardened concrete behaves, making it easier to work with, stronger, and more durable. FA reacts with the lime in cement, creating an extra binding agent that makes the concrete denser, less permeable, and longer lasting. SCMs also have a significant impact on other properties of concrete, like its strength, elasticity, and how it changes over time. They make concrete more resistant to things like acids, sulfates, and corrosion, depending on the type and activity level of the additive. As individuals, understanding the significance of these supplementary cementitious materials (SCMs) is crucial in realizing the potential for more sustainable construction practices. By choosing concrete formulations incorporating SCMs like fly ash (FA) [7-9], we can contribute to a greener environment and a more resilient infrastructure. Opting for concrete with FA enhances its

FULL TEXTS BOOK

mechanical properties and reduces its environmental footprint. When FA replaces some of the Portland cement (PC), it decreases the amount of CO2 emitted during production, helping combat climate change. This means that our choices as consumers directly impact the health of our planet.

Furthermore, the improved durability of concrete with SCMs means that structures built with these materials will require less maintenance and repair over time. This saves money and reduces the resources needed for upkeep, promoting a more sustainable lifecycle for our built environment. By being informed and deliberate in our choices, we can contribute to a more sustainable future, one concrete structure at a time.

2. The Vital Role of Supplementary Cementitious Materials (SCMs)

The construction industry is currently experiencing a profound transformation, placing a greater emphasis on sustainable practices. Central to this paradigm shift are supplementary cementitious materials (SCMs), which play a pivotal role in enhancing the environmental credentials and structural integrity of concrete. SCMs such as fly ash, slag, and silica fume are gaining popularity due to their ability to mitigate the environmental impact associated with traditional cement production [10-12]. Cement production is a notorious emitter of carbon dioxide (CO2), a major contributor to climate change. By incorporating SCMs into concrete mixes, significant reductions in CO2 emissions can be achieved, marking a substantial victory for environmental conservation efforts. Beyond their environmental benefits, SCMs offer remarkable improvements to concrete's performance characteristics. Concrete blended with SCMs exhibits enhanced strength, durability, and resistance to various environmental stresses. For instance, fly ash, derived from coal combustion, not only diverts waste from landfills but also enhances concrete's workability, reduces chemical reactivity, and increases resistance to specific types of damage. Another prominent SCM, ground granulated blast furnace slag (GGBFS), a byproduct of iron production, contributes to concrete's strength development, moderates heat generation during curing, and enhances resistance to chemical attack. Similarly, silica fume (SF), produced from silicon metal refining, enhances concrete's load-bearing capacity, impermeability to water ingress, and resistance to corrosion induced by saline environments [13-15]. The adoption of SCMs signifies a significant stride towards sustainability in the construction sector. By incorporating these materials into concrete formulations, the industry not only reduces its carbon footprint but also extends the service life of structures, thereby minimizing the need for premature replacements and reducing overall resource consumption.

Moreover, the application of SCMs aligns with global efforts to achieve sustainable development goals, particularly in addressing climate change and promoting responsible consumption and production practices. As stakeholders across the construction industry increasingly prioritize sustainability, SCMs are poised to play an indispensable role in shaping a greener and more resilient built environment. In practical terms, the widespread adoption of SCMs necessitates collaborative efforts among architects, engineers, contractors, and policymakers to integrate these materials effectively into building codes, specifications, and construction practices. Education and awareness initiatives are also crucial to fostering a comprehensive understanding of the benefits and proper utilization of SCMs among industry professionals. Furthermore, research and development continue to expand the repertoire of available SCMs and refine their properties to meet evolving performance standards and environmental benchmarks. Innovations in SCM technology aim to optimize material efficiency, improve compatibility with various cement types, and enhance the overall sustainability metrics of concrete construction. Looking ahead, the future of construction increasingly hinges on embracing sustainable innovations like SCMs to address pressing environmental challenges while meeting the growing global demand for infrastructure. As the construction sector navigates towards a more sustainable future, SCMs emerge not only as technical solutions but as catalysts for transformative change in how buildings and infrastructure are conceived, constructed, and maintained. In conclusion, SCMs represent a cornerstone

FULL TEXTS BOOK

of sustainable construction practices, offering multifaceted benefits ranging from environmental stewardship to enhanced structural performance. As awareness grows and technological advancements continue, SCMs will continue to shape the landscape of modern construction, paving the way for a more resilient and environmentally responsible built environment for generations to come [16-20].

3. CONCLUSION

Concrete stands as a cornerstone of modern construction, renowned for its robustness, versatility, and cost-efficiency. However, its heavy reliance on Portland cement (PC) presents profound environmental and economic challenges. The substantial carbon dioxide (CO2) emissions associated with PC production not only contribute significantly to global carbon footprints but also drive up costs within the construction sector. Addressing these challenges demands a concerted effort to reduce PC dependency in concrete mixes and explore alternative materials that offer both environmental sustainability and economic viability. In response to these imperatives, there is a burgeoning interest in integrating industrial waste materials such as ground granulated blast furnace slag (GBFS), fly ash (FA), and silica fume (SF) into concrete formulations. These materials hold promise as effective substitutes for PC, offering pathways to mitigate CO2 emissions and foster sustainable construction practices. As researchers, the construction industry, and end-users increasingly prioritize environmental stewardship, the adoption of these eco-conscious practices becomes paramount. Understanding the distinct properties, benefits, and challenges associated with GBFS, FA, and SF in concrete production is crucial for advancing environmentally responsible construction practices. Each material contributes unique characteristics to concrete mixes, enhancing durability, strength, and resilience against environmental stresses. Ground granulated blast furnace slag, derived from iron production processes, not only enhances concrete strength but also improves workability and reduces heat generation during curing. Fly ash, a byproduct of coal combustion, not only diverts waste from landfills but also enhances concrete's workability, reduces permeability to aggressive substances, and improves resistance to certain forms of deterioration. Silica fume, produced during silicon metal refining, significantly enhances concrete's mechanical properties, including compressive strength and durability, while also providing exceptional resistance to chemical attack and permeability. Beyond their technical advantages, incorporating GBFS, FA, and SF into concrete mixes represents a pivotal step towards achieving global sustainability goals. By reducing CO2 emissions and minimizing environmental degradation associated with traditional concrete production, these materials contribute to lower carbon footprints and improved overall environmental quality. Moreover, sustainable concrete practices extend their benefits beyond the construction phase, positively impacting long-term societal well-being and resource conservation efforts. The momentum towards sustainable concrete production is steadily gaining traction, driven by collaborative efforts among researchers, industry stakeholders, and end-users. Embracing these innovative practices requires a collective commitment to integrating eco-friendly materials into construction projects, adhering to stringent quality standards, and promoting responsible consumption and production patterns. As awareness of environmental issues grows and regulatory frameworks evolve, the imperative to transition towards sustainable concrete becomes increasingly urgent. This transition not only aligns with global sustainability agendas but also underscores the construction industry's role in mitigating climate change and fostering resilient infrastructure development. By embracing sustainable concrete practices, stakeholders can catalyze transformative change within the built environment, promoting economic prosperity, environmental stewardship, and societal well-being on a global scale. In conclusion, the shift towards reducing Portland cement in favor of alternative materials such as GBFS, FA, and SF marks a significant evolution in construction practices. This evolution not only addresses pressing environmental challenges but also enhances construction durability, performance, and affordability. By harnessing the potential of these materials and advancing

FULL TEXTS BOOK

sustainable concrete production methods, stakeholders can pave the way for a greener, more resilient future, ensuring that concrete remains a pillar of sustainable development for generations to come.

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FULL TEXTS BOOK

CULTURAL AND TECHNİCAL SİGNİFİCANCE OF COLORED CONCRETE IN CONTEMPORARY CONSTRUCTİON

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ABSTRACT

Colored concrete has become increasingly significant in modern construction due to its ability to combine structural integrity with aesthetic appeal through the incorporation of pigments into the concrete matrix. This versatile material offers robust wear resistance while providing visually appealing surfaces that can emulate the look of more expensive materials like stone or brick. Recent advancements have also expanded the range of colored cement varieties beyond traditional gray, offering architects and designers a broader palette to achieve specific design intentions. These colored cements incorporate pigments that provide a spectrum of hues, enhancing the aesthetic flexibility of concrete in various construction projects. In practice, the choice between these methods depends on factors such as project requirements, design preferences, and budget considerations. Colored concrete is widely used in driveways, patios, walkways, and architectural features where both functionality and visual appeal are important. Overall, colored concrete exemplifies the synergy of technical innovation and aesthetic enhancement in contemporary construction. By offering durable performance and creative design possibilities, colored concrete continues to play a pivotal role in shaping modern built environments.

Keywords: Colored concrete, Construction Practices, Aesthetic Appeal, integration of pigments, Architectural applications.

1. INTRODUCTION

Concrete has become the cornerstone of global construction, renowned for its unparalleled versatility and structural reliability [1-3]. Beyond its utilitarian role, concrete has evolved into a prominent architectural medium, celebrated for its aesthetic potential across various structures. As a fluid material, concrete lends itself to intricate molding processes, allowing for the creation of complex shapes and achieving smooth finishes that enhance architectural designs. While traditional concrete primarily utilizes gray cement, the integration of white cement and pigments has revolutionized its application, offering extensive opportunities for color customization. Colored concrete has found widespread use in sculptural artworks, decorative surface reliefs, exterior building facades, interior architectural elements, and the design of urban park furniture [4-6]. This versatility highlights concrete's transformation from a purely functional material to a visually expressive medium in modern construction practices. The concept of 'architectural concrete' underscores its transparency and structural integrity, often referred to as 'exposed concrete.' This type of concrete is prominently featured on building exteriors, where its natural aesthetic enhances architectural aesthetics without requiring additional cladding. Increasingly, architectural concrete is also employed within interior spaces, showcasing its adaptability and aesthetic appeal [7-8]. The introduction of pigments in architectural concrete plays a pivotal role in achieving desired colors and textures. Beyond aesthetic considerations, the incorporation of pigments influences various concrete properties, including setting time, color durability, resistance to environmental conditions, mechanical strength, and resilience to thermal fluctuations and freeze-thaw cycles. Attention

FULL TEXTS BOOK

to detail in formwork systems and the selection of mold release agents is essential to ensuring the quality and visual appeal of colored concrete applications in architectural contexts [9-10].

In conclusion, colored concrete exemplifies a harmonious blend of functionality and aesthetics in contemporary construction. Its ability to marry structural integrity with visual expression underscores its pivotal role in shaping modern architectural landscapes, offering architects and designers unparalleled opportunities for creative innovation and sustainable design solutions [11].



Fig.1. Exploring the Visual Impact and Versatility of Colored Concrete in Contemporary Construction [12]

2. Exploring Colored Concrete Applications: A Concise Overview

Colored concrete has emerged as a highly favored building material in contemporary architectural practices, captivating architects and investors alike with its exceptional aesthetic potential. By incorporating color pigments into the concrete mix, designers can extend the palette far beyond traditional gray tones, offering a diverse spectrum of colors that significantly enhance the visual appeal and artistic expression of architectural projects [13]. The color intensity of cured concrete is a result of a complex interplay of factors throughout the concrete production process. One of the primary influencers is the type and color of cement used. While gray cement remains foundational, the introduction of white cement and various pigments opens up possibilities for vibrant hues and subtle shades that cater to specific design requirements. This diversity allows architects to achieve nuanced color effects that harmonize with surrounding environments or make bold statements in urban landscapes. Several parameters during the mixing and pouring stages also impact the final color outcome. The quantity of aggregate, water-to-cement ratio, and the characteristics of molds and release agents all contribute to the color's consistency and appearance. In the case of colored concrete, the dosage and type of pigment are critical. Pigments are added based on the weight of the binder rather than volume to ensure precise control over coloration. Even slight deviations in pigment density or

FULL TEXTS BOOK

misjudgments in dosage can lead to undesired variations in color intensity, highlighting the importance of meticulous measurement and process control [14]. Beyond their aesthetic impact, pigments influence the chemical composition and hardening process of concrete. Certain pigments may interact with cement hydration differently, affecting not only the final color but also the material's durability and performance over time [15-16]. This chemical aspect underscores the need for a comprehensive understanding of pigment behavior and concrete chemistry to achieve both visual excellence and structural integrity in architectural applications. Architectural concrete, particularly when exposed on building facades or integrated into interior spaces, exemplifies the fusion of artistry and engineering. Its ability to reflect light, create texture, and convey a sense of place makes it a versatile medium for expressing architectural intent. Precise management of color variables ensures that concrete surfaces maintain their aesthetic appeal over the lifespan of the structure, resisting environmental stresses and maintaining color vibrancy. In conclusion, colored concrete represents a pivotal advancement in architectural materiality, offering unparalleled opportunities for creativity and design innovation. Through careful consideration of cement types, pigment selection, and manufacturing processes, architects can harness the full potential of colored concrete to realize their vision with precision and enduring beauty in architectural contexts. As the demand for sustainable and aesthetically distinctive building solutions grows, colored concrete stands poised to play an increasingly integral role in shaping the built environment of the future [17-23].

3. Conclusion

In contemporary construction practices, there has been a significant increase in the use of pigments to enhance the aesthetic appeal of concrete structural elements. These pigments, considered architectural design elements, are added to traditional concrete production alongside white cement. The resulting-colored concretes find diverse applications, notably in self-compacting concretes, repair mortars, and the paving and curbing of parks and gardens. This trend is particularly pronounced in Arab and Gulf countries, driven by rising living standards, a demand for innovative construction techniques, and a growing preference for intricate and decorative architectural features. Despite the evident advantages of colored concrete, scientific research in this field remains relatively limited compared to other engineering disciplines, a concern voiced by many researchers in the field. Structural-colored concrete offers unique aesthetic qualities that challenge the monotony of conventional building materials, often proving cost-effective as a finishing surface. The exploration of specialized concretes is inherently innovative, particularly in terms of enhancing durability through ongoing research efforts. The ability to introduce a spectrum of colors ranging from yellow and orange to red, blue, and green enhances the structural appeal of concrete and opens up exciting design possibilities. This study examines various case examples to illustrate the evolving use and development of colored concrete in construction applications. By highlighting both aesthetic and economic dimensions, it underscores how colored concrete has transformed architectural design paradigms, contributing to a visually dynamic built environment. In conclusion, the integration of pigments into concrete represents a significant advancement in modern construction, offering architects and designers powerful tools to create visually striking and durable structures. As research continues to expand in this area, colored concrete is poised to play an increasingly integral role in shaping future architectural landscapes worldwide.

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FULL TEXTS BOOK

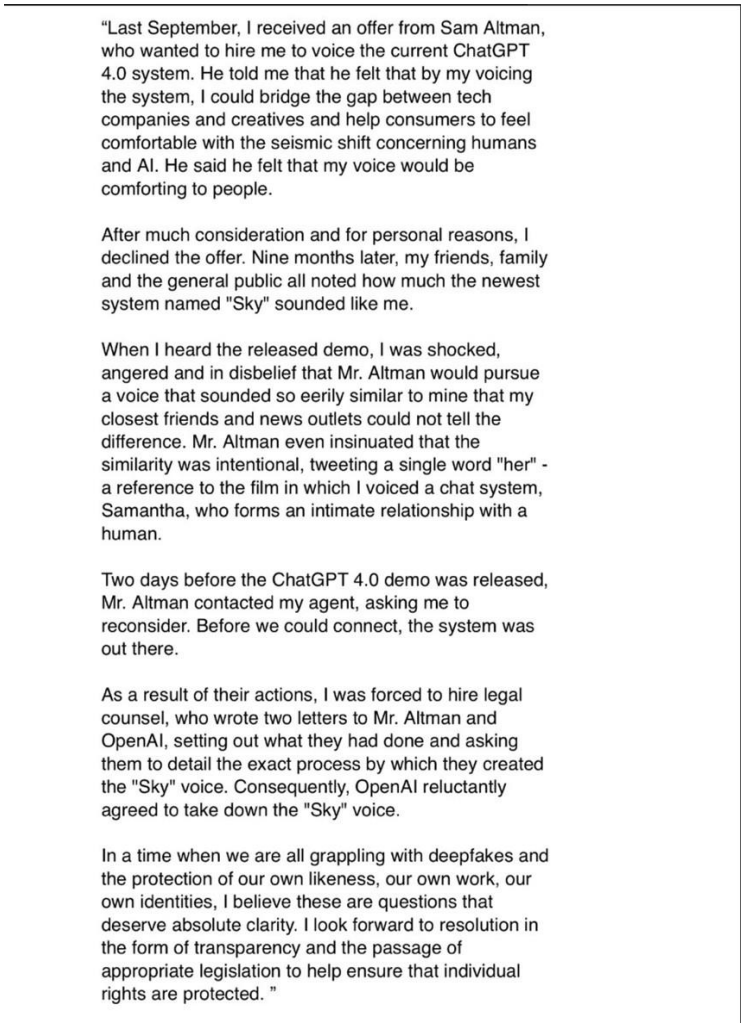
HER, AI, AND US: AUTHENTICITY AND THE UNCANNY IN THE NEW DIGITAL LANDSCAPE

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ABSTRACT

In the digital age, the intersection of artificial intelligence (AI), social media, and the quest for authenticity has transformed the way we perceive reality. The movie “Her” (2013) by Spike Jonze and the recent controversy surrounding OpenAI’s chatbot Sky sounding like Scarlett Johansson’s voice, highlight the etchical implications of AI-driven imitation. ‘Authenticity’ defined by Theo Van Leeuwen is being fundamentally reshaped by AI technologies, which blur the lines between human and machine and challenge our understanding of the uncanny.

Scarlett Johansson’s lawsuit against OpenAI further exemplifies the ethical dilemmas associated with AI-generated content. Johansson’s voice was copied without her consent and without using her voice to train the chatbot. This raise questions about ownership, consent and the authenticity of digital likenesses.



“Last September, I received an offer from Sam Altman, who wanted to hire me to voice the current ChatGPT 4.0 system. He told me that he felt that by my voicing the system, I could bridge the gap between tech companies and creatives and help consumers to feel comfortable with the seismic shift concerning humans and AI. He said he felt that my voice would be comforting to people.

After much consideration and for personal reasons, I declined the offer. Nine months later, my friends, family and the general public all noted how much the newest system named "Sky" sounded like me.

When I heard the released demo, I was shocked, angered and in disbelief that Mr. Altman would pursue a voice that sounded so eerily similar to mine that my closest friends and news outlets could not tell the difference. Mr. Altman even insinuated that the similarity was intentional, tweeting a single word "her" - a reference to the film in which I voiced a chat system, Samantha, who forms an intimate relationship with a human.

Two days before the ChatGPT 4.0 demo was released, Mr. Altman contacted my agent, asking me to reconsider. Before we could connect, the system was out there.

As a result of their actions, I was forced to hire legal counsel, who wrote two letters to Mr. Altman and OpenAI, setting out what they had done and asking them to detail the exact process by which they created the "Sky" voice. Consequently, OpenAI reluctantly agreed to take down the "Sky" voice.

In a time when we are all grappling with deepfakes and the protection of our own likeness, our own work, our own identities, I believe these are questions that deserve absolute clarity. I look forward to resolution in the form of transparency and the passage of appropriate legislation to help ensure that individual rights are protected. ”

Figure 1.

FULL TEXTS BOOK

This paper examines these themes by analyzing key scenes from "Her", integrating insights from authors like Walter Benjamin, Theo Van Leeuwen and using real-world case studies. Through this exploration we aim to understand how AI technologies are transforming our perceptions of authenticity and the uncanny, and what this means for our future interactions with digital copies.
Key words: Uncanny, Authenticity, Artificial Intelligence

MANUFACTURING AUTHENTICITY

Leeuwen writes that the term 'authenticity' applies it to faithful reconstruction or presentation, as when baroque music is played on authentic instruments (paradoxically usually copies) in historically accurate ways.[1]

In "Her" the movie starts with handwritten "her" title and our protagonist Theodore played by Joanquin Phoenix reads out an emotionally filled letter, as audience we get our first clue with Theodore saying "we have been married for 50 years" that something is off then we see that everything he says is being written out in a digital letter in handwriting. Theodore's job is to write letters for people who don't have time, effort or creativity to write a letter for themselves to send to their loved ones.

In this scene we see faithful reconstruction of handwriting, but our protagonist, Theodore, doesn't convey his true feelings, he is manufacturing authenticity between people he doesn't personally knows. This process of creating authenticity by copying genuine moments has always been facilitated through different mediums.

In 2006 there was a YouTube channel that is called Lonelygirl15, then a 16-year-old girl Bree started a video blog. She was funny, friendly, had great eyebrows. Her videos focused on casual teen problems, and she complained about being lonely, hence the name Lonelygirl15.[2]

Bree had a growing following, her subscription numbers ballooned, and she became one of the most popular stars of YouTube. However, Bree was a fictional character written by multiple writers. YouTubers and the media were duped. That caused an outrage but now the channel is most reminded as the first web series of YouTube.[2]

In her video essay "Manufacturing Authenticity (For Fun and Profit!) and Lindsey Ellis reviews how copying authentic moments can create manufactured videos that profit from appearing genuine. She discusses the YouTube channel "How to Cake it!" where the host interacts with a producer behind the camera who is not wearing a microphone that can pick up her voice. The first such interaction seems accidental and adds a sense of genuineness to the video, which then became a staple of the channel's format.[3]

Similarly, "A Man About Cake" features a male host who bakes a cake while producers interject commentary during the video. Although this might initially seem spontaneous, Ellis reveals that the show's format is meticulously planned. The pitching materials indicate that the show is designed with one host and three producers behind the camera, all wearing microphones. This careful construction underscores how perceived authenticity can be deliberately manufactured for audience engagement.[3]

YouTube is not the first platform where copying became an issue. Walter Benjamin's seminal work, "The Work of Art in the Age of Mechanical Reproduction," provides a profound foundation for understanding these issues.

Benjamin discusses how the aura of an artwork diminishes with its mechanical reproduction. He writes, "Even the most perfect reproduction of a work of art is lacking in one element: its presence in time and space, its unique existence at the place where it happens to be" (Benjamin, 1936). This concept of aura, or the unique presence and authenticity of an original work, is central to the discussion of authenticity in the digital age.[4]

In the context of AI and digital technologies, this loss of aura can be observed in the way digital voices and avatars are created and perceived. The controversy surrounding Scarlett Johansson's voice likeness in OpenAI's chatbot exemplifies this issue. Despite not using her actual voice as a training model, the

FULL TEXTS BOOK

AI was able to produce a voice eerily similar to Johansson's, effectively reproducing her vocal aura without her consent. This raises significant questions about the authenticity and ownership of one's digital likeness.

Just as Benjamin described the loss of authenticity in mechanically reproduced art, we now face similar challenges with digitally reproduced voices and personas. The digital age exacerbated these issues, making it possible to replicate not just visual art but also personal attributes and identities. The example of Lonelygirl15, a fictional character who deceived viewers by presenting an inauthentic persona, parallels how AI technologies manufacture authenticity today. Both instances highlight how digital platforms can blur the lines between reality and fiction, creating believable yet artificial experiences.

Lindsey Ellis, in her video essay "Manufacturing Authenticity (For Fun and Profit!)," examines how YouTube channels like "How to Cake It!" and "A Man About Cake" create an illusion of spontaneity and authenticity through carefully crafted interactions. These manufactured moments resonate with audiences as genuine, despite being meticulously planned and executed. This phenomenon aligns with Benjamin's notion that the mechanical (or digital) reproduction of art affects its authenticity and perception.

Companies also needs to manufacture authenticity to ease the concerns of people on their behaviors. Technological companies usually orchestrate grand events for their major announcements, with Apple events being prime examples. These are eagerly anticipated and meticulously analyzed by enthusiasts. At their 2023 June 05th event, Apple unveiled the Apple Vision Pro. CEO Tim Cook took the stage, standing before a black screen with an Apple Logo on it. He addressed the camera as usual, though notably, there was no visible or audible audience.

The camera seemingly mounted on a drone, panned around as he spoke, transitioning to a 3D model of their product. When a woman wears the VR headset, the first noticeable feature is its screen that mirrors the user's eye movements, captured by internal cameras and projected onto the exterior screen.[5]

This strategy was done to make it seem like a VR headset would not diminish the social interactions of the user. However, the visual presentation elicited an uncanny sensation among observers. Tim Cook descriped the product as "Vision Pro augments reality by seamlessly blending real world with the digital world," with the screen for eye movement designed to reinforce this concept. This approach raised questions whether the methods used to achieve the intended effect.



Figure 2.

With each event Apple aims to emphasize that their company produces cutting edge technology, and their presentations are designed to reinforce that effect. In contrast, OpenAI's approach differs significantly in this regard. OpenAI's spring update opens with Chief Technology Officer Mira Murati taking the stage. The presentation opens with a wide-angle shot that includes the audience applauding and cheering her on, along with visible plants, warm lighting and the cameraman in the frame. Murati addresses to the viewers in the building instead of viewers at home, creating a sense of inclusivity and familiarity, akin to watching an online course.[6]

The camera work reenforce that effect by using subtle filming techniques instead of drone shots that are used in Apple events. Even the PowerPoint presentation used lacks templates or flashy backgrounds, relying instead on simple text against a plain backdrop. The difference between OpenAI's and Apple's approach to these events are staggering. Apple seeks to be seen as a leader in cutting-edge technology, while OpenAI aims to present itself as familiar and approachable.

In Scarlett Johansson's lawsuit against ChatGPT, Johansson reveled messages sent to her by OpenAI's CEO Sam Altman. "Last September, I received an offer from Sam Altman, who wanted to hire me to voice the current ChatGPT 4.0 system. He told me that he felt that by my voicing the system, I could bridge the gap between tech companies and creatives and help consumers to feel comfortable with the seismic shift concerning humans and AI. He said he felt that my voice would be comforting to people." OpenAI denied copying Johansson's voice but out of respcet to Johansson they paused using Sky's voice in their products.

This lawsuit showed why OpenAI reached out to Scarlett Johansson or design their presentation in a certain way, they wanted to avoid uncanny valley effect. AI technologies are so capable now that they might scare people away and open a door to a new unknown. With the way ChatGPT 4.0 presented and the voice chosen to resemble a familiar voice, OpenAI hopes to climb out of the valley to a new horizon.

However Scarlett Johansson's lawsuit didn't help OpenAI's aim to feel more familiar. Instead it created a similar feeling to Theodore noticing Samatha's breathing, it opened questions about etichs and individual rights. Is it okay to be able to create an exact copy of someone's voice without their consent or make them say things that they would never say?

Some people are not like Theodore and more open to test the ethical limits of this new technology and for them 'gap' between people, creators and AI is shortening. These early adapters maybe ready to look what is beyond uncanny valley.

AUTEUR THEORY

Leeuwen says; "another form of 'authenticity' is the style of the artist or the voice of the singer. Most artists and singers can credibly perform in many different styles, but if they seek distinction and are to be regarded as having their own authentic style or voice, they must adopt just one style and abandon the others."[7]

In 1940s cinematic theories of Andre Bazin and Alexandre Asrtuc layed the foundation of director-as-author cinema, and in 1962 critic Andrew Sarris came up with the term auteur theory. From then on, the term 'auteur' meant, a director who has a distinct style unique to themselves. In a way 'authentic'.[8]

Spike Jonze have distinct approach to movie making. He focuses on themes of loneliness, uses mashup of real vs. fictional people and things, he is not afraid to use different visual styles. In his movie 'her', he uses retro-futurism style, from the design of the phone Theodore uses to the computers and to wardrobe choices movie feels like it is set in 1960s instead of the near future.

His choices, sets the tone of the movie to feel warmer and makes it easier to feel a connection with the movie's main protagonist.

Being able to tell what makes a director vision 'unique', is to be able to prompt AI to create a copy of it. Wes Anderson has a unique approach to his movies and can be described as 'auteur'. However, his style is one of the most replicated ones in AI tools.



Figure 3. Succession in the style of Wes Anderson

AI, as if now don't have a unique voice and if prompted right, it abandons any other style to adopt the style that its prompted. So, are the images it created can be called authentic?

AI tools also capable of generating new artwork that mimics the style of renowned artists, musicians, even comedians. This ability to produces art in specific styles raises questions about authorship and authenticity, challenging traditional views on creative processes and the essence of originality. The ease with which AI can replicate artistic styles forces us to re-evaluate the significance of originality in an era where technology can effortlessly mimic the creative expressions of human artists.



Figure 4. AI generated painting and an original painting of Winslow Homer, Breezing up for (or A Fair Wind)

CONCLUSION

In the digital age, artificial intelligence, social media algorithms, and persuit of authenticity presents challenges for understanding human interaction and identity. Through the lens of the film "Her" and Scarlett Johansson's lawsuit against OpenAI on her voice likeness in their new chatbot, and other real-world examples, this paper has explored how AI tools are reshaping our perceptions of authenticity and uncanny.

Theodore's relationship with Samantha in "Her" exemplifies the emotional bonds that can be formed with AI tools, highlighting the complexities of manufactured authenticity. Scenes where Samantha mimics human breathing, flirtatious tone, illustrate how authenticity can be crafted.

Theodore, creating handwritten letters for clients using technology demonstrates how authenticity can be commodified.

The controversy surrounding Johansson's replicated voice further emphasizes the ethical implications of AI-driven imitation. This incident brings to light critical issues of ownership, consent, and the authenticity of digital likenesses.

Theoretical insights from Walter Benjamin's discussion on mechanical reproduction, Theo Leeuwen's description of authenticity, and Lindsey Ellis's exploration of manufactured authenticity provide both historical and critical context for these issues and maintaining authenticity in an era where creating AI-generated content is widely accessible.

By incorporating auteur theory, this paper has also highlighted the uniqueness of artists can be replicated. The comparison between auteur-driven content and AI-generated works reveals the ongoing tension between authentically human and seemingly authentically algorithmic replication.

In conclusion, as AI technologies become more prevalent in our daily lives, it is essential to critically examine their impact on our perceptions of authenticity and the uncanny. The evolving relationship between humans, AI and algorithmic generation, leads us to rethink what it means to be genuine and emotionally connected in a digital world. By addressing the ethical and philosophical questions raised by these technologies, we can navigate the complexities of this new era with greater awareness and responsibility, where we might have to redefine what we call 'authentic'.

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FULL TEXTS BOOK

ARONİA MELANOCARPA (MİCHX.) ELLİOT MEYVE EKSTRAKTINDA ANTİOKSİDAN AKTİVİTENİN DEĞERLENDİRİLMESİ
EVALUATION OF ANTIOXIDANT ACTIVITY IN *ARONIA MELANOCARPA* (MICHX.) ELLIOT BERRY EXTRACT

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ÖZET
Artan çevre kirliliği sebebiyle doğal yaşam alanları ve gıdalar çeşitli toksik kimyasallara maruz kalmaktadır ve bu durum insan sağlığını olumsuz etkilemektedir. Bu olumsuzlukların azaltılmasında antioksidanlar önemli bir role sahiptir ve bu bağlamda bitkilerdeki antioksidan bileşenlerin tespiti ve ürüne dönüştürülmesi önem kazanmaktadır. *Rosaceae* familyasının bir üyesi olan *Aronia melanocarpa* (Michx.) Elliott, güçlü antioksidan özellikleri ile öne çıkmaktadır. Genellikle aronia veya kuş kirazı (chokeberry) olarak anılan bu bitkinin meyveleri, farklı toplumlarda koruyucu ve önleyici sağlık uygulamalarında kullanılmaktadır. Bu çalışmada, Çanakkale/Lapseki bölgesinden toplanan aronia meyvelerinin hidroalkolik ekstraksiyon verimini belirlemek ve ardından ekstraktın antioksidan kapasitesinin CUPRAC yöntemi kullanılarak değerlendirilmesi amaçlamaktadır. Analizler sonucunda meyve ekstraktının antioksidan kapasitesi trolox eşdeğeri (TE) olarak hesaplanmıştır. Aronia meyvelerinin %16,3 ekstraktif içerdiği ve ekstraktiflerin 320 mg TE/gr antioksidan kapasitesi olduğu bulunmuştur. Bu sonuçlara dayanarak, aronia bitkisinin tıp ve eczacılık uygulamalarında kullanım potansiyelinin yüksek olduğu düşünülmektedir.
Anahtar Kelimeler: Aronia melanocarpa, antioksidan aktivite, CUPRAC metodu, hidroalkolik ekstraksiyon, fitokimya

ABSTRACT
Due to increasing environmental pollution, natural habitats and food are exposed to a variety of toxic chemicals, which adversely affect human health. Antioxidants play an important role in reducing these negative effects, and it is important to identify the antioxidant components in plants and convert them into products. Aronia melanocarpa (Michx.) Elliott is a member of the Rosaceae family and stands out for its high antioxidant properties. The fruits of this plant, commonly called as aronia or chokeberry, are used in preventive and preventive health practices in different societies. The aim of this study is to determine the hydroalcoholic extraction yield of berries collected from Çanakkale/Lapseki region and subsequently evaluate the antioxidant capacity of the extract using CUPRAC method. As a result of the analysis, the antioxidant capacity of the fruit extract was calculated as trolox equivalent (TE). It was found that the extraction yield was 16.3% and the extracts had an antioxidant capacity of 320 mg TE/gr. Based on these results, Aronia is considered to have a high potential for use in medical and pharmaceutical applications.
Keywords: *Aronia melanocarpa, antioxidant activity, CUPRAC method, hydroalcoholic extraction, phytochemistry*

GİRİŞ
Artan çevre kirliliği, kullanılan kimyasallar ve sentetik malzemeler sebebiyle doğal yaşam alanları ve gıdalar farklı oranlarda toksisiteye maruz kalmaktadır. Bu durum insan sağlığını ve canlı yaşamını olumsuz etkilemektedir. Bu olumsuzlukların azaltılmasında antioksidanlar önemli bir role sahiptir. Antioksidan maddeler, serbest radikallerin neden olduğu birçok oksidatif hasarı önlemede, serbest radikalleri yakalama ve stabilize etmede büyük öneme sahip olan maddelerdir. İnsan yaşamı boyunca

FULL TEXTS BOOK

toksik kimyasallar ile karşılaşma sorunu artmakta ve bu bağlamda bitkilerdeki antioksidan bileşenlerin tespiti ve ürüne dönüştürülmesi önem kazanmaktadır

Aronia melanocarpa (Michx.) Elliot bitkisinin cins adı, "aria" kelimesinden gelir. Aria, *Sorbus* genusunun Yunanca adıdır ve *Rosacea* familyasının farklı iki cinsine ait bu bitkilerin meyveleri birbirlerine benzemektedir. Tür adı *melanocarpa* ise iki kelimenin birleşimidir. Latince melano siyah, carpa ise meyve anlamına gelir.(Anonim,)

Yaprak döken çalı formunda olan Rosacea familyasının 1,5-2,5 m boylanabilen bir üyesi olan Aronia bitkisinin ana vatanı Kuzey Amerika kıtasıdır (Ochmian vd., 2012). 1900'lü yılların başlarında Avrupa ve Rusya'ya getirilerek yetiştirilmeye başlanmıştır (Shahin vd., 2019). En yaygın 3 türü bilinmektedir: *Aronia melanocarpa* (Michx) Elliot (Black chokeberry), *Aronia prunifolia* (Marsh) (Purple chokeberry), *Aronia arbutifolia* (L.) Elliot (Red chokeberry) (King ve Bolling, 2020; Eskimez ve Polat, 2022). 1940'lı yıllardan bu yana Almanya başta olmak üzere Doğu Avrupa ülkelerinde, 1990'lardan sonra Çin'de 2012 yılından beri de Türkiye'de yetiştirilmeye başlanmıştır. (Ünal,2022; Shi vd.,2024) Türkiye'de en çok üretim alanları başında Kırklareli, Bursa, Yalova, Manisa gelmektedir (Poyraz Engin ve Boz 2019).

Aronia melanocarpa nın 'Nero' ve 'Viking' çeşitleri *A. melanocarpa* ve *Sorbus aucuparia* arasında melez türlerdir (King ve Bolling, 2020).

Sert iklim koşullarına dayanıklı olup optimum sıcaklık olan 5-10 °C'de gelişim göstermektedir. (Anonim-2, 2024). Maksimum -25C ye kadar dayanabilir. Her çeşit toprak özelliğinde yetiştiricilik yapılabilmektedir (Özder, 2021). İlkbaharın geç donlarından etkilenmez. Kışın yüksek soğuklama isteğine sahip olan bitki, nisanda çiçeklenme gösterip genellikle eylül ayı ortası hasat için salkımlı meyveleri olgunluğa ulaşır (Şahin ve Erdoğan, 2022). Aronia melanocarpa'nın çiçek ve meyve salkım görünümleri Şekil 1'de verilmiştir.

Amerikan yerlileri olan Kızılderililer bu meyveleri bir besin olarak tüketmişlerdir (Moerman, 1998). Potawatomi ve Abnaki kabileleri ayrıca bu bitkiyi soğuk algınlığını önlemede ve tedavi amaçlı çay yapımında kullanmışlardır (Kokotkiewicz vd., 2010).



Şekil 1. *Aronia melanocarpa'nın* çiçek ve meyve salkım görünümleri

Bazı enfeksiyonlarda, mide, bağırsak, karaciğer ve safra kesesi dahil olmak üzere gastrointestinal sistem hastalıklarında kullanımı, bağışıklık sistemi hastalıkları, dolaşım bozuklukları, hipertansiyon üzerine etkileri kayıtlara geçmiştir (Andryskowski,1998). Diyabet, obezite gibi metabolik hastalık riskini en aza indirebilir (Oszmianski ve Sabina Lachowicz, 2016). Meyve suyu şeklinde elde edilen özütün bir araştırmada hiperlipidemi oluşturulan deney hayvanlarında lipid düşürücü etki gösterdiği ve kalp ve dolaşım sağlığı açısından bu şekilde lipideminin azaltılmasının önemli olacağı ortaya konmuştur (Valcheva vd., 2007). Son araştırmalar, *Aronia melanocarpa* ve ekstaktiflerinin yalnızca bu gibi kronik metabolik hastalıklar değil ayrıca tromboemboli ve kanser gibi ciddi hastalıklar üzerinde de önemli bir iyileştirme etkisine sahip olduğu, aynı zamanda meme kanseri, pankreas kanseri ve bağırsak kanseri tümör hücrelerinin çoğalmasını engelleyebileceğini ortaya koymuştur (Doma vd., 2023). Antidiyabetik ilaçlar ve antikoagükanlar ile etkileşebilir/birlikte alınmaması kayıtlara geçmiştir (TİTCK, 2024; Anonim-3, 2024)

FULL TEXTS BOOK

Günümüzde *Aronia melanocarpa* fenolik biyoaktif maddelerin en zengin bitki kaynaklarından biri olarak kabul edilmektedir. *Aronia melanocarpa*'nın meyveleri kimyasal olarak diyet lifi, protein, şekerler, polifenoller içerir (Demircan, vd., 2024). Polifenolik bileşikler olarak antosyanidinler, proantosiyanidinler, flavonoidler ve fenolik asitler dahil olmak üzere çeşitli bileşenler sayılabilir (Szopa vd., 2017). Polifenoller, meyvelerin yüksek biyoaktivitesini belirleyen en önemli fitokimyasal bileşenlerdir (Sidor ve Michałowska, 2019). *Rosecea* familyasının diğer türlerine göre antioksidan bileşikleri daha yüksek oranda bulundurmaktadır (Shi vd.,2024).

Bu çalışma, *Aronia melanocarpa* meyvesindeki kimyasal bileşenler ve aktiviteler üzerine ilgili araştırmalara katkı sağlamak amacıyla Çanakkale-Lapseki bölgesinde yetiştirilen bitkinin antioksidan aktivitesinin incelenmesini içermektedir. *Aronia melanocarpa* meyvelerinin hidroalkolik ekstraksiyonunun antioksidan aktivitesi araştırılmıştır.

MATERYAL ve METOD:

Bitki materyali

Araştırmada Çanakkale-Lapseki Bölgesinde yetiştirilen Nero çeşidi *Aronia melanocarpa* (Michx) Elliot bitkisinin 2023 yılı ekim başı hasat edilen meyveleri kullanılmıştır.

Ekstraksiyon

A. melanocarpa meyvelerinin hidroalkolik ekstraktı hazırlanmıştır. Taze meyveler, %80 lik Metanol (MeOH) ile muamele edilmiştir. 100 gr meyvenin kullanılan ekstraksiyon işlemi için 1/1,5 (ağırlık/hacim) oranında MeOH çözücü olarak kullanılmıştır. Orbital çalkalayıcıda 48 saat tutularak maserasyon tamamlanmıştır. Filtrasyon işleminin ardından çözücü evaporator ile uzaklaştırılmıştır.

Antioksidan Kapasite Analizi- CUPRAC Metodu

Aronia meyve ekstresinde (MeOH), CUPRAC Metodu ile antioksidan kapasite analizi yapılmıştır (Apak vd., 2004). Troloks eşdeğer antioksidan kapasite (TEAC) yöntemi ile 3 tekrarlı ölçümler gerçekleşirilmiştir.

CUPRAC Antioksidan Kapasite ölçümü, yönteminin kromojenik oksidasyon aracı olan Cu(II)-Nc reaktifinin antioksidanlarla (Ar(OH)n) reaksiyonu sonucu Cu(I)-Nc renkli kelatının oluşumuna dayanmaktadır . Burada oluşan şelatın absorbans değeri ile indirgeme reaksiyonunda aktif olan antioksidan maddelerin aktiviteleri ölçülmüş olmaktadır.

BULGULAR VE TARTIŞMA:

Aronia meyvelerinde %25,38 kuru madde bulunmuştur.

Ekstraktif verim % 16,3 taze meyve (FW) ve %64,54 kuru meyve (DW) için hesaplanmıştır.

Aronia melanocarpa bitkisinde kurutulmuş meyvelerde 206,4 mg TE/gr olarak antioksidan kapasite hesaplanmıştır (Çizelge 1).

Çizelge 1: Aronia melanocarpa meyve kısımlarının CUPRAC yöntemine göre antioksidan aktivite Trolox Eşdeğer (TE) ölçümleri

Concentration (µg/mL)	Trolox Equivalent (µg/mL) Methanol extract	Dried matter
100 µg/mL	32,01 µg/mL	206,4 mg/TE/gr

Antioksidan kapasitesini ölçmek için oldukça farklı metodlar vardır. Ve bu yöntemler antioksidan analizinin reaksiyon ana prensiplerindeki farklılıklardan kaynaklanan birbirinden farklı sonuçlar vermektedir.

Aronia meyvelerinin antioksidan kapasitesi üzerine oksijen radikal emilim kapasitesi (ORAC) prosedürü (Shi vd., 2024) DPPH gibi farklı yöntemlerle yapılmış birçok çalışma vardır. Kapçı'nın 2013'teki çalışmasında CUPRAC metodu ile kuru meyvelerin antioksidan kapasitesinin diğer yöntemlerle ölçümünden daha yüksek olduğunu göstermiştir. Duysak ve arkadaşlarının 2024'teki bir araştırmasında metanolik ekstraktlarının 125 µg/mL konsantrasyonunda aynı yöntem ile antioksidan aktivite 10.72 Trolox Eşdeğer (µg/mL) olarak rapor edilmiştir.

Bununla birlikte *A. melanocarpa* meyvelerinin analiz edilen diğer meyvelerden daha yüksek seviyelerde antioksidan aktivite gösterdiğini rapor eden çalışmalar mevcuttur (Benvenuti vd., 2006; Shi vd., 2024).

FULL TEXTS BOOK

SONUÇ

Son yıllarda gerçekleştirilen bilimsel araştırmalar beslenmede antioksidan içerikli besinlerin ve bileşiklerin tüketilmesinin sağlık açısından olumlu sonuçlara sebep olduğunu göstermektedir. Bununla birlikte bu tür bileşenlerin bazı kanser türlerinin hücre çoğalmasını azalttığı anlaşılmıştır. *Aronia melanocarpa* bitkisi, yüzyıllardır yerliler tarafından ilaç olarak kullanılmıştır. Meyvelerini kurutup yemeklere ilave olarak kullanmışlar ve yapraklarını kurutup çay yapmışlardır. Antioksidan açısından oldukça zengindir. Üzümsü meyveler içinde en çok antioksidan etki içeren meyvedir.

Türkiye'nin doğal florada bulunan üzümsü meyvelerin sağlık alanındaki olumlu etkilerini aydınlatan çalışmalar giderek artmaktadır. Aronia bitkisinin de bu yönde etkileri azımsanmayacak düzeydedir. Hatta antioksidan etkileri bu grup meyveler içinde önde geldiği anlaşılmıştır. Bununla birlikte *Aronia melanocarpa* meyvesinin bireylerin yaş, kilo ve klinik özelliklerine göre beslenme ve tıbbi değeri hakkında yeterli bilgi yoktur. Türkiye'de yetişen türlerin özellikle dozajlama ve farmakolojik aktiviteleri konusunda daha fazla çalışmalar ile kayıtlara geçilme beklentisi bulunmaktadır. Meyveler, fenolik bileşikleri kompleks- zengin yapıda bir antioksidan kaynağı ve fonksiyonel gıda kaynağıdır. Kayıtlara geçmiş güvenilir kullanım ile ekonomik yerel tüketim seçenekleri geliştirilme çalışmaları ilgi uyandırmaktadır.

Kültüre edilen Vaccinium türleri gibi *Aronia melanocarpa* bitkisinin yetiştiriciliği ve fonksiyonel gıda olarak kullanımı ile ilgili çalışmaların daha kapsamlı hali ile gündemde olduğu, özellikle de son 10 yıl içinde arttığı bildirilmiştir. Bilimsel çalışmalardaki olumlu sonuçların bu sektöre bir hız ve motivasyon kaynağı olacağı öngörülmektedir.

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FULL TEXTS BOOK

ANALYSIS OF THE TRANSLATION OF THE ROMANTIC LETTERS OF "THE SORROW OF THE YOUNG WERTHER: BY JOHANN WOLFGANG VON GOETHE FROM GERMAN INTO ALBANIAN

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ABSTRACT
"Die Leiden des jungen Werther "is an epistolary novel by Johann Wolfgang Goethe from 1774, which was published in a revised edition in 1787. It represents one of the fundamental works of the Sturm und Drang period in German literature and had a great influence on the later Romantic movement. This article presents and analyzes the translation of the romantic letters in "The Sorrows of the Young Werther", focusing on the Albanian translation by Petro Zheji. The focus of the analysis is on the letters that Werther writes in German in the first two chapters of the work. This study combines translation analysis by describing the translated elements in different and important fragments of the work, such as metaphors and epithets. Goethe has combined elements such as nature and spirit in a sophisticated way in this epistolary novel.
"The Sorrows of the Young Werther" is an important representation of the Sturm und Drang era, where Werther is a typical representative of that period, embodying the sensitivity and genius of his feelings. Translating such a work brings several challenges, including adapting the vocabulary used, the rhetorical questions addressed in each letter, the style and metaphors to make it attractive to new readers and to arouse curiosity about subsequent letters.
This study includes a comparative analysis of the original German text and its translation into Albanian, focusing on the translation of metaphors, epithets and other stylistic elements. It examines how the translator dealt with the nuances of the original text, especially the connection between Werther's nature and soul, a key aspect of Goethe's style. This approach allows for an investigation into how the semantic development of nature is presented differently by the author and the translator.
Werther's interweaving of nature and spirit is a distinctive feature of Goethe's writings and allows the reader to understand the connection between the protagonist's feelings and nature. The study sheds light on the strategies used, the preservation of romantic nuances on a semantic and linguistic level, and the overall effectiveness of the translation in capturing the essence of the original work.
Keywords: youth literature, strum und drang, metaphor, briefroman, nature, translation analysis

1. Introduction

In this article, a detailed translational analysis of elements from Goethe's work will be presented. This analysis demonstrates that Goethe's writing style is characteristic of the Sturm und Drang era and examines Petro Zheji's art of translating it into Albanian.
The Sorrows of Young Werther (Die Leiden des jungen Werthers), commonly known as Werther, is an epistolary novel written by Johann Wolfgang Goethe in 1774, with a revised edition published in 1787. It is one of the seminal novels of the Sturm und Drang period in German literature and significantly influenced the subsequent Romantic movement. The novel intertwines biographical and autobiographical elements, reflecting two triangular relationships involving Goethe, Christian Kestner, and Charlotte Buff.
The narrative of The Sorrows of Young Werther unfolds through a series of letters penned by Werther, a young artist with a sensitive and passionate temperament, addressed to his friend Wilhelm. Werther falls deeply in love with Charlotte, despite knowing she is engaged to Albert, who is eleven years her senior. Despite the emotional turmoil, Werther spends several months fostering a close friendship with both Charlotte and Albert. Each day becomes a tormenting reminder of Charlotte's unattainable love. Out of respect for her husband and compassion for her friend, Charlotte eventually decides that Werther must limit his visits.
Earlier in the story, Werther had insinuated that one member of the love triangle-Charlotte, Albert, or Werther himself—would need to die to resolve the situation. Unable to harm anyone else or contemplate

FULL TEXTS BOOK

murder, Werther sees no option but to end his own life. After writing a farewell letter to be found posthumously, he requests Albert's pistols under the pretense of going "on a journey." Charlotte, overwhelmed with emotion, sends the pistols. Werther then shoots himself in the head, but he survives for twelve agonizing hours before succumbing to his wounds. He is buried between two linden trees frequently mentioned in his letters, without any clergy or the attendance of Albert or Charlotte. The book concludes with a hint that Charlotte might die of a broken heart: "I shall say nothing of...Charlotte's grief. ... Charlotte's life was despaired of."1

Sturm und Drang, literally translated as "Storm and Stress," was a proto-Romantic German literary movement of the late 18th century that celebrated nature, individual subjectivity, and intense emotions. The primary aim of the movement was to rebel against the Enlightenment's emphasis on rationalism and the classical ideal of beauty upheld by Neoclassicism. Key figures of the Sturm und Drang movement, such as Johann Wolfgang von Goethe and Friedrich Schiller, profoundly influenced German literature with their romantic narratives, strong emotions, and evocative imagery.2

2. Translation Challenges in romanticue Letters

Translating literature with romantic elements presents significant complexities and challenges, particularly for young audiences. One of the primary difficulties lies in capturing the nuanced expressions of love and emotion that are often embedded in romantic letters. These expressions are not only linguistically diverse but also culturally specific, making it challenging to find equivalent translations that resonate with the target audience.

In the Albanian language, expressions of love are deeply rooted in cultural customs and regional dialects, which vary significantly across different parts of the country. As a result, a direct translation from German to Albanian may fail to convey the same emotional depth and cultural context. For instance, phrases that are poetic and profound in German might seem awkward or lose their romantic charm when translated literally into Albanian.

According to Newmark (1988), "translation is not just a matter of substituting words in one language for words in another; it involves the whole culture." This is particularly true for romantic literature, where the translator must navigate the subtleties of both languages and cultures to maintain the intended emotional impact.[3] Venuti (1995) also emphasizes the importance of the translator's role in bridging cultural gaps, arguing that "translation is a cultural act that necessitates a deep understanding of the socio-cultural contexts of both the source and target languages."[4]

Moreover, the German language has its unique way of expressing romantic sentiments, often utilizing compound words and specific grammatical structures that do not have direct equivalents in Albanian. This discrepancy requires the translator to employ creative strategies to adapt the content in a way that feels natural and authentic to Albanian readers while preserving the original meaning and emotional tone.

Susan Bassnett (2002) highlights that "the act of translation involves negotiating complex layers of meaning and finding ways to convey those layers in another language." This negotiation becomes even more intricate when dealing with romantic letters, where the subtleties of tone, context, and cultural implications must be carefully balanced.[5]

Additionally, Eugene Nida's concept of dynamic equivalence (1964) becomes relevant here, where the focus is on achieving a similar response from the target audience as the original text would have evoked. This approach suggests that translators should prioritize the overall impact and emotional resonance of the text over a word-for-word translation.[6]

In summary, translating romantic literature, particularly letters, involves more than linguistic conversion. It requires a deep understanding of cultural nuances and the ability to convey the same emotional and contextual richness in the target language. The translator must skillfully balance fidelity

[1] https://en.wikipedia.org/wiki/The_Sorrows_of_Young_Werther
[2] https://useum.org/Romanticism/Sturm-und-Drang
[3] Newmark, P. (1988). A Textbook of Translation. Prentice-Hall International.
[4] Venuti, L. (1995). The Translator's Invisibility: A History of Translation. Routledge
[5] Bassnett, S. (2002). Translation Studies. Routledge
[6] Nida, E. A. (1964). Toward a Science of Translating. E.J. Brill.

to the source text with the cultural and linguistic expectations of the target audience, ensuring that the translated work retains its romantic essence and resonates meaningfully with readers.

3.2 Practical Text Analysis

Die Leiden des jungen Werthers by Johann Wolfgang von Goethe is a quintessential representation of the Sturm und Drang era. This epoch, known for its emphasis on individual subjectivity and emotional intensity, finds a profound expression in Werther's character. Throughout the novel, particularly in the letters penned by Werther, his sensitivity and profound sense of alienation from the societal norms of his time are vividly portrayed. Werther's letters consistently reflect his inner turmoil and his steadfast loyalty to his own ideals, despite the conflicts with the external world.

Werther often uses nature as a metaphor for his emotional state, mirroring the Romantic inclination towards using natural elements to symbolize inner feelings. His deep, unreciprocated love for Charlotte is a central theme in the novel, portrayed as both an all-encompassing force and the source of his intense suffering. The selected excerpts for this analysis highlight the impossibility of Werther's love for Charlotte, underscoring the emotional and psychological complexities that drive his despair.

The translation of such a work presents significant challenges. The translator must strive to preserve Goethe's original style and intent while making the text accessible and resonant for an Albanian audience. Petro Zheji, the translator of this work into Albanian, undertakes the task of maintaining the authenticity and richness of Goethe's narrative. Zheji's translation captures the multifaceted emotional landscape of the novel, ensuring that the Albanian reader can appreciate the depth and nuance of Werther's character and his unfulfilled love for Charlotte.

This analysis focuses on key excerpts from the letters that illustrate Werther's profound and unattainable love for Charlotte. These selections reveal the intensity and futility of Werther's emotions, which are pivotal to understanding his ultimate despair. The translator’s role is critical in conveying these intricate emotions and preserving the literary quality of the original text. Through Zheji's skillful translation, the Albanian rendition of Die Leiden des jungen Werthers stands out as an authentic and vibrant interpretation, faithfully reflecting Goethe's literary masterpiece.

First part of the book

- **Letter - 10 May**

German
... *— dann sehne ich mich o□ und denke: ach könntest du das wieder ausdrüc-ken,* ***könntest du dem Papiere das einhauchen, was so voll, so warm in dir lebt, daß eswürde der Spiegel deiner Seele, wie deine Seele ist der Spiegel des unendlichen Gottes!..***
Albanian Translation
...dhe them me vete : “Ah sikur te mundta shprehje ate qe ndjen,sikur te ishe i zoti ***te derdhje mbi karte tere kete jete qe rrjedh brenda teje kaq e plote dhe e ngrohte ,qe karta te behej pasqyre e shpirtit tend ,ashtu si shpirti yt eshte pasqyra e hyjnise se pafundme!..***

In the book "The Sorrows of the Boy Werther" there is an extensive use of literary figures such as metaphors, epithets, metaphorical epithets and similes that emphasize Werther's sensitivity in each paragraph.

In this case, the translation of the phrase ***"könntest du dem Papiere das einhauchen, was so voll, so warm in dir lebt, daß es würde der Spiegel deiner Seele, wie deine Seele ist der Spiegel des unendlichen Gottes!"*** in the Albanian language "to pour on the card this whole life that flows inside you so full and warm, so that the card becomes a mirror of your soul, just as your soul is a mirror of the infinite divinity!" shows the effort of Petro Zheji to preserve the same literary figures in Albanian.

FULL TEXTS BOOK

The Albanian translation preserves the sensibility and stylistic richness of the original by using words and structures that give the same emotional impact to the Albanian reader. An interesting adaptation is the word ***"Gottes",*** which ***in Albanian is "god***", but to give a greater stylistic force, the translator has used the term "goddess than infinity". This change not only better conveys the feelings of the protagonist, but also preserves the depth and philosophical dimensions of the original text.
This effort to keep alive the stylistic nuances and emotions of the original is a testament to Zhej's skill as a translator and the importance of preserving authenticity in the translation of classical literary works. Through this practical analysis, we better understand how translation not only conveys the content of the text, but also preserves and transmits the deep feelings and emotions of the original author to the new reader

- **Letter -13 Mai**

German
Wie oft lull ich mein empörtes Blut zur Ruhe, denn so ungleich, so unstet hast du nichts gesehen als dieses Herz... ... Auch halte ich mein Herzchen wie ein krankes Kind*; **jeder Wille wird ihm gestattet**.*
Albanian Translation
...Sa e sa here duhet ta perkund e ta ***ve ne gjume gjakun tim rebel***,sepse,ska gje me te cnjetrajtshme e te paqendrueshme se zemra ime e gjore . *...Pra dhe sillem me zemren time si me nje femije te semure, **duke ia permbushur pa fjale, te gjitha tekat** .*

In the case of translation from the German language, many linguistic elements are adapted based on the culture of a country. In this case, the phrase **"jeder Wille wird ihm gestatet**" is compensated with a sentence of the everyday language like " ***duke ia permbushur pa fjale, te gjitha tekat*** ". The word ***"tekat"*** in the Albanian language is used when a child or a person asks for something immediately, even when this is not possible at that moment.
The German phrase ***"Wie oft lull ich mein empörtes Blut zur Ruhe"*** translated into Albanian " Sa ***e sa here duhet ta perkund e ta ve ne gjume gjakun tim rebel*** " is a proof of the love that Werther felt for Charlotte.The translator uses the technique of linguistic amplification by adding metaphorical elements to emphasize the romantic nuances. This approach not only preserves the original meaning, but also deepens the feeling of the Albanian reader by bringing the character's emotions and experiences closer.
In this letter, Werther's feelings are vividly and powerfully reflected through the use of metaphors and similes. Zheji's translation preserves these stylistic elements, trying to capture the emotional essence of the original text. By comparing his heart to a sick child, Werther shows the fragility and instability of his feelings, and the translator skillfully conveys this in Albanian.

- **Letter - 26 May**

German
und sagte zu ihm: **Feiner jungerHerr**! lieben ist menschlich, nur müßt Ihr **menschlich lieben**!
Albanian Translation
... Te dashurosh **imzot i ri dhe i ndritur** eshte dicka njerezore vetm se duhet **dashuruar njerezisht**!

In this case, the translation from German to Albanian was carried out while maintaining the same literary figures and stylistic nuances. The phrase "**feiner junger Herr**" is translated as ***"young and bright sir"***, retaining the respectful and laudatory title. Also, the word **"menschlich**" is translated as "njerezore", keeping its original meaning.

The translator has faithfully preserved Goethe's style and tone, accurately conveying the emotions and messages expressed in the original text. This is a significant challenge in translating literature, especially when it comes to works from the "Sturm und Drang" era, which are characterized by the use of rich figurative language and intense emotional expressions.
In this phrase, the translator Petro Zheji manages to preserve the cultural sensitivity of the expressions. By translating "***lieben ist menschlich, nur müßt Ihr menschlich lieben***" as "to love is something human only to be loved humanly", Zheji maintains semantic and stylistic equivalence, ensuring that the Albanian reader experiences the same feeling and meaning as the German reader.
In addition, the translation of the literary figures as "***imzot i ri dhe I ndritur*** " shows the translator's care to preserve the reverence and respect expressed in the original, offering a translation that is faithful to the spirit of the work and that respects the cultural nuances of the Albanian language.

- **Letter -16 June**

German
... sie hat allen meinen Sinn gefangen genommen. *So viel Einfalt bei so viel Verstand, so viel Güte bei so viel Festigkeit, und die Ruheder Seele bei dem wahren Leben und der Tätigkeit.*
Albanian Translation
...Shkurt,me ka bere per vete,me ka marre mendte! Nje thjeshtesi kaq e plote bashke me nje mendjee kaq te ndritur ,nje miresi kaq e madhe bashke me nje force te jashtezakonshme karakteri ,dhe nje qetesi shpirterore kaq e persosur mes nje jete plot levizje.

The phrase ***"sie hat allen meinen Sinn gefangen genommen"*** in the Albanian language is translated as ***"Shkurt, me ka marre mendte***" which is an idiomatic way of expressing deep and complete love for him. It is important to note that the word "**Sinn**" in German means "**meaning, sense**", but the Albanian translation uses an everyday idiom that expresses the same emotion in a culturally appropriate way. This translation is understandable and makes sense in the Albanian cultural context, but it does not fully capture the meaning of the original German phrase. This shows that the translator has made a choice to adapt the phrase for Albanian readers, using an idiom that carries the same meaning, but in a different way.
The rest of the phrase "***So viel Einfalt bei so viel Verstand, so viel Güte bei so viel Festigkeit, und die Ruhe der Seele bei dem wahren Leben und der Tätigkeit***" is translated "***Një thjeshtësi kaq e plotë bashkë me një mendje kaq të ndritur, një mirësi kaq e madhe bashkë me një forcë të jashtëzakonshme karakteri, dhe një qetësi shpirtërore kaq e përsosur mes një jete plot lëvizje***". Here, the translator has preserved the structure and nuances of the original, using similar literary figures and ensuring that the translation is faithful to Goethe's style and tone.

German
Wie ich mich unter dem Gespäche in den schwarzen Augen weidete! wie die leben-digen Lippen und die □ischen, muntern Wangen meine ganze Seele anzogen! wie ich, **in den herrlichen Sinn ihrer Rede ganz versunken**, o□ gar die Worte nicht hörte, mit denen sie sich ausdrückte!
Albanian Translation
Me sa etje I perpija , gjate kesaj bisede, syte e saj te zinj! Sa shume e teresisht terhiqeh shpirti im nga buzet e saj kaq te purperta e nga faqet e saj kaq te fresketa e te gjalla! ***... e madherishme ne tufanin e ndjenjave qe ato me zgjonin*** *,nuk arrija dot te degjoja dot as fjalet me te cilat ajo perpiqej te shprehte mendimin e saj !*

In this pragraph from "The Sorrows of the Boy Werther" by Goethe, the translator Petro Zheji has made a careful translation that preserves the emotions and sensitivity of the original. He has used literary figures to convey the deep feelings of Werther in the Albanian language.
In the phrase "***Wie ich mich unter dem Gespäche in den schwarzen Augen weidete***!", the translator brought it into Albanian as "***How thirsty I was, during this conversation, her black eyes***!", using the word "thirst" for conveyed the intensity of Werther's feeling. This is an example of using metaphors to emphasize his desire and passion.
The rest "**wie die lebendigen Lippen und die frischen, muntern Wangen meine ganze Seele anzogen!**" is translated as " ***Sa shume e teresisht terhiqeh shpirti im nga buzet e saj kaq te purperta e nga faqet e saj kaq te fresketa e te gjalla".*** The translator has used epithets like "**purple" te purperta** and "**fresh and lively"** to convey the beauty and vivacity of Charlotte's portrait.
In the phrase "**wie ich, in den herrlichen Sinn ihrer Rede ganz versunken, oft gar die Worte nicht hörte, mit denen sie sich ausdrückte!",** the translator has added an emotional and metaphorical element in Albanian: " ***e madherishme ne tufanin e ndjenjave qe ato me zgjonin"*** **"magnificent in the storm of feelings that they they woke me up, I couldn't even hear the words with which she tried to express her opinion!**". This shows a higher level of emotional intensity and Werther's devotion to Charlotte.

German

Ich war kein Mensch mehr. Das liebenswürdigste Geschöpf in den Armen zuhaben und mit ihr herumzufliegen wie Wetter, daß alles rings umher verging, und ...

....tat ich aber doch den Schwur, daß ein Mädchen, das ich liebte, auf das ich Ansprüche hätte, mir nie mit einem andern walzen sollte als mit mir,und wenn ich drüber zugrunde gehen müßte.

Albanian Translation

...Jo s isha me njeri .Te mbash ne krahet e tu nje krijese te tille **te magjishme** ,te fluturosh me vertkun e nje tufani dhe cdo gje nderkaq rreth teje te venitet e te zhduket dhe ...

Ate /cast bera be e rrufe me veten time se vajzen, me te cilen do te dashurohesha dhe me te cilen do te kisha ndermend te lidhja fatin tim , une nuk do te lejoja kurre dhe sikur ta dija qe do ta paguaja kete me jeten time, nuk do ta lejoja kurre ,them , te kercente vals,pos meje ,me nje tjeter !

In this excerpt from "The Sorrows of the Boy Werther" by Goethe, the translator Petro Zheji has skillfully preserved the sensitivity and passion of the original. The Albanian translation successfully captures the emotional intensity and deep despair of Werther, faithfully conveying the essence and emotions of the work.
The phrase "**Ich war kein Mensch mehr. Das liebenswürdigste Geschöpf in den Armen zu haben und mit ihr herumzufliegen wie Wetter, dass alles rings umher verging**," is translated as ***"No, I was no longer human. To hold a creature in your arms so magical, to fly with the momentum of a storm and everything around you fades and disappears,"*** using powerful literary figures to describe the intensity of the protagonist's feelings. Here, Zheji uses the metaphors **"te magjishme" and "vertkun e nje tufani** " to convey the magic and power of Werther's feelings for Charlotte, giving the reader a vivid and emotional experience.
In the second phrase, **"tat ich aber doch den Schwur, dass ein Mädchen, das ich liebte, auf das ich austenze hätte, mir nie mit einem andern walzen sollte als mit mir, und wenn ich drüber zrunde gehen müsste,**" the Albanian translation " **Ate cast bera be e rrufe me veten time se vajzen, me te cilen do te dashurohesha dhe me te cilen do te kisha ndermend te lidhja fatin tim , une nuk do te lejoja kurre dhe sikur ta dija qe do ta paguaja kete me jeten time, nuk do ta lejoja kurre ,them , te kercente vals,pos meje ,me nje tjeter** ! " includes a precise and emotionally rich translation. Zheji maintains Werther's sense of oath and determination to protect his love, using powerful and determined language that reflects the intensity and drama of the protagonist's oath.

FULL TEXTS BOOK

- **Letter -19 June**

German
... , und ich bin gekommen; und seit der Zeit können Sonne, Mond und Sterne geruhig ihre Wirtscha treiben, ich weiß weder, daß Tag noch daß Nacht ist, und die ganze Welt verliert sich um mich her.
Albanian Translation
...dhe keshtu e pashe perseri dhe qe atehere dielli,hena, yjet mund te vijne rrotull sa te duan e te bjen te qete punen e tyre, se une sdi me ne eshte dite apo eshte nate,sepse bota,tere bota rreth meje u zhduk e s eshte me

The translator has preserved the strong literary figures that Goethe uses to express Werther's emotional state. The use of the words **"the sun, the moon, the stars may come round as they please and do their work quietly"** shows Werther's indifference and total detachment from reality due to his deep and impossible love for Charlotte - n. The Albanian translation preserves the sense of loss and isolation that Werther experiences, making it clear how important this condition is to the entire story.

Letter -16 July

German
Ach wie mir das durch alle Adern läut, wenn mein Finger unversehens den ihrigen berührt, wenn unsere Füße sich unter dem Tische begegnen! Ich ziehe zurück wie vom Feuer, und eine geheime Kra zieht mich wieder vorwärts
Albanian Translation .
Ah cfare rrymash te zjarrta m'i pershkojne damaret kur gishtat e mi cikin padashur te sajet ,kur kembet tona ndeshen rastesisht nen tryeze .Brof prapthi si i perveluar por ja nje forxe e mistershme me shtyn perpara...

The Albanian translation preserves Goethe's literary figures and style, using words like " **rryma të zjarrta " and " i përvëluar** " to convey Werther's strong and contradictory feelings. The translator has brilliantly captured the sense of sudden and forbidden contact between Werther and Charlotte, emphasizing the physical and emotional effect this contact has on the protagonist. Also, the use of phrases like " **një forcë e mistershme më shtyn përpara** "a mysterious force drives me forward" shows the inevitable and powerful attraction that Werther feels towards Charlotte, despite the pain he experiences.

German
*Wilhelm, was ist unserem **H**erzen die Welt ohne **L**iebe! Was eine **Z**auberlaterne ist ohne **L**icht!*
Albanian Translation .
Si do te na dukej valle bota, Vilhelm, pa dashuri ? *Si nje fener magjik pa drite ?*

The Albanian translation preserves Goethe's style using the questions as a way of making the reader more interested in the history and the answer.The question "**Si do te na dukej valle bota, vilhelm, pa dashuri ?** it's a rhetoric question used to express that with no love how can we live in this world . *Was eine **Z**auberlaterne ist ohne **L**icht.*In german translation is used the *word **Zauberlaterne and ohne Licht*** to express that life and love are all together combined so together they exist. one cannot do without the other. A direct translation was made to write the same stylistic force of the word magic lantern and the rhetorical question in both languages.

FULL TEXTS BOOK

German
...da ich diesen ängstlichen Abschiedim Herzen hatte!
Albanian Translation .
...kur zemra ime rridhte gjak nga nje ndarje kaq mizore

Based on the style of Goethe and the translator PETRO Zheji, who always adapts without losing the similar value of the word, but also adding epithets that in the Albanian language are strong and emotional.The metaphor used "*...**kur zemra ime rridhte gjak nga nje ndarje kaq mizore***" to express that the heart was so hurt like something wounded with blood. bleeding is the most common metaphorical form used in the Albanian language when a lover is hurt by separation. The word "**angstlichen Abschied**" in albanian language is translated **"nje ndarje kaq mizore "** to to reinforce with this word the emotional importance of separation.

Letter 27 October, in the night

German
Ich habe so viel, und die Empfindung an ihr verschlingt alles; ich abe so viel, und ohnesie wird mir alles zu nichts.
Albanian Translation .
...kam shume gjera,por ndjenja qe ushqej per te i perpin te gjitha. Kam shume gjera, por pa te nuk do te kisha pasur asgje.

The letter written on the evening of October 27, is a letter that makes Werther a representative of the Strum und Drang era, he is sometimes emotional and hopeless. Being evening and the thoughts are deeper and not at all easy for him to analyze his feelings for Charlotte. To have everything but nothing without Charlotte, and the word "**perpin**" is used to show that everything disappears before the love you feel for her. The great power of the word "verschlingt -**perpin**" to express the power of love.

Letter 6 December

German
Wie mich die Gestalt verfolgt! Wachend und träumend □llt sie meine ganze Seele
Albanian Translation .
...Ah,fytyra e saj me ndjek kudo qe te shkoj!Shpirti im eshte mbushur, ne enderr e ne zhgjenderr, tejpertej me te ...

This phrase is also his last letter. The translator Zheji has adapted the translation of this part by creating new words such as "**zhgjenderr**" to show that it is a dream that is no longer feasible. Such a sensitive translation with the strength of a man who fights to win Charlotte now feels lost, expressing that he cannot escape from her. He feels weak in front of this great love precisely when he should be strong, greedy dreaming but defeated by reality.

Conclusion

The role of the translator in literary works involves many challenges. But to translate romantic letters from the German language into the Albanian language, a translator with a strategy of translation and adaptation has the same emotion as in the original language of the text without losing the style, manner of writing, stylistic force, etc.

In this work, the translator has used several techniques in translation directly translating the same word with an equivalent in the Albanian language. in some cases he presented idiomatic expressions based on the culture of a country from that of the original work to adapt it for the reader.

FULL TEXTS BOOK

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FULL TEXTS BOOK

AN OVERVIEW OF REHABILITATION REGIMEN AFTER SURGICAL TREATMENT OF ACUTE ACHILLES TENDON RUPTURES

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ABSTRACT
Background: Achilles's tendon rupture is a frequent injury with an increasing incidence. Treatment strategies for Achilles's tendon rupture vary considerably, and clinical outcome may depend on the magnitude of tendon elongation after surgical repair. Until now, there is no consensus regarding optimal treatment.
Purpose: To identify and analyze the clinical evidence regarding postoperative rehabilitation after the surgical repair of AT ruptures.
Methods: The studies were retrieved by searching the Medline, Embase, and Cochrane, Scopus databases. Critically reviewed the studies using preset inclusion and exclusion criteria. The quality of the eligible studies was assessed by the Cochrane 12-item scale. All included studies were summarized, and their data were extracted. Seven articles were found and they were all acceptable according to international quality assessment guidelines.
Conclusion: Postoperative early weightbearing combined with early ankle motion exercises is associated with a lower minor complication rate and achieves superior and more rapid functional recovery than conventional immobilization after surgical AT repair. Patient satisfaction and time to return to work were significantly different in favor of surgery in one study, and there was also better functional outcome after surgery in some studies.
Keywords: Achilles tendon rupture; tendon elongation; tendon healing; tendon strain; weightbearing.

INTRODUCTION
The Achilles tendon rupture is a frequent injury with an increasing incidence. Treatment strategies for Achilles tendon rupture (ATR) vary considerably, and clinical outcome may depend on the magnitude of tendon elongation after surgical repair. Until now, there is no consensus regarding optimal treatment. The Achilles tendon (AT) is one of the largest, thickest, and strongest tendons in the human body. The dynamic evolution of the Achilles tendon was strongly associated with the transition from apes' plant diet to humans' meat diet, where fast, shock-absorbing, and energy-saving locomotion was crucial for success. The AT is composed of three rotating subtendons originating from the three parts of the triceps surae muscle: the medial head of the gastrocnemius (MG), the lateral head of the gastrocnemius (LG), and the soleus muscle (SOL). The Achilles tendon (AT) is a common injury site with a wide range of overuse and acute presentations. These can include mid-portion tendinopathies, insertion tendinopathies, muscle injuries, and acute ruptures. It is believed that several factors contribute to AT injury, including poor vascularization, especially in the midportion of the tendon, exposure to high loads during locomotion, and an altered tendon cell response as described in the continuum model by Cook & Purdam, (Cook & Purdam, 2009; Łazarz et al., 2024). Tendon is a non-distensible fibrous cord that connects the muscle to the bone or other structures. The Achilles tendon, also known as the calcaneal tendon, is the largest and most biomechanically strong tendon in the human body. It is also one of the most frequently ruptured tendons in our body. A recent Danish study reported an occurrence of Achilles tendon rupture in 31.17/100,000 individuals. Conventional treatment for Achilles tendon injuries involves rest and immobilization using a brace if the injury is mild; severe injuries require surgical treatments such as suturing or reconstruction. Although surgical treatment can more reliably repair the injured tendon lesion, the return-to-sport rate of patients that undergo surgery is only 60%–80%, with an average return time of 7.6 months and a re-tear rate of 1.7%–5.4%. Therefore, the development of adjuvant therapies such as platelet-rich plasma (the proteinaceous fluid portion of the circulating blood) therapy, which can ensure a more reliable and faster return to sport, is underway in many fields (Shapiro et al., 2015; Veronesi et al., 2020). However, the effectiveness of such adjuvant therapies is

FULL TEXTS BOOK

controversial, (Nakazawa et al., 2024). The Achilles tendon (AT) is crucial to the athlete, as it is essential for explosive activities such as running and jumping. Athletes that sustain an ATR play in fewer games and perform at a lower level of play compared to age-matched controls. Recent studies also theorize that ATR occur due to elongation of the tendon with fatigue failure. Biomechanical studies have focused on comparing modes of fixation under dynamic loading to recreate this mechanism (Mansfield et al., 2022). Early tensile loading improves material properties of healing Achilles's tendon ruptures in animal models and in surgically treated human ruptures. However, the effect of such rehabilitation in patients who are non-surgically treated remains unknown. A variety of treatment options are available. Open surgical treatment with sutures is the first choice for many surgeons mainly because of a lower risk for re-ruptures. Other treatment alternatives include percutaneous suture fixation and various types of nonsurgical treatment. Traditional treatments, regardless of whether they are surgical or nonsurgical, entail several weeks of immobilization in a cast or orthosis. To overcome longstanding functional impairment, a modern physical therapy approach has been implemented and includes early functional rehabilitation with early weightbearing while wearing an ankle orthosis and unloaded ankle joint motion exercises. This shift in rehabilitation, away from extensive periods of immobilization and unloading toward early loading and motion, has been suggested to reduce the overall re-rupture rate and, in combination with the lack of surgery-associated risks, has made nonsurgical treatment more popular (Rendek et al., 2022). Outcomes, such as return to work and absenteeism days from work, are important dimensions in determining value-based healthcare. Determining the effect of orthopaedic trauma on the economic well-being of the patient is essential for designing value-based care programs. In addition, these data inform surgeon-patient communication on recovery expectations, support the prioritization of health policies, and inform the design of future therapeutic studies aimed at mitigating the socioeconomic consequences of injury. The findings suggest that orthopaedic trauma can have a substantial socio-economic impact on patients, and therefore also affect a person's psychological well-being and happiness (Talaski et al., 2024). However, the current techniques to measure socio-economic outcomes following orthopaedic trauma are widely varied in both design and implementation. Informative and accurate socio-economic outcome assessment requires a multifaceted approach and further standardization (O'Hara et al., 2020). The issue of loss to follow-up in orthopaedic trauma surgery persists despite a growing body of literature detailing its risk to both patients and clinical data. Furthermore, there is concern that these risks weigh more heavily on vulnerable populations given previous research identifying a high rate of loss to follow-up in such groups (Kirchner et al., 2022). Given the fact that a period of at least 2 weeks of immobilization is regularly applied clinically when treating ruptured tendons, the results may have a substantial clinical impact for the use of compression therapy during the period of immobilization. Thus, compression treatment may prove to accelerate healing during plaster/splint immobilization of patients, for example, in conservatively managed acute Achilles's tendon ruptures. The results warrant long-term follow up studies, also on suture repair, and clinical studies to confirm the observations in this experimental study (Schizas et al., 2010). Acute Achilles tendon rupture is a severe injury that leads to permanent functional deficits and sick leave. To prevent the injury, knowledge regarding the pathophysiology and risk factors for ATR is essential. Studies have shown that pathological changes occur in the tissue of the Achilles tendon before a rupture. These pathological changes weaken the tendon, which can result in a rupture during routine movements. It is not fully understood why these changes occur in some but not all Achilles tendons. Several risk factors for ATR have been discovered: male sex, genetics, treatment with quinolone antibiotics, treatment with systemic glucocorticoids, severe kidney disease, and type 2 diabetes. A recently study have demonstrated the presence of bacterial DNA in 25% of the samples from ruptured Achilles's tendons (Rolf et al., 2017). This finding has generated the hypothesis that the presence of bacteria plays a role in the pathological changes that occur in Achilles's tendons before a rupture (Cramer et al., 2022). The treatment of Achilles tendon injuries has seen many changes and innovations over the past several centuries. However, it was not until the early 20th century when surgical management of Achilles's tendon ruptures became the recommended treatment option. Surgeons such as Abrahamsen, Quenu, and Stoianovitch were among the earliest pioneers of surgical Achilles's tendon rupture repair and reported the first positive outcomes associated with surgical management (Miller & Chiodo, 2017). Currently, there is no universally accepted treatment for Achilles's tendon injuries; many options, both operative and nonoperative, exist. Additionally, the state of the Achilles tendon injury literature has rapidly advanced over the past several decades with new studies regarding rehabilitation

FULL TEXTS BOOK

protocols, surgical technique, stem cell treatment, platelet rich plasma potential, mechanisms of injury, and updated epidemiology being released daily. With this rapid expansion of the Achilles tendon pathology literature, it has become increasingly difficult for medical professionals and learners to stay up to date with the most impactful articles in this field (Moore et al., 2023). The purpose of this study is to identify and analyze the clinical evidence regarding postoperative rehabilitation after the surgical repair of AT ruptures.

METHODOLOGY

Search Methods for Identification of Studies:

The studies were retrieved by searching the Medline, Embase, and Cochrane, Scopus databases. Critically reviewed the studies using preset inclusion and exclusion criteria. The quality of the eligible studies was assessed by the Cochrane 12-item scale. All included studies were summarized, and their data were extracted. Seven articles were found and they were all acceptable according to international quality assessment guidelines.

DISCUSSION & RESULTS

The main finding of this study was that immediate postoperative EFM in patients with ATR resulted in significantly higher scores on general health and vitality at 6 months, compared with the control group. EFM did not seem to negatively affect heel-rise function, which indicates that muscle-tendon recovery might not be greatly influenced by differences in treatment protocols. The observed difference in health-related QoL was linked to differences in mobilization regimens between groups, independent of the occurrence of DVT. Patients suffering DVT during treatment, however, exhibited greater impairments in general health and disease-specific subjective outcomes at 6 and 12 months, independent of the postoperative treatment regimen. An essential finding of this study was the observation that the EFM group exhibited superior health-related QoL at 6 months, as measured with the RAND-36. A study has reported that earlier weightbearing resulted in greater health-related QoL at 6 weeks; however, at the 6-month follow-up, this difference no longer existed. In this earlier study, all patients were non-weightbearing for the first 2 weeks and then randomized to weightbearing or not (Suchak et al., 2005). In our study, however, patients in the EFM group were allowed weightbearing from day 1 postoperatively, which may explain the differences in outcomes at 6 months between the 2 studies. Additionally, a study on nonoperatively treated patients with an ATR reported better health-related QoL in patients allowed to bear weight compared with the non-weightbearing group during treatment.

The observed difference at 6 months between the EFM and control groups on the RAND-36 subscales of general health and vitality is suggested to depend mainly on the first 2 postoperative weeks in which patients in the EFM group were weightbearing while the controls were non-weightbearing. These findings seem to reflect that direct weightbearing after an injury has essential effects on patients' more global health conditions. A possible explanation might be that patients have a faster trajectory to recovery with early loading; however, the difference evens out in the long term. The effects of weightbearing on general health and vitality may additionally depend on other factors such as the fear of loading and the number of daily steps taken. Our finding at 6 months of no difference in kinesiophobia between the 2 groups suggests that fear of loading did not affect the difference in outcomes. The number of daily steps taken has been shown to be critical for overall health and is known to be positively correlated with increased loading. Thus, further studies need to assess whether it is the actual amount of loading or the number of steps taken that relates to improved health and vitality.

The difference in subjective outcomes at 6 months may also be related to the varying degree of ankle motion performed in the 2 groups. The EFM group was allowed partial ankle motion within the orthosis from day 1, which was continued for 6 weeks. The control group, however, received a plaster cast for 2 weeks, followed by 4 weeks of immobilization in an ankle-stable orthosis. Movements of the ankle have been speculated to activate the calf muscle and enhance tendon healing. The observation, however, of nonsignificant differences at 6 months on the heel-rise test between the EFM and control groups suggests that the ankle motion produced within the EFM group was too small to further improve calf muscle recovery.

CONCLUSIONS

This study demonstrated that an accelerated postoperative protocol with immediate loading and ankle

FULL TEXTS BOOK

motion resulted in better general health and vitality at 6 months. However, there were no differences between the groups in the recovery of heel-rise function. Future studies should place an additional focus on the means to reduce the risk of DVT to improve patient outcomes after ATR. In conclusion, the Achilles tendon plays an important role in sports performance due to its vital role in ankle stability and allowing athletes to perform explosive activities. While nonoperative management may be sufficient in some non-athletes, multiple studies support operative intervention in elite athletes. Recent studies have shown that operative intervention improves postoperative strength and functional outcomes as well as lowers re-rupture rates compared to nonoperative management with rehabilitation. The current literature supports operative intervention in elite athletes to improve performance and shorten their RTP. However, we acknowledge that surgical intervention does have inherent risks. Ultimately, most if not all athletes with an ATR benefit from surgical repair, but it is crucial to take a critical stepwise algorithmic approach and consider other factors, which may lead towards nonoperative intervention. These factors include age, chronicity of injury, gap of ATR, social factors, medical history, and other factors which are discussed in this review. The RTP rate for athletes that experience an ATR still remains to be 80%, with difficulty in achieving baseline performance until 2 to 3 years after surgery, impacting the overall career of an athlete.

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FULL TEXTS BOOK

OVERVIEW OF RISK FACTORS FOR ACHILLES TENDON RUPTURE

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ABSTRACT
Background: Sports participation has undergone an increase in recent decades. Injury due to sporting activity has also recently risen. The Achilles tendon has been one of the most common sports-related injuries. A 2 in 100,000 individual Achilles's tendon injury rate increased to a 12 in 100,000 individual injury rate in less than 10 years. The injury is typically observed in men in the fourth to fifth decades of life. Male to female injury ratios range from 2:1 to 12:1. Achilles's tendon repair is associated with increased rates of complications and increased initial healthcare cost. However, data are currently lacking on the risk factors for these complications.
Purpose: This study aims to provide a comprehensive overview of the risk factors for Achilles's tendons rupture, with a keen focus on its key trends, for avoidance of degenerative changes to prevent rupture.
Methodology: A systematic review was carried out using PubMed, Cochrane, Scopus and ScienceDirect databases. All types of research studies (Randomized Control Trials - RCTs, Cohort studies, Case-control studies and Cross-sectional studies) that considered ATR, were eligible. The inclusion criteria for eligibility of the studies were to be written in the English language, and to include populations of men and/or women, both athletes, and non-athletes, healthy individuals, and patients.
Conclusions: Rupture typically occurs 2 to 6 cm proximal to the calcaneal insertion. Predisposing factors are grouped into 2 categories: intrinsic and extrinsic risk factors. Avoidance of degenerative changes within the tendon is the primary method to prevent rupture. Regular physical activity as athletes age also promotes tendon hypertrophy, increases nutrient delivery, and reduces collagen fiber fatigue. The role of biomechanical and psychological aspects in the ATR etiology may be of interest in future studies, as we could not extract relative data in our review.
Keywords: Achilles's tendon rupture; predictors; prevention; risk factors.

INTRODUCTION
Achilles tendon rupture (ATR) repair is one of the most common orthopaedic surgeries performed in the United States, however there is a paucity of literature on predisposing risk factors for hospital readmissions. The purpose of this study is to identify risk factors. The Achilles tendon is the largest, strongest, and most commonly injured tendon in the human body (Dams et al., 2019). The incidence of an Achilles tendon rupture (ATR) is increasing and currently stands at 11-37 cases per 100,000 persons per year (Tarazi et al., 2023). Although most ATR repairs are performed in an ambulatory setting, surgical repair of these injuries may result in complications requiring readmission to the hospital. The importance for physicians to identify which patients are at increased risk for post-operative complications can hopefully address unexpected readmissions after ATR repair. While previous studies have postulated that risk factors such as diabetes, hypertension, and drug abuse increase the risk of post-operative complications, the data is limited (Pean et al., 2018; Stavenuiter et al., 2019). The epidemiology and profile of the patients who commonly sustain this injury have been well documented in the literature in the past 15 to 20 years. Typically, these injuries occur most often in middle-aged males engaged in different weekend activities. Patients sustaining this type of injury are described as leading sedentary lives. The term "weekend warriors" portrays individuals being involved in activities that they are unaccustomed to. Reported male/female predominance is anywhere from 2:1 to 12:1 (Inglis & Sculco, 1981), and most injuries occur between the ages of 30 and 50 years. There are no studies that report the presence of a racial predominance for this injury. Most evidence supporting this view is anecdotal, based on observations made in the clinical setting. Mechanism of injury was stratified into basketball-related and non-basketball-related mechanisms. Relative risks were calculated using the method of Katz (Jefferson et al., 1999). Achilles tendon ruptures heal spontaneously, if immobilised; but operated on or not, it takes an annoyingly long time. Moreover, some sequelae usually remain. Research on stimulation of tendon repair is still at the stage of animal experimentation. Tendon repair

FULL TEXTS BOOK

can be described as going through different phases. Often, an inflammatory and a formative phase are described, followed by remodelling (Aspenberg, 2007). Except for the quadriceps tendon, the Achilles tendon is one the strongest in the human body (Uquillas et al., 2015). Despite its ability to withstand four times the force produced by the calf muscles, the Achilles tendon is also vulnerable to rupture (Claessen et al., 2014). Several intrinsic and extrinsic risk factors including local, biomechanical, histological, and genetic factors, as well as medication, can influence Achilles tendon rupture (ATR). However, the true etiology of ATR is not completely known and seems to be multifactorial (Morales et al., 2019). The diagnosis of ATR was based on the presented clinical criteria: a) palpable gap in the tendon; b) positive Thompson test result, (THOMPSON, 1962); and c) clinical signs of rupture (patient unable to raise on their toes or heel). In unclear cases such as regarding the extent and location of rupture, and in all cases of bilateral ATR, ultrasonography was performed to confirm the diagnosis. If doubt persisted in these cases, magnetic resonance imaging was routinely performed after the year 2000. Objective factors specific to repair of an ATR were also examined, with a special focus on differences in the end results of both procedures. Complications were divided into two groups: major and minor (Čretnik & Košir, 2023).

The mechanism for fluoroquinolone induced tendon rupture remains uncertain, but has been linked to changes in collagen fibrils following alterations in the regulation of matric metalloproteinases associated with non-traumatic rupture (Tsai et al, 2011). Although some risk factors for tendon rupture have been identified such as increasing age, male gender, obesity, diabetes, corticosteroid therapy and recreational sports (Spoendlin et al., 2016), a further understanding of risk factors is needed to identify at-risk individuals and minimize unintended harm. (Morales et al., 2019). This study aims to provide a comprehensive overview of the risk factors for Achilles's tendons rupture, with a keen focus on its key trends, for avoidance of degenerative changes to prevent rupture.

METHODOLOGY

Search Methods for Identification of Studies:

A systematic review was carried out using PubMed, Cochrane, Scopus and ScienceDirect databases. All types of research studies (Randomized Control Trials - RCTs, Cohort studies, Case-control studies and Cross-sectional studies) that considered ATR, were eligible. The inclusion criteria for eligibility of the studies were to be written in the English language, and to include populations of men and/or women, both athletes, and non-athletes, healthy individuals, and patients.

DISCUSSION & RESULTS

The data addressing predisposing risk factors for complications after ATR repairs is currently limited. The goal of this study was to explore the patient characteristics that increased the risk of hospital readmission within 30 days of an outpatient ATR and to define the causes for readmission (Tarazi et al., 2023) Race was found to be a predisposing factor for the development of Achilles tendon ruptures. This observation is not reported in the literature. It is currently believed that almost all Achilles tendon ruptures occur in tendons that have clinically silent degenerative tendinopathy." It is possible that both tendon degeneration and failure of muscle overload inhibition play a role in Achilles tendon ruptures and in tendon ruptures in general. Discovery of biochemical differences could lead to a better understanding of the pathology behind Achilles tendon ruptures. A large proportion of the Achilles tendon injuries were related to basketball activities. The game requires forced plantarflexion with frequent jumping and pivoting. Such biomechanical actions are known to be associated with Achilles tendon ruptures regardless of the activity. An association between race and basketball participation, however, cannot be made because the number of exposure hours to basketball activities in the cohort is unknown (Jefferson et al., 1999). Patient-specific characteristics—such as increasing age, greater BMI, female sex, retinacular involvement, and current smoking status—were found to be risk factors for poor outcomes after quadriceps tendon repair. Further studies are needed to identify potentially modifiable risk factors that can be used to set patient expectations and improve outcomes (Coladonato et al., 2024). The risk factors for ATR identified in our study differ from those in the general population. The risk of ATR was higher in women than men. This is in contrast to studies of the general population, which reported a higher risk in men (Suchak et al., 2005; Raikin et al., 2013), or no difference between the sexes (Erickson et al., 2014). ATR incidence was also higher in white patients than black patients. Studies of military personnel have shown a greater risk of ATR in black patients than in those of other

FULL TEXTS BOOK

races (White et al., 2007). Other studies have found an association of ATR with fluoroquinolone use and corticosteroid use (Claessen et al., 2014). The use of fluoroquinolones and corticosteroids in the ESRD population explains, at least in part, the higher incidence of ATR in this population. However, fluoroquinolone use did not seem to be responsible for the higher ATR rates in the waitlisted and transplant patients relative to the non-waitlisted patients (Humbyrd et al., 2018). Based on the results of this systematic review there is moderate evidence that decreased tendon fibril size increases the ATR risk. There is limited evidence for many other factors, some of which are modifiable, such as increased body weight, oral corticosteroid use and quinolone use and living in an urban area, and therefore may be of interest in future studies. Furthermore, these results showed that more high-quality studies are needed for evaluating the determinants influencing the ATR risk (Claessen et al., 2014). Findings revealed an upward trend in SES reporting over the decades studied, but no statistical analysis prevented conclusive statements from being made regarding the significance of this upward trend (Talaski et al., 2024). The prediction of ankle torques and Achilles forces during normal walking (without immobilisation) is inherently less accurate using this approach because the contractions are no longer isometric. Some cam-walkers can be adjusted to manipulate ankle angle thereby affecting the position of immobilisation. This is useful for treating Achilles tendon repairs because immobilisation in plantarflexion will decrease the mechanical stress on the repair (Akizuki et al., 2001).

CONCLUSIONS

Our study confirmed that, as in previous results, higher BMI, smoking, and total cholesterol are risk factors for ATR, Hyperuricemia may contribute to the development of ATR, and adjunctive tests for TC and UA in the blood biochemistry may be helpful in predicting the risk of ATR. This study supports the contention that Achilles tendon ruptures occur more frequently among blacks than among nonblacks. A significant number of these injuries occurred during participation in basketball-related activities. Blacks were at a significantly increased risk of sustaining Achilles ruptures even when controlling for age as a cause of injury. The reason(s) for this increased risk are unknown. Further studies could assess racial microbiological differences in discarded tendons from Achilles tendon repairs, hamstring harvesting for anterior cruciate ligament repair, etc. Achilles tendon repair is associated with a relatively low 30-day complication and 2-year revision surgery rate. Factors associated with postoperative complications include hyperlipidemia, hypertension, female sex, obesity, and diabetes. Factors associated with the need for revision surgery include female sex, hypertension, obesity, and the presence of any postoperative complication. Female sex, diabetes, the presence of any complication, and the need for revision surgery had the largest cost associated with them

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FULL TEXTS BOOK

WRİTİNG COMPETENCE IN DAF (GERMAN AS A FOREIGN LANGUAGE) İNSTRUCTİON IN ALBANIA: A COMPREHENSIVE OVERVİEW

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ABSTRACT
Writing competence holds a pivotal role in the instruction of German as a Foreign Language (DaF). In the Albanian context, there is a significant focus on enhancing the teaching of writing skills in DaF instruction. This involves examining various perspectives to develop a holistic teaching strategy.
Initially, the importance of writing didactics in DaF instruction is highlighted, exploring different approaches to teaching this skill. The focus is on how various didactic models can support the writing process and which phases of writing are particularly crucial.
Additionally, the integration of digital media into writing instruction is discussed. Modern technologies offer innovative opportunities to enrich writing lessons and provide students with new ways to engage in writing.
Another critical aspect is the correction of errors in written work. Effective methods for error correction are presented, providing teachers with tools to sustainably improve students' writing abilities.
This article aims to provide a comprehensive insight into the teaching of writing competence in German language instruction in Albania, contributing significantly to the advancement of writing didactics in DaF instruction. The goal is to equip teachers and students alike with effective strategies to enhance writing competence, thereby increasing overall success in learning the German language.
Keywords: Writing competence, DaF instruction, Albania, writing didactics, digital media, error correction, teaching strategies.

1. Introduction

In the context of didactic shifts within the communicative reform approach, the promotion of writing skills in German as a Foreign Language instruction has also receded into the background. It has often been overlooked that writing fulfills not only documentary but also very elementary communicative functions (cf. Krumm 1993). Writing supports foreign language acquisition in multifaceted ways. It serves as an aid in the fixation and structuring of mental actions and can contribute to problem-solving and gaining insights. Moreover, appropriate training of this skill can also help optimize other skills (speaking, reading, listening) and enable learners to achieve comprehensive communicative competence in the target language (cf. Kast 1999).
In Albanian DaF (German as a Foreign Language) instruction, writing is often neglected in favor of promoting oral skills. This led us to conduct a quantitative survey aimed at providing a more detailed description of the current state of writing promotion and forming a basis for didactic innovations.
In the survey of albanian teachers described in this paper, the following questions were fundamental:
– To what extent is writing taught in German instruction at Albanian schools?
– What position does writing hold compared to other skills?
– What difficulties do teachers perceive in acquiring/teaching writing skills?
– For what purposes is writing used in instruction? (Writing as a goal or a means; communicative vs. documentary function of writing)
– Are German writing conventions and text types taught?

2. Survey design and implementation

The survey was conducted anonymously using an online questionnaire in July 2005. A total of 32 teachers across Albania participated.
The questionnaire contained 20 mostly closed-ended questions aimed at quantifying the results. Five questions focused on the personal variables of the respondents (mother tongue, completed studies, research focus, current position, and duration of employment at an Albanian university). Two questions sought information about the focus of the German courses (elective/mandatory or major subject) and the framework within which they were taught.
Additional questions aimed to determine the position of writing skills relative to other skills (listening, reading, speaking), and the main learning objectives. The survey also explored how teachers perceive

FULL TEXTS BOOK

their own teaching of writing, the conditions under which they teach, and the difficulties faced by their learners.

Moreover, it examined the purpose and methods used for teaching writing, the German writing conventions and text types taught. The final question was qualitative, inviting suggestions and comments about the survey and the topic of promoting writing skills in Albanian DaF instruction.

Responses were given on a five-point scale, with '1' and '5' representing extremes such as 'never' and 'regularly' or 'unimportant' and 'very important'. This allowed respondents to express moderate positions, with '3' acting as a significant midpoint in data analysis. Two questions asked instructors to estimate the importance of each skill and the proportion of time students spent writing in and outside of class.

Of the 32 teachers, 12 had been teaching for over 15 years, 14 for 10 years, and 6 for less than 6 years. Research interests of the albanian colleagues included linguistics, German studies, literature and didactics, cultural studies and second language acquisition, history, sociology, and philosophy.

The Importance of Writing

To determine the importance of writing promotion in comparison to other skills, the teaching objectives of the instructors were first precisely defined, with the results recorded in Tables 1a and 1b in the form of a ranking. Differentiation between beginners and advanced learners was useful here, as it can be expected that the focus of learning objectives changes with the advancing language level of the learners.

Table 1a: Learning Objectives for Beginners

Objective	Teachers
Listening Comprehension	4.5
Oral Expression	4.5
Pronunciation	4.3
Reading Skills	4.3
Grammar Proficiency	3.7
Written Expression	3.7
Cultural Knowledge	3.7
Text Genre Competence	2.6
Knowledge of German Literature	2.4

Table 1b: Learning Objectives for Advanced Students

Objective	Teachers
Oral Expression	4.8
Reading Skills	4.5
Written Expression	4.5
Listening Comprehension	4.5
Grammar Proficiency	4.2
Cultural Knowledge	4.2
Pronunciation	3.8
Text Genre Competence	3.5
Knowledge of German Literature	2.9

When examining the results, it is initially apparent that for both beginners and advanced learners, oral expression and its receptive counterpart, listening comprehension, are at the top. At the beginner level, the first three positions are even occupied by oral skills, while written expression only appears in sixth place.

Undoubtedly, emphasizing oral skills has the advantage of quickly enabling learners to speak. However, albanian learners, in particular, have a need for strong syntactic orientation support to grasp the structural framework of the German language.

FULL TEXTS BOOK

In advanced instruction, however, written expression as well as reading and text type competence receive higher importance. The tendency to emphasize writing more in advanced instruction is also reflected in the weighting of the four skills. Tables 2a and 2b show the percentage of class time that instructors dedicate to each skill.

Table 2a: Distribution of Skills: Beginners

Skill	D (%)
Speaking	35.2
Reading	23.5
Listening	25.3
Writing	19.0

Table 2b: Distribution of Skills: Advanced

Skill	D (%)
Speaking	35.0
Reading	24.1
Listening	25.7
Writing	23.2

Overall, speaking was the most emphasized skill across all levels, followed by reading and listening, with writing receiving the least attention. Some teachers viewed writing as less relevant, especially in early stages, but acknowledged its role in supporting other skills and providing a deeper engagement with the language. Studies have also shown that promoting writing skills supports the development of other skills. The written form helps decode what is heard and promotes oral language production (cf. Müller 1997: 39–43). Reading ability is also trained since reading serves as a control mechanism in writing. Many people can retain what they have learned more easily if they have the opportunity to fix new information in writing (cf. Müller 1989: 35 and Krück 1982: 391).

2.1 Goals of Writing Activities

Although writing is emphasized less compared to other skills, the following tables show that 19% of beginner-level and 23.2% of advanced-level class time is devoted to writing activities. These activities aim to determine whether writing is practiced as a skill itself or used to support other skills like grammar.

Table 3: Goals of Writing Activities

Activity	Teachers
Practicing/Reviewing Grammar Structures	3.5
Practicing/Reviewing Vocabulary/Expressions	3.4
Recording Heard or Read Information	3.0
Writing Text Types (letters, essays, etc.)	3.4
Creative Writing, Writing Games	3.3
Text Revision (correction, rewriting, etc.)	2.6
Practicing/Reviewing Spelling	2.6
Communication (interactive writing tasks)	2.6
Teacher-Student Communication	2.7
Translating from the Foreign Language	2.1
Translating into the Foreign Language	1.6
Keeping Learning Diaries/Class Journals	2.0

FULL TEXTS BOOK

The following section will examine these writing activities in more detail. It is especially important to determine whether writing is practiced as a skill in itself, for example through the creation or revision of texts, or if it serves as an auxiliary skill, i.e., to support other sub-skills such as practicing grammatical structures, etc. Table 3 lists the writing activities provided in the survey in the order mentioned by the respondents.

The first three positions are occupied by activities where writing is mainly used as an auxiliary skill. The next two positions are dedicated to writing as a target skill, but the values here are already below the average value of 3.

- **Creative writing and student motivation**: Teachers encourage creativity and enjoyment in writing, which enhances student motivation.
- **Alternative teaching methods**: Innovative methods, such as letting students write freely and providing individual feedback, are preferred by teachers over traditional error correction.
- **Collaborative writing and error handling**: Methods like group or partner work can reduce fear of errors and improve confidence in writing skills.
- **Communicative writing**: Writing tasks that fulfill real communicative needs, such as emails, are underutilized but can significantly boost learning motivation.
- **Translation exercises**: Less common overall, with Albanian teachers finding them easier to evaluate than free writing.
- **Learning diaries**: Effective even at beginner levels for documenting progress and reinforcing learning, yet not widely adopted.

2.2 Text Types

The survey included a section dedicated to teaching text types and writing conventions. Table 4 provides insights into the extent to which various text types are addressed and whether they are taught by teachers.

Table 4: Text Types Covered

Text Type	Teachers
Personal Letter	74%
Curriculum Vitae	73%
Email	68%
Essay (Experience Reports)	65%
Postcard	65%
Summaries	65%
Advertisements	48%
Greeting Cards	53%
Picture Descriptions	32%
Diary	42%
Short Messages	30%
Invitations	30%
Official Letters	36%
Recipes	31%
Retellings	44%
Argumentative Texts	34%
Poems	28%
Semi-Official Letters	22%

In terms of ranking, text types with a personal connection, such as letters, resumes, emails, and postcards, are very popular and are taught by about three-quarters of the respondents, while factually oriented text types, such as recipes, retellings, or argumentative texts, are only addressed by about half of the respondents. In the middle range, we find text types such as advertisements, greeting cards, and picture descriptions, which are also frequently covered in textbooks. The same applies to the lower-

FULL TEXTS BOOK

ranked short messages and invitations. Diaries and official letters are also in the middle range but are likely reserved for instruction with more advanced students. Lower on the popularity scale are poems, retellings, and argumentative essays, as well as semi-official letters, likely because they require a relatively high language level.

2.3 Strengths and Weaknesses in Student Texts

The satisfaction level of the surveyed teachers with student text productions is relatively low,. Table 5 provides a detailed insight into the specific aspects of learner texts that teachers critique. High scores indicate satisfaction, while low scores indicate areas needing improvement.

Table 5: Evaluation of Student Texts

Aspect	Teachers
Originality	3.5
Spelling	3.3
Grammatical Correctness	3.2
Logic/Clarity	3.0
Thematic Development/Coherence	2.7
Reader Orientation/Engagement	2.6
Textuality/Linking Sentences	2.5
Word Choice/Idiomatic Use	2.5
Sentence Complexity	2.3
Style	2.3

Overall, teachers praise the originality of student texts and rate spelling and grammar relatively high, likely reflecting students' focus on formal accuracy. However, lower scores are given for textuality, sentence complexity, reader orientation, word choice, and style, which require advanced written language skills and nuanced understanding.

2.4 Difficulties in Writing Promotion

The survey also explored in detail the factors that hinder the promotion of writing in the Albanian DaF (German as a Foreign Language) classroom. Table 7 lists these hindering factors in order of their perceived impact according to the respondents.

Table 7: Hindering Factors in Writing Promotion

Factor	Teachers
Time required for writing in class	2.9
Curricular restrictions	2.7
Class sizes	2.9
Time required for correcting student texts	2.7
Lack of suitable teaching methods	2.6
Lack of suitable teaching materials	2.6
Lack of relevance for future (career) life	2.3
Low student motivation	2.2
Lack of writing opportunities	1.7

Key Observations:

-Time required for writing in class:

- Albanian students, who aim for linguistic accuracy, tend to spend a lot of time writing even a few sentences, consulting dictionaries, grammar books, and peers before writing.

- Curricular Restrictions:

FULL TEXTS BOOK

- The lack of a formal curriculum often leads teachers to heavily rely on textbooks without adapting them to specific teaching and learning conditions.

- Lack of Suitable Methods and Materials:

- teachers often create their own teaching materials

- Lack of Writing Opportunities:

- This points to the lack of pedagogical training for Albanian German teachers, who often rely heavily on textbooks that do not provide adequate guidance for teaching writing as a skill.
- The need for specific teaching materials adapted to the Albanian context was highlighted Albanian teachers

2. Summary

The data collected in this survey provide insights into the conditions and challenges of promoting writing skills in the Albanian DaF (German as a Foreign Language) classroom. The survey's broad scope only partially allows for uncovering backgrounds or explaining connections based on the comments. The diverse teaching contexts of the respondents, who teach various target groups with different focuses, made it difficult to make universal statements.

Despite these limitations, some overarching conclusions about the promotion of writing in the Albanian DaF classroom can be drawn. It was confirmed that writing is the least emphasized skill compared to listening, speaking, and reading. Writing is primarily used for practicing or testing grammatical structures and vocabulary knowledge. Activities that focus on writing itself, such as fulfilling communicative needs or keeping learning diaries, receive less attention.

In terms of text creation, the survey revealed that teachers cover a wide range of German text types, though Albanian teachers tend to approach these text types more receptively. The quality of learner texts was praised for their originality and grammatical and orthographic correctness, while weaknesses were noted in stylistic areas, word choice, and idiomatic expressions.

The main factors hindering the promotion of writing skills include the time required for writing in class, the time needed for correcting learner texts, and large class sizes. There is also a reported lack of teaching materials and methods tailored to the Albanian context.

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FULL TEXTS BOOK

PROFESSIONAL DEVELOPMENT NEEDS OF ASSISTANT TEACHERS IN PRE-UNIVERSITY EDUCATION

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ABSTRACT
Recent developments and numerous social, political, and economic issues have continuously influenced our educational system in terms of its content, structure, and services. The educational system has undergone significant reforms as social, economic, and political relations. In response to these changes, educational institutions have created opportunities for all children to be educated according to their characteristics and capacities. A contemporary approach to work content, teaching methodology, environmental adaptation, and the organization and planning of various educational elements has always been essential to ensure the full participation of children with disabilities in the school community. In response to these changes, educational institutions have created opportunities for all children to be educated based on their unique characteristics and capacities. There has been a persistent need for a contemporary approach to work content, teaching methodology, environmental adaptation, and the organization and planning of educational elements. This approach ensures that children with disabilities fully participate in the school community as valuable members.
In recent decades, many effective practices for inclusive education have been developed worldwide. International documents, to which the Republic of Albania adheres, have harmonized and continue to align the policies and fundamental principles of inclusive education. Despite these positive developments, significant challenges remain. This study focuses on two critical questions: What are the difficulties and needs of assistant teachers in teaching students with disabilities (SWD)? What model of support for assistant teachers would be most suitable?
Keywords: Inclusive education, assistant teachers, professional training, students with disabilities (SWD)

Introduction

Albania's Context for Inclusive Education

The history of inclusive education in Albania, though brief, is marked by numerous significant events and processes. While inclusive education is now recognized as both a moral and legal right, and a progressive philosophy, its practical implementation must still navigate the obligations imposed by the prevailing realities of Albanian society.
Ensuring access to education and equal treatment is a foundational principle of the Albanian education system. This principle is embedded in the country's constitution, specifically Articles 18 and 57 of the "Constitution of the Republic of Albania." The entire legal framework is aligned with European legislation on education, which serves as the primary reference for any changes or reforms in the education system.
The Ministry of Education and Sports in Albania has developed a comprehensive Education Strategy for the period 2021-2026. The vision of the Education Strategy is to establish an inclusive education system based on equality and lifelong learning. The aim is to provide quality education to all individuals, contributing to their personal well-being. One of the specific objectives of the strategy is to ensure full inclusion in preschool and compulsory education, as well as increase access to preschool and upper secondary education. This will be achieved by providing appropriate infrastructural conditions and creating friendly school environments.

FULL TEXTS BOOK

Over the last decade, there has been significant progress in adopting a new approach to education, aiming to consolidate policy provisions, legal frameworks, and institutional capacity to facilitate inclusion.

National Legal Framework

- Law no. 8417, dated 21.10.1998, "Constitution of the Republic of Albania," as amended:
Based on the constitution, everyone has the right to education. Compulsory school education, as well as general secondary education in public schools, is free. General secondary education in public institutions is open to all, while secondary vocational education and higher vocational education is conditioned by skills criteria.

- Law no. 18/2017, "On the Rights and Protection of the Child," Article 18, "Right to Education":
Every child has the right to access and attend free and quality education, based on equal opportunities and non-discrimination, in accordance with the child's age and maturity. This right is also guaranteed to children who wish to pursue further education after completing compulsory education

- Law no. 69/2012, "On the Pre-University Education System in the Republic of Albania," as amended:
According to this law, Article 5, the right to education is guaranteed to Albanian and foreign citizens, as well as stateless persons, without discrimination based on gender, race, color, ethnicity, language, sexual orientation, political or religious beliefs, economic or social condition, age, place of residence, disability, or other reasons defined in Albanian legislation.
This law dedicates an entire chapter, chapter XI,"Education of the children with disabilities", ensuring their right to education is upheld and supported.

- Article 63 "Principles for education of children with disabilities"
- Article 64 "Attendance of educational institutions by children with disabilities"
- Article 65 "Organization of the education of children with disabilities".

International Legal framework for children with disability

Albania ratified the **Convention on the Rights of Persons with Disabilities (CRPD**) on February 11, 2013. In September 2016, the Committee on the Rights of Persons with Disabilities (CRPD) adopted and published General Comment No. 4 (2016) on Article 24: "Right to inclusive education." The General Comment provides a clear and detailed definition of inclusive education, and all States Parties are expected to progress in the implementation of Article 24. It clarifies that all children with disabilities must be educated in inclusive environments, and it is the government's responsibility to adapt the education system to accommodate the needs of all students, regardless of abilities and impairments, within inclusive environments.

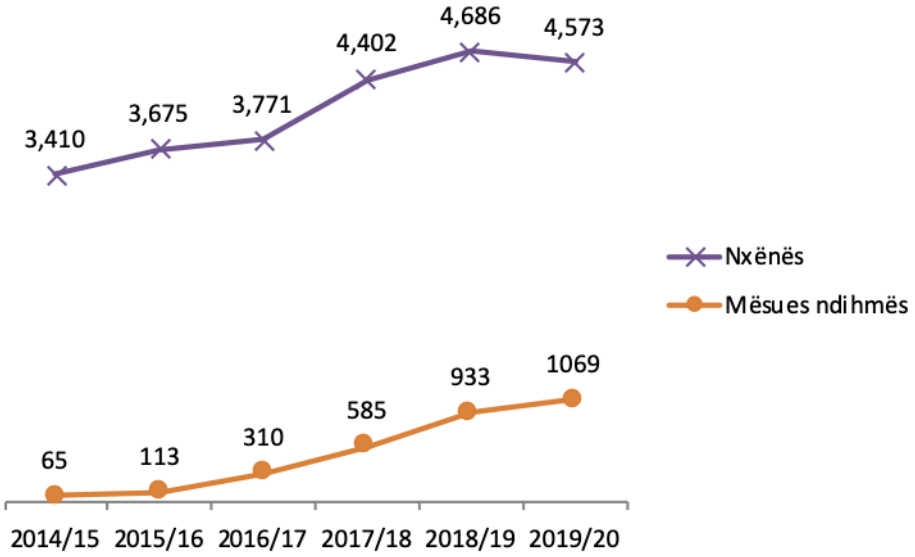
Implementation & Enforcement – Children with disabilities in Albania

While progress has been noted in policies regarding the inclusion of children with disabilities in the public education system, still in Albania there exist a dual system which allows for inclusive mainstream schools and special schools to coexist. The "Law on Pre-University Education" states that Special Schools for children with disabilities should be transformed into Resource Centers and all children with disabilities should be included in mainstream schools. MOES issued Ministerial Order No. 148/2024, which outlines the process for converting special schools into resource centers. The number of children with disabilities attending public educational institutions has steadily increased year after year.

FULL TEXTS BOOK

Even though the Ministry of Education and Sport is committed to providing inclusive education for all children, there are still important foundations that need to be laid to ensure the full participation of children with disabilities in education. Schools still do not meet all-inclusiveness standards in several areas, including infrastructure and physical facilities, curriculum, assessment, and disability accommodations.[7]

MoES in cooperation with Local Offices has taken measures for the creation of development spaces/classes in the mainstreamed schools. Forthe students with hearing impairments, starting from the 2022-2023 school year, ICT in secondary education is offered in Albanian sign language. Albanian sign language was officially recognized by Albanian Government in 2014.Cooperation Agreement between line Ministries and the "Albanian National Association of Deaf Persons" has been signed and is being implemented.



Tab.1 Children with disabilities and assistant teacher in mainstream school, National Strategy of Pre-university Education 2021-2026.

The role of the assistant teacher is one of the innovations introduced by the Normative Provisions. Consequently, a number of important functions have been delegated to the assistant teacher within these provisions.

Starting from the 2014-2015 school year, assistant teachers have been appointed for children with disabilities in mainstream schools. By the 2019-2020 school year, there was a 17% increase in the number of assistant teachers compared to the 2014-2015 school year.

Currently, in public education, an assistant teacher typically works with no more than three students with disabilities. In many cases, an assistant teacher works with just one or two students, marking a significant improvement since 2014.

The role of the assistant teacher is defined as a regulated profession, requiring a Master's degree in Special Pedagogy. In 2016, the Ministry of Education and Sport (MoES) approved the document "Education and Training of Teachers on Inclusion - The Profile of an Inclusive Teacher," which aims to highlight the crucial skills, knowledge, attitudes, and values that every teacher should possess, regardless of their profile or subject area.

In 2019, the MoES approved the Administrative Instruction for Assistant Teachers working with students with special needs in public educational schools at the pre-university level. This document

[7]National Strategy of Pre-University Education 2021-2026.

FULL TEXTS BOOK

outlines the criteria and procedures for selecting assistant teachers, as well as their duties and responsibilities.

During 2019-2020, the Ministry of Education and Sport (MoES) focused on the professional development of assistant teachers for children with disabilities, aiming to establish a support system for their professional skills. Within this framework, 60 professional networks of assistant teachers were established and are now effectively functioning, encompassing all assistant teachers in pre-university education.

In 2023, MoES approved the "Professional Standards of Assistant Teachers in Pre-University Education" and made them available to professional networks and all assistant teachers. Additionally, in 2024, MoES approved a guide for the organization of multidisciplinary commissions to evaluate the needs of students with special needs.

The objective of this study is exploratory, aiming to investigate relatively under-researched issues. It focuses on assistant teachers, examining their roles as professionals, their current experiences, and their professional development needs.

The focus of the study is twofold:

1. **To explore the current professional practice of assistant teachers**:
   - *Identify the specific difficulties and challenges assistant teachers face in their daily work.*
   - *Examine the strategies and methodologies employed by assistant teachers to support students with disabilities.*
2. **To identify the professional development needs of assistant teachers**:
   - *Determine the gaps in their current training and knowledge that hinder their ability to support students with disabilities effectively.*
   - *Investigate the types of professional development opportunities that assistant teachers find most beneficial*.

By addressing these areas, the study aims to provide comprehensive insights into the professional experiences of assistant teachers and offer recommendations for enhancing their effectiveness and satisfaction in their roles.

Research Participants

The survey sample consists of teachers (n = 67) who work with children with various disabilities. The study sample includes assistant teachers (N = 67) from primary, secondary, and high school education from Elbasan city.

The quantitative component involved administering a structured questionnaire to assistant teachers. Most of the questionnaire (a total of 11 questions) utilized a Likert scale ranging from 1 to 5, where 1 = "not at all" and 5 = "very much." The questionnaires were completed by the assistant teachers between April and June 2024. The collected quantitative data were entered into a computer and analyzed using the statistical software SPSS version 20.0. The assistant teachers were informed about the study's objectives, the reporting of results, and the voluntary nature of participation. Personal data were kept confidential to ensure privacy.

FULL TEXTS BOOK

Research Question:

- What are the challenges faced by assistant teachers in their current professional practice?

Table 2. Difficulties Faced by Assistant Teachers with Students with Disabilities (SWD)

Categories of Difficulties	N	%	Illustrations
Lack of teaching and didactic materials	28	42.4	*Lack of didactic materials in school for effective work implementation*
Establishing collaboration with parents, teachers, and other students	18	27.2	*Limited parental cooperation* *Psychological abuse from parents* *Broader cooperation with some teachers, specialists, and collaboration with parents and students*
Working with students with disabilities	18	27.2	*Difficulties in socialization, speech problems, language development, and increasing concentration* *Since these students are part of a class, you need to be careful with the tone of voice used without disturbing the rest of the class*
Lack of information and training about disorders	13	19.6	*Lack of information about diseases and disorders, on how to behave and how to help*
Transportation for students with disabilities	3	4	
Lack of a speech therapist	1	1	

Among the difficulties faced by assistant teachers were: a) the lack of didactic materials (42.4% reported difficulties due to the absence of materials for effective teaching), and b) establishing collaboration with parents, teachers, and students.

Research Question: What are the professional development needs of assistant teachers?

The questionnaire reveals the nature of the professional development needs of assistant teachers through Section III, which contains six statements to be completed by the study participants and then evaluated on a Likert scale from 1 to 5, where 1 = not very necessary and 5 = very necessary. Section II of the questionnaire includes a designated blank space where assistant teachers, as study participants, can freely express their thoughts in a limited text format. Section II of the questionnaire includes questions on: a) training received during the past year, b) training agencies, c) topics of the training received, d) coverage of training costs, and e) the evaluation by assistant teachers of the contribution of the training to their work.

FULL TEXTS BOOK

Ranking of professional development needs of assistant teachersworking with children with disabilities

Table2. Ranking of professional development needs of assistant teachers

Rankings	Needs for the professional development
5	Individualized Education Program (IEP) development Collaboration with parents, the psychologist, and other professionals Identifying the student's needs Managing undesirable behaviors
4	Daily plan for students with disabilities Teaching methods for students with disabilities Preparation and management of the lesson Development and improvement of language and communication skills
3	Autism Hyperactivity
2	Use of the digital textbook
1	Evaluation by the multidisciplinary committee and of children with disabilities

The qualitative analysis of the text comments revealed the following categories of comments:

A) Need for Training
Assistant teachers largely report a need for training. For example, one assistant teacher states, "*Training for assistant teachers should be continuous for students with disabilities, provided by specific agencies to enhance our work experience as assistant teachers in schools*."

B) Presence of a Speech Therapist in School
For example, one teacher said, "*One of the main problems in school is the lack of a speech therapist. All these students have speech issues and need help with language and communication*."

C) Material Resources and Space in School for Working with Children with Disabilities
For example, didactic materials etc.
A detailed Study report of the needs for the professional development of assistant teachers has preceded the preparation of a professional development curriculum.

The most important needs emphasized by the assistant teachers are detailed below:

- Designing Individual Educational Plans (IEPs) for children with disabilities

FULL TEXTS BOOK

- Cooperating with parents of children with disabilities
- Managing the emotions and reactions of children with disabilities
- Implementing effective teaching methods for working with children with disabilities
- Understanding and supporting children with autism
- Utilizing digital books in teaching
- Understanding the evaluation process conducted by multidisciplinary commissions

Conclusions

Assistant teachers are present in pre-university educational institutions in both urban and rural areas. They are engaged in all educational institutions, regardless of the number of students or their location. The majority of assistant teachers support 1-2 children with disabilities, while about 25% work with more than three children with disabilities.

Nearly 50% of assistant teachers are new to this position, with up to three years of experience. Almost all assistant teachers work in compulsory education, and nearly all are female. Assistant teachers in the pre-university education system actively seek professional development opportunities. The most frequent forms of training are professional network meetings and exchanges with other teachers from the same school. They also show interest in and have attempted to attend accredited training offered by agencies accredited by the Ministry of Education, Sports, and Youth (MASR).

Assistant teachers view collaboration with classroom teachers as particularly important in designing Individualized Education Programs (IEPs) and assessing students' achievements across developmental areas. Additionally, they consider collaboration with the parents of children with disabilities to be a crucial factor in promoting the child's development and progress.

However, assistant teachers have had insufficient opportunities to collaborate with other specialized partners, such as social service centers, within their communities. This lack of collaboration has limited their ability to benefit professionally from the expertise of specialists working in these centers.

The need for training and professional development for assistant teachers is very high. They emphasize the importance of several topics, including methods and strategies for classroom support of children with disabilities, collaboration with other professionals to support children with special needs, necessary documentation maintained by assistant teachers, effective design of Individualized Education Programs (IEPs), and understanding the key characteristics and manifestation forms of different types of disabilities.

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FULL TEXTS BOOK

WOMEN MANAGERS OVER 50 IN BULGARIA – CAREER DEVELOPMENT AND DİSCRIMINATION

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ABSTRACT
The focus of this analysis is on women managers over 50 years old in Bulgaria. The article highlights the barriers related to career development of women, the stereotypes associated with age, and gender inequality among the group of working managers and entrepreneurs over 50 years old in Sofia. The research reveals practices of discrimination and exclusion based on age, education, and gender. The study analyzes strategies of exclusion based on age and digital skills of women managers over 50 years old.
Through the lens of the intersectional approach and with the help of qualitative methods – a focus group discussion conducted with men and women holding managerial positions over 50 years old in Sofia – discriminatory practices, career development patterns, and exclusion among women managers over 50 years old in Bulgaria are analyzed.
In conclusion, public policies and practices regarding the group of women over 50 in relation to age discrimination and digitalization are discussed.
Keywords: discrimination, age, intersectional approach, gender, inequalities, career development.

Introductions:
Overall, research in recent years shows that women continue to be underrepresented in executive and managerial positions within the European Union. According to Eurostat[8] data for the third quarter of 2020, out of 9.5 million people holding managerial positions, 6.2 million are men and 3.3 million are women. Eurostat data reveals that women make up nearly half of all employed individuals in the European Union—46%—yet only 35% of those in managerial positions are women.
The highest percentage of women in managerial positions is observed in Latvia at 45%, followed by Poland with 44%, and Bulgaria, Hungary, Slovenia, and Sweden—all with 42%. The lowest percentages of women managers are found in the Netherlands at 26% and Cyprus at 27%.
According to studies, the general profile of female managers tends to be younger, more educated, and less likely to be married compared to their male counterparts in managerial positions.[9] Women often face greater challenges regarding pay and career advancement compared to men. In the U.S., in 2021, 42% of managers are women, but they continue to be underrepresented compared to men and earn significantly less[10]. According to studies, there is a particularly low representation of female managers from ethnic minorities or diverse identities.
According to McKinsey (2023), a flexible working environment has significant benefits for women. They value and prefer hybrid and remote work as it helps them achieve a better work-life balance,

[8] https://ec.europa.eu/eurostat/web/products-eurostat-news/-/edn-20210305-2
[9] https://www.gao.gov/products/gao-22-105796
[10] https://www.gao.gov/products/gao-22-105796

especially for women who are caregivers. For instance, 38% of mothers with children indicate that without flexibility, they would either leave their jobs or reduce their working hours (McKinsey, 2023).
The group of female managers in Bulgaria is under-researched. Studies focusing on discrimination and career development of women in Bulgaria represent a very small portion of all research on discrimination. This article analyzes female managers over the age of 50 in Bulgaria. A review of the results on this topic shows that women over 50 in Bulgaria often face both gender and age discrimination.[11] This manifests as limited or non-existent career development opportunities, lower pay, and a reduced likelihood of being appointed to high-level executive positions. According to the data, women over 50 are perceived as less flexible and less adaptable to new work models and technologies. Due to these prejudices and stereotypes, they are marginalized in the workplace and face severely restricted career development opportunities.
This article aims to highlight the barriers related to the career development of women over the age of 50 in Bulgaria. To achieve this, in-depth interviews and group discussions were conducted and analyzed. Using an intersectional approach and qualitative methods, the study reveals the age-related stereotypes faced by women and brings to light gender inequality among managers and entrepreneurs over 50 in Bulgaria. It uncovers practices of discrimination and exclusion based on age, gender, and education. The study also analyzes exclusion strategies based on age, gender, and digital skills among women managers over 50 in Bulgaria.
The article seeks to answer three main questions. First, what are the barriers to career development and growth for women over the age of 50 in Bulgaria? Second, how does exclusion and discrimination occur for this target group? And third, what are the public policies and strategies to address the marginalization of female managers over 50 in Bulgaria in relation to age and gender discrimination?

Theoretical Model

According to researchers who thoroughly study the topic of inequalities and stratification, the intersectional approach is the most suitable for research on women (McCall, 2005; Stoilova, 2021) because women are a multi-layered and complex subject of study, encompassing various dimensions of inequality such as gender, ethnicity, age, and others. The intersectional approach is applicable to different situations (in the workplace, life circumstances, etc.) and diverse areas of social life (Stoilova, 2021).
The intersectional approach is a powerful analytical tool that enables a better and more in-depth understanding of the complexity of social phenomena and inequalities in society. This approach is used to explore and understand the relationship and interactions between social context, social inequalities, and identity (McCall, 2005).
This is an analytical framework that examines how different categories of social stratification (such as gender, race, ethnicity, age, education, and others) are interrelated, interact, and intersect to create complex patterns of privilege and oppression (McCall, 2005). This approach is crucial for understanding inequalities in society as well as the complexity of social identity. The intersectional approach is well-suited for analyzing exclusion and discrimination because there are multiple axes of identity—such as gender, race, ethnic affiliation, and others—that interact in complex ways and intersect.
The concept allows for the understanding and study of the relationships related to inequalities and different social categories—such as class, gender, ethnicity, and others (McCall, 2005). The complexity of the intersectional approach enables the examination of factors that simultaneously operate to explain

[11] https://www.cambridge.org/core/journals/social-policy-and-society/article/abs/womens-experiences-and-perceptions-of-age-discrimination-in-employment-implications-for-research-and-policy/0ED5DACFF6F551760305200C7F9AACD6

FULL TEXTS BOOK

various situations where inequality and discrimination are observed (Hancock, 2007). The strength of the approach lies in that it does not assume any particular social category as privileged over another but allows for the measurement of the impact of multiple categories (age, gender, class) in their interconnection. Each category is important on its own, but when combined, their influence becomes more pronounced and complex, allowing for the exploration of the multifaceted nature of the issue.
In this case, the combination of gender and age factors leads to a situation of exclusion (from work processes or the labor market), limited or no career opportunities, and discrimination for women in managerial positions over 50 years old in Bulgaria.

Discrimination

Discrimination and intersectionality are closely related concepts in research on social inequalities. Intersectionality provides a framework for understanding how different forms of discrimination intersect. Kimberlé Crenshaw emphasizes that discrimination is not experienced along a single axis but as an intersection of various forms of oppression (Crenshaw, K., 1991). Forms of discrimination are not separate or isolated but are interconnected and overlap. The role and impact of different forms of inequality vary depending on the context (McCall, 2005). In the study of discrimination and inequality in the workplace, several types of discrimination are distinguished—direct, indirect, and institutional (Merton, 1996).

Direct Discrimination – An overt and explicit attitude of marginalization and denial based on various forms of identity—such as gender, age, and others.

Indirect Discrimination – A situation where seemingly neutral rules, policies, or practices place certain groups at a disadvantage compared to others.

Institutional Discrimination – Inequalities embedded within the structures of society and systems that lead to unequal access to opportunities and resources for a particular group compared to another group. Intersectionality examines how different forms of discrimination are related, interwoven, interact, and create specific situations of privilege or oppression for some individuals compared to others. The concept of intersectionality includes multiple axes of identity, meaning that individuals can be discriminated against based on more than one factor simultaneously (Crenshaw, K., 1991). It is important to note that different forms of discrimination do not operate in isolation but are interconnected—they intersect, reinforce each other, and influence one another.

Age

Intersectionality and age are often analyzed together to understand how age interacts with other social categories (such as ethnicity, gender, sexuality, and others). Life events (such as entering the labor market or retirement) interact with social categories (gender, race, class, etc.), resulting in situations where some individuals are in a more privileged position compared to others.
Age is viewed not only as a biological factor but also as a socially constructed category. Social expectations and perceptions of age are often multi-layered and are connected with other social categories and phenomena (Cruikshank, M., 2013). For women, multiple discrimination is common—older individuals can be discriminated against not only because of their age but also due to other aspects of their identity, such as gender, sexuality, ethnicity, and more.

Gender

Gender and intersectionality theories examine how gender interacts with other social categories (such as age, race, ethnicity) to create complex forms of inequality and discrimination (Crenshaw, K., 1991). Gender is often one of the primary axes of discrimination and has a significant influence on situations and processes in the social world.

FULL TEXTS BOOK

Social and sociological problem

The social issue addressed by the article is discriminatory practices against women managers in the workplace, while the sociological problem is how practices of exclusion for female managers become possible.

Data and method

The analysis focuses on gender, age, and digital inequalities among women managers over 50 years old and their role in the accumulation and perpetuation of existing social inequalities. The analysis is based on qualitative data from a group discussion held in March 2023 with male and female managers over 50 in Sofia, regarding the role of digitalization in overcoming marginalization in society, and 10 semi-structured interviews on the topic (5 with female managers and 5 with male managers). In conclusion, public policies and practices concerning women managers over 50 in relation to age and gender discrimination are discussed.

Results analysis

The results of the study show that there is multiple discrimination against women managers over 50 years old. Their exclusion (either from the labor market or, if employed, from important tasks and responsibilities at work) is observed based on a combination of social categories such as age, gender, and education. In almost all examined cases, more than two categories act together, and their interaction leads to women managers over 50 in Bulgaria not being preferred for employment, having almost no career development, and being excluded from corporate educational initiatives.

Age discrimination

According to the results of the study, age proves to be one of the main barriers to career development for women managers over 50 in Bulgaria. Age has a dual role for women managers. On one hand, when seeking employment, women with managerial experience applying for managerial positions are perceived as overqualified and likely to demand higher salaries compared to younger women with similar experience.

"Regarding work in Bulgaria, I believe there is an issue for people over 50... These people have good digital literacy, know languages, and I think employers are afraid of older people because they know they will demand higher salaries. When I have applied for positions, I have been rejected with the argument that I am overqualified..."

(woman, 53, higher education, marketing manager in a bank)

On the other hand, age is perceived as an inability and unsuitability for learning, acquiring new skills, and practices, with a preference for younger employees who can more easily and quickly acquire new skills or knowledge.

"At all training sessions and seminars for various digital and educational courses, they send employees with lower positions than mine with all sorts of explanations. I feel discriminated against because of my age, with the most likely argument being that supposedly younger people learn and absorb faster..."

(woman, 56, higher education, senior manager in the marketing department of a mobile operator)

Age-related stereotypes are a major reason why women managers do not have career development opportunities after the age of 50. They are perceived either as overqualified and having financial and social demands that the employer cannot meet, or as being unable, due to their age, to handle new educational or digital challenges. In this case, both the positive and negative age-based stereotypes are obstacles to career advancement for women managers.

There is a social construction of age—the social attitudes towards age for women over 50 contribute to the formation of discriminatory practices. The combination of gender and age in women managers shows how the interaction of these categories leads to the creation of unequal opportunities for women,

placing them in a disadvantaged and unprivileged work situation compared to younger women and male managers.

In comparison, the stereotypes about male managers over 50 regarding their career development are positive and are associated with developing and advancing their careers, unlike those for women. Age in men is associated with greater experience and knowledge, regardless of the years. For men, the combination of gender and age works to develop their careers and skills, whereas for women, it is the opposite—their careers are either stagnant or there is a decline in their positions

"Male managers—the more they work, the better. Their experience is valued and they can demand higher pay. It doesn't matter how old they are—age doesn't apply to them. If they work and have proven themselves, there is no way they will be denied a promotion, unlike women. There is always an argument to refuse a woman—either their knowledge is outdated, or they lack soft skills—there is always something..."

(woman, 56, higher education, senior manager in the marketing department of a mobile operator)

"I am a marketing manager at an IT company. We work for Switzerland. You constantly need to learn. This is a field that evolves very quickly, and you need to keep up with the new developments. As long as you develop, you understand your work, and positions and pay will follow soon. It doesn't matter how old you are..."

(man, 54, higher education, marketing manager in an IT company for the external market)

Age is perceived as a positive attribute for men but a negative one for women. Based on these stereotypes, which operate independently, an attitude is formed towards women that places them within the framework of not having the ability to handle educational or managerial challenges in the workplace.

Educational discrimination

The study records educational exclusion of women managers over 50, primarily related to their non-inclusion in current or future educational courses and training initiatives within the company

"I wanted to enroll in training for working with new software that we use. I was refused with the argument that the training is funded by the company and there are already selected people to attend, even though my future work involves using that software..."

(woman, 52, higher education, manager in the sales department of a foreign company)

According to the results of the study, men managers over 50 are not denied training and have the freedom to enroll in and participate in training programs, provided they are willing to do so.

"Yes, there are trainings in the company for all sorts of things. Anyone who shows interest can enroll and complete them..."

(man, 58, higher education, manager at a logistics company)

"If someone needs training, they talk to the boss, and he sends them. For example, I wanted to attend training for media studies—I asked, and they sent me."

(man, 53, higher education, manager at a media agency)

The study identifies strategies for exclusion based on age and digital skills among women managers over 50 years old.

"Here, computer literacy is taken for granted. The issue is that they are looking for super-computer literacy..."

(man, 54, higher education, marketing manager at an IT company for the external market)

"The Office suite is clear. They are looking for more than that. High Excel proficiency is good, and it's preferable if you have basic programming language skills. When I applied for a managerial position a while ago, they required initial levels of programming languages. I hadn't taken any courses, so I wasn't hired..."

(woman, 57, higher education, marketing manager at a PR agency)

FULL TEXTS BOOK

"I dare say that I have a decent level of computer literacy. I'm not a programmer. I manage. If there's something I struggle with, I ask a colleague for help. If it's something more serious, the colleagues who understand more are available..."
(woman, 53, higher education, marketing manager at a bank)

Stereotypes regarding women's digital skills are associated with the belief that their digital competencies are weaker compared to those of men. In contemporary society, men are perceived as more knowledgeable and capable when it comes to positions that require higher levels of computer skills.

"I applied to an IT company a while ago. They didn't know what my computer skills were and told me they were looking for someone with high-level computer technology expertise. They didn't administer any tests or find out what I could do or know, but they never got back to me afterward…"
(woman, 57 years old, higher education, marketing manager at a PR agency)

According to the research results, there is discrimination against women managers over the age of 50 when applying for jobs concerning their presumed digital skills. Stereotypes about women's digital skills are linked to the belief that women learn more slowly and are less adaptable. Discrimination against women managers regarding computer and digital skills is based on a combination of gender and age traits. This clearly illustrates the application of the intersectional approach, where the interaction of digital skills, gender, and age contributes to the exclusion of women managers over 50 during job applications and problem-solving in the workplace. Women find themselves in an unfavorable position compared to men, with gender having a particularly strong influence on exclusion and marginalization in the context of digital skills.

Gender discrimination

Discrimination based on gender for women over 50 in the workplace (such as in job interviews, work tasks, and participation in educational initiatives) is highly pronounced. According to their accounts, a primary reason for this exclusion is the societal stereotypes that persist about women over 50, which significantly contribute to their marginalization in the professional sphere. The respondents describe various work situations where they feel disadvantaged compared to men and discuss the limited career opportunities available to them after the age of 50.

"Our company participates in 'Webit' every year. From our entire department, only men in managerial positions present at this forum. No woman has been selected to go, even though there are many women managers in our company who have valuable insights to share..."
(woman, 57 years old, higher education, marketing manager at a PR agency)

"We have an annual 'Employee of the Year' contest. The Employee of the Year receives a bonus and one month's salary. Since I've been with the company, only men from the department have been awarded 'Employee of the Year.'"
(woman, 53 years old, higher education, marketing manager at a bank)

The results of the study show that women managers over 50 perceive discrimination in the workplace due to their gender and age, particularly regarding the assignment of important tasks, receiving company awards, distinctions, and participation in prestigious events. According to their accounts, women over 50 most often retain their managerial positions but lack opportunities for further advancement within the company.

„I have been in the same position at the company for 13 years. My position is managerial, but I haven't had a promotion in over 10 years…"
(Woman, 52 years old, higher education, manager in the sales department of a foreign company)

There are also cases where women report that they have been demoted in their careers.

"From the position of 'Campaign Manager,' I was demoted to 'Senior Specialist' with the explanation that the budget was being optimized and the options were either to lay me off or accept the lower position..."

(woman, 57 years old, higher education, manager in the marketing department of a mobile operator)
The research also identifies discrimination concerning pay based on gender. Respondents report that, despite having equal education and experience, women receive lower salaries compared to men, and they attribute this discrepancy to gender discrimination.

"I know that in my company, women receive lower salaries compared to men. A man and a woman with the same education and experience— the woman has the lower salary, and it's not a small difference..." (woman, 53 years old, higher education, marketing manager at a bank)
Gender discrimination is strongly pronounced, manifesting as lower salaries, career demotions, assignment of more elementary tasks compared to men, and exclusion from educational courses. As a result, women find themselves in a disadvantaged position compared to men in the workplace, with little to no career development after the age of 50. Women over 50 are perceived as more difficult to train and less motivated for career advancement compared to their younger colleagues.

Public policies
Public policies aimed at women managers over 50 in Bulgaria are focused on creating supportive career development programs. These are specialized programs that offer training and counseling to effectively utilize and direct the skills of women over 50. Some companies provide flexible working conditions for women managers over 50, such as reduced working hours, the possibility to work from home, and flexible working hours.
An important step against age and gender discrimination for women over 50 is the adoption of laws and regulations that protect women in the workplace. Regulation through legislation and the introduction of quotas or guidelines for a minimum number of women managers over 50 in company management will reduce age discrimination among women and provide them with job security. Creating programs that offer assistance for children or elderly family members would enable a better work-life balance and support the career development of women over 50.
Financial incentives for companies could also help reduce age discrimination by providing financial or tax relief for companies that hire women managers over 50. Some banks in Bulgaria offer startup loans for women entrepreneurs over 50, providing flexible financing models tailored to their individual situations.
Mentorship programs are also a crucial step in supporting women managers professionally. Establishing connections between women managers and younger professionals, where they can share knowledge and experience, as well as receive feedback, would significantly aid in their professional development. This approach not only empowers experienced women managers but also fosters a culture of continuous learning and mutual support within the workplace.
By implementing public policies, companies and the government can reduce age and gender discrimination against women and create an inclusive and supportive work environment for women managers over 50 in Bulgaria. This would contribute to improved economic performance, benefiting both businesses and society.

Conclusion
The present study aimed to identify the barriers to career development for women over 50 in Bulgaria and to examine the potential discrimination faced by this target group.
The results reveal a combination of age and gender discrimination affecting many women managers over 50 in Bulgaria. Discrimination arises based on entrenched stereotypes regarding age and gender. These stereotypes are largely negative, depicting women as difficult and slow learners, struggling to keep up with new technologies and digitalization, which constitutes one of the primary barriers to their career advancement.

FULL TEXTS BOOK

The study indicates that male managers benefit from positive stereotypes based on gender and age, which facilitate their career development and higher salaries. Men are perceived as more experienced, knowledgeable, and quick learners, and are assigned more responsible and significant tasks. They represent the company in prestigious events and forums, whereas women's roles are more peripheral. Negative stereotypes place women managers over 50 at a disadvantage compared to men, relegating them to lower hierarchical positions and offering lower compensation for their work. The combination of gender and age categories strongly influences the multiple discrimination faced by women in the workplace.

In conclusion, the study demonstrates the complex interaction of social categories such as gender, age, and education, and how the intersection of these categories results in situations of discrimination and exclusion for women managers. It also shows the impact of social categories on career development for both men and women over 50. The question remains as to how to overcome discriminatory attitudes and how public policies can be applied to address exclusion and marginalization of women, which will be explored in future research.

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FULL TEXTS BOOK

BODY MASS INDEX AND LEVELS OF IRISIN IN SERUM AND URINE OF TURKISH MALE PATIENTS WITH ANDROGENETIC ALOPECIA : PRELIMINARY STUDY

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ABSTRACT

Objective: Male pattern androgenetic alopecia (MPAGA) is characterized by progressive hair loss from the scalp. Irisin is a myokine–like hormone which is first discovered as a potential mediator of obesity related energy homeostasis. Recent researches indicated that there is associated between irisin levels and abnormal metabolic conditions such as obesity and may possibility link to MPAGA. The aim of this study was to evaluate the levels of irisin in serum and urine samples of Turkish males with MPAGA and to compare with healthy controls.

Material and methods: 150 males (ranges of age 25-60 years; disease duration 5-10 years) with MPAGA and 130 males (ranges of age 27-63 years) without AGA as controls were involved in this study. Irisin levels in serum and urine samples were measured a commercial kit by ELISA.

Results: Levels of Irisin in serum were decreased significantly in the patients compared to control ($p<0.05$). However, irisin levels in urine were not different between patients and controls ($p>0.05$). Body mass index (BMI) of patients were higher than control group. In addition, while the serum irisin level was found to be significantly lower in those with a BMI of 25 and above ($p<0.05$), a slight decrease was detected in urine samples, but it was not statistically significant ($p>0.05$). BMI was negatively correlated with serum irisin levels
($r =-0,697$, $p<0.05$).

Conclusion: We thought that decreased irisin levels in serum may play a role in the etiology of MPAGA. Furthermore, obesity by making changes in the balance of the irisin in serum and urine may play a role in MPAGA. Therefore, assessing the levels of irisin in serum of MPAGA patients may be more valuable compared to urine for treatment planning.

Key words: MPAGA, Irisin, Serum, Urine

Introduction

Androgenetic alopecia (AGA) is the most common type of progressive hair loss. AGA is a polygenetic condition and accordingly, the severity of hair loss, age of onset and location of involvement vary (1). It is known that AGA has a polygenetic feature, but its pathophysiology and genetics are not fully understood. Studies have shown that AGA is associated with dysregulation in the expression of inflammatory cytokines, with AGA being closely related to androgen metabolism, and chronic microinflammation, which is slow and often asymptomatic, is an aggravating factor (2,3). The pathophysiology of AGA is explained as the exaggerated response of hair follicle cells to androgens triggered by scalp inflammation and external factors in people with genetic predisposition (4, 5).

Obesity is one of today's most important public health problems that affects the whole world. Obesity is defined as an increase in fat mass that impairs health; Its pathogenesis is a metabolic process that is too complex to be reduced to an increase in the amount of fat (6). The development of obesity is not only due to a quantitative increase in body mass, but is characterized by metabolic dysfunctions of muscle, liver and fat tissue, which are the 3 basic tissues that regulate energy metabolism (7).

Irisin is a myokine–like hormone which is first discovered as a potential mediator of obesity related energy homeostasis (8). Recent researches indicated that there is associated between irisin levels and abnormal metabolic conditions such as obesity and may possibility link to Male pattern androgenetic

FULL TEXTS BOOK

alopecia. The aim of this study was to evaluate the levels of irisin in serum and urine samples of Turkish males with male pattern androgenetic alopecia (MPAGA) and to compare with healthy controls. Furthermore, we aimed to investigate the relationship between BMI and irisin levels in MPAGA.

Materials and Methods

The study was approved by the local ethical committee of KSU Medical Faculty, Kahramanmaras, Turkey. Prior to the initiation of the study, each patient was informed about the aims of the study and signed an informed consent. In this study, the subjects were as randomly selected. The data collection of the study has been done at 15 months from February 2023 to April 2024.

Measurements of Body Mass Index (BMI)

BMI measurements were made by the same researcher to reduce the error rate. By removing the jacket, excess clothing and shoes; Their heights were measured with a wall-mounted height meter, and their weights were measured with a standard scale. BMI was calculated with the formula weight (kg)/height squared (m^2).

Classification of AGA

The diagnosis of AGA is based on the following considerations: progression of hair loss, family history of thinning and visual confirmation of a receding frontal hairline, and the presence of thin and short hairs in the frontal area and vertex. The diagnosis was confirmed by video dermatoscope. Assessment of the degree of hair loss was performed by a dermatologist. To classify the degree of AGA for each subject, the Norwood classification system, a standard classification scheme shown to have good test–retest reliability was used (9). The reliability and validity of hair status were assessed by a dermatologist. In addition to classifying the types of AGA, we collected information on possible risk factors by face-to-face questionnaire interviews. Subjects who had undergone significant physiologic stress (surgical trauma, high fever, and hemorrhage) prior to commencement of alopecia or had had history of or received treatment for medical conditions such as thyroid diseases, hepatic failure, chronic renal failure, inflammatory bowel disease, psoriasis, seborrheic dermatitis, and allergic contact dermatitis were excluded from the study. Other factors capable of inducing alopecia such as nutritional factors, e.g. starvation, malnutrition, malabsorption) as well as exposure to medication with the potential of causing alopecia (e.g. angiotensin converting enzyme inhibitors, anticonvulsants, antidepressants, and the anticoagulants such as heparin and warfarin) or altering trace element levels (e.g. mineral supplementations) were considered and affected subjects were excluded from the study. The subjects were not under a therapeutic shampoo (ketokonazol, zinc and selenium) for the past three months. The individuals who were used to smoking and taking alcohol were not included in this study. The people that a chemical process (such as dyes and perms) was applied to his hair in the last 3 months were excluded from the study. The following routine laboratory tests (complete blood count, liver enzymes, thyroid stimulating hormone, fasting glucose, ferritine, vitamin B_{12}, folic acid and antinuclear antibody) were performed. The patients with abnormal laboratory findings were excluded. Blood levels of testosterone and DHEA-SO_4 both in patient and control groups were in the limits of hospital reference values. The control group was healthy male volunteers without AGA. They were exposed to the same procedures with the patients. Both patient and control groups had used only baby shampoo for the last three weeks. One hundred seventy-two MPAGA and 130 healthy individuals were enrolled in this study. Patients were classified according to Norwood–Hamilton scale. Seborrheic dermatitis (9 patients), pitriasis capitis simplex (2 patient) and psoriasis (2 patients), a total of 15 patients were excluded. The people who had used cortisone, muscle building drugs, vitamins and minerals (3 patients) and those with asymptomatic infection (4 patients) in the last 3 months were excluded. 150 MPAGA and 130 healthy controls completed this study.

FULL TEXTS BOOK

Determination of irisin in serum and urine samples

Fasting venous blood samples (10 mL) from patients and healthy control individuals were drawn into tubes without anticoagulant. Samples were centrifuged (Hettich MICRO 220R) at 3000 g for 10 min at 4 ◦C. Serum was separated from clotted blood and serum samples were stored in acid-washed tubes at −20 ◦C until analyses (10).

The urine samples of subjects were collected into 75-mL sterile containers (Kayline Plastics, The Barton, South Australia, 5031). At the start of our study, all urine samples were diluted with 1:50 serum physiologic (0.9% NaCI) for irisin analysis (11).

Irisin levels in serum and urine samples were measured a commercial kit (catalog number:MBS706887, Mybiosource, USA) by ELISA. This assay has high sensitivity and excellent specificity for detection of human irisin. No significant cross-reactivity or interference between human irisin and analogues was observed.

Statistical Analysis

SPSS 22.0 (SPSS Inc., IL, USA) was used for all statistical analyses. One-sample Kolmogorov–Smirnov test was used to analyze the distribution of continuous variables. Results were expressed as mean ± standard deviations. Chi-square test was used for categorical variables and independentsample t test was used for analysis of parametric numerical data. Pearson corelation analysis was used between BMI and irisin levels. A two-tailed p <0.05 was accepted as statistically significant.

Results

As shown in Table 1, 150 men were enrolled with a mean age of 32.82 years. In MPAGA (n = 150), men with severe alopecia had higher BMI than those with mild to moderate alopecia . After multivariate adjustments, the risk for severe alopecia was higher in the overweight or obese (BMI>24 kg/m^2) subjects with MPAGA (odds ratio 3.41, P<0.01). In early-onset MPAGA (n = 54), the risk for having severe alopecia was also higher in the overweight or obese subjects (odds ratio 4.85, p<0.05).

Table 1. Sociodemographic values of patients and control groups.

	Patients (n =150)	Controls (n=100)
Age		
Age mean ± SD (min–max)	32.82 ± 5.31 (25-60)	31.67±6.02 (27- 63)
The duration of the disease (year) Mean ± SD (min–max)	6.89 ± 3.68 (5-10)	
The type of alopecia (Norwood–Hamilton)		
Type 2: n (%)	34 (%22.66)	
Type 3: n (%)	96 (%64.00)	
Type 4: n (%)	20 (%13.33)	
BMI (kg/m^2) mean ± SD	27.31 ± 4.25	22.85 ± 3.45

SD: standard deviation; min–max: minimum–maximum.

As shown in Figures 1 and 2, the levels of irisin in serum were decreased significantly in the patients compared to control (p<0.05). However, irisin levels in urine were not different between patients and controls (p>0.05). BMI of patients were higher than control group (p<0.05) (Table 1). In addition , while the serum irisin level was found to be significantly lower in those with a BMI of 25 and above (p<0.05), a slight decrease was detected in urine samples, but it was not statistically significant (p>0.05). BMI was negatively correlated with serum irisin levels (r = -0,697, p<0.05).

FULL TEXTS BOOK

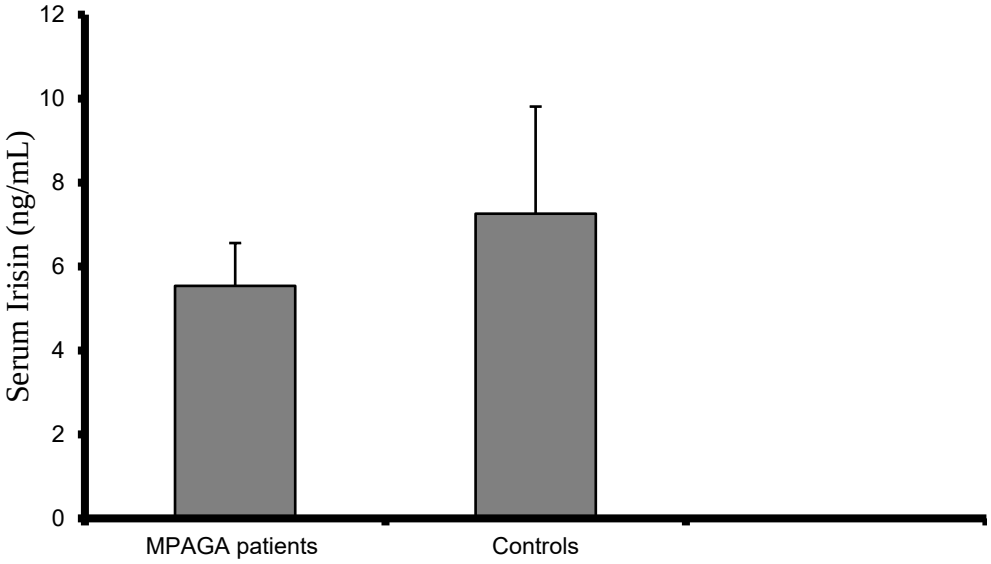


Figure 1.Serum irisin levels in patients with MPAGA and Control groups. *Significant differences serum irisin levels between MPAGA and control groups ($p<0.05$)

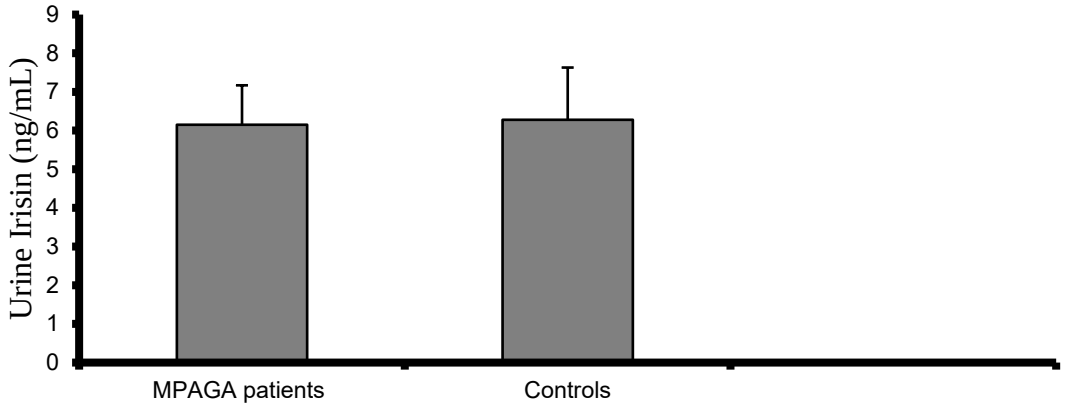


Figure 1.Urine irisin levels in patients with MPAGA and Control groups. *No significant differences in urine irisin levels between MPAGA and control groups ($p>0.05$).

Discussion

The present study showed a significantly decreased serum irisin level in MPAGA patients compared to controls, especially in severe alopecia grades irrespective of patients' age or disease duration. We thought that decreased irisin levels in serum may play a role in the etiology of MPAGA. Furthermore, obesity by making changes in the balance of the irisin in serum and urine may play a role in MPAGA. Therefore, assessing the levels of serum irisin may be more valuable for treatment planning in patients with MPAGA than urine irisin levels.

Irisin is a hormone with myokine properties that was discovered in recent years and is thought to play an active role in the prevention and treatment of many metabolic disorders, especially obesity. It is thought that irisin may mediate the transformation of white fat tissue, which is the main cause of obesity, into brown fat tissue, thus being effective in weight control by increasing heat production and energy expenditure. For this reason, it became very popular in a short time. In our study, we found that decreased irisin levels in serum samples in MPAGA. We thought that this may be related to obesity and the severity of the disease. We also measured irisin levels in urine samples, but there was no significant

FULL TEXTS BOOK

difference between MPAGA patients and controls, and there was a very small decrease. We thought that the disease duration in MPAGA patients should be longer for irisin levels in urine to decrease. Indeed, our results were in similar to some authors, who reported lower serum irisin levels in AGA than controls and showed progressive reduction with increasing disease duration (12).

Recently research has shown that a link between irisin and BMI is complex and not yet fully understood. Onat et al. reported that irisin levels are associated with exercise levels, and low irisin levels are associated with obesity and metabolic diseases (13). In our study, we found that there was a negative significant correlation between serum irisin and BMI. We thought that obesity and AGA findings in MPAGA negatively affected the secretion of the irisin and decreased it. Perhaps, it may include the presence of insulin resistance and up-regulation of insulin-like growth factor-1 in obese subjects. Insulin and insulin-like growth factor-1 are closely related peptide hormones that may induce 5a-reductase activity, leading to an increased conversion of testosterone to dihydrotestosterone, the principle androgen responsible for male-pattern baldness. However, such hypothesis is hindered by the fact that the circulating dihydrotestosterone level is usually normal in MPAGA subjects. Huh et. al. reported that a decrease in circulating Irisin levels and FNDC5 mRNA levels in skeletal muscle samples was detected (14). Stengel et al. studied 40 patients to examine the level of irisin in circulation and the BMI results of the patients were classified as obese, anorexic and normal. They were showed that correlation analyzes examining the relationship between BMI and irisin were performed and also higher serum irisin levels were observed in patients diagnosed as obese compared to normal weight and anorexic patients. A significantly positive relationship between irisin and BMI was detected (15). According to the results found by us and other researchers regarding irisin levels; serum irisin levels may vary according to BMI, disease severity and duration in different diseases, measurement techniques and patients' exclusion criteria.

In a conclusion, the patients with higher BMI (>25) were found to have significantly lower serum irisin levels than those with lower BMI ($p < 0.05$). Moreover, a negative correlation was found between BMI and irisin. In this study, our hypothesis is that: 1) Decreased serum irisin levels may play a role in the etiology of MPAGA. 2) Obesity that can cause an imbalance in the hair irisin levels may lead to MPAGA. 3) Also, irisin may be given in the treatment of MPAGA patients. Of course, in order to check these speculative interpretations, case-controlled studies should be done extensively on this subject.

Limitations of our study In this study, only the male population was studied. According to Hamilton scores, Type 5 and above were not included in the study.

Conflict of interest

The authors confirm that there is no conflict of interests.

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FULL TEXTS BOOK

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FULL TEXTS BOOK

2024 YENİ FEN ÖĞRETİM TASLAK PROGRAMININ ORTAOKUL 8. SINIF FEN BİLİMLERİ DERSİ ÖĞRENME ÇIKTILARIN YENİLENMİŞ BLOOM TAKSONOMİSİNE GÖRE İNCELENMESİ

EXAMINATION OF THE LEARNING OUTCOMES OF THE TURKEY CENTURY EDUCATION MODEL 2024 SECONDARY SCHOOL 8TH GRADE SCIENCE CURRICULUM ACCORDING TO THE REVISED BLOOM TAXONOMY

Dr. Öğrt. Üyesi Duygu BİLEN
Dicle Üniversitesi, Ziya Gökalp Eğitim Fakültesi
İsmail TATLI
MEB, Fen Bilimleri Öğretmeni

ÖZET

Bu çalışmada, Türkiye Yüzyılı Maarif Modeli 2024 ortaokul 8. Sınıf Fen Bilimleri dersi öğretim programı öğrenme çıktılarının Yenilenmiş Bloom Taksonomisine (YBT) göre incelenmesi amaçlanmıştır. Bu amaç doğrultusunda programda yer alan 131 öğrenme çıktısı YBT'nin bilişsel süreç boyutuna göre incelenmiştir. Çalışma nitel yönelimli bir döküman inceleme araştırmasıdır. Çalışmada Türkiye Yüzyılı Maarif Modeli 2024 ortaokul 8. Sınıf Fen Bilimleri dersi öğretim programı doküman olarak kullanılmıştır. Öncelikle öğretim programı öğrenme çıktılarını iki uzman birbirinden bağımsız olarak YBT'nin bilişsel süreç basamaklarına göre sınıflandırmıştır. Ardından yapılan sınıflandırmalar karşılaştırılmış, görüş ayrılıklarının olduğu öğrenme çıktıları üzerinde uzmanlar tartışmış, uzlaşıya varılamayan öğrenme çıktıları için üçüncü bir uzmana başvurulmuştur. Uzmanlar arasındaki uyum düzeyi Krippendorff's alfa katsayısı ile ölçülmüş ve .712 olarak bulunmuştur. Bu değer uyumun yüksek olduğunu ortaya koymaktadır. Bununla beraber uyumsuzluğun olduğu öğrenme çıktıları için üçüncü uzmanın görüşü nihai kararın verilmesinde belirleyici olmuştur. Analiz sonuçları 8. sınıf fen bilimleri öğrenme çıktılarının bilişsel süreç boyutunda dengeli bir şekilde dağıldığını göstermiştir. Öğrenme çıktılarının bilişsel süreç boyutu basamaklarına göre dağılımı şu şekildedir: Hatırlama (%17.9), anlama (%14.9), uygulama (%8.9), çözümleme (%26.1), değerlendirme (%14.9) ve yaratma (%14.9). Görüldüğü üzere çözümleme düzeyindeki öğrenme çıktıları diğer basamaklara kıyasla daha fazladır. Bu durum, programın öğrencilerin analitik düşünme ve problem çözme becerilerini geliştirmeyi önceliği şeklinde yorumlanabilir. Araştırma sonucunda yeni taslak programın öğrencilerin çok yönlü düşünme becerilerini geliştirmeyi hedeflediği söylenebilir.

Anahtar kelimeler: Türkiye Yüzyılı Maarif Modeli 2024 Ortaokul 8. Sınıf Fen Bilimleri Dersi Öğretim Programı, Yenilenmiş Bloom Taksonomisi, Bilişsel Süreç Boyutu, Öğrenme Çıktıları.

ABSTRACT

In this study, it was aimed to examine the learning outcomes of the Turkish Century Education Model 2024 secondary school 8th grade science curriculum according to the Revised Bloom's Taxonomy (RBT). For this purpose, 131 learning outcomes in the program were examined according to the cognitive process dimension of RBT. The study is a qualitative document review research. In this study, the Turkey Century Education Model 2024 secondary school 8th grade science curriculum was used as a document. First of all, two experts independently classified the learning outcomes of the curriculum according to the cognitive process level of RBT. Then, the classifications were compared, the experts discussed the learning outcomes on which there was disagreement, and a third expert was consulted for the learning outcomes on which there was no consensus. The level of agreement between the experts was measured by Krippendorff's alpha coefficient and found to be .712. This value reveals that the fit is high. However, for the learning outcomes where there was a disagreement, the third expert's opinion was decisive in making the final decision. The results of the analysis showed that 8th grade science

FULL TEXTS BOOK

curriculum learning outcomes were distributed in a balanced way in the cognitive process dimension. The distribution of learning outcomes according to the cognitive process dimension steps is as follows: Remember (17.9%), understand (14.9%), apply (8.9%), analyze (26.1%), evaluate (14.9%) and create (14.9%). As can be seen, the learning outcomes at the analyze level are more than the other levels. This can be interpreted as the program prioritizing the development of students' analytical thinking and problem solving skills. As a result of the research, it can be said that the new draft curriculum aims to develop students' multidimensional thinking skills.

Keywords: Turkey Century Education Model 2024 Secondary School 8th Grade Science Curriculum, Revised Bloom's Taxonomy, Cognitive process dimension, Learning outcomes.

GİRİŞ

Öğretim programları, eğitim sistemlerinin omurgası olarak nitelendirilmektedir. Bireyin yeteneklerinin gelişmesine olanak sağlayan ülkemiz öğretim programları öğrencinin duygusal, zihinsel ve sosyal yeteneklerini eşit ölçüde geliştirmesine imkan sağlayarak düşüncelerini özgür bir biçimde ifade edebilen, önerilerde bulunan bireyler olarak yetişmesine olanak sağlamıştır (Milli Eğitim Bakanlığı (MEB), 2017). MEB (2018) ise öğretim programlarında yaratıcı ve analitik düşünebilen, iletişim becerisi yüksek, sosyal ve ekonomik yönden aktif bireyler yetiştirmeyi hedeflemiştir. Öğretim programlarının ana iskeletini oluşturan programlardan biri olan Fen Bilimleri Dersi Öğretim Programı, Türk eğitim sisteminin temel hedefleri doğrultusunda bireylerin tüm yönleriyle gelişimini amaçlar ve bütüncül bir eğitim yaklaşımını temel alır. Bu hedef ve yaklaşımla geliştirilen "Türkiye Yüzyılı Maarif Modeli" ile alan becerileri, kavramsal beceriler, eğilimler ile sosyal-duygusal beceriler, değerler ve okuryazarlık bir bütün olarak ele alınarak, öğrencilerin çok yönlü gelişimini etkili bir şekilde desteklemek amaçlanmıştır. Fen Bilimleri Dersi Öğretim Programı'nda öğrenciyi merkeze alan bütüncül eğitim yaklaşımı benimsenmiştir. Bu yaklaşım, eğitsel süreçleri genişletir ve derinleştirir, bireysel sorumluluğu destekler, sosyal-duygusal becerileri geliştirir. Programın temel amaçları ise şu şekilde sıralanmıştır:

- Üst düzey düşünme ve bilimsel süreç becerilerini kullanabilen, etik ve ahlaki değerleri benimseyen bireyler yetiştirmek.
- Çağın gerektirdiği becerilere ve yaşam boyu öğrenme alışkanlığına sahip bireyler yetiştirmek.
- Dijital dönüşüme uyum sağlayan bireyler yetiştirmek.
- Öğrencilerin problem çözme ve bilinçli karar verme becerilerini geliştirmek.
- Bilimsel bilgiyi evrensel ahlak ve milli değerlerle bütünleştiren bireyler yetiştirmek.

Program uygulanırken ise *i)* öğrencilerin ön öğrenme eksikliklerinin tespit edilip giderilmesi, *ii)* öğrenme-öğretme yaşantılarının kalıcı öğrenmeyi destekleyecek şekilde sunulması, *iii)* Türkçenin doğru ve etkili kullanımına özen gösterilmesi, *iv)* öğrencilerin aktif katılımının sağlandığı bir sınıf iklimi oluşturulması ve *v)* öğretim materyallerinin hazırlanmasında zümre öğretmenleriyle iş birliği yapılması hususlarına dikkat edilmiştir (MEB, 2024). Programı oluşturan unsurlar ise şu şekilde ele alınmıştır: Programlar arası bileşenler (sosyal-duygusal öğrenme becerileri, sistem okuryazarlığı becerileri ve erdem değer ve eylem modeli), öğrenme kanıtları (beceri odaklı ölçme ve değerlendirme, öğrencilerin değerlendirme sürecinin bizzat içinde bulunması), öğrenme-öğretme süreç bileşenleri (kavramsal beceriler, eğilimler, öğrenme çıktıları), öğrenme-öğretme yaşantıları (ön değerlendirme, köprü kurma, öğretme-öğrenme uygulamaları), farklılaştırma uygulamaları (öğrencilerin farklı ihtiyaç ve yeteneklerine göre öğretimin uyarlaması), okul temelli planlama (her okulun kendi bünyesindeki ihtiyaçlarına ve öğrenci profiline uygun programlar geliştirmesi) şeklindedir.

Öğretim programlarının başarıya ulaşması için dört bileşenin planlanması esastır. Bu bileşenler hedef, içerik, öğrenme-öğretme etkinlikleri ve değerlendirme olarak sıralanmaktadır. (Bümen, 2006; Tanık ve Saraçoğlu, 2011). Hazırlanan program doğrultusunda hedef davranışlar belirlenirken bu doğrultuda uygun kazanımlar oluşturulur. Bu kazanımlar oluşturulurken bilim insanları bilgiyi daha anlaşılabilir,

FULL TEXTS BOOK

uygulanabilir ve daha etkin kılmak adına taksonomiler hazırlamışlardır. Hazırlanan bu taksonomilerden en fazla kullanılanı Bloom taksonomisidir. Bloom' a göre bireylerin öğrenme stilleri ve düzeyleri farklıdır bundan dolayı bu taksonomide bilgi basitten karmaşığa, somuttan soyuta doğru ve basamaklar birbirinin tamamlayıcısı şeklinde sıralanır. Taksonomi ilk kez 1956 yılında uygulanmaya başlanmış 2001 yılında ise Bloom' un arkadaşları tarafından revize edilerek yenilenmiş Bloom taksonomisi (YBT) olarak alan yazında kullanılmaya başlanmıştır (Tutkun ve Okay, 2012).

Tablo 1 : YBT' nin Bilişsel Süreç Boyutu (Krathwohl, 2002; Şimşek, 2019)

YBT'nin Bilişsel Süreç Boyutu	Alt Boyutlar
1. Hatırlama	1.1 Fark etme
	1.2 Geri çağırma
2. Anlama	2.1 Yorumlama
	2.2 Örneklendirme
	2.3 Sınıflandırma
	2.4 Özetleme
	2.5 Sonuç çıkarma
	2.6 Karşılaştırma
	2.7 Açıklama
3. Uygulama	3.1 Yapma
	3.2 Tamamlama
4. Çözümleme	4.1 Ayrıştırma
	4.2 Örgütleme
	4.3 İrdeleme
5. Değerlendirme	5.1 Kontrol etme
	5.2 Kritik etme
6. Yaratma	6.1 Oluşturma
	6.2 Planlama
	6.3 Üretme

YBT, öğretim programlarının tasarımı, öğretim yöntemlerinin geliştirilmesi ve değerlendirme süreçlerinde önemli bir rehber olarak kullanılmaktadır. Bu çalışmada, Türkiye Yüzyılı Maarif Modeli 2024 ortaokul 8. Sınıf Fen Bilimleri dersi öğretim programı öğrenme çıktılarının Yenilenmiş Bloom Taksonomisine (YBT) göre incelenmesi amaçlanmıştır.

YÖNTEM

Araştırma Deseni

Bu çalışma, 2024 ortaokul 8. Sınıf Fen Bilimleri dersi öğretim programındaki öğrenme çıktılarının YBT' ye göre analiz edilmesini amaçlayan nitel bir araştırmadır. Araştırma deseni olarak doküman analizi yöntemi kullanılmıştır. Doküman analizi, yazılı materyallerin sistematik bir şekilde incelenmesi ve değerlendirilmesi sürecidir (Creswell, 2014). Bu çalışmada, 2024 Fen Öğretim Programı'nda yer alan 131 öğrenme çıktısı YBT'nin bilişsel süreç boyutuna göre incelenmiştir.

Veri Toplama Aracı

Araştırmanın veri kaynağını, 2024 Fen Öğretim Programı'ndaki 8. sınıf fen bilimleri öğrenme çıktıları oluşturmaktadır. Bu öğrenme çıktıları, Milli Eğitim Bakanlığı tarafından yayımlanan resmi dokümanlardan elde edilmiştir (MEB, 2024). Veri toplama sürecinde, bu dokümanlar incelenmiş ve ilgili öğrenme çıktıları belirlenmiştir.

FULL TEXTS BOOK

Veri Analizi

Veri analizi sürecinde, öncelikle 8. sınıf fen bilimleri dersi öğrenme çıktıları YBT'nin altı bilişsel düzeyi (hatırlama, anlama, uygulama, çözümleme, değerlendirme, yaratma) temel alınarak kategorize edilmiştir. Her bir öğrenme çıktısı, bu bilişsel düzeylerden hangisine uygun olduğuna bakılarak sınıflandırılmıştır. Öncelikle öğretim programı öğrenme çıktılarını iki uzman birbirinden bağımsız olarak YBT'nin bilişsel süreç basamaklarına göre kodlamışlardır. Kodlayıcılar arası güvenirliği sağlamak amacıyla, uzmanlar arasında anlaşma düzeyini ölçmek için Krippendorf Alfa katsayısı kullanılmıştır. Krippendorf Alfa, içerik analizinde güvenirliği ölçmek için kullanılan istatistiksel bir yöntemdir ve aynı veri setini farklı kodlayıcıların değerlendirdiği durumlarda bu kodlayıcılar arasındaki tutarlılığı değerlendirir. Alfa değeri 0 ile 1 arasında değişir; 1 tam anlaşmayı, 0 ise tesadüfi anlaşmayı ifade eder. Bu çalışmada, alfa değerinin 0.67'nin üzerinde olması, uzmanlar arasındaki yüksek düzeyde anlaşmayı gösterecektir (Stemler, 2004). Ancak, yapılan analiz sonucunda uzmanlar arasındaki uyum düzeyi .712 olarak bulunmuştur. Bu oran uyumun sağlandığını ancak düzeyin düşük olduğunu göstermektedir. Bu yüzden anlaşma sağlanamayan öğrenme çıktıları başka bir uzmana danışılmış ve bu öğrenme çıktıları için nihai karara varılmıştır. Bu süreçte, üçüncü bir uzmanın görüşleri dikkate alınarak, uzmanlar arasındaki görüş ayrılıkları giderilmiş ve öğrenme çıktıların doğru şekilde sınıflandırılması sağlanmıştır. Bu yöntem, çalışmanın güvenirliğini artırmış ve sonuçların doğruluğunu sağlamıştır.

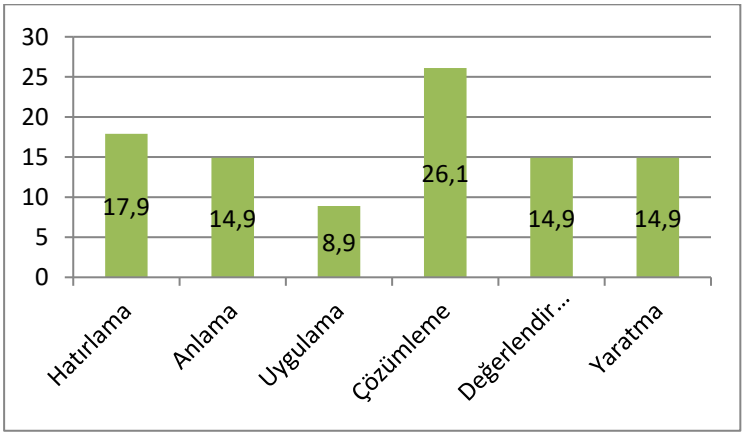
BULGULAR

2024 Fen Öğretim Programı'ndaki 8. sınıf fen bilimleri öğrenme çıktıları YBT'nin altı bilişsel düzeyine göre sınıflandırılmış ve aşağıdaki tablo oluşturulmuştur. Öğrenme çıktılarının tamamının taksonominin bilişsel süreç boyutuna göre sınıflandırması Ek:1'de detaylı biçimde verilmiştir. Tablo 2'de öğrenme çıktılarının bilişsel süreç boyutuna göre nasıl dağıldığı sunulmuştur.

Tablo 2: Bilişsel Süreç Boyutlarına Göre Öğrenme Çıktıların Dağılımı

Bilişsel Süreç Boyutu	Öğrenme Çıktılarının Sayısı	Yüzde (%)
Hatırlama	24	17,9
Anlama	20	14,9
Uygulama	12	8,9
Çözümleme	35	26,1
Değerlendirme	20	14,9
Yaratma	20	14,9

Tablo 2'de görüldüğü üzere en fazla öğrenme çıktısı çözümleme düzeyinde iken en az kazanım uygulama basamağındadır. Öğrenme çıktılarının bilişsel süreç boyutuna göre nasıl bir dağılım gösterdiği ayrıca Şekil 1'de sunulmuştur.



Şekil 1: Öğrenme Çıktılarının Bilişsel Süreç Boyutuna Göre Dağılımı

FULL TEXTS BOOK

Şekil 1'de görüldüğü üzere 8. sınıf fen bilimleri öğrenme çıktılarının bilişsel süreç boyutunda dengeli bir şekilde dağılmaktadır. Öğrenme çıktılarının bilişsel süreç boyutu basamaklarına göre dağılımına bakıldığında çözümleme düzeyindeki öğrenme çıktıları diğer basamaklara kıyasla daha fazladır.

TARTIŞMA, SONUÇ ve ÖNERİLER

2024 Ortaokul 8. sınıf fen bilimleri dersi öğretim programında çözümleme düzeyindeki öğrenme çıktıları diğer basamaklara kıyasla daha fazladır. Bu durum, programın, öğrencilerin analitik düşünme ve problem çözme becerilerini geliştirmeyi önceliğini şeklinde yorumlanabilir. Ayrıca araştırma sonucunda yeni taslak programın öğrencilerin çok yönlü düşünme becerilerini geliştirmeyi hedeflediği söylenebilir. Yapılan araştırmalar ile 2018 fen bilimleri dersi öğretim programındaki kazanımların en çok «Anlama» düzeyinde; en az ise «Hatırlama» düzeyinde olduğu ortaya koyulmuştur yine 2018 programında «Çözümleme» düzeyindeki öğrenme çıktılarının sınırlı olduğu belirlenmiştir (Gündoğdu, 2018; Sağlamöz & Soysal, 2021). 2024 fen bilimleri dersi öğretim programında ise 2018 programına kıyasla «Çözümleme» düzeyindeki öğrenme çıktılarının artışı dikkat çekmektedir. Bu değişiklik, yeni programın öğrencilerin daha yüksek bilişsel süreçlerde aktif olmalarını hedeflediğini göstermektedir. Öğrenme çıktılarının bilişsel süreç boyutlarına göre dağılımı ayrıntılı incelendiğinde öğrenme çıktılarının %17.9'u «Hatırlama» ve %14.9'u «Anlama» düzeyinde yer almaktadır bu sonuç, programın temel bilgi ve kavramların öğretimine önem verdiğini göstermektedir. %8.9'luk bir oranla «Uygulama» düzeyindeki öğrenme çıktılarının diğer düzeylere göre daha az olduğu görülmektedir. Bu sonuç, teorik bilgilerin pratikte kullanımına daha fazla vurgu yapılması gerektiği şeklinde yorumlanabilir. Öğrenme çıktılarının %26.1'i «Çözümleme» düzeyinde yoğunlaşmıştır. Bu oranlar bize programda öğrencilerin analitik düşünme ve problem çözme becerilerini geliştirmeye yönelik önemli bir vurgu yapıldığını göstermektedir. «Değerlendirme» ve «Yaratma» düzeylerinde de %14.9 oranında öğrenme çıktısı bulunmakta, bu sonuç da öğrencilerde eleştirel düşünme ve yaratıcı düşünme becerilerinin kazandırılmasının hedeflendiğini göstermektedir. Araştırmadan elde edilen sonuçların neticesinde öğretim programlarında özellikle «Çözümleme», «Değerlendirme» ve «Yaratma» düzeylerindeki öğrenme çıktıların artırılması, öğrencilerin üst düzey düşünme becerilerini geliştirmelerine katkı sağlayacaktır şeklinde yorumlanabilir ayrıca, «Uygulama» düzeyindeki öğrenme çıktıların artırılması, öğrencilerin teorik bilgilerini pratikte kullanabilme becerilerini güçlendirecektir. Bu çalışmanın benzeri, farklı eğitim seviyelerindeki (ilkokul, ortaokul, lise) öğrenme çıktıların değerlendirilmesi için de yapılabilir.

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FULL TEXTS BOOK

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Ek 1: 8. Sınıf Öğrenme Çıktıların Bilişsel Süreç Boyutlarında Dağılımları

	Bilişsel Süreç Boyutu					
	Hatırlama	**Anlama**	**Uygulama**	**Çözümleme**	**Değerlendirme**	**Yaratma**
8.Sınıf Fen Bilimleri Öğrenme Çıktıların Kodları	Fb.8.1.1.1.a Fb.8.1.2.1.a Fb.8.2.1.1.a Fb.8.2.1.1.ç Fb.8.3.1.2.a Fb.8.3.2.1.a Fb.8.3.3.2.a Fb.8.3.4.1.a Fb.8.4.1.1.a Fb.8.4.2.1.a Fb.8.4.2.2.a Fb.8.4.2.2.b Fb.8.5.1.1.a Fb.8.5.3.1.a Fb.8.5.3.2.ç Fb.8.5.4.1.a Fb.8.6.1.2.a Fb.8.6.1.3.a Fb.8.6.2.1.a Fb.8.6.2.3.a Fb.8.6.2.3.ç Fb.8.6.2.1.ç Fb.8.7.1.2.a Fb.8.7.2.1.a	Fb.8.1.2.1.b Fb.8.2.1.1.c Fb.8.3.1.1.b Fb.8.3.1.2.c Fb.8.3.3.1.b Fb.8.3.4.1.ç Fb.8.3.4.2.b Fb.8.4.1.1.b Fb.8.5.1.1.b Fb.8.5.1.1.c Fb.8.5.1.1.ç Fb.8.5.4.1.b Fb.8.5.4.1.c Fb.8.6.1.2.c Fb.8.6.1.3.c Fb.8.7.1.1.b Fb.8.7.1.3.b Fb.8.7.2.2.b Fb.8.7.2.4.b Fb.8.7.2.4.c	Fb.8.1.1.1.b Fb.8.3.1.2.b Fb.8.3.3.2.b Fb.8.3.4.1.a Fb.8.4.1.2.a Fb.8.4.1.3.a Fb.8.5.3.1.b Fb.8.5.3.2.a Fb.8.6.1.1.b Fb.8.6.1.2.b Fb.8.6.1.3.b Fb.8.7.1.2.ç	Fb.8.2.1.1.b Fb.8.3.1.1.a Fb.8.3.2.1.b Fb.8.3.2.1.c Fb.8.3.3.1.a Fb.8.3.3.3.a Fb.8.3.3.3.b Fb.8.3.4.2.a Fb.8.4.1.2.b Fb.8.4.1.3.b Fb.8.4.2.1.b Fb.8.4.2.1.c Fb.8.4.2.3.ç Fb.8.5.2.1.b Fb.8.5.4.2.b Fb.8.5.4.3.a Fb.8.5.4.4.b Fb.8.6.1.4.a Fb.8.6.1.4.b Fb.8.6.2.1.b Fb.8.6.2.1.c Fb.8.6.2.3.b Fb.8.6.2.3.c Fb.8.6.2.4.a Fb.8.6.2.4.b Fb.8.6.2.5.a Fb.8.6.2.5.b Fb.8.7.1.1.a Fb.8.7.1.2.b Fb.8.7.1.3.a Fb.8.7.2.1.b Fb.8.7.2.2.a Fb.8.7.2.3.a Fb.8.7.2.3.b Fb.8.7.2.4.a	Fb.8.1.1.1.c Fb.8.3.3.2.d Fb.8.3.4.1.c Fb.8.3.4.2.c Fb.8.4.1.1.c Fb.8.4.2.1.ç Fb.8.4.2.2.c Fb.8.4.2.3.e Fb.8.5.2.1.c Fb.8.5.2.1.d Fb.8.5.3.1.c Fb.8.5.3.2.c Fb.8.5.4.2.c Fb.8.5.4.2.d Fb.8.5.4.3.b Fb.8.6.2.4.c Fb.8.6.2.5.c Fb.8.7.2.1.c Fb.8.7.2.4.c Fb.8.7.2.4.d	Fb.8.2.1.2.a Fb.8.2.1.2.b Fb.8.3.3.3.c Fb.8.4.2.1.d Fb.8.4.2.3.b Fb.8.4.2.3.c Fb.8.4.2.3.d Fb.8.5.2.1.a Fb.8.5.2.1.ç Fb.8.5.4.2.a Fb.8.5.4.2.ç Fb.8.5.4.4.a Fb.8.6.1.1.a Fb.8.6.1.5.a Fb.8.6.1.5.b Fb.8.6.2.2.a Fb.8.6.2.2.b Fb.8.7.1.2.d Fb.8.7.2.3.c Fb.8.7.2.4.ç

FULL TEXTS BOOK

DEĞİŞEN DÜNYA KOŞULLARINDA ROMANYA; TARIM POLİTİKALARINDA CANLI HAYVAN İTHALAT VE İHRACAT ORANLARI DEGERLENDİRMESİ
ROMANIA IN CHANGING WORLD CONDITIONS; EVALUATION OF LIVE ANIMAL IMPORT AND EXPORT RATES IN AGRICULTURAL POLICIES

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ÖZET
Romanya, Tuna Nehri ile Karadeniz'in kıyısında yer alan Avrupa, Asya ve Ortadoğu'nun önemli kavşak noktalarının buluşmasını sağlayan stratejik bir konuma sahiptir. Büyük bir ekonomik potansiyele sahip olan ülke, zengin doğal kaynaklarının yanı sıra gelişmiş sanayi ve tarım alanları açısından da oldukça verimli bir coğrafyaya sahiptir. Hayvancılık sektöründe büyükbaş, küçükbaş ve kümes hayvancılığında yeterli üretim faaliyeti bulunmaktadır. Bunun dışında süt ve peynir ürünlerinde yerli ürünlerin yanı sıra piyasada AB ülkelerinden gelen ürünlerin de yaygın olduğu görülüyor. Bu kapsamda ülkenin Avrupa ülkeleriyle ticari ilişkilerinin yüksek oranda değiştiği görülmektedir. Romanya'da büyükbaş hayvancılık ve koyun yetiştiriciliği ülkenin en önemli ticaret kalemleri arasında yer alıyor.
Bu çalışmada Romanya'nın Avrupa ülkeleri ile 2019-2023 yılları arasındaki Canlı hayvan ithalat ve ihracat oranları; ticaret haritası verileri, yabancı kaynaklar ve bilimsel makaleler taranarak açıklanmaya çalışılacaktır. Ayrıca literatür taraması yapılarak konuyla ilgili makaleler, kitaplar, daha önce yapılmış diğer çalışmalar ve bilimsel çalışmalar incelenip değerlendirilecektir.
Anahtar Kelimeler: Romanya, Hayvancılık, Ekonomi, İthalat, İhracat

ABSTRACT
Romania, located on the banks of the Danube River and the Black Sea, has a strategic location that enables the important crossroads of Europe, Asia and the Middle East to meet. The country, which has a great economic potential, has a very productive geography in terms of developed industrial and agricultural areas as well as rich natural resources. In the livestock sector, there is sufficient production activity in cattle, sheep and poultry farming. Apart from this, it is seen that in addition to domestic products in milk and cheese products, products from EU countries are also common in the market. In this context, it is seen that the country's commercial relations with European countries have changed at a high rate. Cattle breeding and sheep breeding in Romania are among the country's most important trade items.
In this study, Romania's live animal import and export rates with European countries between 2019-2023; Trade map data will be explained by scanning foreign sources and scientific articles. In addition, a literature review will be conducted and articles, books, other previously conducted studies and scientific studies on the subject will be examined and evaluated.
Key Words: Romania, Livestock, Economy, Import, Export

GİRİŞ
Romanya, Tuna Nehri ile Karadeniz'in kıyısında yer alan Avrupa ,Asya ve Orta doğunun Önemli kavşak noktalarının buluşmasını sağlayan stratejik bir konuma sahiptir ,büyük bir ekonomik potansiyele sahip olan ülke, zengin doğal kaynaklarının yanı sıra ,gelişmiş sanayi ve tarım alanları açısından da oldukça verimli bir coğrafyaya sahiptir. Hayvancılık sektöründe büyükbaş küçükbaş ve kümes hayvancılığında

FULL TEXTS BOOK

yeterli üretim faaliyeti bulunmaktadır. Bunun dışında süt ver peynir ürünlerinde yerli ürünlerin yanı sıra piyasada AB ülkelerinden gelen ürünlerinde yaygın olduğu görülmektedir. Bu kapsamda ülkenin Avrupa ülkeleriyle ticari ilişkilerinin yüksek oranda değiştiği görülmektedir. Romanya'da büyükbaş hayvancılık ve koyun yetiştiriciliği ülkenin önemli ticaret kalemleri arasında yer almaktadır.

Asya ,Ortadoğu ve Karadeniz'in stratejik konumunda yer alan Romanya'nın büyük bir ekonomik potansiyele sahip olduğu gözlenmekle birlikte zengin doğal kaynaklara sahip olan ülkenin aynı zamanda gelişmiş sanayi ve tarım alanları açısından da oldukça şanslı bir konumda olduğu söylenebilir. Romanya 19 milyonluk nüfusu ve 238.391 kilometrekarelik yüzölçümü ile 1990 yılından günümüze kadar dış göçler ve azalan doğum oranlarıyla azalma göstermiştir.1989 yılında 23,21 milyon olan ülke 2022 yılına gelindiğinde 19,04 milyon kişiye kadar düşmüştür. Bu azalmanın ana etkeni olarak göç önemli bir husus olarak dikkat çekmektedir. Göçün nedeni ise nüfusun önemli bir kısmının ülke dışına çalışma amaçlı çıktığı görülmektedir. Ülke nüfusunun büyük bir kısmını Romen vatandaşları oluştururken geriye kalan kısmın azınlık gruplardan oluştuğu görülmektedir, ülkede Macar ve Alman asıllı azınlık gruplarının olması nedeniyle heterojenik bir yapıya sahip olduğu söylenebilir Romanya, Batı Avrupa ülkelerine göre daha genç bir nüfusa sahiptir.

Aşağıda yer alan tablolar Romanya Tarafından İthal Edilen Bir Ürün İçin Tedarik Pazarlarını ve Romanya'nın ihraç ettiği bir ürünün ithalat pazarlarının listesi Canlı büyükbaş hayvan listesi Büyükbaş hayvan değerlerini göstermektedir.

Tablo 1. Romanya Tarafından İthal Edilen Bir Ürün İçin Tedarik Pazarlarının Listesi Ürün, Büyükbaş Hayvanlar

İhracatçılar	2019'da ithal değer	2020'de ithal değer	2021'de ithal değer	2022'de ithal değer	20203de ithal değer
Macaristan	2,653	4,468	2,125	2,624	6,375
Sırbistan	52	0	-	68	81
Bulgaristan	0	87	154	468	0
Hollanda	2,653	4,468	2,125	2,624	6,375
Almanya	2,728	1,506	3,084	2,609	2,273
Danimarka	10	90	452	1,608	949
Irlanda	726	220	7	76	1510
Fransa	705	483	1,098	1,448	662
İtalya	243	208	182	206	444
Slovakya	191	172	152	48	359
Hırvatistan	243	657	2,167	133	165
Polanya	0	280	892	787	98
Avusturya	885	986	434	279	79
İspanya	72	0	100	8	63
Letonya	95	137	205	156	1
Belçika	0	223	136	8	-
Estonya	89	0	-	-	-
Luksemburg	50	31	-	-	-
Birleşik Krallık	238	102	-	-	-

Sources: ITC calculations based on Eurostat statistics since January, 2023. ITC calculations based on UN COMTRADE statistics until January, 2023.

FULL TEXTS BOOK

Tablo 1 incelendiğinde ihracatçı ülkeler arasında Macaristan, Hollanda ve Almanya'nın ithal değerlerinin diğer ülkelere kıyasla daha yüksek olduğu görülmektedir. Diğer ülkelerle ticaret ağı her ne kadar bu üç ülkeye göre düşük görülse de ticaret ağındaki değişimler yıllar arasında hareketliliğin yaşandığını göstermektedir.

Tablo 2. Romanya'nın İhraç Ettiği Bir Ürünün İthalat Pazarlarının Listesi Ürün,Canlı büyükbaş hayvanlar

İthalatçılar	2019 yılında ihraç edilen değer	2020 yılında ihraç edilen değer	2021 yılında ihraç edilen değer	2022 yılında ihraç edilen değer	2023 yılında ihraç edilen değer
Macaristan	10,512	8,864	9,660	6,937	11,227
Sırbistan	5,921	5,390	6,975	10,624	19,812
Bulgaristan	1,708	566	168	459	1,568
Hollanda	0	208	8	217	238
Almanya	96	39	283	63	69
İsrail	33,585	39,140	67,989	59,980	58,633
Yunanistan	6,105	5,975	6,867	5,594	5,594
Fransa	0	368	9	276	8
İtalya	6,929	5,615	7,423	4,665	3,761
Moldova	103	123	142	330	771
Hırvatistan	45,567	35,504	38,589	32,233	34,822
Polanya	193	70	1,437	355	363
Saudi-Arabistan	198	17,362	10,254	3,772	3,166
İspanya	2,126	442	2,476	518	11
Tunus	0	0	-	131	250
Türkiye	30,582	9,685	2,878	5,568	19,876
Libya	10,749	3,374	6,629	3,910	7,498
Lübnan	6.319	6,256	5,413	444	54

Sources: ITC calculations based on Eurostat statistics since January, 2023.
ITC calculations based on UN COMTRADE statistics until January, 2023.

Tablo 2 incelendiğinde ithalatçı ülkeler arasında Macaristan, Sırbistan, İsrail, Yunanistan, Hırvatistan , Türkiye ve Libya'nın yüksek ihraç değerleri görülürken diğer ülkelerle olan ticari ilişkisinde olumlu yönde hareketliliğin olduğu görülmektedir.

SONUÇ VE DEGERLENDİRME

Romanya gelişen Tarım Politikaları ile birlikte stratejik bir konuma sahiptir .Bu nedenle ticari ilişkilerini Avrupa devletleri ile arttırarak ekonomik gelişmişlik seviyesini arttırmayı amaçlayan bir ülke olarak varlık göstermektedir. Ekonomik Politikalar uygulanırken coğrafi yapı esas alınarak tarım potansiyellerini değerlendirme aşaması hız kazanmıştır. Romanya da hayvancılık ülke olarak geleneksel bir ekonomik faaliyet olarak görülür bu nedenle tarım politikalarına entegrasyonun hızlı bir şekilde gerçekleştiği görülmektedir.

Diğer ilkeler ile ticaret ağında son dönemlerde gelişme kaydettiği görülürken ithalatçı ve ihracatçı ülkelerin ithal ve ihraç değerlerinde olumlu yönde bir değişimin olduğu görülmektedir. Bu durum çoğu

FULL TEXTS BOOK

Avrupa ülkesinin de Romanya'nın ekonomik yapısının güçlenmesine katkıda bulunduğunu göstermektedir.

KAYNAKÇA

ITC Calculatıons Based On Eurostat Statistics Since January 2023.
ITC Calculatıons Based On UN COMTRADE Statics Until January 2023.

EVRİŞİMSEL SİNİR AĞI KULLANILARAK GÜNEŞ FOTOVOLTAİK MODÜLLERDE ETKİLİ BİR ARIZA SINIFLANDIRMA YÖNTEMİ

AN EFFECTIVE FAULT CLASSIFICATION METHOD IN SOLAR PHOTOVOLTAIC MODULES USING CONVOLUTIONAL NEURAL NETWORK

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ÖZET
Günümüzde teknolojinin gelişmesine paralel olarak artan enerji ihtiyacını karşılayabilmek için farklı enerji kaynaklarının kullanılması yaygın hale gelmiştir. Bunlar arasından fotovoltaik (PV) enerji üretimi temiz, sürekli, ekonomik ve kurulumu kolay olduğu için enerji sağlama konusunda en çok dikkat çeken enerji türlerinden biri olup; konutlarda, endüstri alanlarında, ticari işletmelerde ve daha birçok alanda yaygın bir şekilde kullanılmaktadır. PV panelleri genellikle dış ortamlarda kurulu oldukları için çoğu zaman sert iklim koşullarına maruz kalarak kar, buz, toz, gölgelenme, böcek izleri vb. dış etkilerden etkilenerek zarar görebilirler. Enerji sisteminin sürekliliği ve verimliliği için arızalanmış panellerin arızalarının tespit edilmesi oldukça önemlidir. Bu çalışmada PV modülü arızalarını tespit edip türünü belirlemek için yeni ve etkili, derin öğrenme tabanlı bir sınıflandırma yöntemi önerilmiştir. Bu yöntemde, gerçek, büyük ölçekli PV çiftliklerinden elde edilen kızılötesi PV modül arıza görüntüleri kullanılmıştır. Kızılötesi PV modül görüntüleri arızasız ve arızalı olmak üzere iki sınıftan oluşmaktadır. Arızalı PV modül görüntü verileri, kendi içerisinde çatlama, diyot, sıcak nokta, kirlenme, bitki örtüsü gibi 11 farklı sınıftan oluşmaktadır. Sunulan çalışmada öncelikle kızılötesi görüntülere içerdiği bileşenlerin seviyesini ve görüntünün çözünürlüğünü artırmak için bikübik enterpolasyon yöntemi uygulanarak süper çözünürlük elde edilmiştir. Daha sonra elde edilen görüntüler derin öğrenme tabanlı ResNet-18 mimarisine girdi olarak verilerek önce arızalı ve arızasız sınıf tespiti gerçekleştirilmiştir. Sonrasında ise arızalı kızılötesi PV modül arıza görüntüleri kendi aralarında sınıflandırılmıştır. Sistemin performansını değerlendirmek için yapılan çalışmada süper çözünürlük yöntemi ile oldukça etkili sonuçlar elde edilmiştir. Ayrıca önerilen yöntem aynı veri setini kullanan benzer çalışmalarla karşılaştırılmış ve önerilen yöntemin performansının yüksek olduğu görülmüştür.
Keywords: Fotovoltaik Modül, Arıza Sınıflandırma, Bikübik Enterpolasyon, ResNet-18.

ABSTRACT
Nowadays, it has become common to use different energy sources to meet the increasing energy need in parallel with the development of technology. Among these, photovoltaic (PV) energy production is one of the most remarkable energy types in providing energy because it is clean, continuous, economical and easy to install; it is widely used in residences, industrial areas, commercial enterprises and many other areas. Since PV panels are generally installed in outdoor environments, they are often exposed to harsh climatic conditions, such as snow, ice, dust, shading, insect traces, etc. They may be damaged by external influences. It is very important to detect the faults of the damaged panels for the continuity and efficiency of the energy system. In this study, a new and effective deep learning-based classification method is proposed to detect PV module faults and determine their type. In this method, infrared PV module fault images obtained from real, large-scale PV farms are used. Infrared PV module fault images consist of two classes: non-faulty and faulty. PV module fault image data consists of 11 different classes such as cracking, diode, hot spot, contamination and vegetation. In the proposed study, super resolution has been achieved by applying the bicubic interpolation method to infrared images to increase the level

FULL TEXTS BOOK

of components they contain and the resolution of the image. Then, the obtained images have been given as input to the deep learning-based ResNet-18 architecture, and first faulty and non-fault class detection has been carried out. Afterwards, the faulty infrared PV module fault images have been classified among themselves. In the study conducted to evaluate the performance of the system, very effective results have been obtained with the super resolution method. In addition, the proposed method has been compared with similar studies using the same dataset and it has been seen that the performance of the proposed method has high.
Keywords: Photovoltaic Module, Fault Classification, Bicubic Interpolation, ResNet-18.

1. GİRİŞ

Teknolojinin gelişmesi, sanayileşme ve nüfus artışı gibi faktörler elektrik enerjisine olan talebin her geçen gün artmasına sebep olmaktadır. Arz-talep dengesinin sürdürülebilir olması, enerji üretiminin arttırılmasını gerektirmektedir. Bu bağlamda çevre dostu olmaları, tabiatta bol miktarda bulunmaları, dışa bağımlı olmamaları, güvenilir olmaları gibi özelliklerinden dolayı yenilenebilir enerji kaynaklarının kullanımı enerji üretiminde oldukça yaygınlaşmıştır (Acikgoz, 2022; Korkmaz, 2021; Korkmaz vd., 2021). Yenilenebilir enerji kaynaklarından biri olan fotovoltaik (PV) enerji üretimi, temiz ve sürdürülebilir enerji sağlama konusunda dikkat çeken enerji türlerinden biri olup; konutlarda, endüstri alanlarında, ticari işletmelerde ve daha birçok alanda yaygın bir şekilde kullanılmaktadır. PV panelleri genellikle dış ortamlarda kurulu oldukları için çoğu zaman sert iklim koşullarına maruz kalarak kar, buz, toz, gölgelenme, böcek izleri vb. dış etkilerden etkilenerek zarar görebilirler. Ayrıca kurulum aşamasında panelin kırılması, çatlaması, hatalı lehimleme gibi durumlar da panelin zarar görmesine sebep olarak üretim gücünün ve veriminin düşmesine sebep olabilir (Acikgoz & Korkmaz, 2022). Bu nedenle PV sistemin sürekliliğini sağlamak, ömrünü uzatmak ve verimliliğini artırmak için, bu sistemlerde meydana gelebilecek olası arızaların hızlı ve etkili bir şekilde tespit edilip çözülmesi gerekir (Gao & Wai, 2020). PV panel arızalarının tespiti ve sınıflandırılması için elektriksel ölçümler, termografik kızılötesi görüntüleme gibi çeşitli teknikler geliştirilmiştir (Ch, 2023). Elektriksel ölçümde, PV panellerinin çıkış gerilimi ve akımı ölçülerek bir grafik şeklinde ifade edilir. Elde edilen I–V eğrilerinde küçük arızalar zor algılanabileceği için bu durum, anormalliklerin sınıflandırılmasını zorlaştıracağı gibi zaman alıcı bir yöntem olarak görülmektedir (Fernández vd., 2020; Herraiz vd., 2020; Tang vd., 2020). Termografik kızılötesi görüntülemede, ani yüksek bir akım bir bölgede ısınmaya neden olurken, açık devre durumu o bölgenin düşük sıcaklıkta olmasına neden olur. Böylece bu yöntem paneldeki sıcak alanları ve panelin diğerlerinden daha sıcak olan kısımlarının gözlemlenebilmesini sağlayarak kısa devreler, sıcak noktalar ve etkin olmayan hücreler gibi arızaları tespit edebilir (Aghaei vd., 2015). Arızaların görsel olarak algılanıp sınıflandırılması, sistemlerin izlenmesini ve bakımını daha basit hale getirdiği gibi düşük işletme maliyeti de sağlamaktadır (Alves vd., 2021; Le vd., 2021). Literatürde PV panellerinde oluşabilecek arızaların otomatik olarak tespit edilip sınıflandırılmasına ilişkin çok sayıda çalışma yapılmıştır. (Ali vd., 2020)' de PV panellerin sıcak noktalarının tespiti ve sınıflandırılması için kızılötesi termografik görüntüler kullanılarak hibrit özelliklere dayalı bir destek vektör makinesi (DVM) yaklaşımı sunulurken (Venkatesh & Sugumaran, 2022)' de RGB görüntüleri kullanarak PV panellerde meydan gelen delaminasyon, böcek izi, yanık izi, kırılma ve renk bozulması gibi önemli arızaların tespiti gerçekleştirilmiştir. Yapılan çalışmada özellik çıkarımında J48 karar ağacı algoritması kullanılırken sınıflandırıcı olarak yerel ağırlıklı öğrenme, k-yıldız, en yakın komşu ve k-en yakın komşu algoritmaları kullanılmıştır. (Dunderdale vd., 2020) ' de kızıl ötesi termografik görüntüler kullanılarak derin sinir ağları ve SVM tabanlı bir sınıflandırma sistemi önerilmiştir. Evrişimli sinir ağları algoritmaları da PV arızalarının tespitinde yaygın olarak kullanılmaktadır (Manno vd., 2021; Le vd., 2023; KAYCI vd., 2023). Bu çalışmada PV modülü arızalarını sınıflandırmak için yeni ve etkili, CNN tabanlı bir PV arıza tespit yöntemi önerilmektedir. Bu yöntem, gerçek büyük ölçekli PV çiftliklerinden alınan termografik kızılötesi görüntü veri setini kullanarak PV modüllerindeki farklı hasar türlerini

FULL TEXTS BOOK

sınıflandırır. Veri seti, çatlama, diyot, sıcak nokta, kirlenme, bitki örtüsü ve diğer sınıflar gibi 11 tür anormalliği içeren, halka açık en büyük veri setlerinden biridir (Korkmaz & Acikgoz, 2022). Sunulan çalışmada kızılötesi görüntülere bikübik enterpolasyon yöntemi uygulanarak süper çözünürlük elde edilmiştir. Daha sonra elde edilen görüntüler derin öğrenme tabanlı ResNet-18 mimarisine uygulanarak önce arızalı ve arızasız sınıf tespiti gerçekleştirilmiştir. Son olarak arızalı kızılötesi PV modül arıza görüntüleri kendi aralarında sınıflandırılmıştır.

2. MATERYAL VE METOD

Solar PV sistemlerde enerji kaybını önlemek ve arızanın erken teşhisini sağlamak için derin öğrenme yaklaşımları kullanılarak akıllı bir karar verme mekanizması geliştirilebilir. Derin öğrenme tabanlı CNN mimarileri, geleneksel makine öğrenmesi algoritmalarının aksine kendi kendine güçlü öğrenme yetenekleri ile sınıflandırma problemlerine etkili çözümler sunmaktadır. Özellikle son yıllarda solar PV sistemlerde karşılaşılan arızaları tespit etmek ve türünü belirlemek için CNN mimarilerini kullanmak etkili bir yaklaşım olmuştur. Bu çalışmada ResNet-18 mimarisi kullanılarak solar PV modüllerde arızaların tespiti ve sınıflandırılması gerçekleştirilmiştir. Bu tespit işleminde daha etkili bir performans elde etmek için kızılötesi PV modül görüntülerine ResNet-18 sınıflandırıcısına girmeden önce bikübik enterpolasyon yaklaşımı uygulanarak çözünürlükleri arttırılmıştır. Aşağıdaki alt bölümler, bikübik enterpolasyon yöntemini, ResNet-18 mimarisini ve önerilen yöntemin çerçevesini ayrıntılı olarak sunmaktadır.

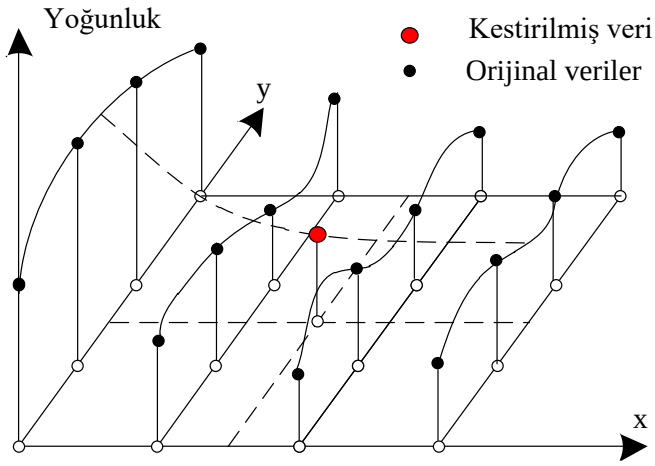
2.1. Bikübik Enterpolasyon

Görüntülerin çözünürlüğü ve detay kalitesi elde edilen bilgilerin doğruluğunda oldukça önemlidir. Bu nedenle görüntülerin çözünürlüğü ve kalitesini arttırmak için literatürde çeşitli görüntü zenginleştirme algoritmaları geliştirilmiştir. Bu algoritmalar düşük çözünürlüklü görüntüyü belli işlemlerden geçirerek içerdiği bileşenlerin seviyesini ve görüntünün çözünürlüğünü arttırmaya yönelik olup günümüzde süper çözünürlük olarak bilinmektedir. Fonksiyonel özelliklerine göre görüntü süper çözünürlük yöntemleri; enterpolasyon tabanlı, yeniden yapılandırma tabanlı, öğrenme tabanlı ve hibrit yöntemler olarak alt kategorilere ayrılmaktadır (Singh & Singh, 2020). Enterpolasyon tabanlı yöntemlerde temel olarak bir görüntünün içindeki belirli bir alandaki piksel sayısı yapay olarak arttırılarak görüntünün çözünürlüğü arttırılır. Bu tekniklerde görüntülerin içerdiği özellikler yerine pikseller işleme alınmaktadır. Enterpolasyon yöntemleri geleneksel süper çözünürlük yöntemleri olarak bilinirler. Görüntü enterpolasyon yöntemleri süper çözünürlük için en hızlı çözüm üreten yöntemlerdir (Deshpande & Patavardhan, 2019). Bilinen en iyi enterpolasyon yöntemleri En yakın komşu , Bilinear ve Bikübik yöntemleridir. Yapılan bu çalışmada görüntü çözünürlüğünü arttırmak amacıyla Bikübik Enterpolasyon yöntemi kullanılmıştır. Bu yöntemde her bir çıkış hücresinin piksel değerinin hesaplanması için en yakın 4x4 (16 piksel) piksellik giriş hücresi kullanılır. Yani bir f(x, y) fonksiyonunun tanım kümesindeki herhangi bir (x, y) noktasındaki değeri, en yakın 16 örnekleme noktasının ağırlıklı ortalamasından elde edilir. Üçüncü dereceden bir polinom olarak ele alınan bu fonksiyonla aşağıdaki denklem aracılığıyla dört köşe nokta arasında bir yüzey oluşturulmaktadır.

$$f(x,y) = \sum_{i=0}^{3}\sum_{j=0}^{3} a_{ij}\, x^i y^j \qquad (1)$$

Bikübik enterpolasyon yöntemi, en yakın komşu ve bilinear enterpolasyon yöntemine göre örtüşme ve bulanıklığı azaltmaktadır. Ayrıca bikübik enterpolasyon yöntemi, hesaplama süresinin önemli olmadığı durumlarda en iyi sonucu üreten enterpolasyon tekniğidir (Fritsch & Carlson, 1980).

FULL TEXTS BOOK

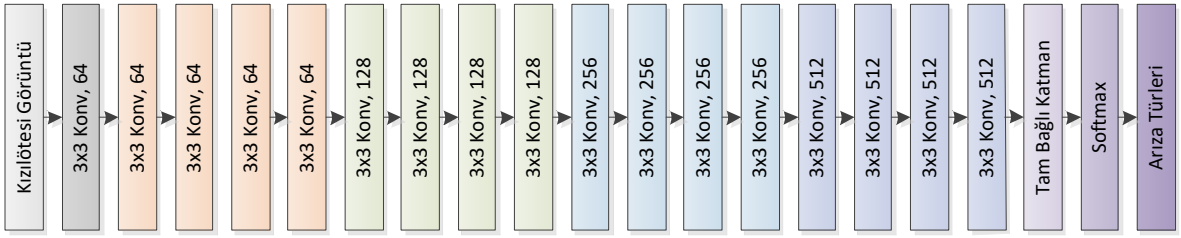


Şekil 1. Bikübik enterpolasyon yöntemi gösterimi.

2.2. ResNet-18 Mimarisi

Artık Ağlar olarak isimlendirilen ResNet mimarisi 2015 yılında Kaiming He ve arkadaşları tarafından geliştirilmiştir. ResNet mimarisi; katılmış olduğu ILSVRC ve COCO2015 yarışmalarında birçok alanda birincilik elde etmiştir (Yu & Wang, 2019).

ResNet, katman sayısı arttıkça eğitim başarısı artar yanılgısını ortadan kaldırmak için geliştirilmiş bir mimaridir. ResNet mimarisi, "resudial" (artık) olarak adlandırılan kısa yol bağlantılarının geliştirildiği bir modeldir. Geliştirilen kısa yol bağlantıları sayesinde bir veya birden fazla katman atlanarak eğitim gerçekleştirilmektedir. Bu sayede aşırı uyum problemlerinin giderilmesine olanak sağlanmaktadır (Yüzgeç & Talo, 2023). Gerçekleştirilen bu çalışmada ResNet-18 mimarisi kullanılmıştır. ResNet-18 mimarisinin yapısı Şekil 2' de gösterilmiştir.

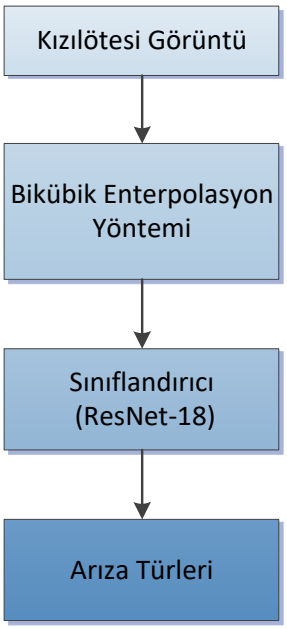


Şekil 2. ResNet-18 Mimarisi.

2.3. Önerilen PV Modül Arıza Tespit Sistemi

Bu çalışmada sunulan PV modül arıza tespit sisteminin en temel özelliği, bikübik enterpolasyon ve ResNet-18 sınıflandırıcıya dayalı sade bir algoritmaya sahip olmasıdır. Şekil 3, sunulan PV modül arıza tespit sisteminin çalışma akışı adımlarını göstermektedir. Sunulan GKB tanıma sistemi birbirini takip eden üç aşamadan oluşur. Bu aşamalar, kızıl ötesi görüntü girişi, bikübik enterpolasyon yöntemi ve ResNet-18 tabanlı sınıflandırmadır. İlk aşama kızılötesi görüntüler için Matlab ortamında veri hazırlama ve etiketleme işlemidir. İkinci aşamada ise her bir kızılötesi görüntüye 2 aşamalı bikübik enterpolasyon işlemi yapılır. Böylece 24×40 piksel çözünürlüğe sahip olan her bir kızılötesi görüntü 48×80 piksel süper çözünürlüğe dönüştürülür. Son aşamada ise süper çözünürlüğe sahip kızılötesi görüntüler, ResNet-18 sınıflandırıcının girişine uygulanarak tanıma sonuçları elde edilir.

FULL TEXTS BOOK



Şekil 3. Önerilen PV modül arıza tespit sisteminin yapısı.

3. BULGULAR VE TARTIŞMA

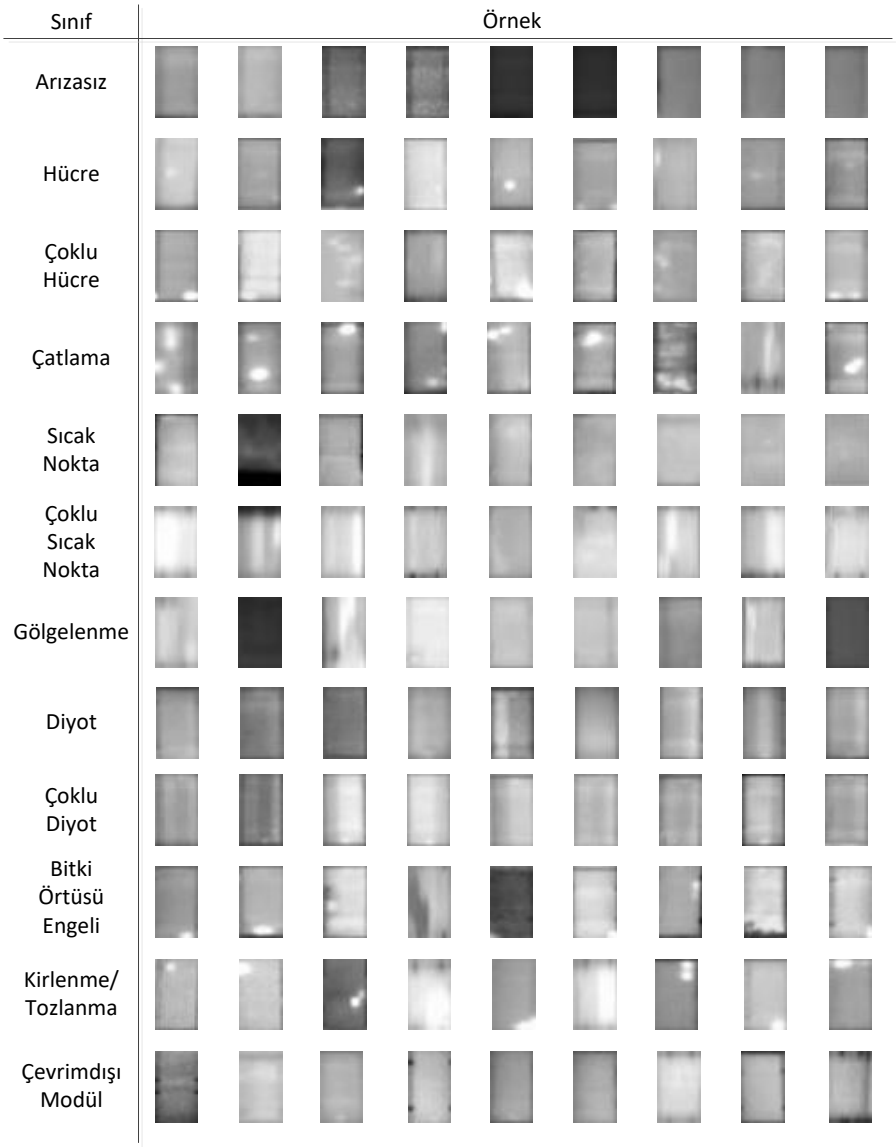
Bu çalışmada sunulan PV modül arıza tespit sisteminin performansını test etmek için bir dizi performans analizleri yapılmıştır. Bu çalışmadaki tüm analizler Matlab(R) 2021 yazılım ortamında gerçekleştirilmiştir. Gerçekleştirilen analizlerde sunulan sistemi değerlendirmek için kamuya açık ve ücretsiz olarak paylaşılan kızılötesi güneş modülleri veri setinden görüntüler kullanılmıştır (Millendorf vd., 2020). Veriler, Raptor Maps Inc ekibi tarafından pilotlu uçaklar ve insansız hava araçlarıyla, orta dalga ve uzun dalga kızılötesi (3–13,5 µm) kameralar kullanılarak toplanmıştır (Alves vd., 2021). Veri seti tek kanalda 24×40 çözünürlükte ve 8 bit derinlikte 20.000 görüntü içermektedir. Bu görüntüler 11 farklı arıza sınıfı ve bir de normal (arızasız) sınıf olmak üzere toplam 12 sınıfa ait görüntülerdir. Veri setinde, arızalı sınıflar için toplam 10.000, arızasız sınıf için yine 10.000 adet görüntü bulunmaktadır. Tablo 1'de her bir sınıfın ismi ve veri sayısı verilmiştir (Millendorf vd., 2020).

Tablo 1. Arıza sınıfları ve açıklamaları.

Sınıf numarası	Sınıf ismi	Görüntü sayısı	Açıklama
1	Arıza yok	10.000	Normal modül
2	Hücre	1877	Tek hücrede kare geometriyle oluşan sıcak nokta
3	Çoklu hücre	1288	Çok hücrede kare geometriyle oluşan sıcak nokta
4	Çatlama	940	Modül yüzeyindeki çatlamadan kaynaklanan modül anormalliği
5	Sıcak nokta	249	İnce film modülü üzerinde sıcak nokta
6	Çoklu sıcak nokta	246	İnce film modülü üzerinde birden fazla sıcak nokta
7	Gölgeleme	1056	Güneş ışığının bitki örtüsü, insan yapımı yapılar veya bitişikteki yapılar nedeniyle engellenmesi
8	Diyot	1499	Aktif bypass diyotu, genellikle modülün 1/3'ü
9	Çoklu diyot	175	Aktif çoklu bypass diyotu, genellikle modülün 2/3'ü
10	Bitki örtüsü engeli	1639	Çevredeki bitki örtüsü tarafından engellenen paneller
11	Kirlenme/tozlanma	204	Modülün yüzeyinde kir, toz veya başka kalıntılar

FULL TEXTS BOOK

12	Çevrimdışı modül	827	Tamamen ısınan ve çalışmayan modül



Şekil 4. Veri setinden rastgele seçilen sınıf örnekleri.

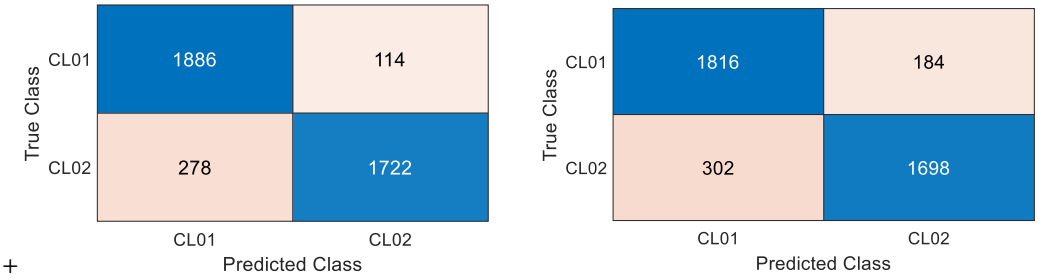
Bu çalışmada sunulan tespit sisteminin performansını değerlendirmek için ilk olarak kızılötesi güneş modül verileri arızasız (CL01)-arızalı (CL02) olmak üzere iki sınıfa ayrılarak arıza tespit sonuçları elde edilmiştir. Bu ikili sınıfın her birinde eşit olarak 10000 adet olmak üzere toplam 20.000 veri bulunmaktadır. Bu verilerin %60'ı (12.000) eğitim, %20'si (4.000) değerlendirme ve %20'si (4.000) test aşamalarında kullanılmıştır. İkili sınıf için gerçekleştirilen sınıflandırma sonuçları Tablo 2'de verilmiştir. Şekil 5'de ise süper çözünürlüklü ve süper çözünürlüksüz durumlar için elde edilen karar matrisi verilmiştir. Bu sonuçlardan da görülebileceği gibi önerilen süper çözünürlüklü yaklaşım ile %90.20'lik bir test başarımı elde edilmiştir. Süper çözünürlüksüz sınıflandırma sonuçlarının ise bu orandan yaklaşık %2.5 daha düşük olduğu görülmektedir.

Tablo 2. Kızılötesi güneş modül verilerinin ikili sınıflandırma başarım oranları.

Yöntem	**Eğitim başarımı**	**Değerlendirme başarımı**	**Test başarımı**
Süper Çözünürlük+ResNet-18	%96.70	%89.43	%90.20

FULL TEXTS BOOK

ResNet-18 (Süper Çözünürlüksüz)	%94.60	%87.43	%87.85



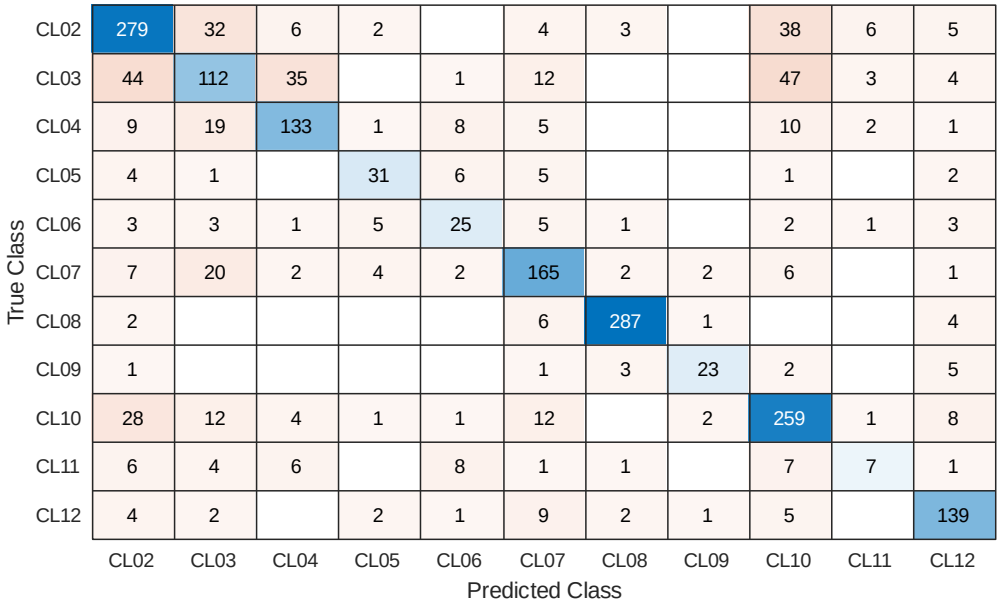
(a) (b)

Şekil 5. Kızılötesi güneş modül verilerinin ikili sınıflandırma sonuçları, (a) Süper çözünürlük+ResNet-18 yöntemi ve (b) ResNet-18 (Süper çözünürlüksüz) yöntemi.

Gerçekleştirilen ikinci sınıflandırma analizinde önerilen süper çözünürlüklü yaklaşım kullanılarak arızalı 11 kızılötesi güneş modül verileri kendi aralarında sınıflandırılmıştır. Tablo 1'de verilen her bir sınıfa ait görüntü sayılarının %60'ı eğitim, %20'si değerlendirme ve %20'si ise test aşamalarında kullanılmıştır. Elde edilen çoklu sınıflandırma sonuçları Tablo 3'de verilmiştir. Şekil 6'da ise süper çözünürlük yöntemi kullanılarak elde edilen karar matrisi verilmiştir. Bu sonuçlardan da görülebileceği gibi önerilen süper çözünürlüklü yaklaşım ile %73.00'lık bir test başarımı elde edilmiştir. Süper çözünürlüksüz sınıflandırma sonuçları ise bu orandan yaklaşık %2.5 daha düşük olduğu görülmektedir.

Tablo 3. Arızalı kızılötesi güneş modül verilerinin sınıflandırma başarım oranları.

Yöntem	**Eğitim başarımı**	**Değerlendirme başarımı**	**Test başarımı**
Süper Çözünürlük+ResNet-18	%87.43	%71.51	%73.00
ResNet-18 (Süper Çözünürlüksüz)	%78.56	%69.67	%70.45



Şekil 6. Arızalı kızılötesi güneş modül verilerinin sınıflandırma sonuçlarına ait karar matrisi (Süper çözünürlük+ResNet-18 yöntemi)

FULL TEXTS BOOK

Son analiz işleminde ise elde edilen bu sonuçlar literatürde aynı veri setini kullanan Alves vd. (2021)'in önermiş olduğu çalışmanın sonuçları ile karşılaştırılmış ve değerlendirmeler yapılmıştır. Alves vd. (2021) ikili sınıf için %92.5'lik sınıflandırma doğruluğu elde etmiştir. Çoklu sınıf için ise başarım oranı %66.43'tür. Bu sonuçlara önerilen yöntemin ikili sınıflandırma başarımı ile benzer bir sonuca sahip olduğu söylenebilir. Çoklu sınıflandırmada ise önerdiğimiz yöntemin başarımı yaklaşık %6 daha iyi bir performans sergilediği görülmektedir. Literatürde aynı veri setini kullanan bazı çalışmalarda çalışmamızdaki sonuçlardan daha iyi sonuçlar elde edildiği görülmektedir. Önerilen bu çalışmada sade bir yaklaşımdan oluşmaktadır. Önerdiğimiz yöntem, veri çoklama (data augmentation) yönteminin kullanımı, farklı derin öğrenme tabanlı sınıflandırıcıların kullanımı ve hatta derin öğrenme tabanlı süper çözünürlük yaklaşımı kullanımı ile geliştirilirse oldukça yüksek başarım elde edileceği söylenebilir. Bu durumları içeren yeni yöntemin geliştirilmesi ileriki çalışmalarda yapılması planlanmaktadır.

4. SONUÇ

Bu çalışmada termografik kızılötesi PV modül görüntüleri kullanılarak, arıza türlerinin derin öğrenme tabanlı ikili ve çoklu sınıflandırılması yapılmıştır. Elde edilen sınıflandırmanın başarısını artırmak için sınıflandırma öncesi her bir görüntüye çözünürlüğü artırmak için bikübik enterpolasyon yöntemi uygulayarak süper çözünürlük elde edilmiştir. Yapılan çalışmada hem ikili hem de çoklu sınıflandırma sonuçlarının süper çözünürlüklü durumda diğer durumdan (süper çözünürlüksüz) daha yüksek başarıma sahip olduğu tespit edilmiştir. Ayrıca yapılan çalışma literatürde aynı veri setini kullanan benzer çalışmalarla karşılaştırılmış ve yapılan çalışmanın oldukça etkili olduğu görülmüştür.

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FULL TEXTS BOOK

İLKÖĞRETİM ÖĞRENCİLERİNDE İKLİM DEĞİŞİKLİĞİ FARKINDALIĞI YARATMAK

RAISING CLIMATE CHANGE AWARENESS AMONG SECONDARY SCHOOL STUDENTS

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ÖZET

Günümüzün en büyük evrensel sorunu niteliğini taşıyan iklim değişikliğinin etkileri gün geçtikçe hızla artmaktadır. Son yıllarda gözlemlenen olağandışı hava olayları (aşırı yağışlar, kuraklık, aşırı sıcaklar, buzulların erimesi, orman yangınları gibi) gelecek için bir uyarı niteliği yansıtmaktadır. Avustralya'da 240 gün süren orman yangınları, Antalya'da 10 gün süren yangınlar, Karadeniz'de seller, İzmir'de denizin taşması sonucu ortaya çıkan sel ve su baskınları son yıllarda dünyada ve ülkemizde görülen can ve mal kaybına neden olan çarpıcı olaylar bağlamında örneklenebilir.

Sayıları hızla artan benzeri olaylar bu bağlamdaki çalışmaların ivedilikle yoğunlaştırılmasını gerektirmektedir. İklim değişikliğinin etkilerini azaltmaya ve bu konudaki farkındalığı artırmaya yönelik olarak Dünyanın çeşitli ülkelerinde olduğu gibi ülkemizde de çeşitli çalışmalar yürütülmektedir. Çalışmanın etkisinin güçlendirilmesi açısından konunun öneminin giderek daha fazla farkında olunmasına bağlı olarak Çevre ve Şehircilik Bakanlığı'nın adına İklim Değişikliği yanı sıra ilköğretimde yer alan Çevre Eğitimi dersinin adına da iklim değişikliği ibaresinin eklenmesi, Ülkemizde konuya dikkat çekmek bağlamında gerçekleştirilen adımlardandır.

Yarının büyüklerine iklim değişikliği farkındalığı kazandırmak, iklim değişikliğini azaltım ve uyum konularında bilgilendirmek yanı sıra Ülkemizin zengin kültürel mirasını tanıtmak, bu eserlerin iklim değişikliği etkilerinden olumsuz şekilde etkilenmemesi açısından yapılabilecekler konusunda onları yönlendirmek üzere bir proje hazırlanmıştır. Dokuz Eylül Üniversitesi güdümlü bilimsel araştırma projesi olarak hazırlanan çalışma, disiplinlerarası bir nitelik yansıtmaktadır. Bu bildiri, 2022 yılından beri süren bu projemizi tanıtmaya yöneliktir. İlköğretim ikinci basamak (ortaokul) öğrencilerinin iklim değişikliği ve tarihi çevre konusundaki farkındalıklarını artırmaya yönelik "İlköğretim Öğrencilerinde İklim Değişikliği Farkındalığı Sağlamaya Yönelik Öğretim Programı ve Zenginleştirilmiş Dijital İçerik Geliştirme (11-14 yaş grubu)" başlıklı proje kapsamında kitap ve dijital içerik niteliğinde iki çıktı üretilmiş, ayrıca iklim değişikliği ile ilintili çeşitli uluslararası bildiriler sunularak yayımlanmıştır. Bu çalışmalar ile, ilgili eğitim düzeyindeki öğrencilerin örgün eğitimine katkı sağlanması, konuya yönelik bilgi ve farkındalığın artırılması düşünülmüştür.

Anahtar kelimeler: İklim Değişikliği, Kültürel Miras, Farkındalık, Azaltım-Uyum Çalışmaları, Öğretim Programı.

ABSTRACT

The effects of climate change, which is the biggest universal problem of our time, are increasing rapidly day by day. Unusual weather events observed in recent years (such as extreme rainfall, drought, extreme heat, melting of glaciers, forest fires) reflect a warning for the future. Forest fires that lasted for 240 days in Australia, fires that lasted for 10 days in Antalya, floods in the Black Sea, floods and inundations caused by the overflow of the sea in Izmir can be exemplified in the context of striking events that have caused loss of life and property in the world and in our country in recent years.

The rapidly increasing number of similar events necessitates the urgent intensification of efforts in this context. In order to reduce the effects of climate change and to raise awareness on this issue, various studies are being carried out in our country as well as in various countries of the world. In order to

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strengthen the impact of the study, the addition of the phrase Climate Change to the name of the Ministry of Environment and Urbanization, as well as the phrase climate change to the name of the Environmental Education course in secondary education, depending on the increasing awareness of the importance of the issue, is one of the steps taken in the context of drawing attention to the issue in our country.
A project has been prepared to raise awareness of climate change among the elders of tomorrow, to inform them about climate change mitigation and adaptation, as well as to introduce the rich cultural heritage of our country and to guide them on what can be done to prevent these artifacts from being adversely affected by the effects of climate change. The study, which was prepared as a dirigible scientific research project of Dokuz Eylül University, reflects an interdisciplinary feature. This paper aims to introduce this project, which has been ongoing since 2022. Within the scope of the project titled "Developing an Instructional Program and Enriched Digital Content for Raising Climate Change Awareness in Secondary School Students (11-14 age group)", two outputs in the form of a book and digital content were produced, and various international papers related to climate change were presented and published. With these studies, it was thought to contribute to the formal education of students at the relevant education level and to increase knowledge and awareness on the subject.
Keywords: Climate Change, Cultural Heritage, Awareness, Mitigation and Adaptation Works, Curriculum.

GİRİŞ

Günümüzde Dünya'nın en önemli sorunu olan ve gelecek açısından da daha büyük risk oluşturan iklim değişikliği, sıcaklık artışı, düzensiz yağışlar, şiddetli rüzgârlar, heyelan ve deniz seviyesinde yükselme gibi pek çok olumsuz etkiye neden olmaktadır. Söz konusu olağandışı hava olayları dünyadaki her canlının yaşamı yanı sıra tüm ekosistemleri giderek artan şiddette tehdit etmektedir. Bu olumsuz olaylar da tüm alanları farklı ölçekte de olsa etkilemektedir. Bildiri kapsamında, belirtilen olumsuz etkilere karşı azaltım ve uyum çalışmaları gerçekleştirmesi beklenen, yarının büyüklerinde farkındalık oluşturmaya yönelik olarak hazırlanan güdümlü bilimsel araştırma projesinin tanıtımına yer verilmektedir.
«İlköğretim Öğrencilerinde İklim Değişikliği Farkındalığı Sağlamaya Yönelik Öğretim Programı ve Dijital İçerik Geliştirme» başlıklı araştırma projesi Prof. Dr. Eti Akyüz Levi yürütücülüğünde 13 kişilik disiplinlerarası bir ekiple yürütülmüştür. Söz konusu ekipte meteoroloji mühendisi, koruma mimarı, eğitimci, sosyolog, bilgisayar ve öğretim teknolojileri eğitimi uzmanı gibi farklı alan uzmanları yer almaktadır. Projemiz, Dokuz Eylül Üniversitesi Bilimsel Araştırma Projeleri Koordinasyon Birimi'nce desteklenmektedir.
Projenin amacı, yarının büyüklerine iklim değişikliği farkındalığı kazandırmak, iklim değişikliğini azaltım ve uyum konularında bilgilendirmek yanı sıra Ülkemizin zengin kültürel mirasını tanıtmak, bu eserlerin iklim değişikliği etkilerinden olumsuz şekilde etkilenmemesi açısından yapılabilecekler konusunda onları yönlendirmektir. Proje ekibinde ağırlıklı olarak Dokuz Eylül Üniversitesi öğretim üyeleri yer almakla birlikte, İstanbul Teknik Üniversitesi, Yıldız Teknik Üniversitesi ve Ankara Üniversitesi'nden öğretim üyeleri de bulunmakta olup, çalışma üniversitelerarası iş birliği bağlamında da önem taşımaktadır.

KAVRAMSAL ÇERÇEVE

İklim değişikliğine ilişkin çeşitli tanımlar yapılmışsa da, Birleşmiş Milletler İklim Değişikliği Çerçeve Sözleşmesi'nde (İDÇS) kavram, *"Karşılaştırılabilir bir zaman periyodunda gözlenen doğal iklim değişikliğine ek olarak, doğrudan ya da dolaylı olarak küresel atmosferin bileşimini bozan insan etkinlikleri sonucunda iklimde oluşan bir değişiklik"* şeklinde tanımlanmıştır (Çevre ve Şehircilik Bakanlığı, 2002).

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Tarihsel süreçte çeşitli zamanlarda iklim değişikliği yaşanmışsa da, bunun özellikle Endüstri Devrimi sonrasında insan faktörü etkisi ile gerçekleştiği belirtilebilir. Atmosfere salınan sera gazlarının artması ile iklim değişikliği ve buna bağlı olarak küresel ısınma ortaya çıkmaktadır.

Son yıllarda hızla artan olağandışı iklim olaylarına bağlı afetler arasında Avustralya'nın birçok bölümünü etkileyen, *240 gün* süren (2019-2020) ülke tarihindeki *en büyük orman yangını,* 2021'de Antalya'da çıkan Cumhuriyet Dönemi'nin en büyük orman yangını, 2023 yılında İzmir'de (Türkiye) deniz taşması sonucu oluşan seller ve su baskınları, 2024 yılında Dubai'deki seller dikkat çekici örneklerdendir (Görsel 1).



Görsel 1 – İzmir'de denizin taşması sonucu ortaya çıkan görüntüler (Haber Türk, 26.11.2023)

Tüm dünyada etkileri görülen iklim değişikliği sonucu ortaya çıkan bu olağandışı hava olayları (orman yangınları, seller, kuraklık, buzulların erimesi gibi) gelecek açısından daha büyük bir endişe kaynağıdır. Bu açıdan proje yarının büyüklerinin beklenilen değişikliklere hazırlıklı olması açısından önem taşımaktadır. Söz konusu çalışma, bu bağlamda farkındalık geliştirmek yanı sıra ülkemizin eşsiz tarihi değerlerinin bu durumdan etkilenmemesi için gerekli çabayı gösterecek bireyler yetiştirmeyi hedeflemektedir.

Türkiye, doğal güzellikleri yanı sıra tarihi dokuları, arkeolojik alanları ile de son derece zengindir. Ülkemizin UNESCO Dünya Miras Listesi'nde 21 adet varlığı bulunmaktadır. Bunlar arasında Göbeklitepe, insanlık tarihini değiştirmesi açısından oldukça önemlidir (Görsel 2). Bu varlıkların yaşatılarak korunması, sürdürülebilirliğinin sağlanması, iklim değişikliğinin olumsuz etkilerinden zarar görmemesi bu konuda bilinç geliştirilmesi ile olanaklı olabilir.

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Görsel 2 – UNESCO Dünya Miras Listesi'ndeki varlıklarımızdan Göbeklitepe

İklim değişikliği ve küresel ısınma, insan-doğa etkileşiminin sonuçları arasında yer alan iki sorun olarak görülmektedir (Odabaş, 2018). İklim değişikliği konusunda afet yönetimi de başlangıçta azaltma odaklı iken, süreçte uyum olarak değişmiştir (Adger vd., 2009). Dolayısıyla günümüzdeki çabalar, hem karbon salımını azaltma yoluyla küresel ısınmayı kontrol etme hem de yeni oluşacak şartlara uyum sağlanmasına yöneliktir. Kültürel miras da, iklim değişikliği etkilerinden kıyılarda yer alan tarihi, arkeolojik alanlar ve geleneksel yerleşimlerin deniz suyu seviyesinin yükselmesi nedeni ile sular altında kalma riski, orman yangınları ve sellerle zarar gören ve yok olan tarihsel alanlar, yöresel mimari, iklim değişikliğine bağlı göçler sonucu yerin ruhunun zedelenmesi ve somut olmayan kültürel mirasın kaybı, aşırı ısı farklarının tarihi yapı malzemeleri üzerinde oluşturduğu yıpranma etkisi gibi pek çok açıdan etkilenmektedir. Bu bağlamda projede konu, tarihi çevre odaklı olarak ele alınmıştır.

Ülkemizin çok zengin tarihsel yerleşimleri, geleneksel dokuları, antik kentlerinin evrensel miras olarak önemi ve sürdürülebilirliğinin gerekliliği bu varlıkların iklim değişikliğinden nasıl etkileneceği konusunu düşündürmektedir. Dolayısı ile bu konuya daha fazla odaklanılıp farkındalık geliştirerek gelecek açısından çözüm üretme bağlamında çalışma önem taşımaktadır.

YÖNTEM

Çalışma kapsamında program analizi yöntemi kullanılmış, bu bağlamda tarihi çevre koruma konusunda öncü nitelik yansıtan İtalya, Fransa ve İngiltere'de ilgili yaş grubunun öğretim planlarında iklim değişikliğine ilişkin kavramlar belirlenmiştir. Ayrıca ülkemizde örgün eğitimde ilgili yaş grubuna yönelik öğretim programları ve ders içerikleri incelenerek analiz edilmiştir.

Çalışmanın aşamaları olarak öncelikle **ihtiyaç analizi** bağlamında:

- İklim değişikliğinin en önemli evrensel sorun niteliğini yansıtması,
- Ülkemizin kültürel mirasının yaşatılarak korunmasının ancak tanınması ve koruma bilincinin geliştirilmesi ile olabileceği,
- İklim değişikliği konusunda ülkeler ve kurumlar ölçeğinde yapılan çalışmaların yeterli olmadığı,
- Bireysel farkındalık kazandırmanın gerekliliği,
- Bu bağlamda en etkili yaş grubunun ilköğretim ikinci basamak düzeyi olduğu,
- Söz konusu yaş grubunun daha iyi ve etkili öğrenmesi açısından dijital eğitim malzemesi oluşturulmasının önemi belirtilebilir.

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Adımlar:

1
- İklim değişikliği ve tarihi çevre konusunun belirlenmesi
- Seçilen ülkelerde ilgili ilköğretim ikinci basamak öğretim programlarının incelenmesi

2
- Ülkemizdeki konu ile ilgili ilköğretim ikinci basamak öğretim programlarının ve ders kitaplarının incelenmesi
- Kavramların belirlenerek içerik oluşturulması

3
- Her bölümle ilgili öğrenme çıktılarının belirlenmesi
- Alan uzmanlarının bölümleri yazması

4
- Kitabın basımı
- Kitabın özet e-kitap niteliğinde dijital içeriğe dönüştürülmesi

5
- Konu ile ilintili uluslararası yayınların yapımı
- Dijital içeriğin açık erişimle yaygın etkisinin artırılması

6
- Üretilen çalışmaların ilgili yaş grubunun eğitimine katkı sağlaması, eğitim programında yer alması
- Yaygın etkiyi artırmaya yönelik tanıtım toplantıları

Çalışmanın çıktıları:

Öğretim planı

Basılı kitap

Zenginleştirilmiş dijital içerik

FULL TEXTS BOOK



Görsel 3 – Basılı kitabın kapak görüntüsü



Görsel 4 – Zenginleştirilmiş dijital içerikten görünüm

Çalışma her biri ilgili alan uzmanınca yazılan sekiz bölüm olarak düzenlenmiş; sonrasında özet e-kitap niteliğindeki zenginleştirilmiş dijital içerik hazırlanmıştır. Böylece, seslendirme ve videolarla daha etkileşimli ve etkili öğrenmeye olanak sunan dijital eğitim materyali oluşturulmuştur. Uluslararası yayınlarla da çalışmanın tanıtımı gerçekleştirilmektedir. E-kitabın açık erişime açılması ile yaygın etkisi artacaktır.

SONUÇ ve TARTIŞMA

Sonuç olarak, iklim değişikliği giderek etkileri artan evrensel bir gerçeklik durumundadır. Bu açıdan gerek azaltım, gerekse uyum çalışmaları ile söz konusu olumsuz etkileri azaltma konusunda yalnızca devlet ve kurumların değil, bireylerin çaba göstermeleri gerekmektedir. Bu açıdan çalışma, yarının büyüklerine gerekli farkındalığı kazandırmak ve konuya ilişkin öğrenmenin daha çarpıcı ve etkileyici şekilde gerçekleşmesine olanak sağlamak açısından zenginleştirilmiş dijital içerik oluşturmaya yöneliktir. Böylece ilgili yaş grubu öğretim planlarında yer alan dijital eğitim malzemesi oluşturulması önerilerine de yanıt sunmaktadır.

FULL TEXTS BOOK

Çalışmanın tarihi çevre odaklı olarak ele alınması da onu özgün kılan diğer unsurlardandır. İklim değişikliğinin olumsuz etkilerine karşı Türkiye'nin eşsiz tarihi güzelliklerinin yaşatılarak korunması ve sürdürülebilirliğine de katkı sağlayacaktır. Çalışma ile ilgili oluşturulan öğrenme araçlarının açık erişim ile geniş kitlelere ulaşması etki gücünü, dolayısıyla çalışmanın başarısını artıracak ve hedefin gerçekleşmesine yardımcı olacaktır.

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FULL TEXTS BOOK

BORAKS VE ÇEŞİTLİ BİTKİ ESKTRAKTLARININ AHŞAP MALZEMEDE YANMA DÜZEYİNE ETKİLERİ
EFFECTS OF BORAX AND VARIOUS PLANT EXTRACTS ON THE COMBUSTION LEVEL IN WOOD MATERIALS

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ÖZET

Gerek ülkemiz ve gerekse ekosistemde (yeryüzü) orman yangınları hızla artmakta, tüm yaşanılan mekânlarda (iç/dış) yanma/yangın tehditleri devam etmektedir. Orman yangınları çok büyük alanlarda gerçekleşirken insanoğlunun yaşamış ve kullanmış olduğu tüm alanların çok çeşitli özelliklerde olması (banka, işyeri, tesisler vb.) yanma/yangın olaylarında kullanılması gereken materyal/yöntemler değişiklik gösterebilmektedir. Bu durum çok çeşitli yangın geciktirici materyal/yöntemler geliştirilmesine zorlamakta insan/çevre sağlığı bilinciyle yangın etkilerine karşı doğal/etkin koruyucular ön plana çıkmaktadır. Yanma parametreleri sadece materyal/yöntemle sınırlı olmayıp içinde bulunulan ortamın oksijen indeksi miktarı (LOI) önemli kısmı teşkil etmektedir. Çalışma kapsamında Karaçam odunu (*Pinus nigra Arnold*) türü tercih edilmiş ve çeşitli konsantrasyonlarda (% 3, % 5) tıbbi aromatik bitki türlerinden lavanta bitki ekstraktı ile boraks çözeltileri vakum yöntemiyle emprenye işlemine tabi tutulduktan sonra tutunma düzeyleri ve sonrasında piroliz işlemi uygulanıp, sınırlayıcı oksijen indeksi (LOI) test ölçümleri yapılarak yine piroliz işlemi uygulanmış kontrol gruplarıyla kıyaslanmıştır. Ahşap endüstrisinde kullanım düzeyi ve özellikle yangına karşı etkileri araştırılmıştır. Sonuçlar değerlendirildiğinde; piroliz işlemi uygulanmış emprenyesiz kontrol gruplarının LOI değerleri ile Piroliz işlemi uygulanmış emprenyeli örnekler üzerinde LOI değerleri kıyaslandığında; LOI değeri özellikle boraks emprenyesi ve borikasit+lavanta ekstraktı emprenyesinde en olumlu sonucu verdiği belirlenmiştir.

Gruplar kendi içinde kıyaslandığında; en yüksek LOI değeri %5'lik boraks ile emprenye edilmiş karaçam odunu üzerinde (% 46.42) olarak belirlenmiştir. En yüksek tutunma düzeyi boraks'ın tek başına kullanımında gerçekleşmiştir.

Anahtar Kelimeler: Ekoloji, Yanma, Bitki Ekstraktı, Bor, İnsan/Çevre Sağlığı

ABSTRACT

Forest fires are increasing rapidly both in our country and in the ecosystem (earth), and burning/fire threats continue in all living spaces (indoor/outdoor). While forest fires occur in very large areas, the materials/methods to be used in burning/fire events may vary due to the diverse characteristics of all areas where human beings have lived and used (banks, workplaces, facilities, etc.). This situation forces the development of a wide variety of fire retardant materials/methods, and with the awareness of human/environmental health, natural/effective protectors against the effects of fire come to the fore. Combustion parameters are not limited to the material/method, but the oxygen index (LOI) of the environment is an important part. Within the scope of the study, larch wood (Pinus nigra Arnold) type was preferred and after impregnation with lavender plant extract from medicinal aromatic plant species and borax solutions in various concentrations (3%, 5%) by vacuum method, adhesion levels were obtained and then pyrolysis process was applied and limiting oxygen index was determined. (LOI) test measurements were made and compared with the control groups that were also subjected to pyrolysis. The level of use in the wood industry and especially its effects against fire have been investigated. When the results are evaluated; When the LOI values of the unimpregnated control groups that were subjected

FULL TEXTS BOOK

to pyrolysis were compared with the LOI values of the impregnated samples that were subjected to the pyrolysis process; It was determined that the LOI value gave the most positive results, especially in borax impregnation and boric acid + lavender extract impregnation. When groups are compared within themselves; The highest LOI value was determined as (46.42) on larch wood impregnated with 5% borax. The highest adhesion level was achieved when borax was used alone.
Key Words: Ecology, Combustion, Plant Extract, Boron, Human/Environmental Health.

1. GİRİŞ

Odun ve selülozik materyallerde yanmayı önlemek için birçok yanmayı geciktirici kimyasal madde kullanılmaktadır. Yanmayı geciktirici kimyasal olarak bor bileşiğine dayalı ürünler, duman bastırıcı özelliklerinden dolayı yalnız veya birlikte kullanılmaktadır. Yanmayı geciktiriciler yapısal özelliklerinden dolayı yanmayı ya azaltırlar ya da önlerler. Kömürleşme oluşumunu sağlarlar. Ağaç malzemenin yüzeyinde meydana gelen kömürleşmeden dolayı iç kısımlara iletilen ısı miktarı, malzemenin içerisinde bulunan yanıcı gazların dışarı çıkmasına yeterli olmadığından yüzeydeki tutuşmayı durdurduğunu bildirmiştir (Baysal, 2002). Dubey ve ark. (2012) Ekosistemin canlılığı, ahşap endüstrisinde yeni organik koruyucu/üst yüzey işlem maddeleri elde edilmesi, geliştirilmesi ve yeni emprenye metotlarının belirlenmesi insanlığın geleceği açısından hayati önem taşımaktadır. Ahşap, doğru kullanım şartları altında birçok endüstride önemli hizmetler sağlayabilir. Ancak, elverişsiz kullanım ortamları ve yangın ahşaba kolayca zarar verebilir. Bu yüzden ahşabın yangın geciktiricilerle muamele edilmesi hayati öneme sahip bir işlemdir. Brunc ve ark. (2003) Odun gibi yenilenebilir enerji kaynaklarının kullanılmasındaki artış sera gazının etkisinin önemli nedenlerinden biri olan CO_2 problemini çözmek içindir. Bu avantajından dolayı günümüzde fosil yakıtlar biyokütle ile yer değiştirdiğini tespit etmişlerdir.

Wang ve ark (2010) Ağaç malzemenin hızlı pirolizi, yavaş pirolize oranla yanma ısısını arttırdığından daha az kömürleşmeye ve daha fazla yanıcı gaz çıkmasına yol açmaktadır. Yavaş piroliz de ise, daha fazla kömürleşme ve daha az yanıcı gaz çıkısı olmaktadır. Odunda, selülozun yanması ile çoğu tutuşucu özellikte gazların çıkısına ve ligninin yanmasıyla da kor halinde yanan maddelerin oluşmasına neden olmaktadır.

Onaran (2018) Reçine ve yaprak Özütlerinin(ekstrat) fungal adlı hastalık etmenlerine karşı kullanılmış olan her konsantrasyonda antifungal aktivite göstermiştir. Konsantrasyonun dozu arttıkça Miselyum gelişim engellemesi değerinin arttığı belirlenmiştir. Reçine ve yaprak ekstraktı karşılaştırıldığında reçine ekstratı yaprak ekstraktına kıyasla daha etkili bir sonuç bulunmuştur

Doğal bitkiler çok çeşitli amaçlarla (fitoperapi, baharat,çay, böcek ilacı, boya, yağlarında faydalanma, sanayi, kozmetik vb) kullanılmaktadır. Doğal (organik) bir yapıda olan ahşabın, antioksidan/antibakteriyel özelliği belirlenmiş lavanta bitkisinin çeşitli konsantrasyonlarından ekstrat (özüt) elde edilmesiyle emprenye edilebilme özelliği İnsan/çevre sağlığının sentetik ve kimyasal maddelerle tehdit edilmesi, orman kaynaklarının hızla azalması, küresel iklim değişikliği, yangınlar karşısında ekosistemde (doğada) bulunan materyalin mümkün olduğu kadar yine doğal yollarla hazır hale getirilerek ahşap malzemede kullanımı amaçlarıyla lavanta bitki ekstraktının çeşitli konsantrasyonlarda kullanımı ve akabinde boraks emprenye maddelerinin ayrı ayrı ve karışım halinde (boraks+ekstrakt) uygulanıp limit oksijen indeksi (LOİ) belirlenmesi suretiyle de kullanılabilirlik etkisinin belirlenmesi hedeflenmiştir.

2. MATERYAL ve YÖNTEM

Çalışma kapsamında lavanta (*Lavandula angustifolia Mill.*) bitkisinin ekstraktı çeşitli konsantrasyonlarda (%3, %5) hazırlanmıştır. Ahşap malzeme olarak karaçam (*Pinus nigra Arnold*) odunu tercih edilmiştir. Örnekler rastgele seçilen, çatlaksız, düzgün liflere sahip, ardaksız, budaksız,

FULL TEXTS BOOK

renk ve yoğunluk farkı olmayan özellikte olmasına dikkat edilmiştir. Daha sonra örnekler TS ISO 13061-1 standardına göre hazır hale getirilmiştir.

2.1. Deney Örneklerinin Hazırlanması ve Emprenye Yöntemi

Piroliz işlemi için 110x20x20 mm ebatlarında örnekler hazırlanmış olup alevli yakma işlemi sonrası örnek boyutları el planya makinesinde kömür kısmı kazınıp; 100x10x10 mm olarak LOI analizleri için odun örnekleri hazırlanmıştır. Sonrasında 103±2 °C sıcaklıktaki etüvde 24 saat bekletilmiştir (Yılgın ve ark.2005). Deney örneklerinin emprenyesinde ASTM D 1413-76 standardında öngörülen şekilde 70 cm Hg-1 basınca eşdeğer ön vakumun 30 dk süreyle uygulanmasının ardından 30 dk süreyle atmosferik basınçta örnekler çözelti içerisinde difüzyona bırakılmıştır

2.2. Çözelti Hazırlama

Lavanta yaprakları ayrıldıktan sonra damıtılmış su veya en az bu saflığa denk bir su içerisine konarak belli aralıklarla karıştırılmak suretiyle 1 saat süre geri soğutuculu düzenekte kaynama noktasının altında bir sıcaklıkta ısıtılmış, önceden hazırlanmış gözenekli kapsül içerisinde vakum eşliğinde süzüldükten sonra balon içerisinde numune kalmayacak şekilde birkaç kez damıtılmış su ile yıkanacak şekilde işleme devam edilmiş ve çözünmeyen kısım tamamıyla gözenekli kapsül içerisine konmuştur. Son olarak kalıntı 200 ml sıcak damıtılmış su ile yıkanmış ve kalıntının bir pompa veya emme vazifesi görecek bir başka cihaz yardımıyla suyu alındıktan sonra gözenekli kapsül ve içerenindekiler 103^{o}C'de ayarlı etüv içerisinde 16 saat tutulmak suretiyle kurutulduktan sonra desikatörde soğutulmuş ve 0.001 g hassasiyetle tartım işlemi yapılmıştır (Ceylan,2020).

2.3.Piroliz İşlemi

Piroliz işlemi ASTM D 1102-84 (2021) esaslarına göre gerçekleştirilmiştir. Çelik telden yapılmış kafes içerisine toleranslı boyutlarda (110x20x20 mm) hazırlanan odun örnekleri pürmüz kullanılarak 1300 °C açık mavi renkte alevli yanma uygulanmıştır. karaçam örnekleri için 5 dakika alevli yanma gerçekleştirilmiştir. Sonrasında yüzeylerdeki kömürleşmiş kısım planya makinesinde kazınıp 100x10x10 mm ebatlarında örnekler hazırlanmıştır.

2.2.5. Limit oksijen indeks Testi (LOI)

Tutuşma işlemi gerçekleşen yanıcı maddelerin yanıcılık özelliği oksijen indeks testi ile belirlenmektedir. Bu değer yanmanın devam edebilmesi için ortamda bulunması gereken oksijen miktarını ifade etmekte olup; yanma olayının tam olarak nasıl gerçekleştiği, yanma sonrası kalıntılarda, ayrışabilir organik maddelerde bulunan karbon miktarı tespit edilmektedir ASTM 2863-09 (2006).

3. BULGULAR VE TARTIŞMA

3.1. Çözelti Özelliği

Çözelti özelliğine ilişkin bulgular Tablo 1 'de verilmiştir.

Tablo 1. Çözelti Özellikleri

Bitki Ekstraktı/Boraks	**Çözücü Materyal**	**Sıcaklık (ºC)**	**pH**	**Yoğunluk**

FULL TEXTS BOOK

					k (g/ml)	
			EÖ	ES	EÖ	ES
% 3 (Lavanta)	Su	22ºC	7.01	7.02	0.928	0.928
% 5 (Lavanta)			7.07	7.02	0.923	0.923
% 3 (Boraks)			9.21	9.21	1.020	1.020
% 5 (Boraks)			9.67	9.67	1.010	1.010
% 3 (Boraks)+ % 3 (Lavanta)			8.05	8.05	0.996	0.996
% 5 (Boraks)+ % 5 (Lavanta)			7.67	7.68	0.890	0.890

EÖ: Emprenye öncesi **ES::**Emprenye sonrası

Çözeltinin emprenye öncesi ve sonrasında Ph ve yoğunluk değerlerinde değişim olmamamıştır. Lavanta bitki ekstraktının su ortamında konsantrasyonunun hazırlanması çözeltinin nötre yakın olmasını sağladığını söyleyebiliriz.

3.2. % Retensiyon

Tam kuru odun ağırlığına oranla tutunan katı madde miktarı (% retense) Tablo 2 ‘de verilmiştir.

Tablo 2. Tutunan Madde Miktarı (%)

Bitki Ekstraktı/Boraks	Çözücü Materyal	Sıcaklık (ºC)	% Tutunma)	
			Ortalama	HG
% 3 (Lavanta)	Su	22ºC	0.91	E
% 5 (Lavanta)			0.85	F
% 3 (Boraks)			2.56	A
% 5 (Boraks)			2.35	B
% 3 (Boraks)+ %3 Lavanta Bitki Ekstraktı			1.94	C
% 5 (Boraks)+ %5 Lavanta Bitki Ekstraktı			1.48	D

En yüksek tutunma değeri % 3 boraks çözeltisinde (% 2.35), en düşük tutunma değeri % 5 lavanta bitki ekstraktında (% 0.85) gerçekleşmiştir. Tutunma düzeyi odunun anatomik yapısı ve lavanta bitkisinin morfololjik yapısından kaynaklandığını söyleyebiliriz. Özellikle ekstrakt hazırlığında su veya etano/metanol’ün tutunmada etkili olduğu belirgindir.

3.3. Karaçam Odununda Limit Oksijen İndeks Testi (LOI)

Karaçam odununda limit oksijen indeks test (LOI) sonuçları Tablo 3’te verilmiştir.

Tablo 3. Karaçam Odununda Piroliz İşlemi Sonrası (LOI) Sonuçları (%)

FULL TEXTS BOOK

Bitki Ekstraktı/Boraks	Çözücü Materyal	Sıcaklık (ºC)	LOI (%)	
			Ortalama	HG
Karaçam Odunu (Kontrol)	-	-	32.58	E
% 3 (Lavanta)	Su	22ºC	21.45	G
% 5 (Lavanta)			26.10	F
% 3 (Boraks)			45.56	A
% 5 (Boraks)			46.42	B
% 3 (Boraks)+ %3 Lavanta Bitki Ekstraktı			37.29	C
% 5 (Boraks)+ %5 Lavanta Bitki Ekstraktı			35.46	D

Kontrol örneğine oranla karaçam odununda en yüksek LOI değeri % 5 Boraksta (% 46.42), en düşük % 3 lavanta bitki ekstraktında örneğinde (% 21.45) tespit edilmiştir. Bu durum emprenye maddesi, odunun anatomik yapısı, emprenye metodu ve konsantrasyondan kaynaklanmış olabilir. Lavanta bitki ekstraktı gerek %3 ve gerekse % 5 konsantrasyonda kontrol örneğine oranla ciddi bir performans gösterememiştir. Bu durum lavanta bitkisinin morfolojik özelliklerinden kaynaklanmış olabilir.
Yılgın ve ark. (2005) yaptıkları araştırmada meşe, çam ve kavak gibi odun türlerinin farklı sıcaklıklardaki flash pirolizi araştırıldı. Yenilenebilir bir enerji ve kimyasal hammadde kaynağı olan odunun flash pirolizi ile elde edilen sıvı ve diğer ürünlerin verimi üzerine sıcaklığın (400, 500 ve 600° C), tane boyutunun (8, 10 ve 12 mm) ve odun türünün etkisi incelemişler, sıvı ürün verimi, piroliz sıcaklığının artması ile artarken tane boyutunun artması ile azaldığını, odun türünün piroliz ürün verimleri üzerinde etkili olduğu bildirmişlerdir.

Uysal ve ark. (2011) yanma riski bulunan alanlarda emprenye yapılan ve vernik uygulanan ağaç malzemelerin, sıcaklığı arttırıcı ve yanma ürünü açığa çıkan gazları arttırıcı özelliği olduğu dikkate alınması gerektiğini ve yangın riski bulunan mekânlarda kullanılacak ağaç malzemelerin emprenye işlemi sonrası vernik uygulanmamış olmasının daha faydalı olacağı bildirmiş, aynı zamanda emprenye maddesi olarak boraks, vernik olarak ise su bazlı vernik uygulanmasını önermişlerdir.

Rowell ve ark.(1984) Ligninin yanma sırasında kömür oluşum oranı selüloz ve hemiselüloza göre yüksek olduğu böylece. lignin ısıya daha dayanıklı bir yapı sergilediği tespit edilmiş, ligninin kömür oluşturma oranının yüksek olması yanıcı gaz oluşumunu azaltmakta ve böylece odunda meydana gelecek daha ileriki ısısal bozulmaları engellediği bildirilmiştir

4. SONUÇ VE ÖNERİLER

Doğal ve organik lavanta bitki özütünün antibakteriyel/antioksidan yapısı insanlığın ve çevrenin geleceğinde bu tür yapılar önemli rol üstlenecektir. Salgın hastalıklar, pandemiler vb ciddi sıkıntılı ortamlar oluştukça özellikle tıbbi aromatik bitki kullanımı yüzyıllar boyu her alanda kullanımı öne çıkmaya devam edecektir. Özellikle iç/dış mekan mobilyaları, inşaat endüstrisi (ahşap yapılar) vb tüm alanlarda bu materyaller üst yüzey, boya, vernik türleri olarak kullanımı zorunlu hale gelmiştir. Emprenye işlemi ile ahşap materyalde tutunan madde miktarı bir miktar daha artış göstermektedir. Tüm kullanılan koruyucu materyallerin yanma, mekanik, piroliz, özgül ağırlık vb özelliklerine bakılarak kullanım alanları belirlenmektedir. Kullanılan yöntem ve kullanılan emprenye maddelerinin çevre dostu ve insan sağlığına zarar vermemesi yaşam alanlarında rahatça kullanılabileceği gerçeğini ön plana çıkarmaktadır. Kullanılan yöntem ve emprenye maddeleri ile elde edilen ahşap malzemelerin yapıda

FULL TEXTS BOOK

kullanılması açısından; inşaat. sigortacılık. peyzaj. tabakalı ağaç malzeme vb birçok orman ürününün iyileştirilmesi ve bahsi geçen sektörlerin daha rasyonel bir üretime yönelmeleri sağlanacaktır. Dolayısı ile her geçen gün daha da azalan orman kaynakları daha verimli kullanılmış olacaktır. Gerek dünyada ve gerekse Türkiye'de 2021 yılında orman yangınlarda 139.500 hektar alan yanmıştır. Üzerindeki yanan ağaçların bir kısmı söndürme faaliyetlerinde dış katmanı kömür olarak fakat enine kesitlerinde iç kısımlarının yanmadığı belirlenmiştir.

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FULL TEXTS BOOK

LAVANTA BİTKİ EKSTRAKTININ AHŞAP MALZEMEDE KULLANIMI VE YÜZEY PARLAKLIK DEĞİŞİMİ

USE OF LAVENDER PLANT EXTRACT ON WOOD MATERIALS AND SURFACE GLOSS CHANGE

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ÖZET

Dünyada çevre ve insan sağlığı bilinci ile doğal ve yenilenebilir enerji (Biyo endüstri) kaynaklarından yararlanarak, amaca uygun ve zararsız alternatif ürünler geliştirmenin önemi her geçen gün artmaktadır. Bu çalışmada; doğal bir ürün olan lavanta bitkisinden ekstrakt elde etmek suretiyle, çevre ve insan sağlığına zararsız, doğal ve su-bazlı ahşap koruyucu ve renklendiricilerin elde edilmesi ve geliştirilmesi, ahşap türlerinde uzun süreli koruyuculuk sağlanabilmesi amaçlarına yönelik olarak da tutunma oranları belirlenmiş; odun türüne bağlı olarak ta yüzey parlaklık değişimleri saptanmıştır..

Araştırmada, lavanta bitki ekstraktından elde edilen organik boyar maddenin odun koruma endüstrisinde kullanım olanakları araştırılmış, odunda toplam tutunma (retensiyon) miktarları ve % retensiyon oranları belirlenmiştir. Lavanta bitki ekstraktı ISO 1574 -TS 1563 standartlarına göre elde edilmiş olup, ASTM D 1413-76 (1976) standardına göre emprenye işlemi gerçekleştirilmiştir. Ahşap malzeme olarak; karaçam (*Pinus nigra*), Akçaağaç odunu (*Acer campestre*) odunları kullanılmıştır. Deney sonuçları göre; en yüksek % retensiyon oranı akçaağaç odununda (% 3.68), en düşük karaçam odununda (% 2.10) olurken; en yüksek toplam retensiyon değeri akçaağaç odununda (59.63 kg/m^3), en düşük karaçamda (36.45 kg/m^3) gerçekleşmiştir. En yüksek parlaklık değeri akçaağaç 'da (65 Gloss) tesbit edilmiştir. Lavanta bitki ekstraktından elde edilen organik maddenin, ahşap malzemede emprenye maddesi olarak kullanılabileceği tutunma düzeyi ile ortaya konmuştur.

Anahtar Kelimeler: Biyokütle, ekosistem, atık çay, ekstrakt, parlaklık, insan/çevre sağlığı**.**

ABSTRACT

The importance of developing suitable and harmless alternative products by taking advantage of natural and renewable energy (Bio industry) resources with environmental and human health awareness in the world is increasing day by day. In this study; Adhesion rates have also been determined for the purposes of obtaining and developing natural and water-based wood preservatives and colorants that are harmless to the environment and human health by obtaining extract from the lavender plant, which is a natural product, and providing long-term protection of wood species; Surface brightness changes were determined depending on the wood type.

In the research, the possibilities of using the organic dyestuff obtained from lavender plant extract in the wood preservation industry were investigated, and the total retention amounts and % retention rates in wood were determined. Lavender plant extract was obtained according to ISO 1574 -TS 1563 standards, and the impregnation process was carried out according to ASTM D 1413-76 (1976) standard. Wood as material; Black pine (Pinus nigra) and maple wood (*Acer campestre*) woods were used. According to the test results; The highest retention rate was in maple wood (3.68%) and the lowest in larch wood (2.10%); The highest total retention value was in maple wood (59.63 kg/m^3) and the lowest in larch wood (36.45 kg/m^3). The highest gloss value was determined in maple (65 Gloss). It has been demonstrated by its adhesion level that the organic matter obtained from lavender plant extract can be used as an impregnation agent in wood materials.

Key Words: Biomass, ecosystem, lavander extract, gloss, human/environmental health.

FULL TEXTS BOOK

1.GİRİŞ

Ahşap eski çağlardan günümüze kadar sıkça tercih edilen bir yapı malzemesi olmuştur. Fakat ahşabı besin maddesi olarak gören biyolojik canlılar ve çevresel faktörler nedeniyle mekanik ve fiziksel hasarlara uğrayabilmektedir. Ahşapta oluşan hasarları engellemek için birçok medeniyet farklı yöntemler kullanmıştır. Çinlilerin tuzlu suyla, Yunanlıların sedir ve zeytinyağıyla, Vikinglerin hayvansal yağlarla ve Osmanlınınsa zift ve halat parçalarıyla ahşabı korumaya çalıştıkları bilinmektedir. Geçmiş dönemlerde kullanılan ahşap koruyucuların çevresel etkileri her ne kadar az olsa da teknoloji ve sanayinin gelişmesiyle daha uzun ömürlü ahşap malzemeye olan talep ve ihtiyaç artmıştır. Özellikle, kullanılan kimyasal ürünler malzemenin hizmet ömrünü uzatmakta fakat çevresel zararlara ve hastalıklara neden olmaktadır. Arsenik kullanımının cilt kanserine neden olabileceği, bakırın ise sulak alanlarda akma yaparak deniz canlılarına zarar verdiği bilinmektedir. Bununla birlikte belli başlı kanserojen kimyasalların kullanımı yasaklansa da günümüze bakıldığında hala bu ahşap koruyucular kullanılmaktadır. Güncel olarak kullanılan ahşap koruyucular her ne kadar ekolojik olarak adlandırılsa da içeriğindeki maddeler incelendiğinde hedefte olmayan canlılara da zararlı olduğu görülmektedir (Hülagü ve ark. 2023).

Sığla ağacında elde edilen Reçine ve yapraklar oda koşullarında metanol ile ekstre edilip elde edilen ekstrelerin Alzheimer hastalığı ile ilişkisi olan asetilkolineteraz ve bütirilkolinesteraz enzimlerinin orta seviyede Alzheimer hastası olan kişilerin tedavisinde kullanılan galantaminin inhibisyonu ile kıyaslanmış ve sonuçta 200 ppm konsantrasyonda reçine ve yaprak ekstreleri sırasıyla, AChE enzimine karşı % 70,79-% 89,15 inhibisyon gösterirken, BChE enzimine karşı % 80,49-% 80,50 inhibisyon göstermiş. Reçine ve yaprak özütlerinin(ekstre) her iki enzimi de galantaminden daha iyi inhibe etmesi, sığla ağacının hem doğal hemde zararsız potansiyel antikolinesteraz ajanı olarak kullanılabileceğine göstermektedir (Gülsen vd. 2011).

Elma ve hıyar bitkilerinde soruna sebebiyet veren fungal adlı hastalık etkenleri Fusarium oxysporum f.sp. cucumerinum (FOC) ve Monilinia fructigena'ya karşı bitki ekstraklarının kontrol gurubu 5,10, ve 20 mg/ml olmak üzere farklı konsantrasyonları kullanılmış ve bu kontrasyonla ulaşılan verilerde, Letal Doz ve Miselyum değerleri belirlenmiş. Reçine ve yaprak Özütlerinin(ekstrat) fungal adlı hastalık etmenlerine karşı kullanılmış olan her konsantrasyonda antifungal aktivite göstermiştir. Konsantrasyonun dozu arttıkça Miselyum gelişim engellemesi değerinin arttığı belirlenmiştir. Reçine ve yaprak ekstratı karşılaştırıldığında reçine ekstratı yaprak ekstratına kıyasla daha etkili bir sonuç bulunmuştur (Onaran, 2018).

Atık yağlar ile emprenye işlemi yapılmış ve ağaç malzemenin emprenye sonrası fiziksel özelliklerine etkisini araştırılmış ve araştırma sonucunda fiziksel özelliklerinin olumlu sonuç verdiği gözlenmiştir (Arpacı vd. 2020).

Sarıçam odununda yapılan bir çalışmada bitkisel koruyucu olarak kullanılması umut edilen valeksin odunun fiziksel, mekanik ve biyolojik özelliklerini genellikle olumsuz etkilediği belirlenmiştir. CCA'nın ve CBA-A'nın ise biyolojik testlerdeki zehirlilik etkisi memnun edici bulunurken mekanik özelliklerde kısmi performans düşüklükleri gözlemlenmiştir (Şimşek, 2013).

Doğal bitkiler çok çeşitli amaçlarla (fitoperapi, baharat,çay, böcek ilacı, boya, yağlarında faydalanma, sanayi, kozmetik vb) kullanılmaktadır. Doğal (organik) bir yapıda olan ahşabın, antioksidan/antibakteriyel özelliği belirlenmiş lavanta bitkisinin çeşitli konsantrasyonlarından ekstrat (özüt) elde edilmesiyle emprenye edilebilme özelliği ve bazı üst yüzey (parlaklık) özelliklerinin belirlenmesinin yanı sıra ahşap malzemede doğal bir koruyucu yapı oluşturulmaya çalışılmıştır.

2. MATERYAL VE YÖNTEM

Çalışma kapsamında lavanta (*Lavandula angustifolia Mill.*) bitkisinin ekstraktı çeşitli konsantrasyonlarda (%1,%3) hazırlanmıştır. Ahşap malzeme olarak karaçam (*Pinus nigra*) ve akçaağaç odunu (*Acer campestre*) odunları tercih edilmiştir. Örnekler rastgele seçilen, çatlaksız, düzgün liflere

FULL TEXTS BOOK

sahip, ardaksız, budaksız, renk ve yoğunluk farkı olmayan özellikte olmasına dikkat edilmiştir. Daha sonra örnekler TS ISO 13061-1 standardına göre hazır hale getirilmiştir.

2.1. Deney Örneklerinin Hazırlanması ve Emprenye Yöntemi

Deney örnekleri, TS 2470'e göre ardak, budak, çatlak, düzgün lif yapısına sahip, mantar ve böcek tahribatına uğramamış, renk bozukluğu olmayan diri odun kısmından hazırlanmıştır [39]. Hava kurusu rutubetteki 100x100x10 mm (boyuna yön × radyal yön × teğet yön) net ölçülerindeki örnekler 20±2°C /%65±5 şartlarında klimatize edilerek örnek rutubetinin %12±2'ye getirilmiştir. Daha sonra, örnek yüzeyleri sırası ile 80 ve 120 no'lu zımparalarla zımparalanmış ve yüzeydeki tozlar basınçlı hava ile temizlenmiştir. Emprenye yöntemi vakum/difüzyon esaslı olarak ASTM D1413-76 standardına göre gerçekleştirilmiştir.

2.2. Parlaklık Ölçümü

Lavanta bitki ekstraktı ile işlem görmüş malzemenin ışığı yansıtma özelliği vasıtasıyla TS EN ISO 2813 esas alınmış "Konica Minolta Multi Gloss 268 Plus" parlaklık ölçüm aleti ile 60º±2º'de liflere paralel parlaklık ölçümü deney örmelerinde gerçekleştirilmiştir. Alet kalibresi ASTM-D-523'e göre yapılmıştır. Cihaz Şekil 1'de verilmiştir. Deneyde kullanılan cihaz, bir ışık kaynağı ve paralel veya birbirine yaklaşan ışık demetini deney alanına yönelten mercek sistemi, fotosel ve yansıyan ışık konisini alan alıcıdan meydana gelmiştir. Ölçümlerde 20/60/85o ' de ölçüm yapan, parlaklık ölçme cihazı her işlemde ve işlemlerden önce kalibre edilmiştir. Günlük kalibrasyonda iyi cilalanmış ve düzgün yüzeyli, kırılma indisi 1.567 olan ve parlaklığı her geometri için 100 olarak belirlenmiş siyah cam kullanılmıştır. Örnek yüzeylerinde, paralel yönde ölçüm yapılmış ve bu ölçümlerin aritmetik ortalamaları parlaklık değeri olarak kaydedilmiştir. 60°'de yapılan parlaklık ölçümlerine göre yüzeyler mat, yarı mat, yarı parlak, parlak ve çok parlak gibi sınıflandırılmaktadır. Parlaklık değerlerinin sınıflandırılması Tablo 1'de verilmiştir.



Şekil 1. Yüzey Parlaklık Ölçüm Cihazı

Tablo 1. Parlaklık değerlerinin sınıflandırılması

60°'de Ölçülen Parlaklık	Parlaklık Sınıf
20 Gloss'un altı	Mat
25-30 Gloss	Yarı Mat
35-45 Gloss	İpek Mat
55-65 Gloss	Yarı parlak
70-80 Gloss	Parlak
80 Gloss'un üzeri	Çok Parlak

FULL TEXTS BOOK

3. BULGULAR VE TARTIŞMA

3.1. Çözelti Özelliği

Çözelti özelliğine ilişkin bulgular Tablo 2 ‘de verilmiştir.

Tablo 2. Çözelti Özellikleri

Bitki Ekstraktı	Çözücü Materyal	Sıcaklık (ºC)	pH			
			EÖ	ES	EÖ	ES
1%	Etanol	22ºC	5.80	5.80	0.912	0.912
3%			5.11	5.11	0.915	0.915

EÖ: Emprenye öncesi ES::Emprenye sonrası

Çözeltinin emprenye öncesi ve sonrasında Ph ve yoğunluk değerlerinde değişim olmamamıştır.

3.2. % Retensiyon

Tam kuru odun ağırlığına oranla tutunan katı madde miktarı (% retense) Tablo 3 ‘de verilmiştir.

Tablo 3. Tutunan Madde Miktarı (%)

Odun Türü	Lavanta Bitki Konsantrasyon	Vakum/ Dıfuzyon	Çözücü	Sıcaklık (ºC)	Retensiyon (%)	
					Mean	HG
Karaçam	1%	30/30 Minute	Etanol	22ºC	1.56	D
	3%				2.10	B
Akçaağaç	1%				1.68	C
	3%				3.68	A

Lavanta bitki ekstraktı özellikle kendi morfolojik yapısı ve etanol ile ekstre elde edilmesi ve % konsantrasyonu itibari ile değerlendirildiğinde en yüksek tutunma değeri % 3 konsantrasyonda akçaağaç odununda (3.68) en düşük tutunma düzeyi karaçam odununda % 1 konsantrasyonda (%1.56) gerçekleşmiştir. Etanol ve odunun anatomik yapısının tutunma üzerinde etkili olduğunu söyleyebiliriz.

FULL TEXTS BOOK

3.3. Yüzey Parlaklık Ölçümü (Gloss)

Yüzey parlaklık ölçüm sonuçları Tablo 4'te verilmiştir.

Tablo 4. Parlaklık Değeri (Gloss/ 60°)

Odun Türü	Lavanta Bitki Konsantrasyon	Vakum/ Difuzyon	Çözücü	Sıcaklık (°C)	Parlaklık (Gloss)	
					Mean	HG
	Kontrol	30/30 Dakika	Etanol	22°C	61	D
Karaçam	1%				55	E
	3%				52	E
	Kontrol				67	A
Akçaağaç	1%				63	C
	3%				65	B

En yüksek parlaklık değeri (60°) % 3 konsantrasyonda akçaağaç 'da (65 Gloss) tesbit edilmiştir. En düşük parlaklık değeri %1 konsantrasyonda karaçam odununda (55 Gloss) belirlenmiştir. Parlaklık ölçüm değerleri kontrol örnekleriyle karşılaştırıldığından kısmen değerlerde düşmeler belirlenmiştir. Bu durum lavanta bitkisinin yapısından kaynaklanabilir. Lavanta bitki ekstraktından elde edilen organik maddenin, ahşap malzemede emprenye maddesi olarak kullanılabileceği tutunma düzeyi ile ortaya konmuş ve mobilya/ahşap endüstrisinde estetik düzeyde (renk/parlaklık) kullanılabilenini söylenebilir.

4. SONUÇLAR

İnsan/çevre sağlığının ön plana çıktığı içinde bulunduğumuz yüzyıl ve gelecek yüzyıllarda bitki, aromatic bitki, tıbbi aromatic bitkiler tüm yönleriyle gerek bitkilerin gövdeleri/yaprakları vb atık /artıkları her türlü ahşap koruyucu olarak kullanılabilir. Materyalin organik olması ve doğal koşulların yanında bazı türlerin kapalı mekanlarda yetiştirilmesi insanlığın geleceği için büyük önem taşımaktadır. Üst yüzey özelliği (parlaklık) itibariyle olumsuz bir durum belirlenmiştir.

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POSTMODERN APPROACHES IN THE CONTEXT OF BİO-CELLULAR REALİSM
CANLI HÜCRE GERÇEKÇİLİĞİ BAĞLAMINDA POSTMODERN YAKLAŞIMLAR[12]

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ÖZET

İnsanoğlu, tarihin başlangıcından bu yana sanatta; yansıma, mimesis, gerçekçilik ve soyut sanat arası bağlamları imgeler ve göstergelerle kültürüne yansıtmıştır. Bu nedenle "Gerçeklik ve Yansıma" sanat tarihinin diyalektiğini her zaman meşgul etmiştir. Modernizmle birlikte gerçeklik soyut sanata dönüşmüş ve Duchamp'ın "Çeşme" eseriyle kavramsal sanata evrilmiştir. Doğadan yansıtmayı terk eden sanatçılar, 21. yüzyılda Postmodernizm ile sanatta elit estetiği yani geleneksel estetik kurallarını ihlal ederek özgünlüğe ve deneyselliğe sırt çevirmiş; görelilik temelli, eklektik, evrensel olmayan, absürd unsurları kullanarak şımarmış, hatta daha da ileri giderek etik dışı bir dünyanın sonucu olan "Kitsch" eserler üretmişlerdir. Gelinen bu noktada artık geçmiş ve günümüz sanatının barışarak daha sağlam estetik üretilerle gelecek kuşaklara yön vermesi gerektiği mantıklı bir önerme olmuştur. Biyosellüler Realizm ve BC-R Kolajlar; takındığı terbiye ve disiplinle bunu sentezleme görevini üslenmiş ve bir Rembrand kadar gerçekçi, bir Monet kadar eklektik ve bir Duchamp kadar kıvrak düşünen bağlamları ortaya koymayı amaçlamıştır. Dolayısıyla Biyosellüler Realizm sanat tarihindeki tüm akımları sentezleyerek onları klasik eserlerdeki gibi duvarlara asabilmektedir. Bunu yaparken Rembrand'ın ulaşmak istediği gerçekçiliği Ready-Made bağlamıyla, doğadan aldığı canlı hücre taşıyan figürleri duvar yüzeylerine Post-Rönesans estetiğiyle kolajlamıştır. Ayrıca Postmodern estetiğin kullanılabilir stratejilerini alarak; taklit etmeden, çalmadan, bir İtalyan beyefendisi Raphael tavrıyla sergilemiştir. Biyosellüler figürler gerçeğin ta kendisi olduğundan doğayı birebir taklit kaygısı taşımaz. Çünkü aradığı gerçek zaten doğanın kendisidir. Doğayı taklit yerine direkt alarak yüzeylere eklerken onları kavramsal, performans, teknoloji, video sanat ve diğer akımlarla koordineli bir şekilde kullanır. BC-R kolajlar köklerini IS, Performans sanat, D. Spoerri ve Maciunas felsefesinden esinlenmiştir. Estetik bağlamda temel prensibi; başkasına ait şeyleri asla kendine mal etmez. Çünkü "Kopyanın bittiği yerde orijinalite başlar" ilkesiyle hareket eder. Fakat tüm akım ve estetiklerle işbirliği içinde ürünler sunmayı amaçlar. Araştırmanın amacı; Biyosellüler Realizm bağlamında gerçeği yansıtma odaklı kontekstlerle yeni Postmodern ötesi ürünler ortaya çıkarmaktır. İkincil amacı ise; Modernist ve Postmodernist estetiklerin derin kavrayışıyla sentezlenen üretileriyle günümüz realizmine alternatif üretiler sunmaktır. Araştırma nitel araştırma yöntemi kullanılarak yapılmış olup verilere ulaşmak için literatür ve online taramalar yapılmış ve eldeki sentezlemelerle tümel yorumlara gidilmiştir. Araştırma sanat tarihi diyalektiğindeki bilinen tüm eserleri irdeleyerek; kiç, çalıntı, etik olmayan tüm yaklaşımları, tasarımları dışında tutmuştur. Gelinen noktada estetik disiplin ışığında da sanat üretilebileceği ve sanatı bekleyen en büyük tehlikenin etik çizgiden ayrılmak olduğu yargısına varılmıştır. Araştırma evreni ve J. Kounellis, B. Nauman, R. Smithson, J. Beuys ve D. Hirst M. Abramović'in arşivlenmiş eserleri incelendiğinde, söylenmemiş estetik olan BC-Realizm'in artık görsel, kavramsal, teknolojik ve günümüzün ileri estetik uygulamalarının ışığında; ancak estetik disiplin etiği üzerinden ifade edilmesi gerektiği yargısına

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FULL TEXTS BOOK

varılmıştır. Ayrıca BC-R kolajların taşıdığı barışçıl estetik auranın, diğer tüm estetikler arası barışın tesisinde de rol oynayacağı düşünülmektedir.
Anahtar Kelimeler: **:** Biyosellüler Realizm, Biyosellüler Kolaj, Gerçeklik, Yansıma, Hologram, Performans Sanat, Ayna, BC-R, Kavramsal Sanat.

ABSTRACT

Human beings have been in art since the beginning of history; They reflected the contexts between reflection, mimesis, realism and abstract art into his culture with images and signs. For this reason, "Reality and Reflection" has always occupied the dialectic of art history. With modernism, reality turned to abstract art and evolved into conceptual art with Duchamp's artwork "Fountain." Artists who abandoned reflecting from nature turned their backs on originality and experimentation with Postmodernism in the 21st century, violating elite aesthetics, that is, traditional aesthetic rules, in art; Artists became spoiled by using relativity-based, eclectic, non-universal, absurd elements, and even went further, producing kitsch works that were the result of an unethical world. At this point, it has become a logical proposition that past and present art should reconcile and guide future generations with more solid aesthetic products. Biocellular Realism and BC-R Collages took on the task of synthesizing this with their upbringing and discipline, aiming to reveal contexts that were as realistic as a Rembrand, as eclectic as a Monet, and as agile as a Duchamp. Therefore, Biocellular realism can synthesize all movements in art history and hang them on the walls like classical works. During this process, he employed the Ready-Made technique, which embodies the realism that Rembrand aimed for, and collaged figures with living cells from nature onto wall surfaces, incorporating Post-Renaissance aesthetics. Additionally, by adopting the practical strategies of postmodern aesthetics, BC-R exhibited them with the attitude of an Italian gentleman, Raphael, without imitating or stealing. Since Biocellular figures are the real thing, they do not have to worry about imitating nature exactly. Because the truth it seeks is nature itself. While adding nature to surfaces directly rather than imitating it, BC-R uses them in coordination with conceptual, performance, technology, video art, and other movements. BC-R collages are rooted in IS, performance art, inspired by D. Spoerri, and Maciunas philosophy. Its basic principle in the aesthetic context is; it never takes someone else's work as his own. It adheres to the principle that "originality starts where copy ends." However, BC-R works aims to offer products in cooperation with all movements and aesthetics. Purpose of the research; In the context of Biocellular realism, it is to create new postmodern products with contexts focused on reflecting reality. Its secondary purpose is; It aims to present alternative productions to today's realism with its products synthesized with a deep understanding of modernist and postmodernist aesthetics. The research was conducted using the qualitative research method, literature and online searches were made to access the data, and universal interpretations were made with the available syntheses. The research examines all known works in the dialectic of art history; and excluded all kitsch, stolen and unethical approaches and designs. At this point, we've concluded that aesthetic discipline can guide the production of art, and that straying from the ethical line poses the biggest danger. When the archived works from the universe of the research and J. Kounellis, B. Nauman, R. Smithson, J. Beuys, and D. Hirst M. Abramović are examined, it is seen that BC-Realism, the unspoken aesthetic, is now in the light of visual, conceptual, technological, and today's advanced aesthetic practices; but it has been judged that it should be expressed through the ethics of the aesthetic discipline. The peaceful aesthetic aura of BC-R collages is believed to contribute to harmony among all other aesthetics.
Keywords: Bio-Cellular Realism, Bio-Cellular Collage, Reality, Reflection, Hologram, Performance Art, Mirror, BC-R, Conceptual Art.

FULL TEXTS BOOK

TANIMLAR:

Biyosellüler: Biyolojik hücrelerden oluşan veya bu hücrelere sahip olan canlı yapıya denir (URL-1; URL-2). Dolayısıyla canlı hücresel öğelere sahip olan anlamına gelmektedir.

Biyosellüler Gerçekçilik (Biocellular Realism; BC-R): Terim Türkçeye "Canlı Hücre Gerçekçiliği" olarak çevrilir. Biyolojik canlı ya da figürlerin duvar gibi yüzeylere klasik tablolara gönderme yaparak adeta bir kolaj gibi asılması sanatıdır. Biyohücresel çalışmalarda aranan temel prensip figürün ya da figüre ait unsurun canlı hücre taşımasıdır. Terim Biyosellüler kolaj olarak ta adlandırılır (URL-3).

Jouissance: "zevk, orgazm" (URL-7), "Lacan'a göre psikanalitik teoride, Freudcu "haz ilkesi"nin ötesinde, "ölüm dürtüsü"ne benzeyen erotik bir coşku" (URL-8).

GİRİŞ

İnsanoğlunun görsel korteksleri varlığının ilk aşamalarında bu yana sanatta; yansıma, mimesis, gerçekçilik ve soyut sanat arası bağlamları imgeler ve göstergelerle kültürüne yansıtmıştır. Bu sebepten "Gerçeklik ve Yansıma" sanat tarihinde, sanatçı ve izleyicileri arasındaki diyaloğu sürekli meşgul etmiştir.

Modernizm; özgünlüğü, deneyciliği, estetik hazzı farklı bir gerçekçilikle ortaya koyarken Postmodernizm bu çabayı bir anda baş aşağı ederek popüler kültürün ya da sıradan bireyin estetik beğenisini yüksek kültür estetiğiyle bir tutmuştur.

Gerçeklik, Postmodern dönemde yerini simüle edilmiş şeylere bırakmıştır. Mektup yerini e-maile, doğada yürüyüş yerini bilgisayar oyunlarına ya da simülasyona uğramış ekrandaki müzikli doğa görüntülerine terk etmiştir. Bu bağlamda mimar Richard Neutra insanların sosyolojik ve psikolojik gereksinimleri düşünülmüş Bio-realistik ortamlarda yaşamalarını şart koşmuştur (Resim 1) (Morse, 2013: 4-6). Neutra'nın Biyorealizmi 1920'lerde mimariye girse de, 1954'de bastırdığı "*Survival Through Design*: Tasarım ile Hayatta Kalma" adlı kitabından sonra resmi olarak çalışmaları mimarinin klasikleri arasında yer almaya başladı (URL-9).



Resim 1. Mimar Richard Neutra'nın İnşa Ettiği Bio-Realistik Ev Tasarımları.

METODOLOJİ

Bu araştırmanın amacı; Biyosellüler Realizm bağlamında gerçeği yansıtma odaklı kontekstlerle yeni ve alterntif bir dil ya da Postmodern ötesi plastik söylemler ortaya çıkarmaktır. Biyosellüler kolajların sanat tarihi diyalektiğinde daha önceden, içerdiği bağlam ve felsefesinin kullanılmamış oluşu, bu yeni Realizm ile sanatçıları karşı karşıya bırakması açısından araştırmayı önemli ve gerekli kılmaktadır. Araştırma nitel araştırma yöntemi kullanılarak yürütülmüş olup, verilerin toplanmasında internet aramalarından, evrensel ya da avam sanat eserlerinden seçilen derleme çalışmalardan yararlanılmıştır. Eşdeyişle, araştırmanın evrenindeki; geçmişteki eski ustaların yaptığı eserler ve günümüz plastik eserleri taramasından sonra J. Kounellis, B. Nauman, R. Smithson, J. Beuys ve D. Hirst M. Abramović'in

FULL TEXTS BOOK

eserleri incelenmiş ve bu söylenmemiş estetik olan BC-Realizm'in varlığının dillendirilmesini zaruri hale gelmiştir.

Araştırmada Biyosellüler Realizm'e köprü olan kök eserler, analojik değerlendirildikten sonra Biyolsellüler sanat felsefesiyle üretilmiş 6 çalışma BC-R kolajlara örnek olarak verilmiş ve açıklanmıştır. BC-R kolajların tarihe katkısının değerlendirmesi sonucu denebilir ki, Biyosellüler Realizm; barışçıl, etik kurallara ve estetik kavrayışa aşırı derecede duyarlı bir üslup ve tekniktir. Varılan diğer bir yargı ise, günümüz eserlerinin estetik disiplin etiği üzerinden ifade edilmesi gerektiğidir. Böylece BC-R kolajların taşıdığı barışçıl estetik, tüm akımlar arası barışı tesis ederek toplum bireylerinde de hoşgörünün inşasına yapıcı rol oynayacağı önermesi mantıklıdır.

KAVRAMSAL ÇERÇEVE

Fotoğrafın icadıyla Modern sanat, doğadan kaçarak soyut figürlü bir dünyaya sığınmıştı. Düşünür Arthur Danto sanatın güzel olmasına, doğanın birebir taklidine, formların bir mekanda işlenmesine gerek olmadığını vurgulamıştı (Barrett, 1990: 35). Böylece Amerikan Expresyonizm'ine kadar boya/pigment, yüzeyleri kavrayarak düzleşti ve her şeyi düzleştirdi. (Barrett, 2011: 205).

Modernizmle birlikte gerçeklik soyut sanata dönüşmüş ve daha sonra Duchamp'ın "Çeşme" eseriyle kavramsal sanata evrilmiştir. Doğadan yansıtmayı terk eden sanatçılar, 21. yüzyılda Postmodernizm ile birlikte sanatta elit estetiği yani geleneksel estetik kurallarını dışlayarak özgünlüğe ve deneyselliğe sırt çevirmiş; görelilik yani rölativizm temeline dayanan, eklektik konstrüksiyonlarla biçimlenen, evrensel olmayan, absürd unsurları kullanarak şımaran, hatta daha da ileri giderek etik dışı bir dünyanın sonucu olan "Kitsch" eserler üretilmişlerdir.

Evrensel mesajların reddedilişiyle artık gündemi meşgul eden konularla yeni işler üretilmiştir. Sanatta evrensellik adına atılan adımların sekteye uğraması, Prof. Baymur'un gerileme (regression) tanımını akla getirmektedir. Böylece bu tanım, Postmodern dönemi sanatını açıklamamıza yardımcı olmaktadır. Baymur'a (2004: 104) göre; Birey kendi istekleri ve temel ihtiyaçlarının karşılanmasında yaşadığı doyumsuzluk ve kaygılarla, devreye giren ilkel bir doyumsuzluk hissederek davranışlarında da ilkel olgunluk psikolojisine gerileyecektir. Bunun sonucunda hareketlerinde; kekeleyen, kızaran hatta küçük bir çocuk gibi davranmaya başlayan dışavurumlar sergileyecektir. Dolayısıyla denebilirki; sanatçılar da bu ilkellikle sanatta eklektik üslupları çoğaltarak ve onları tekrarlayarak bir kekeleme dönemine geçirmiş, gösterdikleri şımarıklıklarla çocuklaşan kiç üretilerini rastgele söylemlemişlerdir. Bu bağlamıyla adeta mağara dönemi insanları gibi sadece kendini düşünen çocukluk kavrayışıyla, üretilen eserlere kodlanan lakayt ve keyfi felsefe adeta yazı öncesinde yaşayan insanın düşünme yapısına gerilemeye başlamıştır.

Gelinen bu noktada artık geçmiş ve günümüz sanatının bu gerilemeden kurtularak daha elit, seçici, barış taraftarı ve daha sağlam estetik üretilerle gelecek kuşaklara yön vermesi gerektiği mantıklı bir önerme olarak görülebilir.

SANAT TARİHİ DİYALEKTİĞİNDE BİYOSELLÜLER REALİZM'İN KÖKLERİ

Biyosellüler Realizm ya da BC-R kolajlar kullandıkları etik kurallar ve disiplinle, günümüz kaosa dönmüş üretilerini daha doğru ve evrensel yaklaşımlarla tekrar estetik ve etik bir alana doğru çekmeyi planlamaktadır. Bunu yaparken elindeki tüm akım ve üslupları kullanarak farklı sinerji ve sentezleri devreye sokmaktadır. Böylece bir Rembrand kadar gerçekçi, bir Monet kadar eklektik ve bir Duchamp kadar kıvrak düşünen bağlamları ortaya koymayı amaçlamaktadır. Dolayısıyla Biyosellüler Realizm, sanat tarihindeki tüm üretilerden kendine faydalı olanları farklı bağlamlardan, fakat kopyalamadan, çalmadan istifade etmektedir.

BC-R kolajlar ortaya koyduğu tasarımlarıyla tuvalden aldığı figürleri canlı hücresel işleme sokarak adeta klasik eserler gibi duvarlara asabilmektedir. Böylece Rembrand'ın ulaşmak istediği gerçekçiliği ready-made objeler kullanır gibi kullandığı insan, hayvan ve canlı bitkileri yani doğadan aldığı canlı

FULL TEXTS BOOK

hücre taşıyan figürleri duvar yüzeylerine Post-Rönesans estetiğiyle kolajlamaktadır. Ayrıca sunduğu bu alternatif estetikte, Postmodern eklektik estetiğinin kullanılabilir olanlarını alarak; çalmadan, taklit etmeden, ya da daha kibar tabirle temellük kullanmadan, adeta bir İtalyan beyefendisi Raphael tavrıyla devreye sokarak sergilemiştir.

Biyosellüler çalışmalar doğayı birebir taklit kaygısı taşımazlar; çünkü figürler gerçeğin ta kendisidir. Dolayısıyla kullandığı/aradığı gerçek zaten doğanın kullandığı gerçeğin ta kendisidir. BC-R kolajlar, doğayı taklit yerine onların gerçekleri olan figür ve canlı hücreli varlıkları direkt alarak yüzeylere ekler ve bunu yaparken de, onları performans sanatı, kavramsal düşünce, teknoloji, D. Spoerri'nin duvara asılı "EatArt" işlerinden (Resim 3) ve Maciunas'ın bir dönem ortaya attığı "Somutluğu Benimsemek" kuramında çürük domatesin sanat nesnesi olarak sergilenmesi felsefesinden esinlenmiştir. Bu felsefede Maciunas'ın "Somutluğu Benimseme Kuramı" kısaca irdelenirse: "Alımlayıcı çürük bir domatesi, onun gerçekliğini ve biçimini değiştirmeksizim algılar, yansıtır yani kullanır. Böylece form, ifade, içerik ve algı aynı kalır" (Erdem, 2012: 50-52) Böylece kullanılan kolaj ya da figürler doğadan alınark direkt kullanılır. Daha sonra seçilen bu somut sanat nesnesi, retina ve algıda dolaşarak yanılsamaya dayalı simge ve görüntüsü yerine çürük domatesin gerçekliğinin ta kendisini kullanmış olur (Resim 2).





Resim 2. **Resim 3.**

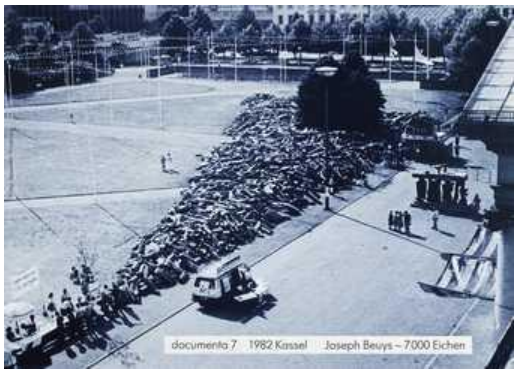
Resim 2. Maciunas'ın "Somutluğu Benimseme Kuramı" (AI Design by A. E. BAYKURT)
Resim 3. D. Spoerri "Eat Art" Çalışması, 1960.

Böylece Biyosellüler kolajlar, mesajın içeriğini sosyal yaşamdaki organik formlarla inşa etme eğilimiyle biçimlerini yüzeye çerçevelemeden veya aşırı pentürel yüzeylere boğmadan Maciunas'ın çürük domates bağlamlı felsefesini dikkate alarak tespit edilen mekanda "fluxus" tavrıyla akmasını ister.

BC-R kolajların estetik alımlama bağlamındaki temel prensibi; başkasına ait şeyleri asla kendine mal etmez. Çünkü "Kopyanın bittiği yerde orijinalite başlar" ilkesiyle hareket eder. Fakat tüm akım ve estetiklerle işbirliği içinde ürünler sunmayı evrensel barışa katkı olarak yorumlar.

BC-R kolajlar diğer en büyük etkileşimini, Joseph Beuys'un "sanatın hayata girişi" kuramından almaktadır. Bu kuramı 1970'li yıllarda "Sosyal Heykel" görüşüyle ortaya atan Beuys "Her şeyin sanat olduğu, hayatın her alanına yaratıcı bir şekilde yaklaşılabileceği ve bunun sonucunda herkesin sanatçı olma potansiyeline sahip olduğu" anlayışını savunmuştur. Beuys, Almanya'nın Kassel kentinde günüllü insanlarla yapılan ve beş yıl süren bir performans "Sosyal Heykel" eylemiyle bu teorisini destekledi. Fridericianum Müze'sinin dışına yığdırdığı bazalt siyah taşların her biri, her ağaç dikildiğinde birer ikişer kaldırıldı ve böylece 5 yılda 7.000 meşe ağacı bölgeye dikilmiş oldu (Resim 4), (URL-5). Bunun karşıtında BC-R kolajlar da figürlerini canlı ve normal bireylerden seçmektedir. Ayrıca, Bruce Nauman'ın eserlerinde kullanılan insan organ parçalarının konstrüksiyonlarıyla, kendi kullandığı kolajların benzerliğinin de farkındadır ve onları non-bio örnekler olarak sınıflandırmaktadır (Resim 7, 8).

FULL TEXTS BOOK



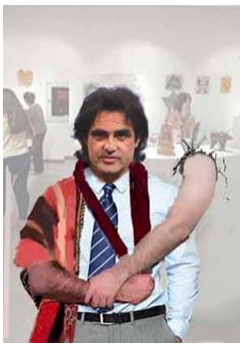
Resim 4. Joseph Beuys, 7000 Oak Trees (1982), Tate and National Galleries of Scotland, 2024.

SANAT TARİHİNDE UYGULANMIŞ BC-R BAĞLAMLI ÖRNEKLER

Biosellüler Realizm; Klasizm, Rönesans, Barok, Realizm, Hyper-realizm gerçekciliğini tuvalden kurtararak; mutlak ve canlı hücreleri taşıyan doğadaki bitki, insan ve hayvan uzuvlarını kolajlayarak onları tuvalden arınmış yüzeylere ya da uzamlara kolajlamıştır. Fakat bunu yaparken tüm akımları dışlamadan, bilakis onların kullandığı gerçeklik katmanlarının tümünden yeri geldiğince istifade ederek ereğine ulaşmaktadır. Bu da onun esnek ve üretici karakterinden kaynaklanmaktadır. Tıpkı Picasso'nun kullandığı mavi renk gibi. "Kırmızım yoksa mavi kullanırım" Picasso (URL-10).

Biosellüler Realizm; mimesis/yansımaya dayalı simge ve görüntüler yerine canlı hücreleri olan mutlak, somut ve asıl gerçekliği elde etme peşindedir. Fakat araştırmada kullandığı ayna aks/yansımaları da bu gerçekliği pekiştiren diğer bir önemli katmandır. Eşdeyişle, BC Realizmde, eserin mesajının vurgu/odak noktası; simge, ışık ya da yanılsamayla tercüme edilmez, bu öğeleri direkt BC-R kolajıyla sunar (Resim 6,7). Bu bağlamda Biosellüler kolajlar; yüksek sanat ve doğanın bio kolajlarıyla, yani; doğa/ilahi sanat kolajlarıyla sentezlenir. Dolayısıyla bu kolajlara en kusursuz realizmi verebilen gerçeğin kıdemli üst Hyper-Realizm'i de denebilir.





Resim 5. **Resim 6.**

Resim 5. The Calling of Saint Matthew by Caravaggio (1599-1600).

Resim 6. "Nefis-Ego/ BC-R 5" ve Sağ-Sol Cepheden Kesitler, 110 x 70 cm, d: 40 cm, KT, (BC-kolaj insan figürü, Hazır-Nesne: Heybe, Elbise, Ayna, Performans: Ahmet Soyad), 2024.

Sanat tarihinde Biosellüler Realizm'e yakın bağlamda çalışılan ama birebir örtüşmeyen ilk kök örneklerine bakılacak olursa bu çalışmalar üç ana gruba ayrılır. Bunlar:

a -Biyolojik olmayan Figürler (Non-Bio),

b - Biyolojik Figürler,

c - Uzamda/mekânda yer alan biyolojik figürler.

FULL TEXTS BOOK

a- Biyolojik olmayan Figürler (Non-Bio)



Resim 7.



Resim 8.

Resim 7. Bruce Nauman İsimsiz (El Çemberi) 1996 © Bruce Nauman. Sanatçı Hakları Derneği (ARS), New York ve DACS, Londra 2023

Resim 8. Bruce Nauman, " Elden Ağıza".



Resim 9.



Resim 10.

Resim 9. Rauschenberg, Monogram, YB. Tekerlek, İçi Doldurulmuş Keçi, 1955.

Resim 10. Kiki Smith, İsimsiz, 1995.



Resim 11.



Resim 12.

Resim 11. Damien Hirst, 'Ölüm Ötelendi', 2008.

Resim 12. . Gunther Von Hagens, "Deri Adam." BODY WORLDS, Plastinasyon Enstitüsü, Heidelberg, Almanya.

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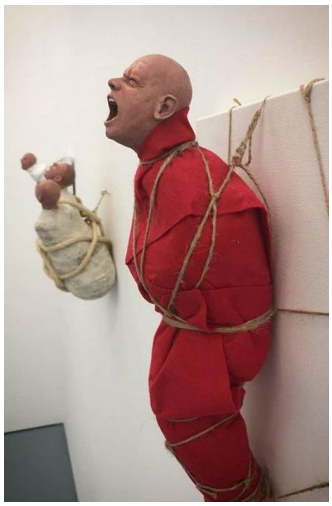




Resim 13. **Resim 14.**

Resim 13. Maurizio Cattelan – 3. Uygulama + 2 AP İsimsiz, 2007,İçi Doldurulmuş Atlar, Kaputt'un Enstalasyon Görünümü.

Resim 14. Matteo Pugliese, La promessa, Yükseklik 62 cm - Genişlik 111x26 cm., Bardiglio Mermeri 2020.



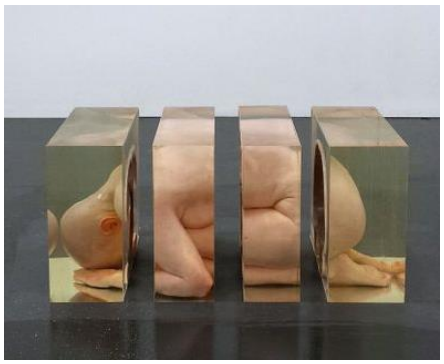


Resim 15. **Resim 16.**

Resim 15. Miguel Vigo, Hijos de Fóbetor VI, 44 x 30 x 15 cm 2018 - Polikrom Reçine, Tahtada Kumaş ve İp.

Resim 16. Lidó Rico, Aşıklar III, Heykel, Polyester Reçine, Ayna, 2018.

FULL TEXTS BOOK



Resim 17. Santissimi, Horror Vaqui, 4 Reçine Bloktan Oluşan Silikon Heykel, 86 × 47 × 35 cm., 2012.

b- Biyolojik Figürler





Resim 18. Marina Abramovic, Ejderha Kafaları (1990).
Resim 19. Matthew Barney, Cremaster 4. Photograph: Supplied.

c- Uzamda (in-space) Biyolojik Figürler





Resim 20. **Resim 21.**

Resim 20. .Joseph Beuys, Ben Amerikayı, Amerika da Beni Seviyor, 1974. © Artists Rights Society (ARS), New York.
Resim 21. Jannis Kounellis, İsimsiz (Cavalli), 1969 (© Jannis Kounellis).

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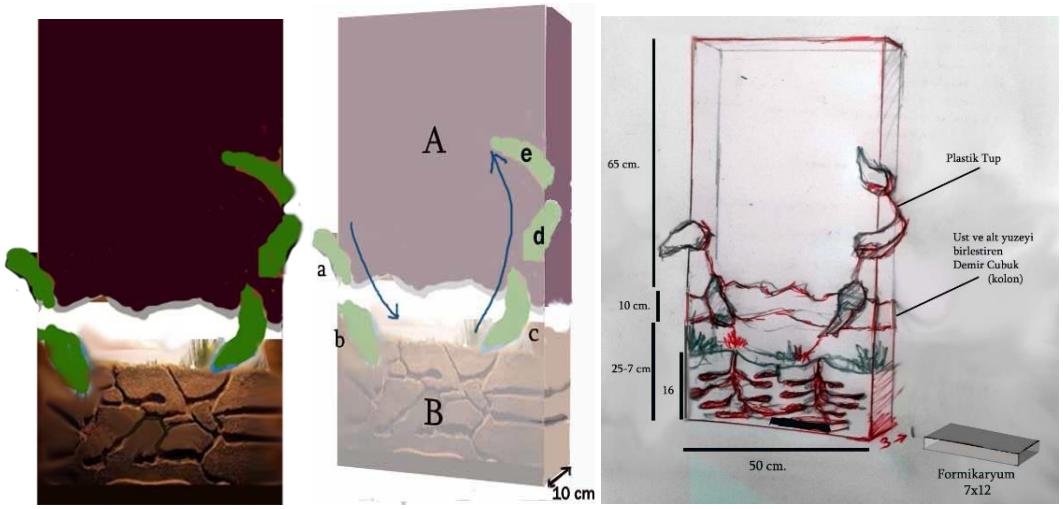


Resim 22. Stelarc, Kol Üstü Süspansiyon", Scott Livesey Galerileri, Melbourne 2012. Fotoğrafçı: Polixeni Papapetrou.

BİYOSELLÜLER BAĞLAMLI İLK MODEL UYGULAMALAR

Biosellüler çalışmalar genel olarak Postmern tutumlardan; figür kullanımı, tarihsel bağlama dönüş, metinler ve sözcüklerin kullanılması, sanat eserlerinin müze ve galerilere tekrar girişini öneren, elit estetik duyarlılığıyla üretmekte olup bu üretilere imza atarak onlarda prestij ve özgünlüğünü vurgulamaktadır. Bu vurgulamayla birklikte nesneleri Jouissance bakışla alımlamayı da reddetmektedir. BC-R kolajlar Postmodern stratejilerden; sanatçı ve zanaatkârlarla işbirliği yapmak, aynalarla gerçeği simule etmek, kültürel etkileri melezlemek, malzeme/teknikleri ve akımları harmanlamak, imgeleri katmanlamak, kodları harmanlamak, tanıdık olan isim, imge ve kavramı yeniden bağlamlamak, metinler arasılığı kullanmak, bakışla yüzleşmek, uyumsuzluktan yararlanmak, yeni kimlikler inşa etmek, edebi araçları görsel sanatlarla harmanlamak gibi stratejileri ihtiyacı olan bağlama göre kullanır; fakat appropriation yani kendine mal etme stratejisine şiddetle karşıdır. Bu bağlamda verilen örnekden BC-R 1 Modeli, prototip model olarak ilk sırada yer almaktadır:

Bc-r 1



Resim 23. " BC-R 1", 100 x 50 cm, d: 10 cm, TÜAB ve KT, (0.6 mm, Mika, Tuval Bezi, Yutong Taşı, Canlı Karınca Formikaryumu), 2023.

Biosellüler Realizm'in ilk örneklerinden olan bu çalışmada üst kısımdaki soyut formlar ve yüzey karınca kolonisinin imitasyonu olan karınca habitatı ve formikaryumuyla beraber hibritlenmektedir. Karıncalar, a, b, c, d, e formlarına açılan yollarda gezinerek soyut formların içinde dolaşmakta, soyut sanat ve BC-R realist sanat bağlamlarıyla adeta Dao felsefesinin zıt kutuplarını aynı yüzeyde sentezlenmektedir. Bu sentezle çalışma, mekân ve zaman içinde yaşayan gerçek bir koloni şehrine dönüştürülmüştür. 2. Modelde Ego konulu sürrealist biçemi ve evrensel mesajyla BCR-4 dikkat çekmektedir.

Bc-r 4



Resim 24. "Stalking Medusa-BC-R 4" ve Duvardaki Yandan Görünüşü, 70 x 50 cm, d: 80 cm, KT, (BC Kolaj; Yılan Balığı, Kil/Seramik, Cam Akvaryum, Ayna, Su), 2023.



Resim 25. Yılan Balıkları.

Yunan mitolojisinde Medusa mitinin devamı olan bu tasarım, saçları suya bırakılan Medusa'nın BC-R kolaj yılan balıklarıyla oluşturulması üzerine kurgulanmıştır. Tasarımda Medusa'nın başı ve sağ eli ayrı ayrı yerleştirilmiş ve akvaryum camının dışına çıkan yüz ve sağ el, tasarıma sürrealist bir dinamizm katmıştır.



Resim 26. Çalışmanın duvar arkasının yan kesitten görünüşü.

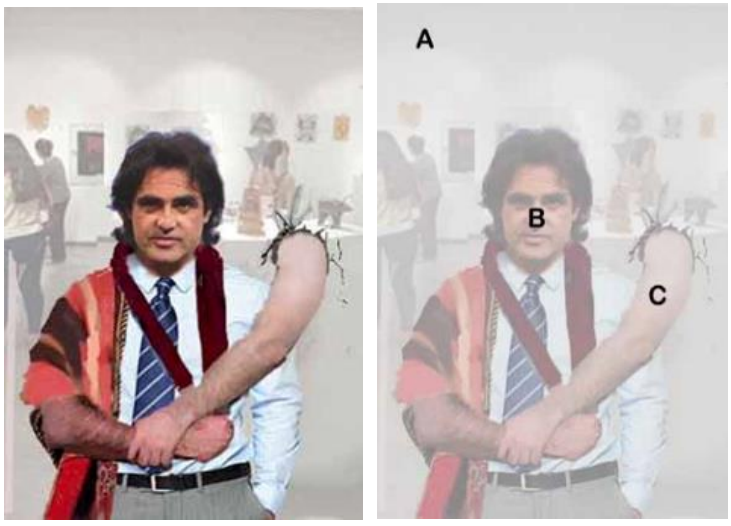
Bc-r 7



Resim 27. "Beyaz Adam, BC-R 7 ve Yüzey Dağılımı", 58 x 83 cm, KT, (YB, Ayna, Tablet, Tuval Bezi), 2023.

"Beyaz Adam" adlı çalışmada, geleneksel yağlıboya tekniğiyle üretilmiş yağlıboya portre, video art ve kliplerle kompoze edilmiştir. "Beyaz Adam" adı "Siyahi" lere yapılmış katliamların sorumlularına verilen isimle gönderme yapılmaktadır. Ayrıca kullandığı çoğul estetiğiyle Oryantalistlerin gizli emellerini, işlediği suçları ve ırkçılığı da eleştirmektedir.

Bc-r 5



a. **b.**

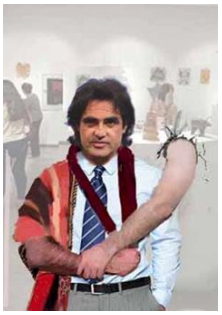
Resim 28. a. "Nefis-Ego/ BC-R 5", 110 x 70 cm, d: 40 cm, KT, (BC-kolaj insan figürü, Hazır-Nesne: Heybe, Elbise, Ayna, Performans: Ahmet Soyad), 2024.
b. Yüzey Tasarımı,

Çalışmada "İnsanlığın egosoyla, kibriyle, dünya hırsıyla hem kendine hem de başkalarına zulmetmektedir" mesajı verilmektedir. Kolaj C, insan egosunu sembolize ederken kolaj B bu egoya yenilen ya da onu güden efendiyi temsil etmektedir. Heybe tasavvufi bağlamda öğüt veren bir objedir ve heybe sahibi dervişin kendine yapılan iyilikleri heybenin ön bölmesine koyarak unutmadığı, kötülükleri ise arka bölmeye koyarak unuttuğu hikmetli bir davranışın aktarımını simgelemektedir.

FULL TEXTS BOOK

Böylece iyilikten iyiliğin, kötülükten kötülüğün filizlendiği bir bakış açısıyla derviş; sadece iyilikle meşgul olduğu evrensel mesajı sunmaktadır. Böylece heybe; "Dervişin hem fikri hemde zikri" olmaktadır (URL-6). Bu nedenle eğer iyilikle dolaşırsa insan; toplumda kötülüğe yer kalmaz, bağlamı çalışmanın mesajıdır.





Resim 29. Çalışma Ortaya Koyduğu Konstrüksiyonuyla, Klasik Sanatta Varılmak İstenen Ereği, Geleneksel Estetik ve Postmodern Dönemi Sanat Stratejilerini Senzetleyerek Ortaya Koymuştur.

Resim 30. Çalışma BC-R 5.

Bc-r 6





Resim 31. "Binici, BC-R 6" ve Duvar Yan Kesiti, 250 x 285 cm, KT, (BC Kolaj "İnsan Figürü", Ayna, Permanent Marker Deseni, Eyer), 2023.

Altı no'lu çalışma BC-R kolajı ve desen tekniğiyle yapılan bir biniciyi tasvir etmekte ve hazır nesne ayna ile simülasyona uğrayan seyircilerin görüntüleri; aynanın sunduğu Postmodern ilişkisel estetik tutumuyla farklı bir sinerjiye dönüşmüştür. Böylece geleneksel yansıtma, aynadan görülen yansıtma ve canlı hücreli figürün doğadan alınarak bu yüzeye kolajlanması ile sunulan konstrüksiyon; üç ayrı yansıtma biçimini aynı yüzeyde eklektik olarak tasarlamıştır.

FULL TEXTS BOOK

Bc-r 8



Resim 32. "Kesikbaş, BC-R 8", 240 x 185 cm, KT, (BC Kolaj, 3D Hologram h:100 cm, Hazır Nesne: Bitkiler, Natürel/Plastik Doğa İmitasyonları), 2024.

Model 6'daki çalışmanın ana konusu evliya ve şehit yeniçeri olan Deli Mehmet figürüdür. Zigetvar savaşında şehit edilen Deli Mehmet'in destandaki adı Kesikbaş olarak geçer ve çalışmada örnek BC-R kolajı olan figür ön planda yaklaşık 4.2 m²'lik bir toprak parçası üzerinde kurgulanmıştır. Arka planda Zigetvar kalesi ve etrafında günümüz popüler kültür nesnelerini (araba, apple amblemi, kahve fincanı, basketbol topu, Yankees şapkası gibi objeleri) yanyana koyarak katmanlama yapılmış; böylece, geçmiş ve günümüzle ilgili gerekli tüm popüler kültür nesneleri, canlı hücresel kolajlarla aynı konstrüksiyonda tepkimeye sokulmuştur. Kompozisyonda sağ üst köşede ise göklerden inen melek sehit askerin yanında gelerek bir dua ritüeli gerçekleştirerek onu ebediyete uğurlamaktadır.

BİOCELLULAR REALİSM MANİFESTOSU

a - Günümüz sanatındaki elit estetiği yıkmak isteyenlere cevap olarak sunulan Biyosellüler gerçekçilik, Modern sanatın labaratuarlarının kapılarını tekrar aralamakta ve dünya kültürlerinin yozlaşmaması için avam üretilere karşı temkinli davranmaktadır.

b - Biyo-hücresel kolajlar bir başka sanatçıdan alıntı yapmaz, kopyalamaz. Özellikle kendi döneminden kes-yapıştır yapmadan, mevcut bağlama kendi yenilikçi (innovative) yorumlarını aktararak mesajlar üretmeyi amaçlar. Çünkü o bir üreticidir; tüketici ya da hırsız değildir.

c -Biyosellüler Realizm'e, sunduğu estetikle Klasizm'in ereği olan gerçekciliğin Postmodern alternatifi ve Hyper-Realizmin bir üst koludur denebilir.

d - Biyosellüler Realizm sanatçısı eserlerini imzalayarak 1950'lerden sonra unutulan eserin özgünlüğünü teyit eden bu geleneği sürdürmektedir. Böylece çalışmasının avam estetikten kopuşunu kutlayarak eserin prestijini tescil etmektedir.

e - Biyosellüler Realizm avam sanata karşıdır. Çünkü avam sanatın toplumu yozlaştırdığını düşünmektedir.

FULL TEXTS BOOK

f - BC-R gerçekçiliğinin diğerlerinden farkı, canlı hücreleri taşıyan figürleri duvarlara kolaj olarak yapıştırıp onları geleneksel sanat eserleri gibi bazen bir yüzeyde, bazen de belirlenen uzamda sunarak klasik sanattan günümüze gelinen mesafeye işaret etmektedir.

g - BC-R üretilerin bu ilk prototiplerinde malzeme olarak aynaların kullanımının amacı; geleneksel tuvaldeki resimleme konseptlerini alarak onları tuvalsiz yüzeylere yeniden kolajlamak ve alımlayıcıları sanatının bir parçası haline getirerek bu kolajlamayla en kusursuz ve kinetik boyamayı ya da aktarımı yapmaktır.

h - BC-R kolajlar hiçbir akımı dışlamaz ve kendinden önceki akımların gerçekliklerini sunacakları estetiğin değerine göre seçerek faydalanır.

SONUÇLAR

Tarihte kendinden önceki İzm'lere alternatif olan Canlı Hücre Realizm'i (Biyosellüler Realizm) performans bağlamlı yüksek sanat ve doğa (ilahi) sanat kolajlarını sentezleyerek gelecekteki gerçekliğe köprü olma potansiyeli taşımaktadır. BC-R kolajlar, Hiper-Realizmin; balmumu ve rezin malzemeleriyle ortaya koyduğu hyper gerçekciliği, daha da ileri götürerek Roma Verizm'inin postmodernist katmanlarını yakalamıştır denebilir. Postmodern dönem artık bitmiştir. BC-R figürlerin sanat tarihi literatüründe yer alışıyla artık Postmodern dönemi sonrası üretilerinin BC-R olanlar ve olmayan diye ayrılarak gruplandırılabilir. Peki, neden daha önce BC-R kolajlar keşfedilemedi? Hukuk ve insan Hakları burada sanatçının daha ileri gitmesini engellemektedir. Dolayısıyla BC-Realizm bu engeli, çalışmalarındaki performans bağlamlı BC-R kolajlarıyla kırarak literatüre felsefik derinliği olan; kusursuz figür, kusursuz ışık, gölge, mekân ve renklerle yeni sinerjiler sunan potansiyellere sahip olduğu söylenebilir.

BC-R kolajlarla: evrensel mesajları olan tasarımlardaki gerçekler, yeni bağlamlarla ve canlı hücresel vurgularla yeni bir gramer oluşturmaya başlamıştır. Dolayısıyla, Klasizm'in ereği olan yüksek gerçekçilik, örneklenen model çalışmalarda aynalı yüzeylere kinetik ve canlı hücresel bağlamlarla eklenmiştir. Tasarlanan konstrüksiyonların bazılarında tarihten alıntılar, konu ve kültürel simge bazında kullanılmıştır. Sinemada; rol çalma, edebiyatta; cümle/dize çalma, sanatta; temellük/resim çalma, sosyal hayatta: hırsızlık olan başkalarının üretilerini kullanma reddedilmiştir. Böylece metinlerarası hırsızlık dışlanarak temellük tarzı yaklaşımlar dahi olsa başkasının üretilerinden uzak durulması gerektiği görsel ve felsefik bağlamlarla ikaz edilmiştir.

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COĞRAFYA DERSİ ÖĞRETİM PROGRAMLARINDA COĞRAFİ BİLGİ SİSTEMLERİNİN YERİ

THE PLACE OF GEOGRAPHICAL INFORMATION SYSTEMS IN GEOGRAPHY COURSE TEACHING PROGRAM

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ÖZET
Coğrafi Bilgi Sistemleri (CBS) son 20–30 yıldır bilgi teknolojilerindeki gelişmelere bağlı olarak gelişen yeni bir teknolojidir. CBS verilerin depolandığı, düzenlendiği, analiz edildiği ve gösterildiği bir sistemdir. CBS birçok disiplin tarafından kullanılmaktadır ve sık kullanıldığı alanlardan birisi de Coğrafya bilimidir. Bu araştırmanın temel amacı, 2005, 2018 ve 2024 coğrafya öğretim programlarında Coğrafi Bilgi Sistemleri (CBS) kullanımının nasıl bir gelişim gösterdiğini ve bu programlar arasında CBS'nin eğitimdeki yerinin nasıl değiştiğini ortaya koymaktır. Bu çalışmada nitel araştırma yöntemlerinden biri olan doküman analizi uygulanmıştır. Araştırmanın verilerini 2005, 2018 ve 2024 Coğrafya Dersi Öğretim Programları oluşturmaktadır. Bu programlar coğrafi bilgi sistemleri ile ilişkilendirilerek incelenmiştir. Araştırmanın sonucunda 2005 ve 2018 yılları Coğrafya Dersi Öğretim Programlarında coğrafi bilgi sistemleri kazanımların içerisinde önerilirken, 2024 yılı öğretim programında her sınıf seviyesinde "Mekânsal Bilgi Teknolojileri" ünitesi içerisinde verilmiştir. Böylece öğrencilerin coğrafi bilgi sistemleri gibi gelişen teknolojilere uyum sağlamaları ve dijital okuryazarlıklarını artırmaları hedeflenmektedir. Bu araştırmada yeni coğrafya öğretim programında uygulanabilecek CBS uygulama örneğine de yer verilmiştir.
Anahtar Kelimeler: Coğrafya, coğrafya öğretim programı, coğrafi bilgi sistemleri

ABSTRACT
Geographic Information Systems (GIS) is a new technology that has developed over the last 20-30 years as a result of developments in information technology. GIS is a system for storing, organising, analysing and displaying data. GIS is used by many disciplines and one of the areas where it is frequently used is geography. The main purpose of this study is to show how the use of Geographic Information Systems (GIS) has developed in the 2005, 2018 and 2024 Geography curricula and how the place of GIS in education has changed between these programmes. Document analysis, one of the qualitative research methods, was used in this study. The data of the study consists of the geography curricula of 2005, 2018 and 2024. These programmes were examined in relation to geographical information systems. As a result of the research, geographical information systems are recommended within the outcomes of the 2005 and 2018 Geography Curricula, while in the 2024 Curriculum they are given within the 'Spatial Information Technologies' unit at each grade level. The aim is for students to adapt to developing technologies such as geographic information systems and to increase their digital literacy. This research also includes an example of a GIS application that can be used in the new geography curriculum.
Keywords: Geography, geography education program, geography information systems

FULL TEXTS BOOK

GİRİŞ

Coğrafi bilgi sistemleri (CBS) yeryüzüne ait verilerin elde edildiği, depolandığı, kontrol edildiği, işlendiği, analiz edildiği bir sistemler bütünüdür. CBS ilk olarak Kanada'da 1960'lı yıllarda doğal kaynakların analiz ve envanter çalışmalarının yapılması amacı ile geliştirilmiştir. Bilgisayar teknolojisindeki hızlı değişimler, uzaktan algılama, veri işleme, matematik ve istatistik gibi alanlarda yaşanan gelişmelerin ortak bir sonucu olarak CBS, günümüzde pek çok alanda hizmet vermeye başlamıştır.

Temelde çeşitli ölçeklerde haritalar içeren CBS, harita destekli uygulamalardan yararlanmayı ve en iyi şekilde analiz etmeyi sağlar. Harita üzerindeki bilgiler grafiksel olarak gösterilebilmektedir. CBS, mekâna ait olan grafik ve grafik olmayan verilerin toplandığı, analiz edildiği bir programdır. Elde edilen bilgilere hızlı ve güvenli bir erişim sağladığından sistemin verimliliği ve güvenliği oldukça fazladır (Öner ve Aydın, 2014). CBS, konusu ve kapsamı itibarı ile çalışma alanı bir şekilde yeryüzünün bir parçasını temsil eden doğal ortam, zaman değişkeni ve insan konularından biri veya tümünü içeren bütün bilim dalları ve meslek grupları tarafından kullanılma imkânı vardır. İdari ve hizmet yönetimi, sağlık, şehir yönetimi, afet bilgi sistemi, pazar paylaşım analizleri, askeri hizmetler, polis teşkilatı, nüfus ve diğer istatistik çalışmaları, madenlerin haritalanması, kirlilik kontrolü, çevresel etki değerlendirmesi vb. birçok alanda CBS kullanılmaktadır (Turoğlu, 2008).

Coğrafya Eğitiminde CBS Kullanımı

CBS'nin en etkili kullanıldığı alanlardan birisi eğitim sektörüdür. Özellikle bir mekân bilimi olan Coğrafya eğitimi CBS'nin yaygın olarak kullanıldığı alanlardan birisidir. Daniel Sui (1995)'ye göre "CBS Eğitimi" ve "CBS ile Eğitim" olmak üzere iki şekilde eğitim yapılmaktadır (Johansson, 2003). CBS eğitiminde amaç CBS'yi öğretmek, CBS'yi kullanarak veri toplama, veri depolama ve veri analizi yaparak mesleki anlamda kullanmaktır. Özellikle üniversitelerin coğrafya, şehir planlamacılığı, mühendislik gibi bölümleri ile askeri kuruluşlar ve yerel yönetimler CBS destekli eğitimi kullanmaktadırlar. CBS'nin eğitimde ikinci kullanımı olan CBS ile eğitimde ise CBS öğrenme sürecinde bir araç olarak kullanılmaktadır. Özellikle ilk ve orta öğretimde, CBS ile ders materyali yapıp ders esnasında modüller hâlinde kullanılır. Burada asıl amaç, CBS ile özellikle coğrafya derslerinde coğrafi veri girişi, depolama, veri analizi yapıp mekânsal analizler yapabilmektir. CBS eğitimi ve CBS ile eğitimin amaçları ve kullanım alanları farklı olmakla beraber, ders esnasında amaçtan kaymalar olmaması için öğrenmeye rehberlik eden öğretmenin süreci iyi kontrol etmesi gerekmektedir (Aladağ, 2007).

CBS temelli uygulamalar, öğrencilerin soyut bilgileri somut hale getirmesini, konuları görsel olarak öğrenmelerini sağlarken yaparak-yaşayarak öğrenmelerine de yardımcı olacaktır. Artvinli ve Martinha (2014), öğrencilerin ortaöğretimin ilk yılında CBS ile tanışmalarının büyük önem taşıdığını belirtmiştir. Schleicher ise, beşinci sınıftan itibaren CBS'nin derslerde yer alması gerektiğini savunmuş ve öğretmen merkezli eğitimden öğrenci merkezli eğitime geçişte CBS kullanımının aşamalarını tanımlamıştır (Schubert & Uphues, 2009).

Cbs ile Araştırma (öğrenci merkezli) Öğrenciler kendi veri setlerini oluşturur ve sonra onlarla çalışır. (10/11. Sınıftan itibaren)
CBS ile Öğrenme (öğrenci merkezli) Öğrenciler CBS'de verilen veri setlerini kullanarak coğrafi konular üzerinde çalışırlar. (8/9. Sınıftan itibaren)

FULL TEXTS BOOK

CBS ile Öğretim (öğretmen merkezli)
CBS, öğretmen merkezli bir derste, projeksiyon yardımıyla coğrafi bir konuyu anlatmada araç olarak kullanılır.
(6/7. Sınıftan itibaren)

CBS Hakkında Öğretim (öğretmen merkezli)
Öğretmen CBS'nin ne olduğunu, nasıl çalıştığını, nerelerde kullanıldığını açıklar.
(5. sınıftan itibaren)

Şekil 1: Derslerde CBS kullanım basamakları (Schleicher'den akt. Schubert & Uphues, 2009).

Öğrencilere coğrafi becerileri kazandırmak için yararlanılabilecek en önemli eğitim teknolojilerinden biri CBS'dir. Bilgi-iletişim teknolojilerinin coğrafya konularının öğretiminde kullanılmasını destekleyen CBS coğrafya dersi öğretim programına ilk kez 2005 yılında doğrudan etkinlik geliştirme olarak girmiştir (Demirci, 2006). CBS'nin coğrafya derslerinde kullanılması ile öğrenciler daha etkin bir öğretim sürecinin içerisinde yer alacaklardır. Öğrenciler CBS sayesinde veri tabanındaki bilgilerle kendi haritalarını oluşturabilecek, neden-sonuç ve dağılış prensibini esas alarak yeni bilgi oluşumunu sağlayabileceklerdir. CBS destekli öğretimde öğrenci kendi haritalarını analiz ettiği için araştıran, eleştirel düşünen, yorum yapan bireyler olarak yetişirler. Dolayısıyla öğrenmeleri anlamlı ve kalıcı olacaktır (Öner, 2011). CBS destekli bir coğrafya öğretimi ile öğrenciler; coğrafi özellikleri, coğrafi dağılımları ve coğrafi ilişkileri içeren coğrafi bilgiyi sunması için haritaları, diyagramları, tabloları, grafikleri düzenler ve çizerler. Haritaları kullanarak coğrafi ve mekânsal sorunları çözmek için gerekli verileri analiz ederler. Problem çözme sürecini kullanarak sorunu belirler, bilgiyi toplar, seçenekleri listeler, avantajları ve dezavantajları göz önünde bulundurur. Çözümü seçer, uygular, çözümün etkinliğini değerlendirirler (Aydın ve Güngördü, 2016). CBS'nin etkinlik odaklı öğrenmeyi desteklemesi ve uygulamaya yönelik olması hem coğrafya öğretimini daha kolay ve etkili hale getirmekte hem de öğrencilerin öğrenme motivasyonları üzerinde olumlu etki yaratabilmektedir. Ayrıca CBS öğrencilerin çok yönlü bir öğrenme gerçekleştirmesine ve öğrenilen kavramlar arasında nedensellik ilişkisi kurmasına olanak sağlamaktadır (Çepni, 2013).
CBS'nin eğitimdeki önemi ve kullanım alanları her geçen gün artmaktadır. 2005, 2018 ve 2024 coğrafya öğretim programları incelendiğinde, CBS'nin bu programlardaki yeri ve uygulama biçimleri üzerine yapılan çalışmalar, CBS'nin eğitimdeki etkinliğini ve öğrencilere sağladığı faydaları daha da net bir şekilde ortaya koymaktadır. Bu bağlamda, CBS'nin coğrafya öğretimindeki rolü ve gelişimi, modern eğitim teknolojilerinin entegrasyonunun başarılı bir örneği olarak değerlendirilebilir.
Bu araştırmanın temel problemi, 2005, 2018 ve 2024 coğrafya öğretim programlarında Coğrafi Bilgi Sistemleri (CBS) kullanımının nasıl bir gelişim gösterdiğini ve bu programlar arasında CBS'nin eğitimdeki yerinin nasıl değiştiğini ortaya koymaktır.

YÖNTEM

Bu çalışmada nitel araştırma yöntemlerinden biri olan doküman analizi yöntemi uygulanmıştır. Doküman analizi, araştırılan olgu veya konular hakkında hem basılı hem de dijital (bilgisayar tabanlı ve internet üzerinden sağlanan) materyallerin gözden geçirilmesi veya değerlendirilmesi amacıyla kullanılır. Diğer nitel araştırma yöntemlerinde olduğu gibi, doküman analizi de anlam oluşturma, anlayış geliştirme ve ampirik bilgi üretme amacıyla verilerin incelenmesi ve yorumlanmasını içerir (Bowen, 2009, s.27; Yıldırım ve Şimşek, 2016). Doküman analizi, eğitim araştırmalarında yaygın olarak kullanılan bir yöntemdir. Örneğin, müfredat değişikliklerinin incelenmesi, eğitim politikalarının değerlendirilmesi ve öğretim materyallerinin analiz edilmesi gibi konularda etkili sonuçlar sağlamaktadır. Araştırmanın verilerini 2005, 2018 ve 2024 Coğrafya Dersi Öğretim Programları oluşturmaktadır. Bu programlar coğrafi bilgi sistemleri ile ilişkilendirilerek incelenmiştir. Ulaşılan

FULL TEXTS BOOK

verilerin yorumlanmasında uygulanan betimsel analiz ile amaç, bulguları okuyucuya tamamen vermek yerine özetlenmiş ve yorumlanmış bir şekilde sunmaktır (Dawson, 2009).

BULGULAR

Coğrafya Dersi Öğretim Programında CBS

Bu bölümde 2005-2018 yılları arasında uygulanan Coğrafya Dersi Öğretim Programı (CDÖP), 2018 yılında uygulanmaya başlayan CDÖP ve 2024 yılında köklü değişiklikler yapılarak 2024-2025 eğitim öğretim yılından itibaren kademeli olarak uygulanmaya başlayacak olan CDÖP coğrafi bilgi sistemleri açısından ele alınmıştır.

2005 yılı Coğrafya Dersi Öğretim Programında CBS'nin Yeri

Türkiye'de CBS'nin eğitim alanında kullanılması henüz çok yenidir. İlk kez 2005 yılında ortaöğretim coğrafya dersi programında yapılan değişiklikler sonucunda Coğrafi Bilgi Sistemleri (CBS)'nin coğrafya derslerinin işlenişi sırasında bir araç olarak kullanılması önerilmiştir. 2005 yılı CDÖP'nda (2009 ve 2011 yıllarında güncellenmiştir) Müfredatta "*Okullardaki teknik donanım ve fiziki imkanlara bağlı olarak, öğretmen CBS uygulamaları geliştirebilir veya mevcut örnekleri inceleyebilir*" şeklinde ifade yer almaktadır. 4 yıllık eğitim öğretim süresi içinde 28 kazanımın öğretilmesinde CBS araç olarak gösterilmiştir (Tablo 1).

Tablo 1. Coğrafya öğretim programında (2005) önerilen CBS uygulamaları

Sıra	Sınıf	Önerilen Kazanım Numaraları	Önerilen Etkinlik Konusu
1	9	A.9.3	Haritalar (açıklamalar bölümünde)
2		A.9.4	Koordinat sistemi (açıklamalar bölümünde)
3		A.9.5 – A.9.6	Eş yükselti eğirileri
4		C.9.5 – C.9.6	Türkiye iklimi
5		C.9.7	Türkiye'de iklim elemanları
6	10	A.10.2 – A.10.3	Sıcak su kaynakları
7		B.10.2	Dünya nüfusu
8		B.10.3	Nüfus değişimi
9		B.10.4	Nüfus dinamiği
10		B.10.5	Nüfus piramitleri
11		B.10.9 – B.10.10	Ekonomik faaliyetlerin sınıflandırılması
12		C.10.10	Türkiye'nin şehirsel dokusu
13		C.10.11	Türkiye'de nüfus dağılışındaki farklılık
14		C.10.12	Nüfusumuzun dinamikliği
15	11	B.11.4 – B.11.5 – B.11.6	Üretimden tüketime
16		D.11.2	Türk kültürünün yayılış alanları
17	12	C.12.4 – C.12.5	Türkiye'nin ticari dokusu
18		C.12.8 – C.12.9	Türkiye nüfusunda geleceğe ait senaryolar
19		D.12.6	Ülkelerin konumu
20		D.12.8	Dünyanın bölgeselleşmesi

Kaynak: Demirci (2006)

Tablo 2: Coğrafya öğretim programında (2011) önerilen CBS uygulamaları

Sıra	**Sınıf**	**Kazanım Numaraları**	**Önerilen Etkinlik Konusu**

FULL TEXTS BOOK

1	9	A.9.5	Koordinat sistemi (Açıklamalarda)
2		A.9.6	Eş yükselti eğrileri
3	10	A.10.2	Sıcak su kaynakları
4		B.10.1	Nüfus özellikleri (Açıklamalarda)
5		B.10.2	Dünya nüfusunun dağılışı
6		B.10.3	Dünya nüfusunun tarihsel süreçteki değişimi
7		B.10.4	Nüfus piramitleri
8		B.10.5	Nüfusun dinamikliği
9		B.10.10	Ekonomik faaliyet türlerinin oransal dağılımı
10		C.10.5	Türkiye'deki iklim elemanlarının özellikleri
11		C.10.6	Türkiye'de görülen iklim tipleri
12		C.10.15	Türkiye'de fonksiyonlarına göre şehir türleri
13		C.10.16	Türkiye nüfusunun yapısal özellikleri ve dağılışı
14		C.10.17	Türkiye nüfusunun tarihsel seyri
15		D.10.1	Doğal afetlerin oluşum nedenleri, özellikleri (Açıklamalarda)
16	11	B.11.2	Şehirlerin fonksiyonel özellikleri
17		B.11.6	Üretim, dağıtım ve tüketim sektörleri ve aralarındaki ilişki
18		C.11.2	Ülkeler ve bölgeler arasın ticarette hammadde, üretim ve pazar ilişkisi
19	12	C.12.5.	Türkiye'nin ticari dokusu
20		C.12.11	Türkiye nüfusunda geleceğe ait senaryolar
21		D.12.5	Ülkelerin konumu

Kaynak: CDÖP (2011); Aydın ve Güngördü (2016)

2018 Yılı Coğrafya Dersi Öğretim Programında CBS'nin Yeri

Programda CBS ile ilgili olarak şu şekilde bir ifade yer almaktadır: "*Coğrafya Dersi Öğretim Programı, günümüz bilgi-iletişim teknolojilerinin coğrafya konularının öğretiminde kullanılmasını destekler niteliktedir. Coğrafi Bilgi Sistemleri'nin (CBS) uygulanması bazı kazanımlarda önerilmiştir.*" Yeni öğretim programı incelendiğinde CBS sadece 2 yerde önerilmiştir. Bunlar:

9.1.7. Bilgileri haritalara aktarmada kullanılan yöntem ve teknikleri açıklar.

a) Haritacılık tarihinde önemli olan Türk ve Müslüman bilim insanları ve çalışmaları üzerinde durulur.

b) ***Coğrafi Bilgi Sistemlerine (CBS)*** *ve uzaktan algılama tekniklerine yer verilir.*

10.4.1. Afetlerin oluşum nedenlerini ve özelliklerini açıklar.

Coğrafi problemlerin çözümünde ***CBS*** *ve diğer mekânsal teknolojilerden yararlanıldığına dair örneklere yer verilir.*

Programda ayrıca *"Okullardaki teknik donanım ve fiziki imkânlara bağlı olarak öğretmen CBS uygulamaları geliştirebilir veya uygulayabilir" (CDÖP, 2018: 14)* şeklinde bir ifade yer almaktadır. Bundan hareketle program detaylı bir şekilde incelenmiş ve öneri niteliğinde CBS'nin uygulanabileceği kazanımlar belirlenmiştir (Tablo 3).

Tablo 3: Coğrafya öğretim programında (2018) CBS'nin uygulanabileceği kazanımlar ve konular

Sıra	**Sınıf**	**Kazanım Numaraları**	**Kazanımlar**
1	9	9.1.5	Koordinat sistemini kullanarak zaman ve yere ait özellikler hakkında çıkarımlarda bulunur.
2		9.1.6	Haritayı oluşturan unsurlardan yararlanarak harita kullanır.

FULL TEXTS BOOK

3		9.1.7	Bilgileri haritalara aktarmada kullanılan yöntem ve teknikleri açıklar.
4		9.1.8	Haritalarda yer şekillerinin gösteriminde kullanılan yöntem ve teknikleri açıklar.
5	10	10.1.5	Türkiye'deki yer şekillerinin oluşum sürecine iç kuvvetlerin etkisini açıklar.
6		10.1.10	Türkiye'deki su varlıklarının genel özelliklerini ve dağılışını açıklar.
7		10.2.3	Nüfusun dağılışı üzerinde etkili olan faktörler ile dünya nüfusunun dağılışını ilişkilendirir.
8		10.2.4	Nüfus piramitlerinden hareketle nüfusun yapısıyla ilgili çıkarımlarda bulunur.
9		10.2.6	Türkiye'de nüfusun dağılışını, nüfusun dağılışında etkili olan faktörler açısından değerlendirir.
10		10.2.11	Ekonomik faaliyetleri temel özelliklerine göre ayırt eder
11		10.2.12	Ekonomik faaliyet türlerinin oransal dağılımına ilişkin verileri, ülkelerin gelişmişlik düzeyleriyle ilişkilendirerek çıkarımda bulunur.
12		10.4.1	Afetlerin oluşum nedenlerini ve özelliklerini açıklar.
13		10.4.2	Afetlerin dağılışları ile etkilerini ilişkilendirir.
14		10.4.3	Türkiye'deki afetlerin dağılışları ile etkilerini ilişkilendirir.
15	11	11.2.4	Şehirleri fonksiyonel özellikleri açısından karşılaştırır.
16		11.2.6	Türkiye'deki şehirleri fonksiyonlarına göre ayırt eder.
17		11.2.16	Tarımın Türkiye ekonomisindeki yerini açıklar.
18		11.2.17	Türkiye'nin madenleri ve enerji kaynaklarının dağılışını açıklar.
19		11.2.19	Türkiye'de sanayi sektörünün özelliklerini açıklar.
20		11.3.1	İlk kültür merkezlerinin ortaya çıkışı, yayılışı ve dağılışlarını belirleyen faktörleri açıklar.
21		11.3.2	Farklı kültürel bölgelerin yeryüzünde yayılışına etki eden faktörleri açıklar.
22		11.3.3	Türk kültürünün yayılış alanlarını bölgesel özellikler açısından analiz eder.
23		11.3.9	Bölgesel ve küresel ölçekteki örgütleri etki alanları açısından değerlendirir.
24	12	12.2.8	Ulaşım ağları ile yerleşme ve ekonomik faaliyetler arasında ilişki kurar.
25		12.2.10	Dünya ticaret merkezleri ve ağlarını küresel ekonomideki yerleri açısından analiz eder.
26		12.2.12	Tarihî ticaret yollarını Türkiye'nin konumu açısından değerlendirir
27		12.2.14	Türkiye'deki doğal ve kültürel sembollerin mekânla ilişkisini açıklar.
28		12.2.15	Türkiye'nin turizm potansiyelini ve varlıklarını açıklar.
29		12.3.10	Dünyadaki başlıca enerji nakil hatlarının bölge ve ülkelere etkisini açıklar.

Kaynak: CDÖP (2018)

FULL TEXTS BOOK

Yeni CDÖP incelendiğinde toplamda 29 kazanımda CBS uygulamalarına yer verilebileceği tespit edilmiştir. 2005 yılı CDÖP'de kazanımların açıklamalarında CBS uygulama önerileri verilirken yeni programda verilmediği belirlenmiştir.

2024 Yılı Coğrafya Dersi Öğretim Programında CBS'nin yeri

Ünite temelli yaklaşımla hazırlanan Coğrafya Dersi Öğretim programı *"Coğrafyanın Doğası, Mekânsal Bilgi Teknolojileri, Doğal Sistemler ve Süreçler, Beşerî Sistemler ve Süreçler, Ekonomik Faaliyetler ve Etkileri, Afetler ve Sürdürülebilir Çevre; Bölgeler, Ülkeler ve Küresel Bağlantılar"* ünitelerinden oluşmaktadır. 2005 ve 2018 yılları Coğrafya Dersi Öğretim Programlarında coğrafi bilgi sistemleri kazanımların içerisinde önerilirken 2024 yılı öğretim programında her sınıf seviyesinde 2. ünite olan "Mekânsal Bilgi Teknolojileri" ile öğrencilerin coğrafi bilgi sistemleri gibi gelişen teknolojilere uyum sağlamaları ve dijital okuryazarlıklarını artırmaları hedeflenmektedir. Bu süreçte, öğretmenlerin teknolojik yetkinliklerinin hizmet içi eğitimlerle desteklenmesi ve okullarda gerekli donanımın sağlanması büyük önem taşımaktadır. Ayrıca, öğretmenlerden, öğrencilerin bu teknolojileri kullanabilecekleri öğrenme ortamlarını oluşturmaları beklenmektedir (CDÖP, 2024: 6).

9. sınıflarda "Mekânsal Bilgi Teknolojileri" ünitesinde üç kazanım yer almaktadır.

COĞ.9.2.1. Harita uygulamaları yapabilme

a) Haritaya ait bileşenlerden yararlanarak haritaları okur.

b) Haritaya ait bileşenlerden yararlanarak haritadaki olay, olgu ve mekânlar arası ilişkileri çözümler.

c) Haritada yer alan olay, olgu veya mekânların özellik, konum, dağılış ve ilişkileri ile değişim ve/veya harita türüne ilişkin çıkarım yapar.

ç) Harita yapım aşamalarını kullanarak harita oluşturur.

COĞ.9.2.2. Türkiye'nin konum özelliklerini algılayabilme

a) Türkiye'nin konum özelliklerini belirler.

b) Türkiye'nin konum özelliklerini görselleştirir.

c) Türkiye'nin konum özelliklerini özetler.

COĞ.9.2.3. Mekânsal bilgi teknolojilerini oluşturan bileşenleri çözümleyebilme

a) Mekânsal bilgi teknolojilerini oluşturan bileşenleri belirler.

b) Mekânsal bilgi teknolojilerini oluşturan bileşenler arasındaki ilişkileri belirler.

Bu kazanımların genel amacı, öğrencilerin coğrafi bilgi sistemleri (CBS) ve mekânsal bilgi teknolojilerini etkin bir şekilde kullanarak harita okuma, analiz etme, çıkarım yapma ve harita oluşturma becerilerini geliştirmektir. Ayrıca öğrencilerden CBS'ye ait bileşenleri (donanım, yazılım, veri, yöntem ve kullanıcı) öğrenmeleri ve bu bileşenlerle CBS'ye ait metodolojiyi (verileri elde etme, depolama, kontrol etme, işleme, analiz etme ve görüntüleme) ilişkilendirilmeleri beklenmektedir. Bu kazanımlar, öğrencilerin coğrafi bilgi sistemleri ve mekânsal bilgi teknolojilerini kullanarak mekânsal düşünme, problem çözme ve analitik yeteneklerini geliştirmeyi amaçlamaktadır. Bu beceriler, öğrencilerin coğrafi verileri etkili bir şekilde analiz edebilmelerini, yorumlayabilmelerini ve görselleştirebilmelerini sağlar.

10. sınıflarda ünite ile ilgili iki kazanım yer almaktadır.

COĞ.10.2.1. Örnek uygulamalar üzerinden CBS ve uzaktan algılamanın kullanım alanlarını özetleyebilme

a) Örnek uygulamalar üzerinden CBS ve uzaktan algılamanın kullanım alanlarını çözümler.

b) Örnek uygulamalar üzerinden CBS ve uzaktan algılamanın kullanım alanlarını sınıflandırır

c)Örnek uygulamalar üzerinden CBS ve uzaktan algılamanın kullanım alanlarını yorumlar.

COĞ.10.2.2. Mekânsal bilgi teknolojilerini kullanarak altlık haritalar üzerinde mekânsal veriler oluşturabilme

a) Oluşturacağı haritanın amacını belirler.

b) Oluşturacağı harita için gerekli olan yöntem ve araç gereçleri kullanır.

c) Oluşturacağı haritaya ekleyeceği verileri toplar.

FULL TEXTS BOOK

ç) Oluşturacağı haritanın türünü belirler.
d) Verileri haritaya işler ve haritanın bileşenlerini oluşturur.
e) Oluşturduğu haritayı amacına uygun biçimde kullanır.
f) Oluşturduğu haritayı ihtiyaç duyduğunda tekrar kullanır.

Bu kazanımlar, öğrencilerin coğrafi bilgi sistemleri (CBS) ve uzaktan algılama teknolojilerini etkili bir şekilde kullanabilmeleri, mekânsal düşünme becerilerini geliştirmeleri ve dijital okuryazarlıklarını artırmaları amacıyla belirlenmiştir. Ünitenin ilk kazanımıyla öğrencilerin CBS ve uzaktan algılama teknolojilerinin farklı kullanım alanlarını çözümleyebilme, sınıflandırabilme ve yorumlayabilme becerileri kazanmaları hedeflenmektedir. Bu sayede, öğrenciler bu teknolojilerin çeşitli sektörlerde nasıl kullanıldığını anlayarak, teorik bilgilerini pratik örneklerle pekiştirebileceklerdir. İkinci kazanımla öğrencilerin mekânsal bilgi teknolojilerini kullanarak altlık haritalar üzerinde mekânsal veriler oluşturabilme yetenekleri geliştirilmek istenmektedir. Bu süreçte, öğrenciler harita oluşturmanın amacını belirleme, gerekli yöntem ve araçları kullanma, verileri toplama, harita türünü belirleme, verileri haritaya işleme ve haritanın bileşenlerini oluşturma gibi adımları öğrenirler. Ayrıca, oluşturdukları haritayı amacına uygun şekilde kullanma ve gerektiğinde yeniden kullanma becerisi kazanmaları amaçlanmaktadır.

11. sınıflarda ünitede bir kazanım bulunmaktadır.

COĞ.11.2.1. Web tabanlı CBS aracılığı ile harita uygulamaları yapabilme
a) Web tabanlı CBS uygulamasını kullanarak harita okur.
b) Web tabanlı CBS uygulamasını kullanarak harita çözümler.
c) Web tabanlı CBS uygulamasını kullanarak haritadan çıkarım yapar.
ç) Web tabanlı CBS uygulamasını kullanarak harita oluşturur.

Bu kazanımın genel amacı, öğrencilerin dijital okuryazarlıklarını artırarak, gelişen CBS teknolojilerini etkin bir şekilde kullanmalarını sağlamaktır. Öğrenciler, web tabanlı CBS uygulamaları sayesinde teorik bilgilerini pratikte uygulayabileceklerdir. Öğrencilerin web tabanlı CBS uygulamaları kullanarak haritaları okuma, çözümleme, çıkarım yapma ve kendi haritalarını oluşturma yeteneklerini geliştirebileceklerdir. Bu sayede öğrenciler mekânsal verileri anlama, yorumlama, analiz etme ve görselleştirme becerilerini artırarak, haritalardan anlamlı bilgiler çıkarabileceklerdir.

12. sınıflarda "Mekânsal Bilgi Teknolojileri" ünitesinde bir kazanım yer almaktadır.

COĞ.12.2.1. Mekânsal veriler kullanılarak CBS'de oluşturulan tematik haritalardan uygulamalar yapabilme
a) Mekânsal verileri kullanarak CBS'de oluşturulan tematik haritaları okur.
b) Mekânsal verileri kullanarak CBS'de oluşturulan tematik haritaları çözümler.
c) Mekânsal verileri kullanarak CBS'de oluşturulan tematik haritalardan çıkarım yapar.
ç) Mekânsal verileri kullanarak CBS'de tematik haritalar oluşturur.

Bu kazanım, öğrencilerin CBS teknolojilerini kullanarak tematik haritaları okuma, analiz etme, çıkarım yapma ve oluşturma becerilerini geliştirmeyi hedefler. Böylece, öğrenciler mekânsal düşünme, problem çözme ve analitik yeteneklerini güçlendirerek, haritalardan elde ettikleri verileri etkili bir şekilde kullanabilir hale gelirler.

FULL TEXTS BOOK

Program detaylı bir şekilde incelenmiş ve bu kazanımların dışında öneri niteliğinde CBS'nin uygulanabileceği kazanımlar belirlenmiştir (Tablo 3)

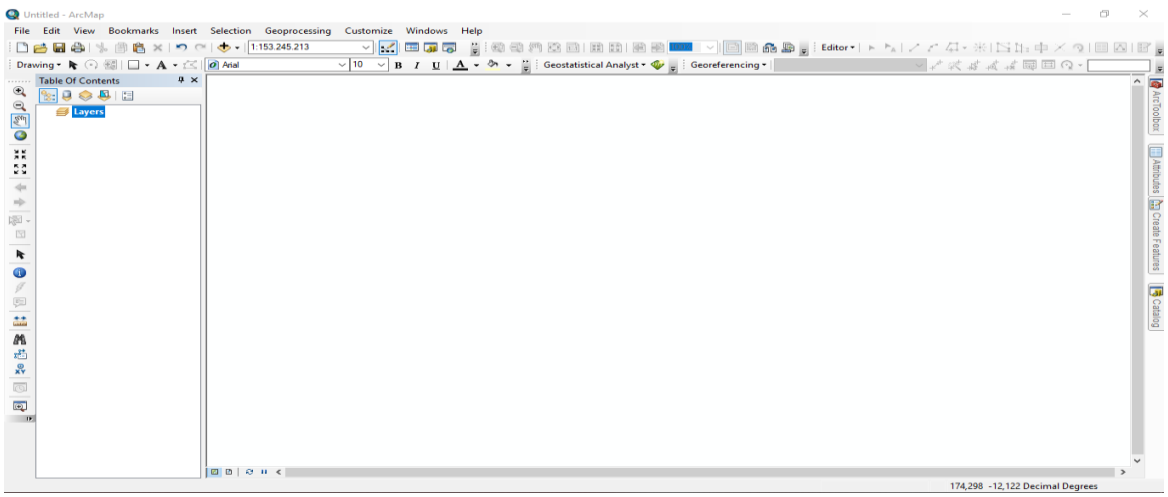
Tablo 4: Coğrafya öğretim programında (2024) CBS'nin uygulanabileceği kazanımlar ve konular

Sıra	Sınıf	Kazanım Numaraları	Kazanımlar
1	9	9.3.3.	Türkiye ve dünyadaki farklı iklim türlerine sahip yerlerin iklim verilerini kullanarak tablo, grafik, şekil ve/veya diyagram hazırlayabilme
2		9.4.1.	Nüfusun zaman içerisindeki değişimini tablo ve grafikler aracılığı ile yorumlayabilme
3		9.4.2.	Dünya ve Türkiye'deki nüfusun dağılışı ve hareketlerini etkileyen faktörler hakkında haritalar üzerinden çıkarımda bulunabilme
4		9.4.3.	Türkiye ve farklı ülkelerin nüfus piramitlerinden yararlanarak demografik dönüşüm sürecini yorumlayabilme.
5		9.6.3.	Bütüncül afet yönetimi uygulamalarını tablo, grafik, şekil ve/veya diyagramlar aracılığıyla yorumlayabilme
6		9.7.1.	Bölgelerin belirlenmesinde kullanılan kriterlere göre bölge hakkında çıkarım yapabilme
7	10	10.1.1.	Örnek olay, olgu ve/veya mekânı coğrafyanın temel kavramları ile ilişkilendirebilme
8		10.5.2.	Ekonomik sektörlerin dağılımını gösteren tablo, grafik, şekil ve/veya diyagramlar üzerinden farklı gelişmişlik seviyesine sahip ülkeleri karşılaştırabilme
9		10.5.3.	Ekonomik sektörlerin Türkiye ekonomisindeki yeri ve önemini gösteren tablo, grafik, şekil ve/veya diyagram hazırlayabilme
10		10.7.1.	Türk dünyasının ortak kültürel özellikleri hakkında çıkarım yapabilme
11	11	11.3.1.	Yeryüzündeki su kaynaklarını sınıflandırabilme
12		11.4.1.	Türkiye ve dünyadaki yerleşmelerin mekânsal organizasyonunu çözümleyebilme
13		11.5.2.	Dünya ve Türkiye'deki tarım uygulamalarını sürdürülebilirlik ölçütlerine göre değerlendirebilme
14		11.5.3.	Dünya ve Türkiye'de bulunan stratejik-kritik madenlerin ülke ekonomileri ve ülkeler arası ilişkilerdeki yerine yönelik çıkarım yapabilme
15		11.5.4.	Dünya ve Türkiye'deki enerji kaynaklarının kullanımında meydana gelen değişim ve sürekliliği algılayabilme
16		11.5.5.	Sanayi faaliyetlerinin mekânsal etkilerini sorgulayabilme
17		11.6.3.	Türkiye'de bulunan su kaynaklarının sürdürülebilir kullanımını sorgulayabilme
18		11.7.1.	Türkiye ile Türkiye'nin kültürel açıdan güçlü ve köklü bağlara sahip olduğu yerler arasındaki etkileşimi sorgulayabilme
19		11.7.4.	Örnek bir ülkede yürütülen madencilik faaliyetleriyle ilgili tablo, grafik, şekil ve/veya diyagram hazırlayabilme
		11.7.5.	Örnek ülkelerin enerji kaynaklarını coğrafi açıdan karşılaştırabilme

FULL TEXTS BOOK

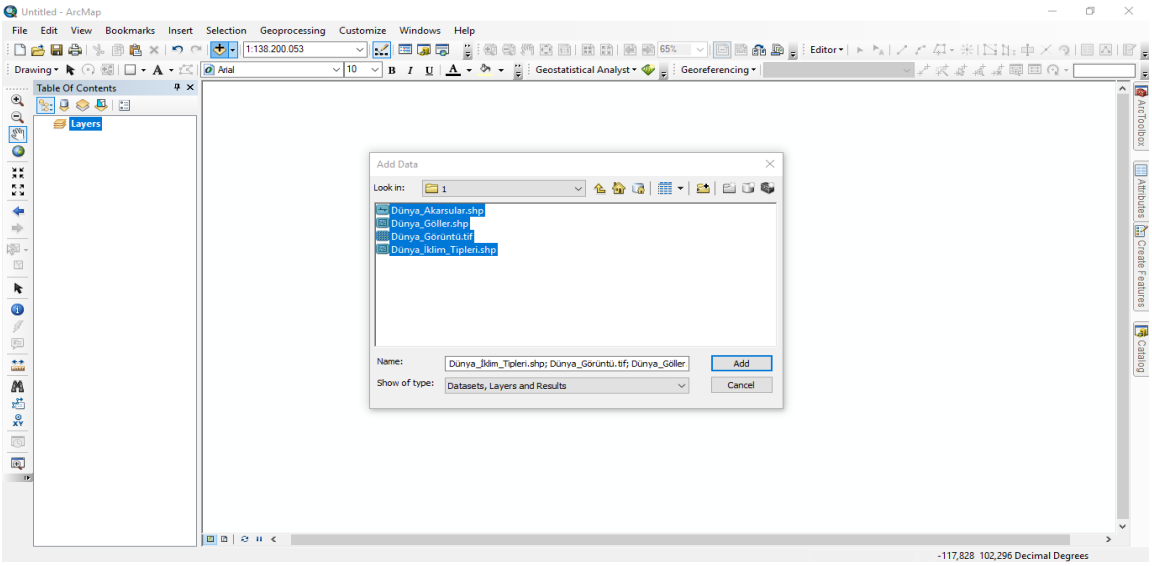
20	12	12.3.3.	Coğrafi faktörlerin dünya ve Türkiye'deki bitki örtüsünün çeşitliliği ve dağılışı üzerindeki etkisi hakkında haritalardan çıkarım yapabilme
21		12.5.1.	Dünya ve Türkiye'deki ulaşım sistemlerinin gelişim sürecinde meydana gelen değişim ve sürekliliği algılayabilme
22		12.5.2.	Küresel ticaretin mekânsal bağlantılarını çözümleyebilme
23		12.6.2.	Türkiye'deki bitki topluluklarında görülen değişim ve sürekliliği algılayabilme
24		12.6.5.	Dünya veya Türkiye'den örnek bir çevre sorununa yönelik çözüm önerisi geliştirebilme
25		12.7.2.	Örnek ülkelerin ulaşım sistemlerini karşılaştırabilme
26		12.7.3.	Örnek bir ülkeyi ticari faaliyetleri açısından sentezleyebilme
27		12.7.4.	Örnek ülkelerin turizm faaliyetlerini karşılaştırabilme

Yeni Coğrafya Dersi Öğretim Programına Göre CBS Uygulama Örneği
Örnek 1
Sınıf: **9**
Ünite: **Doğal Sistemler ve Süreçler**
Kazanım: 9.3.3. Türkiye ve dünyadaki farklı iklim türlerine sahip yerlerin iklim verilerini kullanarak tablo, grafik, şekil ve/veya diyagram hazırlayabilme
Uygulama:
Bu kazanımı gerçekleştirmek için masaüstünde bulunan *ArcMap* uygulama ikonu üzerine çift tıklayarak program çalıştırılır **(Şekil 1)**. Program arayüzündeki menüde yer alan *Add Data* açılır ve gelen ekrandan *Masaüstü/Öğretim Uygulaması/1* klasöründe bulunan verilerin hepsi seçilip *Add* diyerek programa çağırılır **(Şekil 2)**. Açtığınız veriler büyükten küçüğe *(Poligon, Line, Point(varsa))* şeklinde aşağıdan yukarıya doğru sıralanır. Sol tarafta yer alan *Table Of Contents* kısmındaki *Dünya_İklim_Tipleri* verisi üzerine sağ tıklanır ve en altta yer alan *Properties* menüsü açılır, gelen ekrandan *Symbology/Categories/Unique values* seçilerek *Value Field* bölümüne *İklim_tipi* getirilir. Pencerenin alt kısmından *Add All Values*'e basılarak iklim tipleri menüye eklenir ve uygun renklendirmenin ardından *Tamam*'a bir kez tıklanır **(Şekil 3)**. Arayüzün alt kısmında yer alan *Layout View*'e basarak çalışma çıktı sayfasına getirilir ve üst kısımdaki *İnsert* menüsüne tıklanarak başlıca harita unsurları olan *Title(Başlık), Legend(Lejant), North Arrow(Kuzey Oku), Scale Bar(Ölçek), Coordinate System (Koordinat Sistemi)* ve *Kaynak* eklenir **(Şekil 4)**. Bu işlemlerin ardından *File* menüsünden *Export Map* seçeneği seçilir, açılan pencereden *Dosya Adı* ve *Kayıt Türü* belirlendikten sonra harita *Kaydet* butonu ile kaydedilir **(Şekil 5)**. Harita elemanları (Başlık, Lejant, Ölçek vb..) eklenir **(Şekil 6).**

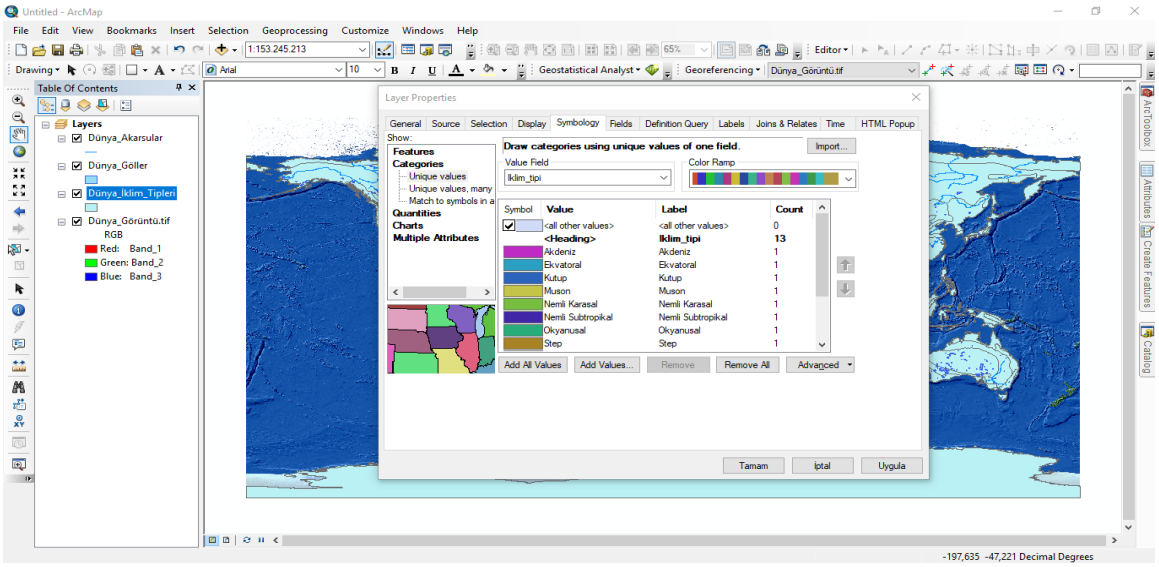


Şekil 2: *ArcMap arayüzünün görünüşü*

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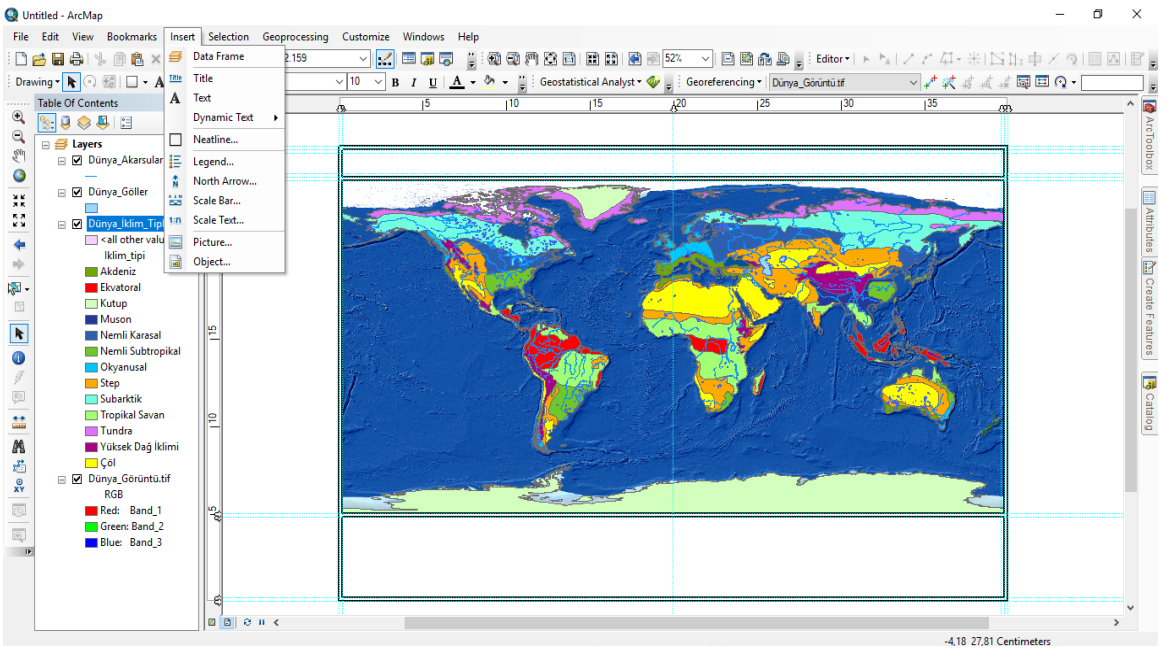


Şekil 3: *ArcMap programı ile verilerin çağrılma işlemi*

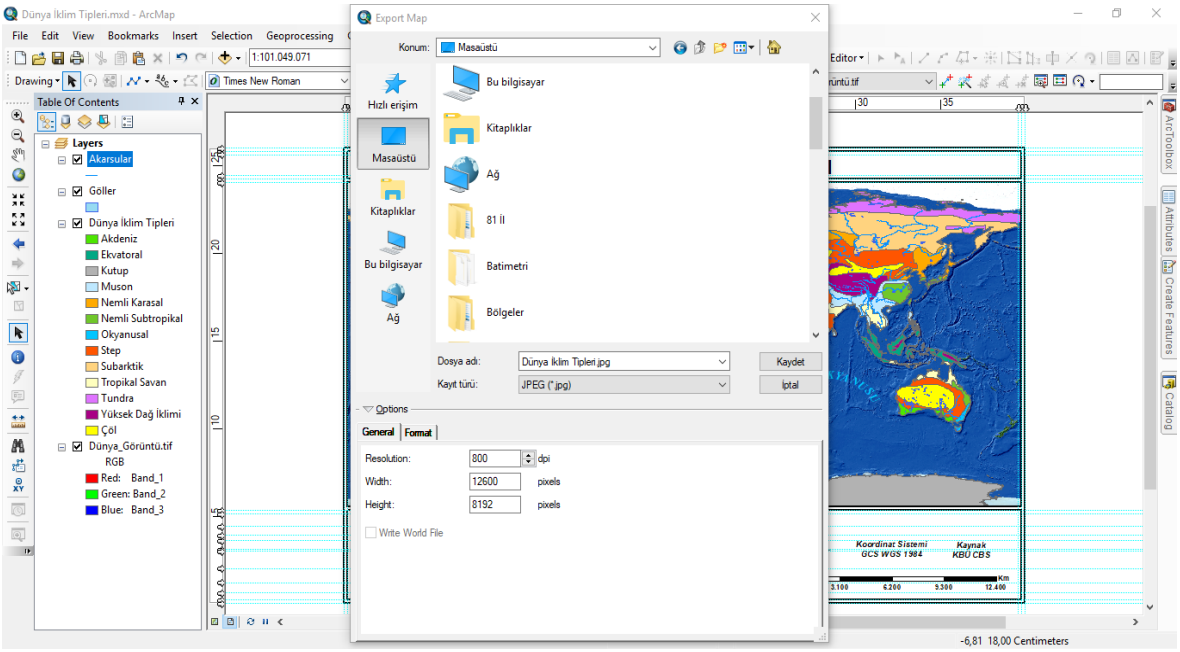


Şekil 4: *Çağırılan Dünya İklim Tipi ve diğer verilerin renklendirilmesine ilişkin görüntü*

FULL TEXTS BOOK

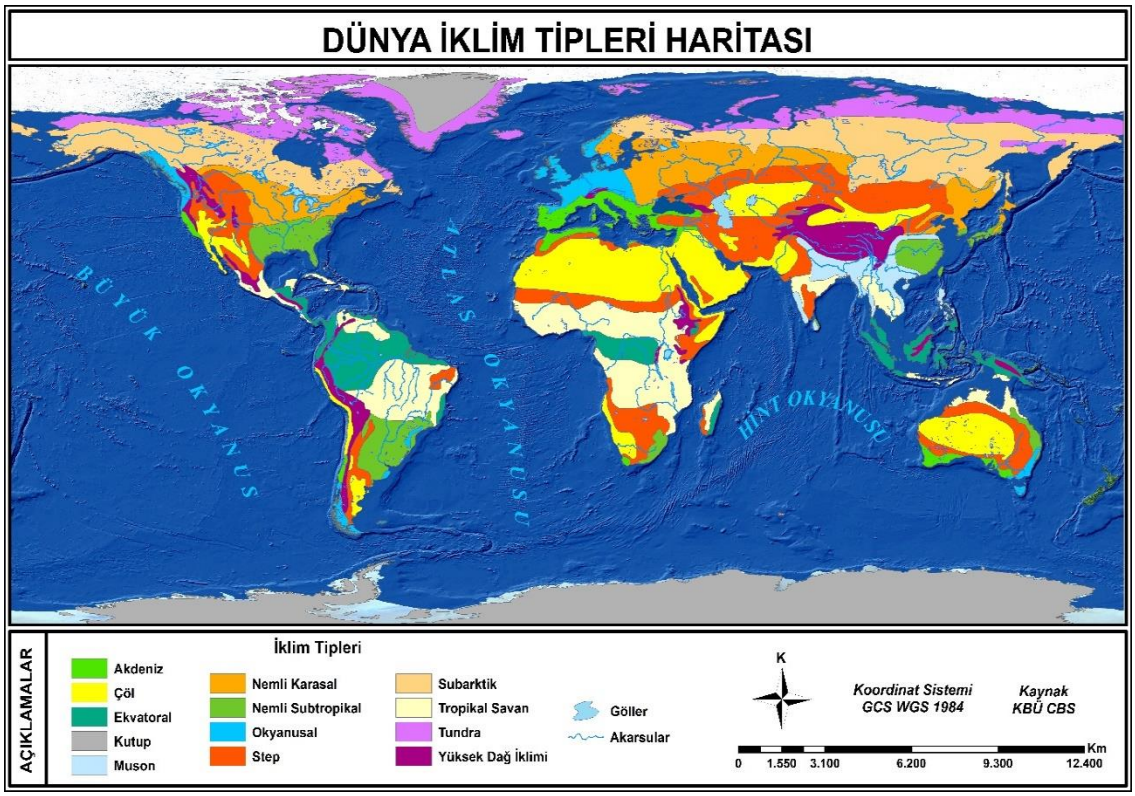


Şekil 5: *Layout View ile çıktı sayfasına geçiş ve İnsert menüsü ile harita unsurlarının eklenmesi*



Şekil 6: *Hazırlanan haritanın kaydedilme işlemine ilişkin görüntü*

FULL TEXTS BOOK



Şekil 7: *Etkinlik sonucunda elde edilen harita*

SONUÇ VE TARTIŞMA

Teknolojik gelişmeler, yalnızca ticaret, sanayi ve idari alanlarda değil, eğitim alanında da büyük etkiler yaratmaktadır. Eğitimdeki bu teknolojik ilerlemeler, ülkelerin gelişmişlik düzeylerinde belirleyici bir rol oynamaktadır. 2005 yılından itibaren Coğrafya Dersi Öğretim Programı (CDÖP) kapsamında CBS'nin eğitimdeki rolü vurgulanmış ve çeşitli kazanımlar ile CBS'nin kullanımı teşvik edilmiştir. 2005 CDÖP'nda, CBS'nin derslerde bir araç olarak kullanılabileceği belirtilmiş ve 28 kazanımda CBS'nin rolü tanımlanmıştır. Ancak uygulamada, teknik donanım ve fiziki imkanlar göz önünde bulundurularak, öğretmenlerin CBS uygulamalarını geliştirmeleri veya mevcut örnekleri incelemeleri önerilmiştir. 2018 CDÖP'nda ise CBS'nin önemi vurgulanmaya devam edilmiştir, ancak uygulama alanı daralmış ve sadece iki kazanımda CBS'nin kullanımı önerilmiştir. Program, bilgi-iletişim teknolojilerinin coğrafya öğretiminde kullanılmasını desteklerken, CBS uygulamaları için yine okullardaki teknik donanım ve fiziki imkanların belirleyici olacağını belirtmiştir. Bu dönemde CBS uygulamalarının somut örneklerle zenginleştirilmemesi, programın etkililiğini sınırlamıştır.

2024 yılına gelindiğinde, CDÖP köklü değişiklikler geçirmiş ve ünite temelli bir yaklaşımla hazırlanmıştır. Bu programda, her sınıf seviyesinde "Mekânsal Bilgi Teknolojileri" ünitesi eklenmiş, öğrencilerin coğrafi bilgi sistemleri gibi gelişen teknolojilere uyum sağlamaları, mekânsal düşünme becerilerini geliştirmeleri ve CBS ile dijital okuryazarlıklarını artırmaları hedeflenmiştir. 2024 CDÖP, öğrencilere CBS'nin çeşitli bileşenlerini ve metodolojilerini öğretmeyi, bu teknolojilerle harita okuma, analiz etme, çıkarım yapma ve harita oluşturma becerilerini geliştirmeyi amaçlamaktadır. Ayrıca, öğretmenlerin teknolojik yetkinliklerinin hizmet içi eğitimlerle desteklenmesi ve okullarda gerekli donanımın sağlanması öngörülmüştür.

2005 yılından 2024 yılına kadar olan süreçte CDÖP'da CBS'nin yeri ve önemi artmış, ancak uygulama alanları ve kapsamı değişmiştir. 2005 yılında başlayan CBS entegrasyonu, 2018'de daralmış, ancak 2024 yılında kapsamlı ve sistematik bir yapıya kavuşmuştur. Bu değişim, CBS'nin coğrafya

FULL TEXTS BOOK

eğitimindeki rolünün giderek daha önemli hale geldiğini ve teknolojik gelişmelere uyum sağlama çabasını yansıtmaktadır.

Ancak okulların fiziki imkânları ve teknolojik donanımlarına bağlı olarak coğrafi bilgi sistemleri teknolojilerinin uygulanabilirliğinin sınırlı kalacağı düşünülmektedir. Araştırmalar, CBS'nin eğitimde uygulanmasının önünde birtakım engeller olduğunu göstermektedir. Bu engeller arasında okulların yetersiz fiziki ve teknik koşulları, CBS yazılımlarının yüksek maliyeti, ders saatlerinin kısıtlı olması, öğretmenlerin yeterli hizmet içi eğitim almaması ve CBS etkinliklerinin yapılabilmesi için gerekli olan planlamaların zaman alması sayılabilir (Aladağ, 2007; Artvinli, 2009; Cameron, 2005; Crabb, 2001; Demirci, 2006; Johansson, 2003; Kerski, 2000; Koçak, 2007; Pitts, 2005; Tiyekli, 2007; Yurdam, 2013). Sınıfta CBS kullanan öğretmenlere veri sunumu ile ilgili ön bilgi verilmediği takdirde, CBS'nin öğrencilerin öğrenme sürecine olumsuz etkisi olabileceği belirtilmiştir (Bednarz, 2004). CBS tabanlı ders modellerinin yetersiz olması, öğrencilerin bilgisayara yetersiz ulaşımı (Kerski & Kerski, 2003) göz önünde bulundurulmalıdır. Araştırmalar, öğrenci sayısının 20 ve altında olduğu sınıflarda CBS uygulamalarının daha kolay gerçekleştirilebildiğini göstermektedir (Artvinli, 2009).

Coğrafya derslerinin CBS ile işlenebilmesi için laboratuvarlar hazır hale getirilmelidir. Bunun için bilgisayar laboratuvarlarındaki bilgisayarlar iyileştirilmeli ve bu bilgisayarlara CBS yazılımları yüklenmelidir. Coğrafya ders kitapları hazırlanırken CBS ile ilgili örnek uygulamalara ve gerekli bilgilere yer verilmelidir. Öğretmenlerin CBS'yi nerede, nasıl ve ne ölçüde kullanacağını bilmeleri ve bu konuda istekli olmaları gerekmektedir (Demirci, 2006).

CBS'yi öğretim ortamında kullanacak öğretmenlerin olumlu bir tutuma sahip olmaları önemlidir. Öğretmenlerin CBS ile yapılacak uygulamaların sonuçlarını görmeleri, bu tutumu olumlu yönde etkileyecektir. Eğer öğretmen CBS'ye karşı olumsuz bir tutum geliştirmişse, bu durum öğretmenin teknolojik bilgi ve becerisi konusundaki yetersizliğinden kaynaklanabilir (Uğurlu, 2008).

Sonuç olarak, Coğrafya Dersi Öğretim Programı (CDÖP) kapsamında CBS'nin rolü ve önemi zaman içinde belirgin değişiklikler göstermiştir. Teknolojik gelişmelerin eğitimdeki etkileri göz önüne alındığında, 2005 yılında başlayan CBS entegrasyonu, 2018'de daralmış ancak 2024 yılında yeniden yapılandırılarak güçlü bir şekilde devam etmiştir. Bu süreçte, CBS'nin eğitimdeki uygulamaları ve etkileri konusunda ortaya çıkabilecek zorluklar da göz önünde bulundurulmalıdır. Okulların teknik altyapı ve fiziki koşullarının iyileştirilmesi, öğretmenlerin teknolojik yetkinliklerinin artırılması ve öğrencilerin CBS ile mekânsal düşünme becerilerinin geliştirilmesi, CBS'nin etkin kullanımı için önemli adımlardır. Gelecekte, CBS'nin eğitimdeki rolünü güçlendirmek ve bu teknolojiden maksimum fayda sağlamak için bu yönde yapılan çalışmaların sürdürülmesi gerekmektedir.

ÖNERİLER

- Okullarda CBS uygulamalarının daha etkin bir şekilde kullanılabilmesi için teknik altyapının güçlendirilmesi ve güncellenmesi önemlidir. Bu kapsamda, öğretmenlerin ihtiyaç duydukları donanım ve yazılımlara erişimlerinin sağlanması gerekmektedir.
- CBS teknolojilerini etkin bir şekilde kullanabilmeleri için öğretmenlere yönelik düzenli eğitimler düzenlenmelidir. Bu eğitimler hem CBS tekniklerini hem de pedagojik yaklaşımları kapsamalı ve öğretmenlerin profesyonel gelişimlerini desteklemelidir.
- CBS'nin öğrencilerin mekânsal düşünme ve analitik yeteneklerini geliştirmedeki potansiyelinden tam olarak faydalanabilmek için öğretim programlarında daha fazla öğrenci merkezli etkinlik ve projeler yer almalıdır. Öğrencilerin CBS teknolojilerini aktif olarak kullanarak problem çözme becerilerini geliştirebilecekleri ortamlar oluşturulmalıdır.
- CDÖP'te CBS'nin rolünün anlatılmasında daha fazla somut örnek ve uygulama senaryosu sunulması önemlidir. Bu sayede öğretmenlerin CBS uygulamalarını daha iyi anlayıp ders içeriklerine entegre etmeleri kolaylaşacaktır.

FULL TEXTS BOOK

- CBS'nin etkin kullanımının değerlendirilmesi ve öğrenci başarılarının izlenmesi için uygun değerlendirme araçları ve geri bildirim mekanizmaları oluşturulmalıdır. Bu süreçler, CBS'nin öğrenci başarıları üzerindeki etkisini değerlendirme ve geliştirme açısından kritik öneme sahiptir.
- CDÖP'te belirtilen CBS kullanımı ve hedefleri, düzenli olarak izlenmeli ve gerektiğinde revize edilmelidir. CBS'nin eğitim süreçlerine entegrasyonu sürdürülebilir bir şekilde desteklenmeli ve sürekli iyileştirme için çaba sarf edilmelidir.

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FULL TEXTS BOOK

THE INHIBITORY EFFECTS OF SOME NOVEL BENZOTHIOPHENE DERIVATIVES ON BUTYRYLCHOLINESTERASE

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ABSTRACT

Global population aging is a process that has social and economic impacts on society. The frequency of dementia, which is the common name of several diseases in which severe forgetfulness is observed, increases with advancing age. Alzheimer's Disease (AD) is the most common type of dementia. It is a progressive neurodegenerative disease characterized by memory loss and difficulties in problem solving, language and thinking skills. One of the most important developments within the scope of the cholinergic hypothesis is the discovery that cholinergic antagonists impair memory in AD, but cholinergic agonists have an ameliorating effect on memory loss. This hypothesis was confirmed by the fact that cholinesterase inhibitors used in the treatment of AD patients significantly increased symptomatic improvement. It has been demonstrated that aberrant β-amyloid (Aβ) deposition and BuChE have a strong correlation. According to a number of studies, BuChE inhibition may be used as a therapy tactic for advanced AD. Benzothiophene derivatives are heteroaromatic compounds with the chemical formula C8H6S having interesting biological properties such as anti-bacterial, anti-cancer, anti-oxidant and anti-fungal, are being studied and have become the pioneers of therapeutic substances used in various fields. In this study, the inhibitory effects of three novel benzothiophene derivatives on the butyrylcholinesterase (BChE) enzyme were investigated both in vitro and computationally. To determine the inhibition models, measurements were taken using the ELISA Plate Reader system at 7 different concentrations (0.83 - 80 mM) of the three tested benzothiophene derivatives, separately; and three different substrate concentrations (0.126-0.506 µM) for each of them. The calculated specific enzyme activity values were obtained and submitted to the licensed software SigmaPlot 13.0 Enzyme Kinetics Module, by which the inhibition model was found together with the kinetic parameters. A weak inhibitory effect on the BuChE enzyme was determined for the Q40 derivative; for the partial non-competitive inhibition model (R^2 = 0.96) V_{max} = 7.29 ± 0.25 µmol/min/mg, K_m = 0.61 ± 0.04 mM and K_i = 9.17± 8.37 µM. Kinetic tests for the Q41 derivative reported two distinct inhibition modes with close probabilities: Kinetic parameters for the partial mixed inhibition model (R^2: 0.96) V_{max} = 9.97 ± 1.10 µmol/min/mg, K_m = 1.06 ± 0.20 mM and K_i = 20.25 ± 21.21 µM. On the other hand, for the second

FULL TEXTS BOOK

proposed inhibition model, partial noncompetitive, the calculated parameters were V_{max} = 8.50 ± 0.36 µmol/min/mg, K_m = 0.80 ± 0.006 mM and K_i = 14.76 ± 17.80 µM. For the last tested benzothiophene derivative Q44, two separate inhibition models were reported with similar probabilities. Kinetic parameters for partial mixed inhibition (R^2: 0.95) and partial competitive inhibition (R^2: 0.94) exerted by Q44 reported as V_{max} = 8.49 ± 0.97 µmol/min/mg and K_m = 0.85 ± 0.18 mM, V_{max} = 6.96 ± 0.26 µmol/min/mg and K_m = 0.58 ± 0.00 mM, respectively. Because the range of inhibitors tested was high, extremely small K_i values were calculated for Q44; however, it was concluded that this part of the study should be repeated in a lower concentration range. In the second part of the study, molecular docking analyzes were performed with AutoDockTools-1.5.6 and CB-Dock2 software; and the regions where the substances settled on the enzyme were determined. Q40 has a hydrophobic interaction with TYR332, two hydrophobic interactions with PHE329, a hydrophobic interaction with VAL288, one pi-pi stacking with TRP82, and two pi-pi stackings with TRP231. Q41 has three hydrophobic interactions with PHE329, two hydrophobic interactions with TYR332, one hydrophobic interaction with ALA328, one hydrophobic interaction with VAL288, one hydrophobic interaction with PHE398, two pi-pi stackings with TRP82, and two pi-pi stackings with TRP231. Q44 has a hydrophobic interaction with TRP82, a hydrophobic interaction with PHE398, two hydrophobic interactions with LEU286, a weak hydrogen bond with GLY115, two pi-pi stackings with PHE329, and two pi-pi stackings with TRP231. Authors thank to Van Yüzüncü Yıl University Scientific Research Projects Department for supporting this work by project code FYL-2023-10496.
Keywords: Alzheimer's Disease, benzothiophen, butyrylcholinesterase, inhibition, molecular docking

INTRODUCTION

The ageing of the world's population affects society on both a social and economic level. According to Cankurtaran and Arıoğul (2005), dementia, a group of diseases characterised by severe forgetfulness, becomes more prevalent as people age. Alzheimer's disease (AD) is the most prevalent form of dementia. It is a progressive neurodegenerative disease that causes memory loss as well as difficulties with problem-solving, language, and thinking skills. The World Health Organisation recognises Alzheimer's disease as a global public health problem. Since Alois Alzheimer reported the first case in 1907, no method for changing the course of the disease or completely treating it has been discovered (Lane et al., 2018).

Acetylcholine, an alkaloid neurotransmitter, was first described by Henry Hallett Dale in 1914. Acetylcholine, whose formula is $CH_3COOCH_2CH_2N^+(CH_3)_3$, is the ester of acetic acid and choline. It functions in the parasympathetic nervous system of many organisms, including humans. It is also a chemical neurotransmitter located in the central nervous system. It is released from postganglionic parasympathetic nerve endings, causing contraction of respiratory tract smooth muscles and mucus secretion. There are also neurons containing acetylcholine in the brain, as it is linked to learning and memory. The choline acetyltransferase (CAT) enzyme found in these neurons synthesizes acetylcholine from choline and acetyl-CoA. Butyrylcholine is a choline-based ester that can function as a neurotransmitter. It is similar to acetylcholine, with activation of some of the same receptors as acetylcholine. Butyrylcholine is a synthetic compound and does not occur in the body naturally. It is used as a clinical laboratory tool to distinguish between the cholinesterases; acetylcholinesterase and butyrylcholinesterase preferentially lyse acetylcholine and butyrylcholine, respectively.

Acetylcholine is released from presynaptic neurons into the synaptic gap and carries out its function by binding to the receptors on postsynaptic neurons. It is then converted into choline and acetic acid by the acetylcholinesterase enzyme (Acetylcholinesterase-AChE) located in the synaptic gap. CAT level is one of the most common enzyme markers used to diagnose AD. In the study conducted by Perry et al. (1978), it was reported that the activity level of the CAT enzyme in subjects with dementia was much lower than normal. As the number of Aβ plaques formed in the brain increases, CAT enzyme levels decrease

FULL TEXTS BOOK

in proportion to memory impairment (Wilcock et al., 1982). The cholinergic hypothesis is based on three milestones: the first is the discovery of depleted presynaptic cholinergic biomarkers in the cerebral cortex, the second is the discovery of cholinergic neural networks that undergo severe neurodegeneration in AD, and the third is the discovery that cholinergic antagonists impair memory but cholinergic agonists have an ameliorating effect on memory loss (Francis et al., 1999). This hypothesis was confirmed by the fact that cholinesterase inhibitors used in the treatment of AD patients significantly increased symptomatic improvement. Although other pathophysiological mechanisms have attracted attention in recent years, cholinergic recovery is of critical importance in the treatment of AD (Hampel et al., 2018).

Although Alzheimer's disease has been studied for more than a hundred years, a fully therapeutic method has not yet been found due to its complex pathogenesis. Today, the drugs used for the treatment of AD are cholinesterase inhibitors (ChEI) and they provide long-term symptomatic treatment in patients. There are three drugs approved by the FDA; donepezil, rivastigmine and galantamine. It has been statistically proven that these drugs used in the treatment of AD have a curative effect on cognitive and behavioral activity (Hampel et al., 2018).

Butycholinesterase, which belongs to the serine hydrolase enzyme family, is an enzyme known as pseudocholinesterase or non-specific cholinesterase that hydrolyzes choline esters. It constitutes 10% of total cholinesterase activity. It is associated with butyrylcholine as a substrate, but it can also hydrolyze many choline esters such as succinylcholine, mivacurium, procaine, heroin and cocaine, including acetylcholine (Geula and Darvesh, 2004). While AChE is inhibited in the presence of excess substrate, BChE is activated when the substrate increases (Masson et al., 2001). BChE has high activity in the liver, blood, intestine, heart, kidney and lung. BChE is encoded by a gene on chromosome 3, synthesized in the liver and released into plasma. Although they are the products of two different genes, AChE and BChE have 65% amino acid sequence homology and have similar structures in terms of active site organization and molecular forms. BChE has attracted attention as a detoxification enzyme in recent years. It has pharmacological and toxicological importance as it can hydrolyze ester-containing drugs and scavenge organophosphorus nerve agents before they reach the brain (Çokuğraş, 2003).

Butyrylcholinesterase is effective in areas where neurons responsible for cognition and behavior are located. However, in AD, it is found in association with pathologies such as β-amyloid (Aβ) plaques in the cerebral cortex, where it is not normally found. This indicates that increased BChE activity causes amyloid plaque formation in the brain. For this reason, BChE inhibitors are frequently used in the treatment of Alzheimer's disease (Darvesh, 2016).

Benzothiophene is an aromatic organic compound with the chemical formula C_8H_6S. It is a relatively stable compound that is used as a starting material in biosynthesis studies but also has reactive regions (Sarankar et al., 2010). Benzothiophene derivatives are heteroaromatic compounds with interesting biological properties. Many biological properties of these compounds have been studied and they have become pioneers of therapeutic agents used in various fields. Heteroaromatic compounds have played important roles in the discovery of new drug candidates for many years due to their biological and pharmacological properties (Algso et al., 2018).

Thiophene and benzothiophene derivatives have interesting biological properties. They have a special position among heteroaromatic compounds because they take their place as building blocks and reagents in organic synthesis (Skrzyńska et al., 2016). Benzothiophene scaffold has, already, a privileged place in the discovery of new drugs (Keri et al., 2017) because it exhibits various biological activities thanks to its structure that allows them to have anti-bacterial (Konus et al., 2019; 2020), anti-cancer (Konus et al., 2022; Yılmaz et al., 2022), anti-oxidant (Kavak et al., 2021; Konus et al., 2022), anti-fungal potential (Algso et al., 2018; Konus et al., 2020). Additionally, many benzothiophene-based compounds have been studied as clinical drugs and have been used to treat various diseases, such as histamine H3 antagonists (Santillan et al., 2010), histone deacetylase 6 inhibitors (De Vreese et al., 2015), DPS-2

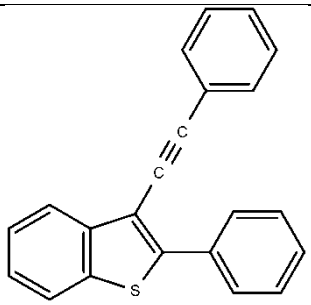
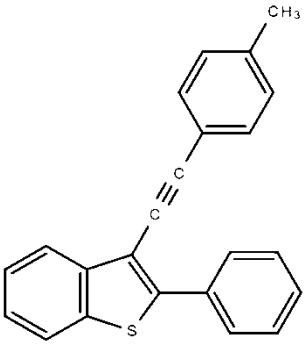
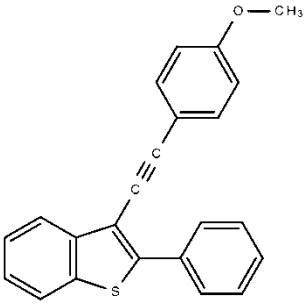
FULL TEXTS BOOK

which show cytotoxicity in cancer cells (Theochari et al., 2018). In this study, the possible inhibitory effects of three benzothiophene derivatives on the butyrylcholinesterase enzyme were investigated and inferences were made regarding their potential use in the treatment of AD.

MATERIALS AND METHODS

Three new benzothiophene derivatives (Q40, Q41, Q44) used in the experiments were previously developed and synthesized and was used for other studies after purity tests and identification analyzes (Algso et al., 2018). Anticancer and antioxidant activities were studied. However, no studies have been conducted on the anti-cholinesterase capacities of these substances.

Table 1. General properties of the three benzothiophene derivatives used in the experiments

Derivatives	Molecular structure	Molecular weight (g/mol)	Chemical formula
Q40		310.41	$C_{22}H_{14}S$
Q41		324.44	$C_{23}H_{16}S$
Q44		340.44	$C_{23}H_{16}OS$

Butyrylcholinesterase enzyme shows homology among species because its active site is highly conserved. For this reason, equine serum butyrylcholinesterase (eqBChE) enzyme is the most used enzyme in the literature for studies on humans. As a matter of fact, this enzyme was used in this study. The modified Ellman's method was used to test the probable inhibitory effects of benzothiophene derivatives on BChE (Ellman et al., 1961). In this method, butyrylthiocholine iodide containing thioester is used as the substrate. This is because cholinesterases hydrolyze this substrate to thiocholine. Thus, DTNB, known as the Ellman's reagent, reacts with thiocholine and turns into nitrobenzoate, and this structure absorbs light at 412 nm. As a result of measuring the absorbance, enzyme activity was calculated with the following equation:

Specific activity = (dA/dt)/ε× DF/protein concentration

here, dA/dt ratio is the rate of change of absorbance measured at 412 nm over time; ε value is the extinction coefficient of the enzyme and its value is 13.6 mM-1cm-1; and, DF represents the dilution

FULL TEXTS BOOK

factor. When the enzyme breaks down the substrate into thiocholine and acetic acid, DTNB is reduced by the thiol groups in thiocholine and turns into yellow nitrobenzoate anion. The yellow color given by this anion is measured at 412 nm (Nieri et al., 2017).

Enzyme activity measurements were made in 96-well microplates. The microplates were arranged so that the first three wells of a line were the control group and one blank for the control, then three wells of the other lines for each concentration of the substance (reaction wells) from low to high and one blank well for each concentration. Inhibitory substance, substrate (butyrylthiocholine iodide), DTNB and butyrylcholinesterase enzyme were added to the reaction wells. Pure ethanol, substrate, DTNB and butyrylcholinesterase enzyme were added to the control wells instead of the inhibitor substance, respectively. Pure ethanol instead of inhibitor substance, phosphate buffer instead of substrate, DTNB and butyrylcholinesterase enzyme were added to the blank wells, respectively. Seven different concentrations (0.83 – 83 µM) of inhibitory substances were prepared. Three different concentrations (123 µM, 246 µM, 492 µM) were prepared for the substrate butyrylthiocholine iodide. These concentrations were tested for each substance. The experiments were carried out in three repetitions on different dates.

The latest version of the .pdb extension file of the enzyme *Homo sapiens* butyrylcholinesterase (PDB ID: 5K5E) (Dighe et al., 2016) was obtained from the Protein Data Bank (PDB) site. The molecular structures of benzothiophene derivatives were drawn using the SwissADME (https://www.sib.swiss/) software offered by the Swiss Bioinformatics Institute and then presented by CADD Group Chemoinformatics Tools and User Services (https://cactus.nci.nih.gov/). It was converted to .pdb format using Online SMILES Translator and Structure File Generator software. Using Autodock Tools 1.5.6 open source software, the receptor (enzyme) and ligands (benzothiophene derivatives) were prepared by removing water molecules, adding charges, adding hydrogens, and atomic and rotatable bond applications. Ligands present on butyrylcholinesterase were removed using the same software before analysis. The files prepared for docking were uploaded to the free open source software CB-Dock2 (https://cadd.labshare.cn/cb-dock2/php/index.php), which runs on the AutoDock algorithm and is offered by Yang Cao Lab, and blind docking analysis was performed. Here, the bonds established between the ligand and the receptor, which amino acids the ligand interacted with, and in what position it was located on the receptor were determined.

Statistical analyzes were completed using the SigmaPlot 13.0 licensed software package. One-way ANOVA and Duncan multiplier post-hoc comparison test were used to analyze differences between groups. Results are expressed as mean ± standard deviation (±SD), and values of $p < 0.05$ were considered statistically significant.

RESULTS

The BChE enzyme inhibition tests yielded data that were uploaded to the licenced software SigmaPlot 13.0. The table below illustrates the effects of three benzothiophene derivatives on the BChE enzyme in terms of inhibition. The Enzyme Kinetics module of SigmaPlot 13.0 software was used to analyse the data derived from the enzyme activity tests. Using the data submited, the software generated inhibition models for every molecule with definitive scores.

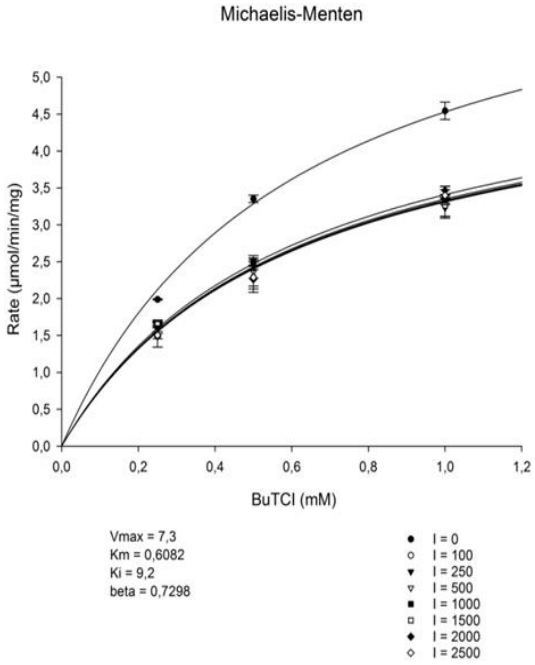
Tablo 2. Inhibition effects of tested benzothiophene derivatives on pure horse serum

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butyrylcholinesterase enzyme and determined possible inhibition models

Derivatives	Mode of inhibition	V_{max} ± SD (µmol/min/mg protein)	K_m ± SD (mM)	K_i ± SD (µM)	R^2
Q40	noncompetitive (partial)	7.29 ± 0.25	0.61 ± 0.04	9.17 ± 8.37	0.96
Q41	mixed (partial)	9.97 ± 1.10	1.06 ± 0.20	20.25 ±21.21	0.96
	noncompetitive (partial)	8.50 ± 0.36	0.80 ± 0.006	14.76 ± 17.80	0.96
Q44	mixed (partial)	8.49 ± 0.97	0.85 ± 0.18	1.06e-6 ± 38.14	0.95
	competitive (partial)	6.96 ± 0.26	0.58 ± 5.26e-2	1.17e-6 ± 69.19	0.94

The tested derivative Q40 was determined to have a K_i value of 9.2 µM and a K_m value of 0.60 mM. The graphs of Michealis-Menten (MM) and Lineweaver-Burk (LB) for the partial noncompetitive inhibition of butyrylcholinesterase by the Q40 coded derivative are shown below.



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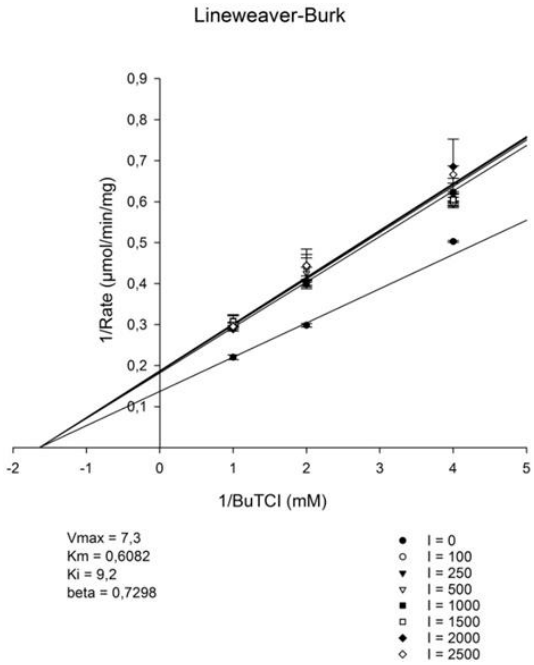
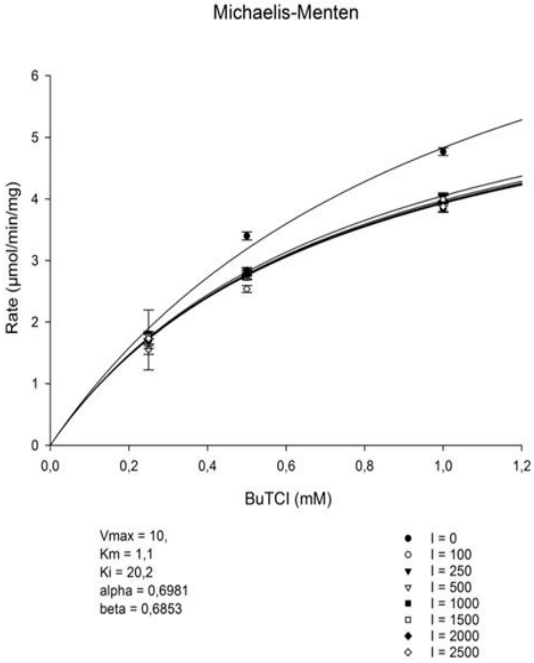


Figure 1. Michealis-Menten (MM) and Lineweaver Burk (LB) graphs drawn for the partial non-competitive inhibition of the Q40 coded derivative on butyrylcholinesterase

The results of the analysis demonstrated that the K_i value as 20.2 µM, while the K_m value was determined to be 1.1 mM, for Q41. The plots of MM and LB for the partial mixed inhibition of butyrylcholinesterase by the Q41 coded derivative are shown below.



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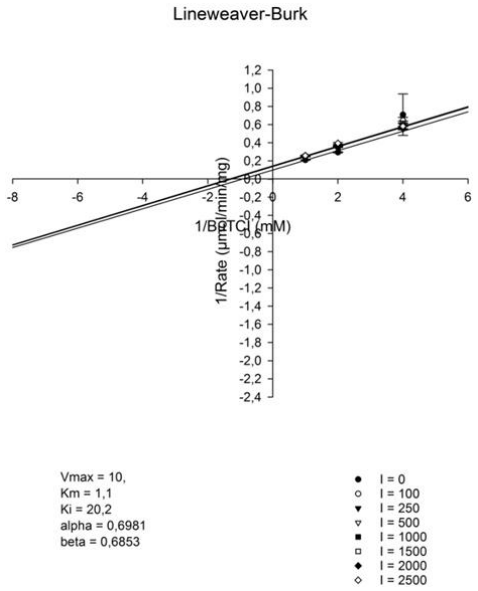
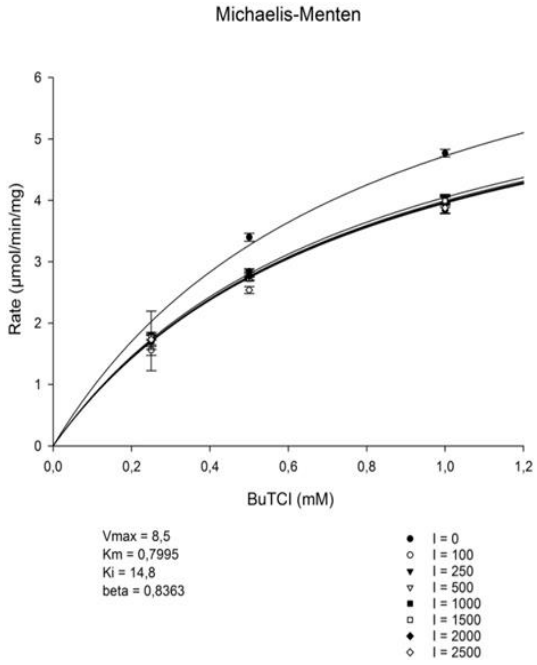


Figure 2. Michealis-Menten (MM) and Lineweaver-Burk (LB) graphs drawn for the partial mixed inhibition of the Q41 coded derivative on butyrylcholinesterase

The software proposed a second inhibition model with approximate scores for the derivative coded Q41. The inhibition resulting from Q41 in the second model had a K_i value of 14.8 µM and a K_m value of 0.79 mM. The partial noncompetitive inhibition that Q41 applied to butyrylcholinesterase is depicted in the MM and LB plots below.



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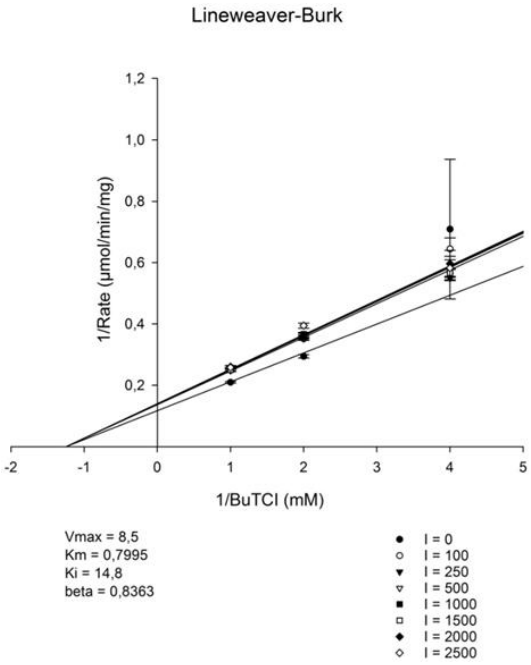


Figure 3. Michealis-Menten (MM) and Lineweaver-Burk (LB) graphs drawn for the partial non-competitive inhibition of the Q41 coded derivative on butyrylcholinesterase

Kinetic parameters for partial mixed inhibition (R^2: 0.95) and partial competitive inhibition (R^2: 0.94) exerted by Q44 reported as V_{max} = 8.49 ± 0.97 µmol/min/mg and K_m = 0.85 ± 0.18 mM, V_{max} = 6.96 ± 0.26 µmol/min/mg and K_m = 0.58 ± 0.00 mM, respectively. Because the range of inhibitors tested was high, extremely small K_i values were calculated for Q44; however, it was concluded that this part of the study should be repeated in a lower concentration range.

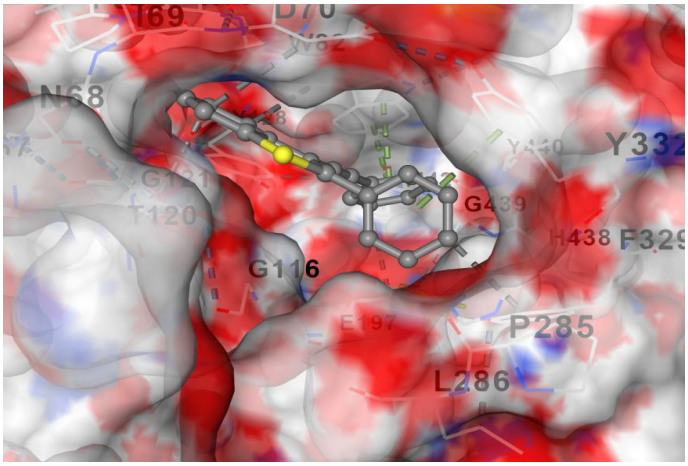


Figure 4. Location of the Q40-encoded derivative on the BChE enzyme

The Q40 coded derivative is located at the entrance of the narrow gorge on the BChE enzyme, as shown in the figure above. Amino acids reported to interact with this derivative are: TRP82, GLY115, GLY116, GLY117, TYR128, GLU197, SER198, TRP231, PRO285, LEU286, SER287, VAL288, ALA328, PHE329, TYR332, PHE398, HIS438. The bonds established in the highest scoring binding position are as follows: There is a hydrophobic interaction with TYR332, two hydrophobic interactions with PHE329, a hydrophobic interaction with VAL288, one pi-pi stacking with TRP82, and two pi-pi stackings with TRP231.

The Q41 coded derivative, like Q40, is located in the entrance/middle region of the narrow gorge on the BChE enzyme. At the bottom of this narrow gorge is the active site where the catalytic triad's main reaction takes place. Interacting amino acids reported as a result of molecular docking analysis: TRP82,

FULL TEXTS BOOK

GLY115, GLY116, GLY117, TYR128, GLU197, SER198, TRP231, PRO285, LEU286, SER287, VAL288, ALA328, PHE329, TYR332, PHE398, HIS438, ILE442. The bonds established between Q41e and the narrow gorge and surrounding amino acids are as follows: three hydrophobic interactions with PHE329, two hydrophobic interactions with TYR332, one hydrophobic interaction with ALA328, one hydrophobic interaction with VAL288, one hydrophobic interaction with PHE398, two pi-pi stackings with TRP82, and there are two pi-pi stackings with TRP231. The settlement of Q41 in the narrow gorge is depicted in the figure below.

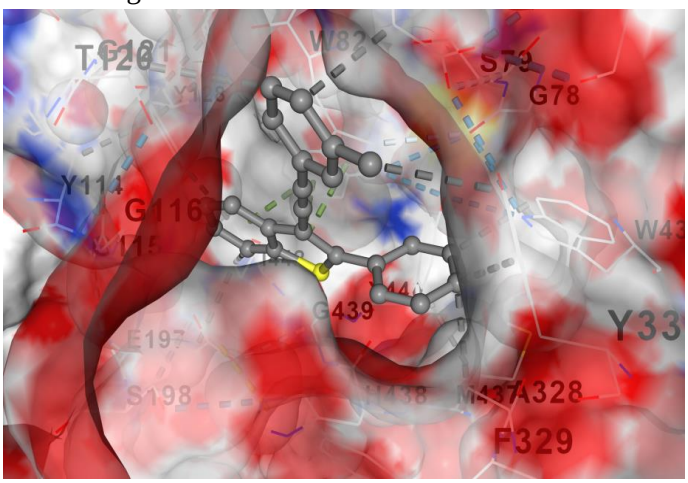


Figure 5. Location of the Q41-encoded derivative on the BChE enzyme

The highest scoring binding position of Q44 is presented in the figure below.

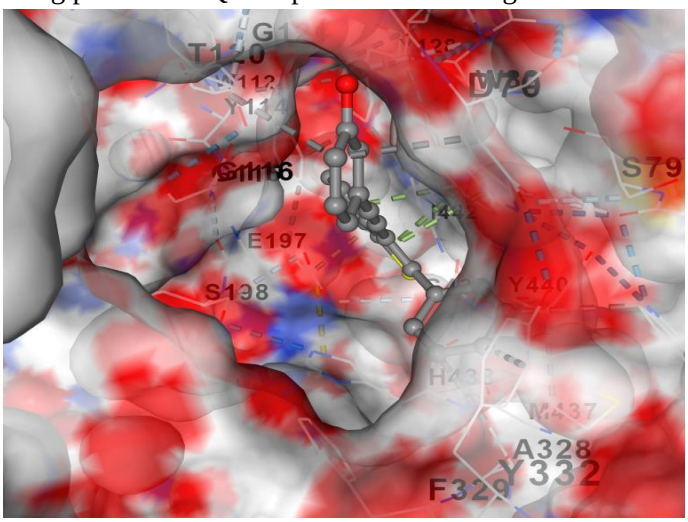


Figure 6. Location of the Q44-encoded derivative on the BChE enzyme

The following amino acids may interact with the derivative in and around the narrow gorge: ASP70, TRP82, GLY115, GLY116, GLY117, THR120, GLY121, TYR128, GLU197, SER198, TRP231, PRO285, LEU286, SER287, VAL288, PHE329, TYR332, PHE398, HIS438, GLY439, ILE442. The derivative has reportedly formed the following bonds: weak hydrogen bond with GLY115, two pi-pi stackings with PHE329, two pi-pi stackings with TRP82, two hydrophobic interactions with PHE398 and two hydrophobic interactions with LEU286.

DISCUSSION AND CONCLUSION

The increasing elderly population in the world brings with it many diseases. As health problems increase, the need to find new treatments also increases. For this reason, the design of molecules with

FULL TEXTS BOOK

pharmacological properties is becoming increasingly important. Molecules containing aromatic rings are compounds that are widely found in nature, are essential for life, and have promising properties for drug design (Mishra et al., 2011). In this study, three newly synthesized benzothiophene derivatives, whose various biological activities were studied, were evaluated in terms of their inhibition effects on BuChE. These substances were tested for their inhibitory effects on butyrylcholinesterase enzyme obtained from horse serum using the modified colorimetric Ellman method.

Cholinesterases show homology between species due to their conserved active site. In this study, this commercially obtained enzyme, which is frequently preferred in the literature and whose results are accepted in studies involving drug discovery and development, was chosen. No studies have been conducted on the anti-cholinesterase capacities of these substances. Compounds that can pass the blood-brain barrier (Blood-Brain-Barrier-BBB) from the synthesized benzothiophene derivatives were selected and used in this study.

The phenylacetylene group in the derivative coded Q40 provided the substance with a K_i value of 9.17±8.37 µM. In the study conducted by Gulcin et al. in 2022, the K_i value of compound number 13, which contains a phenylacetylene group, against the AChE enzyme is 8.04±1.20 µM. This value is very close to the value provided by the Q40 coded derivative against the BChE enzyme. One may argue that compounds with phenylacetylene groups inhibit the activity of cholinesterase enzymes. (Gulcin et al., 2022).

The 3-ethynyltoluene group found in the derivative coded Q41 provided a K_i value of 14.76±17.80 µM. In their study in 2021, Li and colleagues found that pyrazole derivatives containing 4-ethynyltoluene group have the potential to alleviate neurodegenerative symptoms. According to Li et al. (2021) there is reason to believe that cyclic compounds with an ethinyltoluene group hold promise for the treatment of neurodegenerative illnesses.

The ethinylanisole group in the Q44 coded derivative provided the substance with a K_i value of 1.06e-6±38.14 µM. In their study in 2005, Sheng et al. synthesized a series of indanone derivatives containing ethinylanisole. All of the compounds showed an inhibitory effect on cholinesterases. It is possible to state that cholinesterase activity is inhibited by heterocyclic compounds that contain an ethinylanisole group (Sheng et al., 2005).

The human butyrylcholinesterase enzyme's active site is shown below (PDB DOI: 1P0I-Bajda et al., 2013).

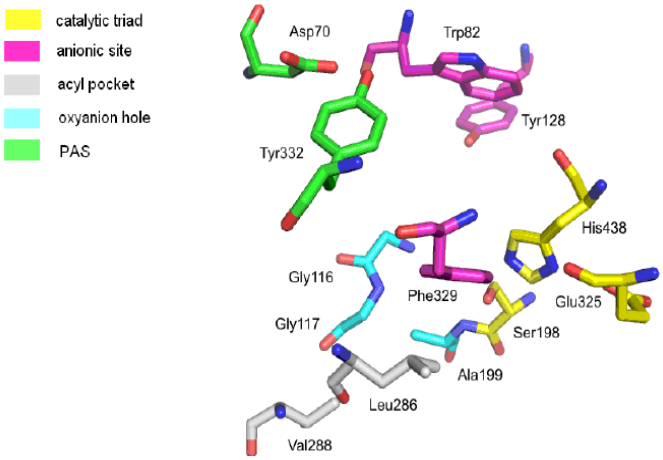


Figure 7. Active site of human butyrylcholinesterase enzyme

The derivative Q40 formed a hydrophobic interaction with PHE 329 and a pi-pi stacking with TRP 82 in the anionic region. It formed a hydrophobic interaction with TYR 332 in the peripheral anionic region and a hydrophobic interaction with VAL 288 in the acyl region. The derivative coded Q41 also formed a hydrophobic inteaction with PHE 329 and a pi-pi stacking with TRP 82 in the anionic region. It formed a hydrophobic interaction with TYR 332 in the peripheral anionic region and a hydrophobic interaction

FULL TEXTS BOOK

with VAL 288 in the acyl region. The derivative coded Q44 formed a hydrophobic interaction with TRP 82 and a pi-pi stacking with PHE 329 in the anionic region. It has a hydrophobic interaction with LEU 286 located in the acyl region, too. All these interactions support the inhibition models of the tested benzothiophene derivatives determined as a result of *in vitro* analyses. Inhibitors of cholinesterases achieve these effects by binding to different regions along the narrow channel. Supporting this, in the blind docking analyzes performed for bezothiophene derivatives, the most probable interactions always occurred with the amino acids forming or adjacent to this narrow gorge.

In this study, three different benzothiophene derivatives, whose possible inhibitory effects on butyrylcholinesterase were examined both with *in vitro* methods and *in silico* methods, were shown to have important drug potentials. Q40, Q41 and Q44 inhibited BChE with statistically significant scores. These substances should be further studied and derived as active pharmaceutical ingredients for use against AD. After the research, studies with these substances will continue in line with this purpose.

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TREATMENT OF URBAN WASTEWATER USING THE ELECTRO-FENTON PROCESS

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ABSTRACT
Biological and chemical treatment process are generally used together to reduce the load of organic pollutants for urban wastewater treatment. However, these conventional treatment processes cannot be achieved to treat or degrade refractory organic compounds to last products such as water and carbon dioxide. Advanced oxidation methods can easily treat both readily degradable and refractory organic substances in a shorter time. Therefore, it is aimed to meet discharge criteria with a single process by applying the electro-Fenton process as an advanced oxidation process. Within the scope of this study, the wastewater sample was taken from an organized industrial zone, and a treatability study with electro-Fenton was conducted on the inlet wastewater samples to examine its effect on wastewater treatment.
The Box-Behnken statistical method was applied to the electro-Fenton oxidation experiments. The reaction time, the dose of H_2O_2 and the applied voltage were considered as independent variables. Chemical oxygen demand (COD) removal efficiencies were selected as dependent variable, and the effectiveness of the electro-Fenton process was investigated through COD removal efficiencies. The optimum reaction conditions were observed when the reaction time was 30 minutes, the H_2O_2 dose was 1000 mg/L, and the voltage was 1 V. Under these conditions, COD removal efficiencies was determined to be approximately 99%. It was observed that a single treatment unit was sufficient for discharge limits and reaction time of electro-Fenton process was lower than its for other conventional treatment process.
Keywords: Conventional treatment process, Electro-Fenton Process, Urban wastewater, Box-Behnken

INTRODUCTION
Urban wastewater that includes industrial effluents has a high chemical oxygen demand and may contain toxic substances. The definition of urban wastewater is made as domestic wastewater or a combination of domestic wastewater with industrial wastewater or stormwater (Urban Wastewater Treatment Regulation, 2006). Urban wastewater can contain phosphorus from detergents of domestic origin, numerous pathogenic microorganisms from human waste, and toxic substances from various industries (Çakmakcı, 2012). In urban wastewater treatment, biological and chemical treatment units are typically used together to reduce the load of organic pollutants. Biological treatment is preferred for less complex and biologically degradable organic substances, while chemical treatment is preferred for the removal of toxic and hard-to-degrade organic substances. This combination is not very efficient in terms of space and cost. Existing wastewater treatment units may not be sufficient for treating wastewater. In recent times, advanced treatment methods have been applied for wastewater treatment (Topal & Arslan, 2014). The Fenton process is an advanced oxidation process based on the reaction of ferrous ion with hydrogen peroxide under acidic conditions, with different treatment functions depending on the hydrogen peroxide/ferrous ion ratio (Gürtekin & Şekerdağ, 2008). Electro-Fenton process which is a hybrid or modified Fenton oxidation process produces high amount of hydroxyl radicals to oxidize recalcitrant organic compounds and is especially useful process to degrade these organic compounds that are not easily treated with conventional wastewater treatment units.

FULL TEXTS BOOK

The organized industrial zone that is investigated in this study contains agricultural machinery, marble, cement, and ceramics industry, soap and detergent industry, food and packaging industry, rubber and rubber products industry, various machinery industry, feed industry and construction machinery industries. This zone had a wastewater treatment plant which includes a chemical treatment unit and a biological treatment unit. The aim of the treatment units is to meet the discharge standards for mixed industrial wastewaters into receiving environments specified in table 19 of the water pollution control regulation for organized industrial zones. According to these limitations, discharged COD value should be lower than 300 mg/L of COD. Therefore, it is aimed to meet discharge criteria with a single process by applying the electro-Fenton process to wastewater samples taken from the inlet of an urban wastewater treatment plant. The electro-Fenton method that is advanced oxidation process was chosen due to the higher content of metal industry wastewater in urban wastewater. Box-Behnken statically design to applied to Electro-Fenton process to evaluate optimum reaction conditions and to observe maximum removal efficiencies.

MATERIAL and METHOD

The characterization of wastewater taken from the Organized Industrial Zone (OSB) is presented in Table 1.

Table 1. The characterization of wastewater taken from the Organized Industrial Zone (OSB)

Parameter	Unit	Value
Flow rate	m^3/gün	1700
COD	mg/L	1000
BOD	mg/L	500
SS	mg/L	500
Oil-gress	mg/L	200
pH	6-9	6-9

Materials

In the experimental studies, hydrogen peroxide (H_2O_2) was used as the oxidant, iron (Fe^{2+}) as the catalyst, and 98% sulfuric acid (H_2SO_4) for pH adjustments. Stock solutions of 2500 g/L H_2O_2 and 25 g/L Fe^{2+} were prepared and used to obtain the desired concentrations. All materials used in the experimental studies were cleaned by washing with distilled water. Analyses were performed on the samples obtained from the experimental studies for pH value and dependent variables.

Experimental procedure

The experimental studies were conducted at room temperature in a square-shaped reactor made of PVC material with a volume of 5.25 liters. Stainless steel electrodes used in the experiments were placed parallel to each other in the reactor as an anode and cathode. The red cable from the power supply was connected to the anode, and the black cable to the cathode to provide voltage to the system. A schematic diagram of an experimental setup can be seen in Figure 1.

FULL TEXTS BOOK

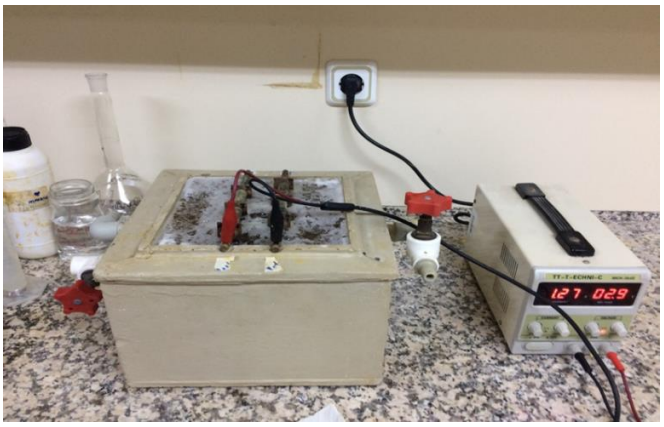


Figure 1. A schematic diagram of an experimental setup

In the Electro-Fenton method, sulfuric acid was added to adjust the pH value of the raw sample to the desired range (3-3.5). When the pH value of the sample was adjusted to this range, ferrous ion, as a catalyst that accelerates the chemical reaction, and then H_2O_2 as an oxidant were added in doses determined by the Box-Behnken statistical design. Then, the pre-adjusted power supply was turned on to start the reaction. At the beginning and end of the experiments, samples were taken to analyze COD and pH values.

Methods

Box-Behnken statistical experiment design as an response surface methodology were used to observe the effects of independent variables on response function as a COD removal efficiencies and also to evaluate the optimum reaction conditions maximizing the COD removals. Chemical oxygen demand removal efficiencies were selected as dependent variables, and the effectiveness of the electro-Fenton process was investigated through COD removal efficiencies. The reaction time (X_1), hydrogen peroxide concentration (X_2), and voltage (X_3) were selected as the independent variables. The response function was the COD (Y_1) removals.

The regression model

The application of RSM offers an empirical relationship between the response function (Y) and independent variables (X) as follows (Charles and Kennneth, 1999);

$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_{12}X_1X_2 + b_{13}X_1X_3 + b_{23}X_2X_3 + b_{11}X_1^2 + b_{22}X_2^2 + b_{33}X_3^2$ Eq (1)

This model includes one block term (b_o), three linear term (X_i), three quadratic term (X_i^2), and three interaction terms (X_iX_j). The coefficients of the response functions were determined using a Stat-Ease regression program.

RESULTS and DISCUSSION

The Box-Behnken statistical design was applied to the oxidation experiments. The independent variables were reaction time (X_1), H_2O_2 dosage (X_2), and voltage (X_3); the dependent variable was COD removal efficiency (Y_1). In the Box-Behnken design, the operating ranges for the independent variables were defined as follows: reaction time (X_1) 5-30 minutes, H_2O_2 dosage (X_2) 1000-5000 mg/L, and voltage (X_3) 1-5 V.

In Table 2, the minimum, medium, and maximum values are indicated as -1, 0, and +1, respectively. The removal efficiencies obtained from the experimental studies with response functions are given in Table 3.

The objective function for COD removal efficiencies with the determined coefficient is presented by Eq. (2).

$Y_1=95.68+0.26X_1-0.001X_2-3.9X_3-1.0E^{-05}X_1X_2-0.02X_1X_3-0.0003X_2X_3+0.001X_1^2+3.54E^{-07}X_2^2+0.79X_3^2$

$R^2 = 0.9703$ Eq (2)

Table 2. Experimental conditions and coded values for Box-Behnken Design

FULL TEXTS BOOK

Variables	Reaction Time (min)	H_2O_2 (mg/L)	Voltage (V)
Coded	X_1	X_2	X_3
-1	5	1000	1
0	17.5	3000	3
1	30	5000	5

Table 3. COD removal efficiencies obtained from experiments that designed by Box-Behnken

Run	Reaction Time (min)	H_2O_2 (mg/L)	Voltage (V)	Rem. Eff. (%)
1	17.5	5000	5	99.00
2	17.5	5000	1	91.00
3	17.5	1000	1	96.00
4	17.5	1000	5	90.00
5	30	3000	5	95.00
6	30	3000	1	92.00
7	5	3000	1	92.50
8	5	3000	5	97.00
9	30	5000	3	99.00
10	30	1000	3	93.00
11	5	1000	3	97.00
12	5	5000	3	96.00
13	17.5	3000	3	97.00
14	17.5	3000	3	92.00
15	17.5	3000	3	94.00

Table 4 indicates the analysis of variance results which understand the predictability of the model. A coefficient of determination (R^2) is larger than 0.99. The F-value of 18.3 implies that the model is significant. P values of less than 0.05 indicated the effectiveness of independent variables on objective function.

Table 4. The analysis of variance test for COD removal efficiency

Source	SS	Df	MS	F value	P value	Result
Model	111.48	9	12.39	18.13	0.0026	significant
X_1-Reaction Time	55.12	1	55.12	80.67	0.0003	
X_2-H_2O_2	0.5000	1	0.5000	0.7317	0.4314	
X_3-Voltage	6.13	1	6.13	8.96	0.0303	

FULL TEXTS BOOK

$X_1 X_2$	0.2500	1	0.2500	0.3659	0.5717	
$X_1 X_3$	1.0000	1	1.0000	1.46	0.2805	
$X_2 X_3$	6.25	1	6.25	9.15	0.0293	
X_1^2	0.1026	1	0.1026	0.1501	0.7144	
X_2^2	7.41	1	7.41	10.84	0.0216	
X_3^2	37.03	1	37.03	54.18	0.0007	
Residual	3.42	5	0.6833			
Lack of Fit	3.25	3	1.08	13.00	0.0723	not significant
Pure Error	0.1667	2	0.0833			
Cor Total	114.90	14				

R-squared= 0.992, sum of squares (SS), Mean Square (MS).

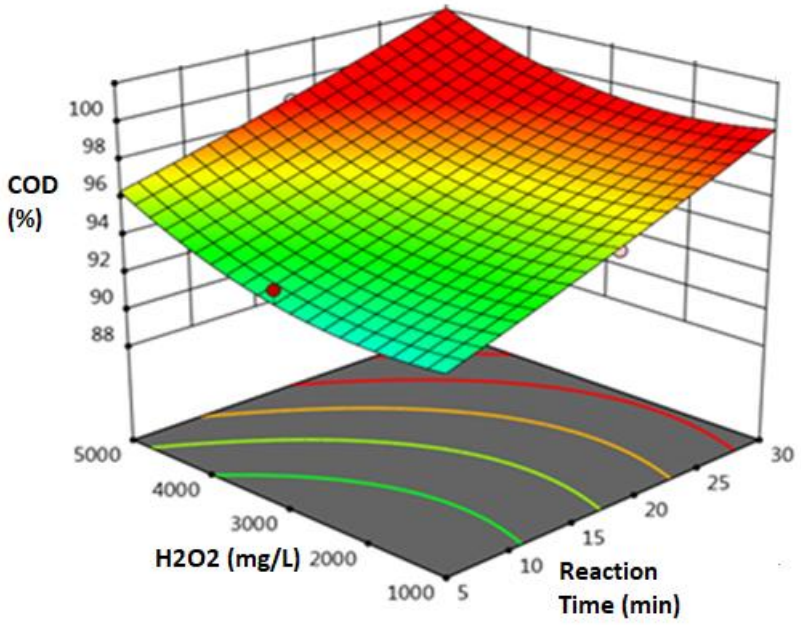


Figure 2. COD Removal efficiencies obtained from application of minimum voltage

COD removals results obtained from application of minimum voltage are given in Figure 2. Organic compounds resulted in COD in wastewater was completely treated with H_2O_2 concentration of 1000 mg/L and minimum voltage of 1 V during 30 min reaction time. COD removal efficiencies was affected by hydrogen peroxide concentration and reaction time. COD removal efficiencies were 96 and 88% when initial hydrogen peroxide concentration of 5000 mg/L and 1000 mg/L, respectively, at reaction time of 5 min. After evaluation of experiments, it can be concluded that the optimum reaction time/H_2O_2/voltage resulting the highest COD removal efficiency (100%) was 30 min/1000 mg/L/1 V. The analysis of variance showed that reaction time and voltage were significant. The electro-Fenton process is a highly advantageous choice for the treatment of urban wastewater containing toxic and persistent substances due to its ease of operation and high treatment efficiency.

FULL TEXTS BOOK

CONCLUSION

The aim is the study is to change conventional treatment process to advanced oxidation process. For that reason, classical chemical treatment unit was changed to advanced oxidation process as electro-Fenton process eliminating a biological treatment process. So, Box-Behnken statically design to applied to Electro-Fenton process to evaluate optimum reaction conditions and to observe maximum removal efficiencies.

According to the results of the experimental study, the optimum reaction conditions were observed when the reaction time was 30 minutes, the H_2O_2 dose was 1000 mg/L, and the voltage was 1 V. Under these conditions, COD removal efficiency was determined to be approximately 99%. It was observed that a single treatment unit was sufficient for discharge limits (300 mg/L COD value) and reaction time of electro-Fenton process was lower than its for other conventional treatment process. It has been demonstrated that instead of using classical treatment methods in multiple stages, the electro-Fenton method may be sufficient as only one treatment stage and can be used or preferred as a treatment unit in future facilities.

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FULL TEXTS BOOK

ENERGY RESOURCES IN TURKEY AND ENVIRONMENTAL EFFECTS OF ENERGY SOURCES

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ABSTRACT
Energy is one of the fundamental sources of economic development for all countries worldwide. It can be obtained from various sources and is a fundamental factor affecting industrial production and technological development in many areas, from daily life to industrial processes. Therefore, energy can also represent a country's independence.
Environmental effects of the energy sources are very important issue. Effects of fossil fuel usages concern about energy supply security enhance the importance of renewable energy sources. Global warming is the one of the important effects of fossil fuels usage. Additionally, shortages in fossil fuel reserves, as well as international agreements such as the Kyoto Protocol, and the Paris Agreement, are steering countries towards renewable energy sources and helping them to move away from the negative impacts of fossil fuels. In this study, the impact of energy policies and energy resources on the environment in Turkey is evaluated.
Notably, among Turkey's goals is to increase the share of renewable energy sources in total energy production. This goal aims to promote the use of sustainable energy and increase environmentally friendly energy sources. Renewable energy can be considered more environmentally friendly compared to traditional energy. In addition, Turkey's energy policies should aim to support both environmental sustainability and create a more balanced structure in terms of energy supply security. At this point, increasing the use of renewable energy and enhancing energy efficiency will enable Turkey to take steps towards a more sustainable future in the energy sector.
Keywords: Turkey's energy sources, renewable energy, fossil fuels, environmental effect

INTRODUCTION
Energy is a concept that expresses the working capacity of a system. The reflection of energy in life is as important as its definition. Energy is one of the fundamental sources of economic development for all countries worldwide. The rapid increase in the world's population causes a continuous rise in energy demand. In this context, energy plays a key role in many areas such as economic development, social welfare, and quality of life. Therefore, energy can also represent a country's independence.
Environmental effects of the energy sources are very important issue. Effects of fossil fuel usages concern about energy consumption enhance the importance of renewable energy sources. Global warming is the one of the important effects of fossil fuels usage. Since the negative effects (air pollution, water pollution, radiation, etc.) of energy production can affect not just one country but the entire world, energy policies and practices must be conducted jointly. Therefore, within the scope of the United Nations' efforts to prevent climate change, the Framework Convention on Climate Change, the Kyoto Protocol, and the Paris Agreement are the most important energy policies and agreements, guiding energy and energy policies worldwide.

FULL TEXTS BOOK

The UN Framework Convention on Climate Change (UNFCCC) is an international agreement adopted at the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992. The convention aims to foster global cooperation in combating climate change and adapting to its impacts. The UN Framework Convention on Climate Change has laid the foundation for more specific and detailed agreements such as the Kyoto Protocol and the Paris Agreement, marking a shift from encouragement to enforcement in addressing climate change.

The Kyoto Protocol, the first implementation agreement of the UN Framework Convention on Climate Change (UNFCCC), is an international treaty adopted at the United Nations Climate Change Conference held in Kyoto, Japan, on December 11, 1997, to combat global climate change. The protocol was developed under the UNFCCC and includes commitments from various countries to reduce greenhouse gas emissions. Although it was adopted in 1997, it did not come into force until 2005.

The Kyoto Protocol consists of two commitment periods. During the first commitment period (2008-2012), countries listed in Annex I of the UNFCCC were required to reduce their total greenhouse gas emissions by at least 5% from 1990 levels. In this period, specific emission reduction or limitation obligations were established for the countries listed in Annex B of the protocol.

The Paris Agreement is an international treaty adopted in 2015 in France to prevent climate change. The agreement was ratified and entered into force within a year on November 4, 2016. It aims to set limits on global warming, reduce greenhouse gas emissions, and establish a common framework for addressing climate change. At the 21st Conference of the Parties (COP21), for the first time, all countries committed to globally reducing greenhouse gas emissions beyond 2020. The agreement has been signed by 196 countries and the European Union and ratified by 191 countries. The annual COP meetings address the implementation and enhancement of the agreement.

To summarize the work and agreements carried out by the United Nations: The Framework Convention on Climate Change (UNFCCC) has two main implementation instruments: the Kyoto Protocol (up to 2020) and the Paris Agreement (post-2020). The Kyoto Protocol set specific targets for emission reduction commitments, while the Paris Agreement includes commitments from all countries to reduce greenhouse gas emissions under common but differentiated responsibilities.

Turkey became a party to the Kyoto protocol in 2009. When the Kyoto Protocol was adopted in 1997, Turkey was not yet a party to the UNFCCC and thus was not included in the Annex B list of countries with specific emission reduction or limitation obligations, so it had no commitments at that time. However, with the introduction of the Paris Agreement, the second commitment period was only formally recognized, leading to the conclusion of the Kyoto Protocol's function. After Kyoto Protocol, Paris Aggrement is accepted by Turkey at the end of 2021 (ÇŞİB, 2024).

Turkey's Energy Needs and Perspective on the Energy Sector

Turkey's energy needs and perspective on the energy sector are dynamic subjects, constantly evolving due to factors such as the country's economic growth, industrialization process, population increase, and rising energy demands. Over the past 20 years, Turkey has been the fastest-growing country in terms of energy demand among the Organization for Economic Co-operation and Development (OECD) countries. This situation highlights the need for the country to continuously strengthen and diversify its energy supply (ÇŞİB, 2016).

Turkey is a country with various energy potentials; however, due to insufficient domestic production, it also meets its energy needs from external sources, resulting in a position of energy dependency. Therefore, considering the country's geographical advantages and technical potential, it is necessary to increase the share of renewable energy sources in domestic production capacity. Turkey's energy policies that focusing on sustainable and renewable energy sectors/sources aims to minimize negative effects of fossil fuels on global warming. In addition, Turkey's energy policies that reducing energy dependency is crucial for lowering costs and increasing national income.

FULL TEXTS BOOK

The Ministry of Energy, through the Directorate of Renewable Energy, collaborates with organizations such as the International Energy Agency (IEA) and the International Renewable Energy Agency (IRENA) to monitor developments in the energy sector. Additionally, it follows the work carried out with the European Union (ÇŞİB, 2024; IEA, 2024; IRENA, 2024).

Energy Sources

Energy is an increasingly important concept, and the idea of sustainable energy is a priority for societies worldwide. The effective production and consumption of energy sources, minimizing environmental impacts, and the transition to clean and renewable energy sources are clearly highlighted by the concept and practice of sustainable energy.

The problems of global warming and environmental pollution, largely caused by the increasing energy demand being met by non-renewable energy sources like fossil fuels, combined with the likelihood of these fuels depleting in the near future, drive the promotion and widespread adoption of renewable energy to ensure sustainable energy.

Non-Renewable Energy Sources

Non-renewable energy sources are those that are limited in nature and take a very long time to replenish through natural processes after being consumed by human activities. These sources, such as fossil fuels, are formed through natural processes but deplete rapidly with human consumption. The rapid depletion of non-renewable energy sources, coupled with economic growth and increased energy demand, leads to environmental issues. Therefore, the search for and promotion of sustainable energy sources are becoming increasingly important.

Renewable energy sources

The use of renewable energy resources is increasing rapidly around the world. This trend is a result of global efforts on sustainable energy production. It is of critical importance for Turkey to keep up with this development, not only for the energy sector, but also for the general economic and environmental development of the country. The decrease in the costs of renewable energy resources allows resources such as solar and wind energy to become competitive with fossil fuels. Turkey's adoption of a strategic approach towards these low-cost and environmentally friendly energy sources will contribute to a sustainable energy future by transforming its energy consumption structure.

The Status of Non-Renewable Energy and Renewable Energy in Turkey

A large part of Turkey's energy demand is still provided by fossil fuels, which are non-renewable energy sources, as of 2023. Especially natural gas and coal play an important role in electricity production. Turkey's dependence on energy imports, especially the high level of natural gas imports, is an important issue in terms of energy security.

Turkey is taking important steps towards renewable energy sources in order to reduce foreign dependency and ensure the directive of the Kyoto and Paris agreements. It has great potential especially in the field of wind energy and solar energy. Turkey has implemented various support mechanisms to encourage renewable energy projects. Applications such as YEKA (Renewable Energy Resource Areas) projects and YEKDEM (Renewable Energy Resources Support Mechanism) are important steps in this framework (ÇŞİB, 2024).

However, the share of renewable energy in the energy mix is still not sufficient and most of the country's energy needs are met from fossil sources. Turkey should aim for a sustainable energy transformation by taking more renewable energy projects and energy efficiency measures in the coming period.

The electricity produced from renewable energy sources (Wind, Solar, Geothermal and Biomass energy) is 21.75%, 57.55% from fossil resources and 20.71% from hydroelectric power plants has been obtained.

FULL TEXTS BOOK

The percentage of electrical energy obtained from renewable energy sources is 42.45% in total. In 2022, the number of power plants benefiting from the RES Support Mechanism (YEKDEM) reached 1,036 and the operating power of these participants is 22,982.1 MW (EPDK, 2022).

Comparison of Energy Sources Effects

Turkey is a country in great need of energy. Therefore, it becomes very important to identify energy sectors that pollute the environment less and put them into practice. It is necessary to evaluate the projects, meet the energy needs with the energy/energies that will cause the least harm to the environment and, accordingly, determine the energy sectors that have the least negative effects. Positive or negative reflections of energy resources are presented in the figures below.

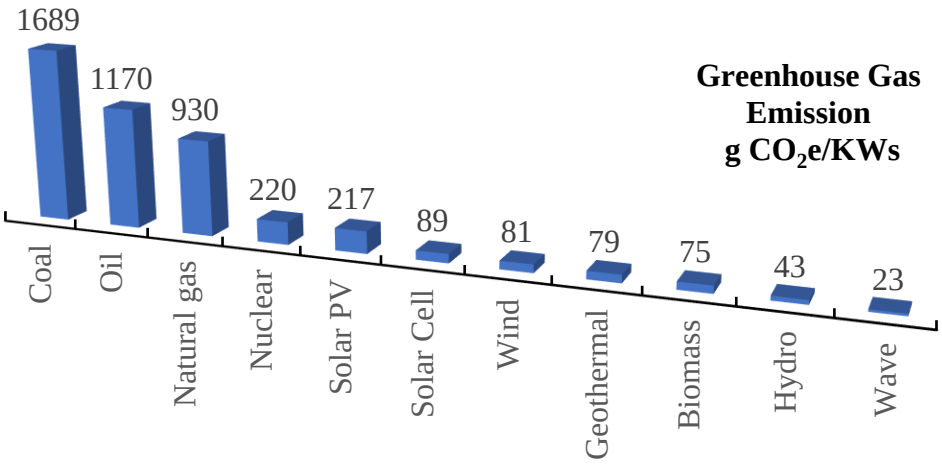


Figure1. CO_2 Emission obtained from power plants (Saner, 2015)

When we examine power plants in terms of greenhouse gas formation, it is seen that thermal power plants cause a large amount of greenhouse gas emissions (Figure 1). It is stated that the greenhouse gas emissions of other energy sources are greenhouse gas emissions that occur not during the operation phase of the power plants, but during the installation phase of the power plants.

Figure 2 presents water consumption of power plants, it can be seen in Figure 2 that thermal power plants and nuclear power plants need a large amount of water during operation and in the disposal of the waste generated. The water consumption of other energy sources, renewable energy sources, is much less than the consumption required by thermal power plants and nuclear power plants. Since the raw material of hydroelectric power plants is water, water consumption seems high, but it is compatible with the target of obtaining energy.

FULL TEXTS BOOK

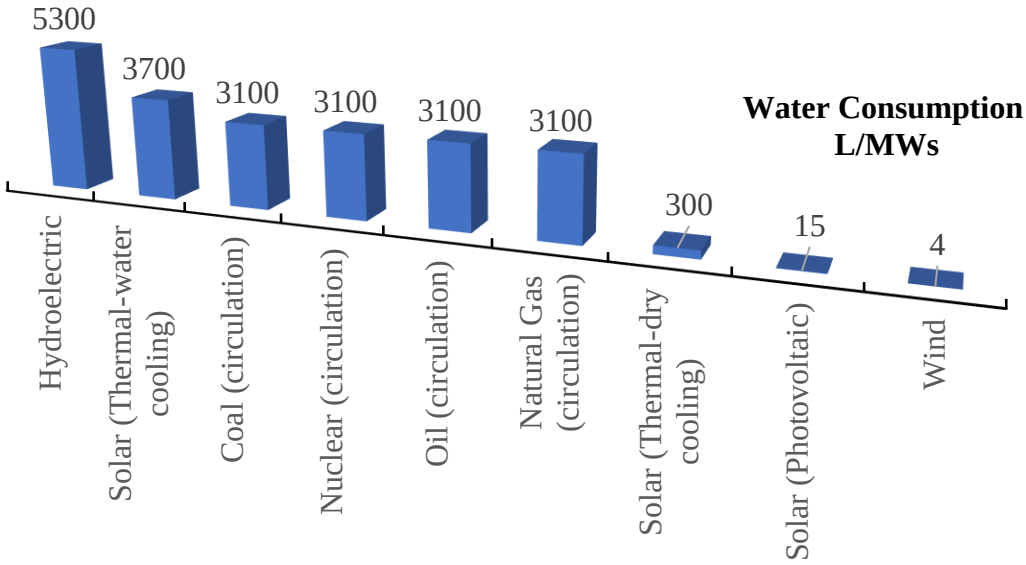


Figure 2**.** Water consumption of power plants (Saner, 2015).

When we examine the power plants in terms of required land installation, large areas are needed for the installation of hydroelectric power plants (Dam Type) and solar power plants. It can be said that non-renewable energy sources require less space than renewable energy sources.

In the evaluation based on water and air pollution parameters, it was stated that wind energy and solar energy did not have a negative effect. When evaluated in terms of global warming, it is seen that wind energy and solar energy do not have a negative effect. Wind energy does not cause thermal pollution in water, floods etc in superficial areas. It is also stated that it does not cause any problems, does not create waste, and does not have a negative impact on activities such as mining, etc. The energy sources with the least negative impact among alternative energy sources are wind energy and solar energy. It is reflected that negative effects may occur only during the construction phase.

It is very important to carry out environmental impact assessment very carefully in power plants planned to be operated using renewable energy resources, to thoroughly examine all possible negative effects along with the mentioned issues, to make the necessary reports, and it should be aimed to plan the projects very well. It should not be forgotten that as more hydroelectiric energy, wind energy, solar energy, biomass energy sources and geothermal energy will be used in the future, the environmental dimension of energy security will need to be addressed more comprehensively.

CONCLUSION

Energy is one of the main sources of economic development for all countries around the world. Therefore, the need for energy and energy resources is great for a balanced and sustainable development. The rapid increase in the world population causes the demand for energy to constantly increase. Environmental problems arising from the use of fossil fuels and concerns about energy supply security increase the importance of renewable energy sources. In addition, shortages in fossil fuel reserves, the UNFCCC, the Kyoto Protocol and the Paris Agreement direct countries to renewable energy sources and enable them to move away from the negative effects of fossil fuels.

Turkey is a country with various energy potentials, but since the resources it produces are insufficient, it meets its energy needs from external sources, which causes it to be in a foreign-dependent position in terms of energy. Energy is important to reduce foreign dependency, reduce costs and increase national

FULL TEXTS BOOK

income. Therefore, considering the country's geographical advantages and technical potential, the share of renewable energy sources in domestic production capacity should be increased.

Although Turkey has increased its use of renewable energy in recent years, it remains behind on a global scale. As of December 2022, most of the electricity produced is obtained from fossil resources (55%), and 45% is provided from renewable energy sources. Among the renewable energy sources, hydraulic energy provides 20% and the remaining 25% is provided by other renewable energy sources. Increasing the use of renewable energy and increasing energy efficiency will enable Turkey to take steps towards a more sustainable future in the energy sector.

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FULL TEXTS BOOK

ECO-FRIENDLY COLOR REMOVAL FROM SOAP PRODUCTION WASTEWATER

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ABSTRACT
While the soap manufacturing industry is vital for everyday products, it faces significant environmental challenges, particularly in the management of soap production wastewater containing color. The discharge of soap production wastewater into natural water bodies poses significant environmental risks to aquatic ecosystems by affecting photosynthesis and aquatic life. For this reason, it is necessary to treat wastewater containing color, especially soap processing effluent, before discharge. Effective treatment methods, including biological treatment systems such as activated sludge processes and physicochemical treatment processes such as coagulation-flocculation, are used to reduce color in wastewater. Additionally, advanced oxidation processes, including ozone oxidation, are promising for efficient removal of color and organic compounds from wastewater. In particular, the ozone oxidation process offers a sustainable solution in color removal due to its strong oxidation properties. Unlike traditional methods, ozone increases the clarity of water by effectively breaking down the organic molecules that create color. In this study, the use of ozone process for color removal from soap production wastewater was investigated. Statistical analysis identified a minimum ozone dose of approximately 340 mg/L.min to consistently achieve 80% or higher color removal under these conditions. These findings highlight ozone as a promising, cost-effective, and environmentally friendly solution for soap production wastewater treatment in the soap manufacturing sector.
Keywords: Color removal, ozone oxidation process, soap production wastewater.

INDTRODUCTION
The soap and detergent industry play a crucial role in maintaining cleanliness and hygiene. However, its production processes generate significant amount of wastewater, containing both organic and inorganic compounds. Soap production wastewater is generated during the various stages of soap making, including oil washing and preparation, saponification reaction, soap neutralization and washing, and the shaping and cutting of soap bars. This wastewater typically contains oil and soap residues, alkaline substances, and other chemicals. Proper treatment of this wastewater is necessary to prevent environmental harm. This colored wastewater is highly polluted due to its high content of organic and inorganic compounds (Pavithra et al., 2019).
Color in wastewater, often due to organic molecules with conjugated double-bond systems, reduces sunlight penetration, hindering photosynthesis and disrupting aquatic ecosystems. High chemical oxygen demand (COD) and biological oxygen demand (BOD) levels can lead to oxygen depletion. These components can pose environmental risks if discharged untreated (Pavithra et al., 2019; Alsukaibi, 2022; Ismail et al., 2022)
Due to its significant contaminant load, soap production wastewater requires extensive treatment using physical, physicochemical, and biological methods to reduce pollutants to acceptable levels before it can be safely discharged or repurposed. Various methods such as biological treatments, coagulation-flocculation, membrane filtration, and advanced oxidation processes have been developed to address

FULL TEXTS BOOK

this issue. Besides, some traditional wastewater treatment technologies have low feasibility on a large scale due to their high costs. Therefore, there is a need for a more economical and effective alternative treatment technology for the treatment of wastewater (Alfred et al.,2024). Effective treatment of soap production wastewater from soap industry is essential to minimize its environmental impact. Effective treatments, like ozone treatment, are essential to break down color-causing compounds and reduce pollution. Among the alternative treatment technologies, ozone treatment stands out as an environmentally friendly and efficient approach to remove color and reduce pollutants from wastewater. Recent studies by Tripathi and Hussain (2022) highlight the potential of ozone treatment as a cost-effective and energy-efficient alternative to traditional methods in wastewater treatment.

Ozone (O_3) is a reactive gas formed from dry air or pure oxygen, known for its thermodynamic instability, quickly reverting to oxygen. It is easily produced via electric discharge and reacts effectively with organic and inorganic compounds. In wastewater treatment, ozone is beneficial as it decomposes into oxygen, leaving no harmful residues, and interacts with contaminants through direct and indirect pathways. This process targets dissolved materials, including color, by breaking down organic molecules with conjugated double-bond systems that often cause coloration. The ozonation process enhances water clarity by decomposing color-causing compounds (Lim et al. 2022). Ozone oxidation process is an effective and eco-friendly method for treatment of wastewater (Krichevskaya et al., 2011; Mousset et al., 2021)

In this context, ozone oxidation process was used to remove color from soap production wastewater. The effects of ozone dose, contact time, and pH were examined by using Box-Behnken statistical design and optimize the conditions for the experimental range.

MATERIAL and METHODS

Wastewater

The soap production wastewater used in the experimental studies was untreated raw effluent collected directly from production of DALAN Chemistry located in İzmir. Before conducting any removal studies, the wastewater was first characterized to determine its properties. The characterization of the soap production wastewater is presented in Table 1. The intensity of a water sample's color is characterized by light absorption at wavelengths where the highest absorptions occur and is quantitatively determined using a spectrophotometer. Measurements at specific wavelengths are conducted to determine the colors of industrial wastewaters. According to international standards for industrial wastewater, the color is measured at three wavelengths within the visible light spectrum: 436 nm, 525 nm, and 620 nm (APHA 2005).

However, in this study, color analysis was performed at 350 nm, which is the wavelength that gives the maximum absorbance value. Data obtained at 350 nm for soap production wastewater are compatible with standard wavelengths of 436 nm, 525 nm and 620 nm (data not shown). Table 1 shows the various parameter values of the wastewater used in the experiment.

Table 1. Parameters and values measured in soap production wastewater

Parameters	Value
pH	9.2
Conductivity (µS/cm)	177.4
Temperature, °C	25
True Color Units (TCU) 350 nm	3.436
True Color Units (TCU) 436 nm	0.514
True Color Units (TCU) 525 nm	0.194

FULL TEXTS BOOK

Parameters	Value
True Color Units (TCU) 620 nm	0.076
TOC (mg/L)	10750

Experimental Set up and Procedure

The laboratory-scale ozone reactor, made of 3 L glass column reactor, was used with ozone generator producing up to 15 grams per hour from 99.5% pure oxygen. Ozone was introduced at various rates via a 15 mm diffuser, with the flow controlled by adjusting the current and air flow. The ozone feeding rate was measured using the potassium iodide absorption method (APHA 1992). A constant dose of 0.15 mg/L ozone was selected as the standard for all experiments. The remaining ozone in the gas scrubber was also measured. An ozone monitor checked the effluent concentration, and excess ozone was destroyed using a catalytic unit (Cokay & Kargi 2009).

For soap production wastewater, color analysis is performed at 350 nm, which is the wavelength giving the maximum value in the wavelength scan. To prevent interference from suspended solids, the wastewater samples were filtered by 0.45 µm millipore filter. The percentage of color removal was determined using following equation.

Percentage Color Removal = $[(C_o - C) / C_o] * 100$

where X_o represents the initial absorbance and X represents the final absorbance measured at 350 nm.

pH levels were monitored with a WTW pH meter from Germany. All experiments were performed at room temperature.

Box-Behnken Statistical Experiment Design

Statistical experiment design takes into account interactions between variables while minimizing the number of tests required. Thus, it is possible to optimize operational parameters in multivariable systems. The Box-Behnken statistical experiment design was used to obtain optimal conditions for the ozonation process. The independent variables were pH (Factor X_1), ozone contact time (Factor X_2), while the dependent variable was the color removal efficiency (Response) (Box &Wilson, 1951; Eker & Kargı, 2008).

Ozone reacts with organic matter in two ways. In the ozone oxidation process, when the pH of the wastewater is below 5-6, ozone typically remains in the O_3 form and reacts with organic substances. When the pH is above 7, ozone decomposes to form hydroxyl radicals. These hydroxyl (OH•) radicals are fast and non-selective, reacting with many organic compounds. Therefore, having a pH higher than 7 in colored wastewater is advantageous for free radical formation and complete color removal. This pH range is also suitable for the raw wastewater and was chosen for its ease of adjustment and economic feasibility in the plant. Therefore, the pH range was set to the basic conditions (7–11) for the experiment design.

The ozone contact time for the experiments was planned to be between 2 and 10 minutes based on preliminary ozone experiments on the soap production wastewater. It was observed that after 10 minutes, there was no further color change, and the targeted color removal was achieved.

RESULTS and DISCUSSION

In the Box-Behnken design, the independent variables were the pH and ozone contact time. The color removal efficiencies obtained at the statistical experiment points in the experiments were given in Table 2.

FULL TEXTS BOOK

Table 2. Color removal at 350 nm

Run	Factor X1: pH	Factor X2: Ozone Contact Time (min)	Response Color Removal (350 nm) (%)
1	7	10	77.00
2	11	10	79.60
3	9	6	79.80
4	9	2	52.71
5	7	2	66.24
6	11	10	39.80
7	11	2	73.28
8	7	6	72.50
9	9	2	86.15
10	11	6	79.80
11	9	6	79.80

The optimization process involves looking at the results of statistically designed experiments, figuring out the coefficients by fitting the experimental data to the response function, guessing the results using the fitted model, and using Analysis of variance (ANOVA) tests to make sure the model is correct. The response function values for each independent variable were found by iterating over the experimental data. The coefficients of the response function for independent variables were determined correlating the experimental data by using the Stat-Ease Design Expert Software. ANOVA was performed to choose the response function to correlate experimental data. Response function calculated coefficients are shown in the equation below.

$$\text{Color Removal (\%)} = 18.87 + 11.34X_1 + 2.44X_2 + 0.91\ X_1 * X_2 - 1.04\ X_1^2 - 0.61\ X_2^2$$

ANOVA testing showed that model suited experimental data best with the lowest standard deviation, highest correlation coefficient, and lowest p-value (<0.0019). Response function predictions matched experimental data with R^2 values over 0.96.

Figure 1 depicts the percentage color removal at varying ozone contact times and pH levels. At low ozone contact time, there is a noticeable decrease in color removal efficiency as the pH increases from 7 to about 10. The results showed that both higher pH levels and longer ozone contact times are beneficial for reducing color in the wastewater. The interaction between these two factors shows that optimizing both parameters can significantly enhance the efficiency of the ozonation process for color removal.

FULL TEXTS BOOK

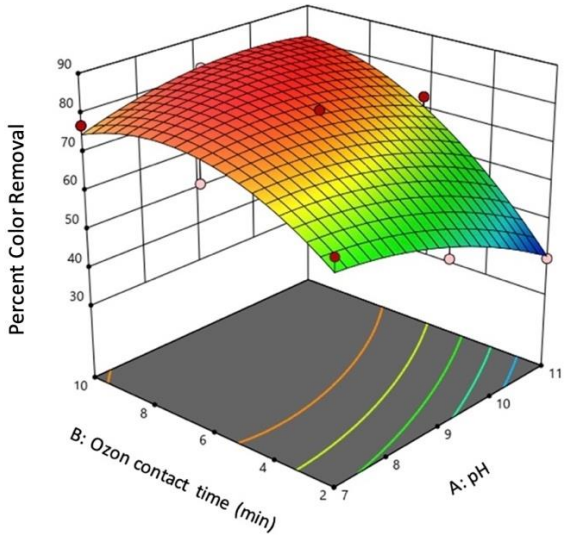


Figure 1. Variations of percent color removal at different ozone contact time and pH values.

Figure 2 shows the optimized reaction conditions according to the experimental results. With the experiments carried out using statistical design, the optimum ozone contact time and optimum pH value were found and the ozone dose that should be used for the highest color removal was determined.

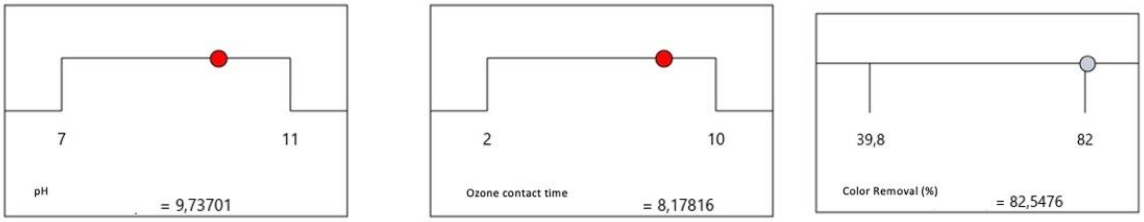


Figure 2. Suggested optimum operational conditions of pH, ozone contact time and ozone dose.

In the ozone oxidation process, when the pH value is around 9.7, the color removal efficiency can be obtained as 83% at an ozone contact time of 8.2 minutes. In addition, it was determined by the statistical program that the ozone dose that should be applied to the soap production wastewater to achieve 80% and above color removal under these reaction conditions is approximately 340 mg/L.min. The study conducted by Upadhyay (2013) on the treatability of soap and detergent industry wastewater by the ozonation process found that the ozonation process is effective in removing COD, BOD, and color from the wastewater. The optimal ozone doses were determined to be 19 mg/L, 21.58 mg/L, and 30.70 mg/L, achieving overall COD and color reductions of 50.8%, 53.4%, and 60.8%, and 52.6%, 57.4%, and 61.8%, respectively. These findings indicate the effectiveness of ozone process in the treatment of soap and detergent wastewater in both studies. The required ozone doses and efficiencies differ significantly, possibly due to variations in experimental conditions and wastewater characteristics.

CONCLUSION

As a result, in this study, within the scope of optimization experiments for color removal from soap production wastewater by ozone oxidation process, the minimum ozone dose and maximum efficiency were determined. The investigation revealed that ozonation is indeed a highly effective method for color removal. According to optimization experiments, approximately 85% color removal can be achieved if the pH is kept at 9-9.5 and the wastewater is exposed to ozone for approximately 8 minutes. The statistical analysis identified the optimal ozone dose required to attain 80% and above color removal under the experimental conditions as approximately 340 mg/L.min. Besides, even upon evaluating the raw experimental results, it was evident that the desired color removal efficiency could be reliably

FULL TEXTS BOOK

achieved with an ozone dose of approximately 400 mg/L.min across all pH values. The results demonstrated efficient, cost-effective, and sustainable color removal from soap production wastewater using the ozone oxidation process.

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FULL TEXTS BOOK

CONCEPTUAL ANALYSIS OF MODERN EUROSCEPTICISM

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ABSTRACT
Understanding euroscepticism goes beyond normative concerns about deepening European integration. It encompasses various aspects of political behavior, identities, public policies, democratic legitimacy, economy, ideology, and more. Euroscepticism is a complex and evolving phenomenon that lacks a universally accepted theoretical framework. Broadly, it denotes opposition to the European Union, whether in its entirety as a supranational entity or in its current structure, form, and political trajectory. Furthermore, euroscepticism manifests across the political spectrum, from left to right. Factors such as economic crises, fiscal policies, and the refugee crisis have intensified negative sentiments toward the EU among its populace. This environment has fostered the growth of eurosceptic parties and groups espousing populist and nationalist agendas. This study aims to delineate the contemporary dimensions of euroscepticism within the EU, following a review of the theoretical framework and essential conceptual clarifications related to euroscepticism. The results indicate that euroscepticism primarily revolves around concerns regarding sovereignty, identity, and the level of trust in national political systems. Additionally, euroscepticism correlates with the two significant crises that have challenged the EU and considerably tarnished its reputation: the economic crisis and the refugee crisis.

Keywords: Euroscepticism, European integration, European Union.

1. Defining the Euroscepticism

The term "euroscepticism" is widely used but lacks a specific, universally accepted definition. According to some scientists euroscepticism broadly encompasses varying degrees of opposition, from mild to absolute, towards the European integration process. [13]Taggart and Szczerbiak categorize euroscepticism within political parties into two main types: hard and soft. Hard euroscepticism refers to parties that fundamentally advocate for their countries to leave the European Union, with opposition to the European project being a core tenet. On the other hand, soft euroscepticism involves opposition to specific EU policies or beliefs that these policies negatively impact national interests, without rejecting the European project as a fundamental principle of the party.

In a different approach, some other authors build upon David Easton's foundational distinction among the different types of backing for political regimes. [14]They identify two dimensions for analyzing endorsement or skepticism towards European integration. They differentiate between "diffuse" and "specific" support for European integration. Diffuse support pertains to backing the overarching concepts of European integration that underpin the EU. Specific support relates to the practical implementation of European integration, meaning how the EU currently operates and its trajectory.

The first dimension, "support for the ideas of European integration," distinguishes between "Europhiles" and "Europhobes." Europhiles, as some authors define embrace the fundamental principles of European integration upon which the EU is founded. Europhobes, on the other hand, do not endorse and often

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FULL TEXTS BOOK

oppose these foundational concepts, rejecting one or more of the ideas that form the bedrock of European integration.

The second dimension, "support for the European Union," separates "EU optimists" from "EU pessimists." Optimists believe in the current state of the EU and its ongoing development, either because they are content with its current operation or because they are optimistic about its future direction. EU pessimists, conversely, are dissatisfied with the current state of the EU or hold negative expectations about its future trajectory. It's important to note that being an EU pessimist doesn't necessarily imply opposition to EU membership; some simply believe that the current EU configuration diverges significantly from their understanding of the core principles of European integration and aspire to reform it.

In this context it is important to mention Mats Braun[15] who is political scientist whose research focuses on Euroscepticism and its implications for European integration and national sovereignty. His work typically examines several key aspects of Euroscepticism:

1.Impact on National Sovereignty: Braun explores how Eurosceptic movements and attitudes within member states challenge or advocate for the preservation of national sovereignty in the face of increasing European integration. This includes analysis of legal, political, and economic implications.

2.Political and Public Opinion Dynamics: He studies how Euroscepticism influences political behavior, party systems, and electoral outcomes across different European countries. This involves examining the rise of Eurosceptic parties, their rhetoric, and their impact on mainstream political agendas.

3.Policy Implications: Braun likely examines how Eurosceptic attitudes affect policy-making within the European Union. This includes assessing the negotiation of treaties, the implementation of EU directives, and the dynamics of intergovernmental cooperation versus supranational integration.

4. Comparative Analysis: His research may involve comparative studies of Euroscepticism across European countries, looking at variations in public opinion, political mobilization, and policy outcomes.

5. EU Institutions and Democratic Legitimacy: Braun might also explore debates surrounding the democratic deficit within EU institutions as perceived by Eurosceptic movements and the broader public. This involves questioning the accountability and transparency of EU decision-making processes.

Overall, Mats Braun's contributions to the field of political science provide nuanced insights into the multifaceted nature of Euroscepticism, its drivers, and its consequences for European integration and national sovereignty. His work helps to illuminate the complex interplay between national identities, political ideologies, and the evolving role of the European Union in contemporary Europe.

2. Factors that Influence Euroscepticism

Euroscepticism refers to skepticism or criticism towards the European Union (EU), its policies, and its institutions. The economic crisis, such as the global financial crisis of 2008-2009 and the subsequent Eurozone crisis, significantly contributed to the rise of euroscepticism for several reasons:

1.Economic Hardship: The economic crises led to widespread unemployment, austerity measures, and economic downturns in many EU member states. Citizens experiencing economic hardship often blamed EU policies for exacerbating their situations. Austerity measures imposed by the EU and bailout conditions imposed on countries like Greece by the EU and IMF were particularly contentious, leading to perceptions of loss of sovereignty and unfair economic burden-sharing.[16]

[15] Mats Braun (2019).Postfunctionalism, Identity and the Visegrad Group. https://www.researchgate.net/publication/336977963_Postfunctionalism_Identity_and_the_Visegrad_Group visited on 15.07.2024.

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FULL TEXTS BOOK

2.Perceived Democratic Deficit: Many eurosceptics argue that the EU suffers from a democratic deficit, meaning that its decision-making processes are seen as distant, opaque, or not directly accountable to voters. During economic crises, decisions made by EU institutions (such as the European Commission and the European Central Bank) that affect national economies can be viewed as undemocratic or unrepresentative of national interests.
3.National Identity and Sovereignty: Economic crises can provoke a resurgence in nationalism and a desire to reclaim national sovereignty. Eurosceptics often argue that the EU imposes policies that undermine national sovereignty and cultural identity. Economic hardships can amplify these concerns, leading to increased support for nationalist or anti-EU political parties and movements.
4.Inequality and Social Cohesion: Economic downturns can widen economic inequalities within and between EU member states. This can lead to social discontent and a perception that the EU's policies exacerbate inequalities rather than address them. Eurosceptic parties may exploit these sentiments to gain support by advocating for policies that prioritize national interests over European integration.
5.Public Perception of EU Institutions: The handling of economic crises by EU institutions, such as the European Central Bank's monetary policies or the European Commission's fiscal rules, can be seen as ineffective or detrimental by affected populations. This can erode public trust in the EU and its ability to manage economic challenges.
Overall, the economic crises in the 2000s and early 2010s intensified existing eurosceptic sentiments and contributed to the electoral success of eurosceptic parties in several EU member states. These parties often campaigned on platforms that critiqued EU policies, advocated for greater national sovereignty, and appealed to citizens' frustrations with economic conditions and perceived loss of control over their own futures.
The other very important factor that influence the Euroscepticism is the EU's handling of the refugee crisis, which reached its peak in 2015-2016 and became a focal point of public dissatisfaction with the union. The surge in refugee and migrant arrivals, predominantly from Syria and other Middle Eastern nations, as well as from North Africa and Asia to the EU, became a rallying cry for various extremist eurosceptic parties. They capitalized on this discontent, often gaining significant electoral support.
Criticism towards the EU regarding the refugee crisis came from a wide spectrum of citizens, commentators, and political parties, regardless of their ideological leanings. Some blamed the EU for not adequately providing essential assistance to those in need, failing to efficiently redistribute refugees, and delaying asylum application processes. Others argued that the EU did not sufficiently protect its external borders, thereby challenging the integrity of the Schengen treaty.

3. Euroseptisism in Context of Different Ideologies

Euroscepticism refers to a spectrum of attitudes and beliefs that question or oppose the European Union (EU), its policies, or the process of European integration. It can manifest differently depending on the ideological perspective of the individuals or groups involved. Here's how euroscepticism aligns with different ideologies:

Conservatism:
Right-wing conservatism: Euroscepticism from the right often stems from concerns about national sovereignty and control over national laws and borders. These conservatives may view the EU as overly bureaucratic, infringing on national identity, and limiting economic freedom. They might advocate for a looser confederation of states rather than a centralized union.[17]

[17] Hans Kundnani (2016)"The Conservative Party and Euroscepticism: A Changing Relationship"

Liberalism:
Classical liberalism: Liberals might be eurosceptic due to concerns about democratic deficit within the EU institutions or issues related to economic liberalism. They might argue that the EU's regulatory framework restricts free markets and entrepreneurship.
Social liberalism: Some social liberals may be critical of the EU's policies on civil liberties, immigration, or social justice, feeling that EU regulations can undermine these values or fail to address them adequately across member states.

Socialism:
Left-wing socialism: Euroscepticism on the left often focuses on critiques of the EU's economic policies, perceiving them as favoring big business over workers' rights and social welfare. Left-wing eurosceptics may oppose EU austerity measures and advocate for policies that prioritize social equality and workers' rights.

Nationalism:
Nationalist movements: Nationalist eurosceptics are concerned with preserving national sovereignty and cultural identity. They may view the EU as eroding these aspects through its policies on immigration, integration, and economic harmonization. They often prioritize national interests over supranational governance.

Populism:
Populist movements: Populist eurosceptics typically appeal to the general dissatisfaction with established political elites and institutions. They frame the EU as an undemocratic entity that imposes policies without adequate popular consent. They may advocate for returning decision-making power to national governments seen as more responsive to popular will.

Environmentalism:
Green parties and environmentalists: Some environmentalists may be eurosceptic due to concerns about the EU's environmental policies. They may criticize the EU for not being ambitious enough in addressing climate change or for prioritizing economic interests over environmental protection.
In summary, euroscepticism is multifaceted and can arise from various ideological perspectives, each highlighting different aspects of concern ranging from sovereignty and democracy to economic policy and social justice. Understanding euroscepticism in these contexts helps to appreciate the diverse reasons why individuals and political groups might question or oppose the European Union and its integration efforts.

Conclusion

Euroscepticism is a complex and varied phenomenon that manifests differently across different regions and periods, lacking a universally accepted theoretical framework for its definition. It is not tied to any specific position on the Right-Left political spectrum. Some argue that it is part of a broader emerging divide that encompasses a growing range of issues. Research using Eurobarometer surveys indicates that the Eurozone crisis significantly contributed to the increase in euroscepticism in Europe. However, euroscepticism is not solely driven by economic concerns. Strong dissatisfaction with domestic political systems and the fragmentation of national party systems can also lead to a negative view of the EU's institutions. Additionally, it remains unclear whether the refugee crisis alone was a major factor or if it, combined with the lingering effects of the economic crisis, contributed to the rise in euroscepticism.

FULL TEXTS BOOK

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FULL TEXTS BOOK

USE OF CORE TRAINING IN THE PREVENTION OF TRAUMA IN SOCCER PLAYERS

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ABSTRACT

This clinical article underscores the global significance of core training in sports physiotherapy, with a focus on enhancing performance and minimizing injuries. The core concept has garnered considerable attention in media and scientific journals from the end of the last decade to the present. The role of core musculature in movement, trunk maintenance, and vertebral column stability has prompted a wide range of studies since 1950. The effective control of abdominal and lumbar muscles is crucial for preventing and recovering from musculoskeletal pathologies, maintaining posture, and improving sports performance.

Numerous studies have demonstrated that excellent core stability is linked to better physical performance across various sports. Proper force transmission from the lower to the upper limbs and effective stabilization provide a solid foundation for developing muscular strength, thereby enhancing the effectiveness of athletic movements. A strong and stable core improves an athlete's lower limb mobility, speed, and overall performance.

This article is based on a comprehensive review of scientific literature from databases such as Medline, Scopus, Web of Science, PubMed, and Cochrane Library, supplemented by Google Scholar, Springer Link, and Elsevier. A total of 32 publications were analyzed.

The purpose of this article is to review the literature examining the relationship between postural variations, core stability, and performance in sports that require balance and posture. It identifies gaps in the current literature and suggests areas for further research.

In conclusion, this article highlights the importance of a holistic approach to core training in sports physiotherapy for enhancing athletic performance and reducing injuries. The core is essential for stability, power transmission, and injury prevention. The findings and recommendations presented contribute to the body of knowledge in sports physiotherapy and serve as a valuable resource for professionals working with athletes at all levels.

Keywords: Core Training, Physiotherapy, Rehabilitation, Stability, Posture

Introduction

Soccer is one of the most popular sports globally, engaging players, spectators, and viewers alike. The latest FIFA report from 2007 highlights that 265 million people around the world regularly participate in the game of football. Performance in football is influenced by technical, tactical, physiological, and mental aspects. Physical fitness is a crucial element affecting football performance due to the high physical demands of the game.

As a high-impact sport, football poses a significant risk of injury, both in contact and non-contact situations. Studies have demonstrated that the risk of injury for professional players is 1,000 times higher compared to the general population [3].

The frequent changes in direction, accelerations, and rapid braking during matches increase the likelihood of muscle injuries among soccer players. These injuries not only impair player performance but also impose economic burdens on clubs due to rehabilitation costs. Power and speed are critical in decisive moments of the sport, which is why sprinting and changing direction are common during goal-scoring situations.

FULL TEXTS BOOK

Research indicates that during a high-level soccer match, a player performs a sprint every 90 seconds, with each sprint lasting an average of 2-4 seconds [5]. According to some studies [19], these sprints are short and explosive. Although evidence is limited, incorporating basic stabilization exercises into injury prevention programs, particularly for the lower extremities, has been shown to reduce injury rates [6,7,8]. A universally accepted definition of core stability is still lacking.

The importance of core musculature in movement and trunk stability, as well as vertebral column stability, has prompted extensive research since the 1950 until today [1]. Initially, the focus was on muscle strengthening through specific exercises. Over time, research has evolved to analyze the effects of various training methodologies aimed at trunk muscle strengthening, seeking optimal parameters for prevention, rehabilitation, and physical conditioning of football players.

Surface electromyography, which studies the myoelectric signal, has been a fundamental tool in scientific research related to the abdominal and lumbar regions. Its widespread use is attributed to technological advancements and the need to address existing scientific gaps.

There is growing interest in a more holistic view of the human body, transitioning from the concept of abdominal musculature to that of the "core region." The core, defined as "the functional center of the body," has become a significant focus of study. Over the past decade, a science of "core training" has emerged, revolutionizing many training methodologies and playing a leading role in various aspects of motor activity.

Core stability refers to the ability to maintain functional stability and neuromuscular control in the core region. Effective control of the abdominal and lumbar muscles is essential for preventing and recovering from musculoskeletal pathologies, controlling posture, and enhancing sports performance.

Core stability encompasses the lumbopelvic region, the hips, and the ability to maintain the balance of the vertebral column within its physiological limits, thereby reducing displacement and preserving structural integrity [2]. Some researchers propose viewing the core as a system of kinetic chains responsible for transferring force and energy between the lower and upper extremities [9,10].

Many muscles affecting the knee joint and its surrounding areas originate in the lumbopelvic region. Therefore, a loss of core muscle control and strength can increase rotational forces on the knee, particularly during the landing phase after a jump, which may lead to damage to the anterior cruciate ligament (ACL).

Core Concept

The core concept has been a focal point in media and scientific literature since the end of the last decade [4]. However, a precise and universally accepted definition remains elusive, with variations in interpretation based on different authors and contexts.

Historically, the core has been described as a "cylindrical box" encompassing the abdominal muscles in the front, the gluteal and paraspinal muscles in the back, the diaphragm at the top, and the pelvic floor/coxofemoral joint as the base.

Some authors [11] have expanded this definition to describe the core as the "lumbopelvic complex," which includes the lumbar vertebral column, pelvis, coxofemoral joint, and all associated muscles that produce or limit movements of these segments.

As suggested by other researchers [16], the definition of core endurance is context-dependent, varying between biomechanical laboratories, rehabilitation clinics, and sports centers. This definition must be grounded in principles from engineering and biomechanics, as well as the morphological and functional characteristics of the core structures. In light of these considerations, some researchers propose defining the core as the ability of osteoarticular and muscular structures, coordinated by the motor control system, to maintain or return to a desired trunk position or trajectory when subjected to internal or external forces. In training or sports medicine contexts, core endurance can be viewed as a physical quality that can be modified through training or rehabilitation, though it remains context-specific.

FULL TEXTS BOOK

In sports contexts, the core is often defined as "the group of all anatomical components between the sternum and the knees, with a focus on the abdominal region, lumbar spine, and coxofemoral joint." This perspective is supported by other researchers [12,13] who suggest that "core muscles" include "all muscles between the shoulders and pelvis that facilitate the transfer of forces from the vertebral column to the extremities."

Consequently, the core is considered a muscular corset that functions as a unit to stabilize the entire body, particularly the vertebral column, both during limb movements and at rest. It acts as a bridge connecting the upper and lower body, where forces are transmitted and generated.

Researchers [14] have highlighted the core's role in improving balance, strength, and proprioception during trunk examination, daily activities, and sports. In alternative medicine, the core is often viewed as "energy," serving as the source of all limb movements and the origin of all energy, referred to as the "inferior dan tian."

The core comprises both passive and active elements: passive structures include the thoracolumbar column and pelvis, while active structures involve the trunk muscles. These muscles are crucial for maintaining the stability of the vertebral column and pelvis, as well as generating and transferring forces between the trunk and limbs during sports activities.

Since the core connects the upper and lower limbs, controlling strength, balance, and movement in this region can optimize the entire kinetic chain, which includes both upper and lower limb athletic gestures. Some criteria for enhancing the sports specificity of core stability training programs involve performing exercises on the feet and incorporating three planes of motion. While some studies have analyzed core stability programs [17,18], there is a noted lack of research specifically evaluating sport-specific core stability programs that apply these criteria, highlighting a limitation in existing studies.

It is also important to train core muscles independently, despite their interdependence through fascial connections, which form a dynamic system that enables efficient movement and force transmission throughout the body.

Core anatomy includes all structures between the scapula and gluteals. Core structures can be categorized into stabilizers, such as the internal and external oblique muscles, which control movement angles eccentrically, and mobilizers, such as the rectus abdominis and iliocostalis, which accelerate movement concentrically.

The muscles constituting the core are responsible for maintaining posture in various positions and facilitating safe and effective movement through different planes and directions. The core, represented by the coxo-lumbo-pelvic complex, is the center of the kinetic chains from which all upper and lower limb movements originate.

An accurate anatomical understanding of the core region should also include the axial skeleton (coxofemoral and shoulder joints) and connective tissues (tendons, ligaments, fascia).

Researchers [20] have divided the core into three subsystems based on analogies with the "spinal stabilization system":

- **Passive**: Comprising vertebral ligaments, intervertebral discs, and articular fasciae.
- **Neural**: This subsystem controls core muscle usage through feedforward and feedback mechanisms.
- **Active**

The classification model proposed by researchers [21]is detailed in the following table (Tab 1).

LOCAL STABILIZER	GLOBAL STABILIZER	GLOBAL MOBILIZER
Transverse abdominal	Obliquo sterno	Rectus abdominis
Interspinal	Internal oblique	Ileocostal
Psoas (posterior fascia)	Gluteus medius	Piriformis

FULL TEXTS BOOK

Diaphragm	Quadrato dei lombi (deep bandage)	Quadrato dei lombi (ileo-costal bandage)
Pelvic muscles		Hip bi-articular muscles

Tab 1. Classification of Core Muscles

The core muscles can be classified into various groups based on their anatomical location and function. The primary groups include:

1. **Abdominal and Paraspinal Muscles**: These muscles are fundamental components of the core and have been extensively studied. They are divided into two main categories:
    - **Abdominal Muscles**: This group includes the rectus abdominis, external oblique, internal oblique, and transverse abdominis. These muscles are crucial for trunk flexion, rotation, and stabilization.
    - **Paraspinal Muscles**: This group consists of the spinal erectors (such as the iliocostalis and latissimus dorsi) and deeper trunk muscles like the rotatores, intertransversarii, and multifidus. These muscles are involved in extending and stabilizing the spine.

Particularly, the transverse abdominis is notable for its close anatomical relationship with the trunk and the thoracolumbar fascia. It has been the focus of many studies due to its role in core stability and is often targeted through specific exercises.

2. **Diaphragm**: The diaphragm is considered the upper part of the core region. Its contraction, in synergy with the transverse abdominis and pelvic floor muscles, increases intra-abdominal pressure and enhances trunk stability, independent of its role in respiration.
3. **Coxofemoral Joint and Pelvic Muscles**: These structures form the base of support for the core. Key muscles in this region include the gluteal muscles. The gluteals are significant for stability and force production during specific sports movements. They help stabilize the trunk through closed kinetic chain movements and contribute to the generation of power and force for lower limb activities.
4. **Iliopsoas**: The iliopsoas, a major muscle of the lumbar region, plays a role in trunk flexion but does not contribute significantly to stabilization. Hypertonicity in this muscle can increase the load on the lumbar spine.

Core Functions

The core performs four essential functions crucial for athletic performance:

1. **Movement Prediction**: The core helps prepare the body efficiently for dynamic movements by anticipating the demands of activity.
2. **Vertebral Column Stabilization**: It creates a stable base for effective power transmission.
3. **Support During Weight-Bearing Activities**: It ensures proper support during exercises and activities involving weight-bearing.
4. **Coordination Between Upper and Lower Body**: The core acts as a bridge, facilitating coordination of movements between the upper and lower body during activities such as walking and running.

Methodology

Core training is crucial for optimizing athletic performance and preventing injuries. The program outlined utilizes the "Key Principles of the Four Pyramids," which include four distinct phases: activation, stabilization, integration, and perturbation. Each phase has specific objectives and incorporates various exercises to achieve these goals.

FULL TEXTS BOOK

1. **Activation Phase**

The objectives of the activation phase are to reduce pain, regulate breathing, improve posture and range of motion, strengthen the core, increase coxofemoral joint strength, and provide patient education. Therapeutic interventions during this phase include: Modalities, Biofeedback, Diaphragmatic breathing, Core isometrics, Coxofemoral exercises, Pelvic positioning, Mobility exercises.

2. **Stabilization Phase**

In the stabilization phase, the focus shifts to coordinating respiration, aligning posture, and enhancing core strength without external cues. The objectives are to maintain proximal stability with distal mobility, generate force, introduce rhythmic stability, and regain trunk and coxofemoral joint strength. Exercises include:

- **Counter-movement exercises**: Dead-bugs, Bird-dogs, Lunge presses
- **Basic resistance exercises**: Plank (lateral, Copenhagen), Bridge
- **Balance and proprioception exercises**

Haroy et al. investigated the effectiveness of Copenhagen exercises in a group of 35 semi-professional soccer teams. The study found that performing three levels of the Copenhagen plank three times a week during the pre-championship period (6-8 weeks) and once a week during the season (28 weeks) led to a significant 41% reduction in pubalgia-related injuries, highlighting the importance of this exercise in injury prevention at this level [31].

3. **Integration Phase**

During the integration phase, athletes must demonstrate restored muscle relationships and maintain proper posture during multi-articular exercises. Objectives include performing movements such as sitting, hanging, falling, holding, vertical/horizontal pressing, and lateral sliding.

4. **Perturbation Phase**

In the perturbation phase, athletes are required to maintain proper posture under varying loads and demonstrate good neuromuscular control on unstable surfaces or stable surfaces with closed eyes. The main objectives are to enhance the central nervous system's ability to adapt to external forces, improve power transmission, and enhance reaction time.

Clinical Assessment of Core Injuries

The clinical assessment of core injuries involves understanding the injury mechanism, sport-specific demands, and conducting both objective and subjective evaluations. This includes functional tests and specific assessments to identify the primary cause of the injury.

- **Injuries**: The rectus abdominis and adductor longus are commonly injured due to their opposing force vectors, acting as antagonistic muscles during coxofemoral extension and core rotation. These muscles connect to the pelvis along the pubic symphysis, forming the pubic aponeurosis or "plate," which serves as a fulcrum for these structures [23].
- **Subjective Symptoms**: Patients often report deep, chronic pain in the inguinal region and lower abdomen, which tends to ease with rest but can be exacerbated by directional changes. Common injury mechanisms identified include strains, hyperextension with rotation, and excessive load on the vertebral column [24].

FULL TEXTS BOOK

- **Objective Assessment**: Objective assessment includes palpation to gauge sensitivity in the core region [25], measuring mobility in the thoracic and pelvic areas, and examining the ribs. Strength measurement, particularly of adductor and abductor muscles, is also essential. Tyler et al. reported a 17-fold increase in injury risk for individuals with adductor strength less than 80% of normal [26].
- **Functional Testing**: Functional tests assess the base level of function and include exercises such as single-leg squats/step-ups, hip bridge tests with one foot, and trunk durability tests. Chaudhary et al. found that increased anterior-posterior deviation of the pelvis during a 3" step-up was associated with an elevated risk of injuries to the shoulders, ulnar collateral ligament, and elbows during major league bullpen games [27]. Meister et al. also identified a correlation between core stability, as determined by pelvic deviation during single-leg balance, and extremity injuries among professional shooters during competitive seasons [28].

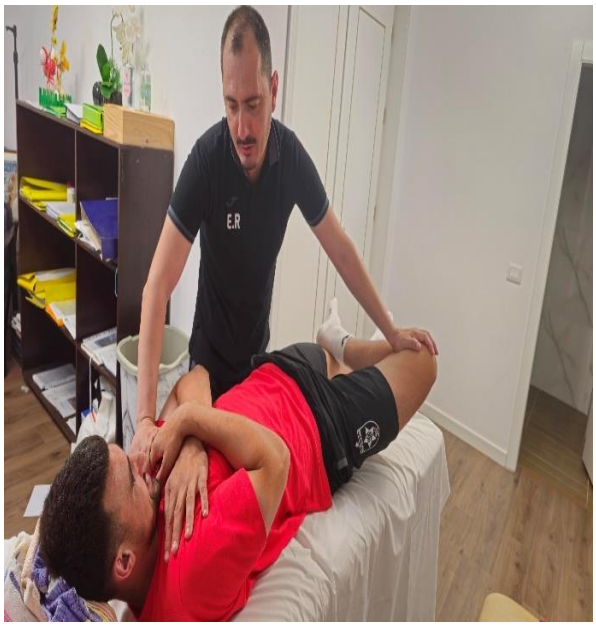
Testing trunk resistance is crucial for understanding the relationship between core stability and lower extremity injuries. Research by various authors [22] has provided insights into average endurance times for trunk exercises. Studies indicate that women generally exhibit greater endurance in flexion and extension exercises, whereas men tend to show more endurance in side bridge exercises. The authors [15] found that athletes with lower core stability are at a higher risk of sustaining lower extremity injuries compared to those with higher core stability. Injured athletes often demonstrate reduced hip abduction and external rotation, as well as decreased resistance in extension and side bridge exercises [29]. The test of resistance adduction is usedabout the differential patology of the pelvis from hip and about the identified patients without pubalgia



Figure 1. Test of resistance adduction

Kurowicki et al [22]. identify central muscle damage using four key criteria. Each test is designed to induce pain or reproduce the patient's symptoms:

FULL TEXTS BOOK



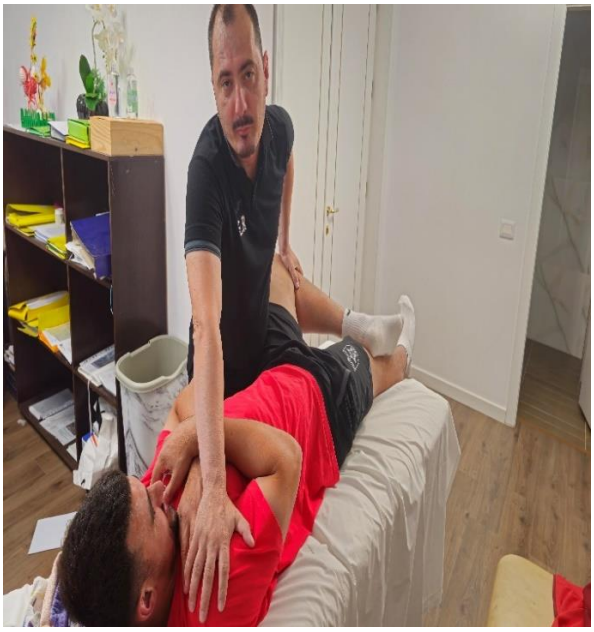
a. Sit-up with crossed resistance



b.Sit-up test with extended-leg



c. Test of hip flexion against resistance in extrarotation contracture



d. Test of adductor

Figure 2. Test of adductor and hip flexion

• **First Test**: Sit-up with crossed resistance in a quadruped position. The patient lies supine, positions the symptomatic side limb in a square shape, and brings the contralateral shoulder towards the symptomatic side against the therapist's resistance (Fig. 2a).
• **Second Test**: Extended-leg sit-up. The patient lies supine, raises both shoulders and the symptomatic leg approximately 10 inches off the bed, and attempts to maintain this position against resistance (Fig. 2b).
• **Third Test**: Coxofemoral flexion against resistance in external rotation (Fig. 2c).
• **Fourth Test**: Presence of adductor contracture while the patient is in a square position [30] (Fig. 2d).

FULL TEXTS BOOK

Finally, the author employs a custom dynamic evaluation to assess trunk stabilization across multiple planes. The therapist places the patient in a dead bug starting position (Fig. 3) and applies resistance in various directions to challenge the stability of each fascial line. The therapist communicates with the patient to identify the most challenging direction of stabilization. This assessment aids in identifying deficits and developing a personalized program.



Figure 3.Evaluation of trunk stabilization in multiple planes

RESULTS

Core stability plays a crucial role in athletic function and performance. Strengthening these muscles impacts the central nervous system, as these muscles help maintain trunk alignment and provide a stable pelvis foundation, thereby preventing instability. This stability enhances overall movement efficiency, dynamic control, and injury prevention during sports activities [22].

Core stability is closely related to the prevention and rehabilitation of lower limb injuries. The core is the primary point through which the lower limbs generate or resist forces during movements. Authors [15] have emphasized that core stability is vital for injury prevention. Reduced lumbo-pelvic stability has been shown to correlate with an increased risk of lower limb injuries, particularly in women. Beyond its stabilizing function and force generation, core functionality is integral to all sports involving extremities, such as athletics, football, swimming, and cycling.

A recent study by the authors [22] found that core stability exercises improve lower limb symmetry during jumping and kinetic variables during one-leg jumps and landings in patients who have undergone anterior cruciate ligament reconstruction. In a systematic review and meta-analysis, the authors [22] evaluated the effects of injury prevention programs incorporating core stability exercises on knee and ACL injuries. They discovered that such exercise programs reduced knee injury incidence by 46% in men and 65% in women.

Since the core connects the lower and upper limbs, controlling the strength, balance, and movement of the core can optimize the entire kinetic chain, including isolated athletic gestures of both the upper and lower limbs. Several studies have shown that excellent core stability is associated with improved physical performance in all sports. A precise transmission of forces from the lower to the upper limbs, along with good stabilization, provides a strong foundation for developing muscular strength, enhancing the effectiveness of athletic movements. A strong and stable core improves mobility, speed, and performance in athletes' lower extremities.

DISCUSSION

Many researchers question the significance of the connection between core training and performance, especially regarding injury prevention. Despite its importance in sports, scientific literature does not provide conclusive evidence about the actual impact of core training methods.

FULL TEXTS BOOK

Core training has gained prominence due to the belief that it contributes to injury prevention and the treatment of lower back pain. However, research on this topic remains contradictory and inconclusive. Studies often use abdominal muscle training programs, based on the notion that a "strong core" translates to increased lumbar spine support. Jeng (1999) suggested that strengthening the muscles of the legs, back, and abdomen could reduce lower back pain [32]. Conversely, McGill et al. argue that core muscle development is essential for preventing and rehabilitating lumbosacral injuries.

Research by the authors [32] reviews various studies that challenge the predominant view of abdominal muscles in preventing back pain. Lederman highlights the lack of evidence supporting the predictive role of the transversus abdominis muscle and its delayed activation in cases of lower back pain. He argues that common core stability exercises fail to restore the activation time of the abdominal muscles and that most exercises do not significantly improve core strength and endurance. This is supported by comparisons showing that basic exercises and general activation exercises are equally effective in preventing or rehabilitating lower back pain, indicating that improvements are likely due to the overall benefits of exercise.

"Core stability" is crucial in treating pubalgia, involving the synergistic training of the abdominal, adductor, and lumbar muscles to create a balanced muscular synergy among these groups. Specific exercises using the Swiss Ball are employed for this purpose. Core stability exercises target all abdominal muscles (rectus, transverse, oblique, and pyramidalis). Notably, exercises performed as part of a core stability program can achieve greater muscle activation compared to the same exercises done on a stable surface. Despite the lack of strong scientific evidence supporting core training's effectiveness, it remains widely used for prevention, sports performance, and rehabilitation, keeping the debate on its utility ongoing.

CONCLUSIONS

In conclusion, this article underscores the importance of a comprehensive approach to core training in sports physiotherapy for enhancing athletic performance and reducing injuries. The core plays a fundamental role in providing stability, transmitting power, and preventing sports-related injuries. This article offers valuable insights into core anatomy, function, various sports injuries, and clinical assessment techniques, benefiting sports physiotherapists.Implementing the "Four Principles of the Pyramid"—activation, stabilization, integration, and perturbation—provides a scientifically-based framework for designing effective programs. By adhering to this approach, athletes can improve core function, stability, and performance while minimizing injury risk. The results and recommendations presented contribute to advancing knowledge in sports physiotherapy and serve as a valuable resource for professionals working with athletes at all levels.

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FULL TEXTS BOOK

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FULL TEXTS BOOK

VALIDITY AND RELIABILITY EVALUATION OF THE FAMILY ROUTINES INVENTORY IN TURKISH: A METHODOLOGİCAL RESEARCH

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ABSTRACT

Aim: This research evaluated the validity and reliability of the Family Routines Inventory in Turkish.
Methods: This methodological research was completed with 390 adults. In the psychometric analysis of the scale, confirmatory factor analysis and criterion validity were examined in validity evaluation, item-total score correlation, split-half test consistency, and Cronbach's α coefficient were examined in reliability evaluation.
Result: 61.8% of the parents are women, 56.9% have a language education or higher, and 44.6% work in a job that does not require working on weekends. In the confirmatory factor analysis during the evaluation of the validity of the inventory, model fit indices were found to be $\chi 2/df=4.310$, RMSEA=0.092, CFI=0.647, GFI=0.741, AGFI= 0.699. The model improvements did not show a corrective effect on these values. During the evaluation of the reliability of the inventory, it was determined that item-total score correlation values varied between 0.207 and 0.574, Cronbach's α values were 0.886, and there was a high correlation between the two halves (r: 0.717, $p<0.001$).
Conclusion: As a result of the examinations, it was determined that the Family Routines Inventory has reliability qualities but does not have validity qualities. The need for a valid measurement tool that can assess family routines for Turkish culture continues.
Keywords: Family, validity, reliability, routine.

INTRODUCTION

The family is a complex social system in which family members depend on each other and their environment (Schlebusch et al., 2016). Although there are differences in family lives in different cultures, Similar practices, and family routines are observed in situations such as household management, child care, meal times, leisure activities, marriage, and death (Crespo et al., 2013). Family routines (AR) are defined as “behaviors that occur predictably throughout daily or weekly family life that can be observed repeatedly by two or more family members” (Jensen et al., 1983).

Because AR is repetitive behavior, it allows a supportive interaction between the child and the parent, creating an ideal educational environment for the child and creating multiple learning opportunities (Ferretti & Bub, 2017). AR is characterized by improving parental competence, ensuring a sense of belonging among family members, protecting and improving child health, increasing academic achievement, supporting the sociocultural development of family members, and family well-being (Schlebusch et al., 2016). AR has a dynamic structure; These are behaviors that can change and differentiate in the face of loss, life crises, and sudden events (Churchill & Stoneman, 2004). In addition, AR has a significant place in protecting the psychosocial health of family members, maintaining loyalty between family members, and supporting family integrity by acting as a buffer against adverse life events and conditions (Churchill & Stoneman, 2004; Ferretti & Bub, 2017).

When the reflections of family routines on health and health outcomes are evaluated, In adults with high AR, tobacco, alcohol, and addictive substance (cannabis) use is less, while violence and substance use disorders are more in adults with inconsistent AR (Abar, 2020), behavioral problems are less in kindergarten students with AR, and pro-social behavior gains are observed. Higher and their physical health status is better (Ferretti & Bub, 2017); by supporting AR with families with 2-5-year-old children,

FULL TEXTS BOOK

the body mass index in children decreases positively, and the risk of obesity decreases (Hanies et al., 2013), the disabled people's It has been reported that high AR is associated with psychological health in parents with children, and depression and stress are lower in parents with high AR (Larson & Miller, 2014).

Within the scope of this information, it is understood that family routines are an issue that affects the health of individuals, families, and society. In this context, the question of determining the family routines of individuals and families comes to the fore. Having a valid and reliable measurement tool to assess family routines can help determine a family's routine behaviors, evaluate the impact of family routines on health outcomes, and the gains that can be achieved by supporting family routines (Hatherly et al., 2023; Romano et al., 2022). Although there are valid and reliable measurement tools that evaluate family routines in different languages worldwide (Jensen et al., 1983), the lack of a measurement tool that assesses family routines in our country is a significant deficiency in the literature. Within the scope of all this information, this study aimed to evaluate the validity and reliability of the Family Routines Inventory in Turkish.

METHOD

Research Purpose and Type

This research was carried out using a methodological design to evaluate the validity and reliability of the Family Routines Inventory (FRI) in Turkish.

Adaptation Steps of the Family Routines Inventory

The inventory was first translated from Turkish to English, sent to 12 experts, and feedback was received from 10 experts. Following expert opinions, a preliminary draft form of the ARE was created by making minimal adjustments to some items. The inventory, for which a preliminary draft form was created, was translated from Turkish to English again by the translation center, and author approval was obtained. No changes were made to the inventory during the author's approval stage. The preliminary draft form was created for the inventory, which was pre-applied to 35 participants. During the pre-application phase, clarity, readability, etc., of the items in the inventory are checked. No negative feedback has been received about it. After the pre-application phase, the data collection phase started, and when the data collection phase was completed, the psychometric evaluation of the inventory was made.

Data Collection Tools

Research data were collected using the Personal Information Form and Family Routines Inventory.

Personal Information Form: This form is prepared by the researchers; there are 12 questions, including age, gender, marital status, employment status, number(s) of children, child age(s), and presence of children in need of constant care.

Family Routines Inventory (FRI): Jensen et al. (1983) developed it to evaluate the daily functioning of families in a wide range of families with children aged 0-16. The inventory is answered on a 4-point Likert scale: Every day (3 points), 3-5 times a week (2 points), 1-2 times a week (1 point), and Rarely (0 points). There are no reverse-scored items in the inventory. The total score is obtained by summing the responses to each item. The total score that can be obtained from the inventory is between 0 and 84. An increase in the total score obtained is not interpreted as having a high family routine. The Cronbach Alpha reliability coefficient of FRI was reported as 0.79.

Study Group

Considering the number of ARE items (28 items), reaching 140-280 participants is necessary. It was aimed to reach 300-500 participants to evaluate the psychometric properties of the inventory correctly. The research was completed with 390 participants.

Collection of Data

The data were collected by the researchers between June 1, 2023, and September 30, 2023, in a Family Health Center (FHC), where the community frequently applies for primary health care services.

FULL TEXTS BOOK

Data Analysis

The construct validity of the inventory was examined using Confirmatory Factor Analysis (CFA) and Explanatory Factor Analysis (EFA). In the CFA stage, $\chi 2/df$ value and standard fit indices (RMSEA, CFI, GFI, AGFI, NFI) were interpreted. In the EFA stage, the factor loadings of the items, the sub-dimensions in which the items were collected, and the explained variance rates were examined. For reliability, they focused on item-total score correlation, split-half reliability, and Cronbach's alpha reliability coefficient. A significance level of $p<0.05$ was considered in interpreting all analysis results.

Ethical Considerations

The researchers obtained permission from the authors (by e-mail) to adapt the FRI to Turkish. The study was approved by the ethics committee (number: E-18457941-050.99-38208, date: 02.02.2022) and institutional permission (number: E-17720518-602.01.01, date: 26/05/2022). The study adhered to the Declaration of Helsinki.

RESULTS

61.8% of the parents participating in the research are women, 56.9% have a seconder education or higher, and 44.6% work in a job that does not require working on weekends. While 40.5% of parents have someone to help with child care, 3.6% have a child who needs constant care.

Validity

The construct validity of the Turkish inventory was examined using CFA analysis. First of all, the adequacy of the sample size was discussed with the Holter value, and it was determined that the sample size should be at least 128 at the $p = 0.05$ significance level and at least 134 at the $p = 0.01$ significance level. Within the scope of these results, it was concluded that the sample size ($n = 390$) was sufficient. Before examining the construct validity of the inventory, the data set was analyzed to determine whether it met the average distribution assumptions. As a result of the evaluations, it was determined that the data set met the average distribution assumptions, and the construct validity of the inventory was evaluated with the maximum likelihood method, which tries to explain the factor structure with the highest probability for the measurement tools. It was determined that the factor loadings of the items in the inventory were between 0.19 and 0.66, some items in the inventory did not contribute sufficiently to the inventory, and the factor loading of some items was determined to be below 0.45 (Figure 1). When the fit indices of the inventory were examined, it was determined that the fit values of the inventory were far from acceptable values ($\chi 2 = 1508.541$, $\chi 2/df = 4.310$, RMSEA= 0.092, CFI= 0.647, GFI= 0.741, AGFI= 0.699) (Table 1).

FULL TEXTS BOOK

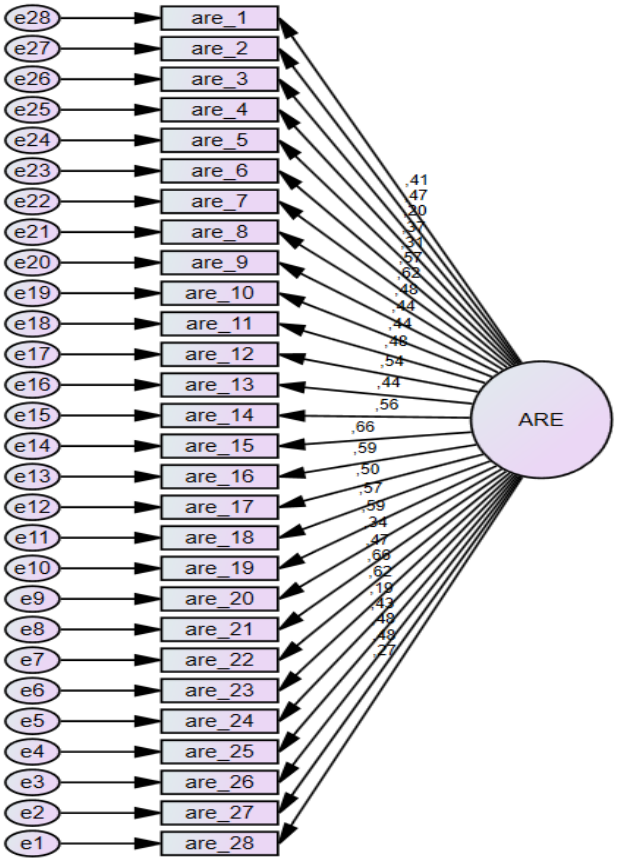


Figure 1. CFA Result and PATH diagram

Table 1. Acceptable fit, perfect fit, and scale values for CFA

	Acceptable fit	Perfect fit	Scale values
X^2/sd	<5	<2	4.310
GFI	> 0.90	>0.95	0.741
AGFI	> 0.90	>0.95	0.699
CFI	> 0.90	>0.95	0.647
RMSEA	<0.05	<0.08	0.092
RMR	<0.05	<0.08	0.074
NFI	> 0.90	>0.95	0.588

χ2: Chi-square, sd: degrees of freedom, χ2/sd: Chi-square/degrees of freedom, AGFI: Adjusted Goodness of Fit Index, GFI: Goodness of Fit Index, NFI: Normed Fit Index, CFI: Comparative Fit Index, RMSEA: Root Mean Square Error of Approximation, RMR: Root Mean Square Residual (Assessment was conducted in the default model)

Since the fit indices were far from acceptable and perfect fit values, various modifications were made, but it was determined that the fit values were outside the acceptable values. Explanatory Factor Analysis (EFA) was performed when compliance was not achieved during the CFA phase. In EFA, it was determined that the factor loadings of the items were between 0.23 and 0.66. When the sub-dimensions of the items in the inventory are examined, it is seen that items 8 and 10 are not included in any sub-dimensions, items 18, 14, 15, 6, 25, 26, 4, 5 and 13 are in two, and three sub-dimensions. It was determined that only item 6 was included under the fifth sub-dimension. In addition, when the sub-

FULL TEXTS BOOK

dimensions formed in the EFA phase were examined, it was determined that the items in the sub-dimensions were not related and did not provide conceptual integrity. These results show that the Family Routines Inventory does not meet the validity criteria for Turkish.

Reliability

The reliability of the Family Routines Inventory was examined with item-total score correlations, split-half correlation coefficient, and Cronbach α reliability coefficient. The item-total score correlation coefficients of the inventory are between 0.207 and 0.574.

The Cronbach α value for the entire inventory was calculated as 0.886, the Cronbach α value for the first half was calculated as 0.796, and the Cronbach α value for the second half was calculated as 0.817. In addition, the Spearmen-Brown coefficient of the inventory was found to be 0.835, Guttman's split-half coefficient was 0.835, and the inter-half correlation coefficient was 0.717 (Table 2).

Table 2. Reliability results of the Family Routines Inventory (n=390)

Features	Scale value
Cronbach α	0.886
First half Cronbach α	0.796*
Second half Cronbach α	0.817**
Spearman-brown	0.835
Gutman split half	0.835
Correlation between two halves	0.717

*İtem 1-14, **İtem 14-28

DISCUSSION

AR is behavior that repeats at regular intervals in a family; It creates a supportive environment between the child and the parent. AR has significant effects on the bio-psycho-socio-cultural health of family members in the short and long term (Schlebusch et al., 2016; Hatherly et al., 2023). Various studies in the literature report that positive gains can be achieved in the health outcomes of the child and the parent by supporting AR (Hanies et al., 2013; Larson & Miller, 2014; Romano et al., 2022). Although there are valid and reliable measurement tools that can evaluate the family routines of parents and families in different languages around the world (Jensen et al., 1983; Satoh et al., 2014), the lack of a valid and reliable measurement tool that evaluates family routines in Turkey is an essential deficiency in the literature. For this reason, this study aimed to assess the methodological evaluation of the Family Routines Inventory.

When the results obtained in the CFA phase of ARE are examined, it is seen that the standard fit indices are far from acceptable values and perfect fit values. EFA was performed to evaluate the construct validity of ARE because construct validity was not ensured. When the validity results of the ARE were examined at the EFA stage, it was determined that the factor loadings of some items were lower than 0.32, some items were included in more than one sub-dimension, and the explained variance rate of the inventory was low (43%). Within the scope of the results obtained during the evaluation of the construct validity of the ARE, it was determined that the construct validity of the ARE was not ensured.

When the reliability results for ARE were examined, it was determined that the correlation coefficient of the items was between 0.207 and 0.574, and the Cronbach α reliability coefficient was 0.886. When the two-half test consistency of the ARE was examined, it was determined that there was a high correlation between the two halves (Spearmen-Brown r: 0.835, Guttman's r: 0.835, inter-half r: 0.717). Although these results show a high correlation between the Cronbach α reliability coefficient of the ARE and the two halves, they show that some items in the ARE do not contribute sufficiently to the

FULL TEXTS BOOK

inventory. Within the scope of the reliability results obtained from the research, it was concluded that ARE meets the reliability criteria to a limited extent.

CONCLUSION AND RECOMMENDATIONS

This study, which was conducted to evaluate the validity and reliability of the Family Routines Inventory for Turkish, determined that the inventory had reliability qualities but did not have validity qualities. Considering the importance and impact of family routines on health outcomes, a valid and reliable measurement tool should be introduced into the literature to evaluate the family routines of parents and families in Turkish culture.

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FULL TEXTS BOOK

DETERMINATION OF ANTIMIROBIAL ACTIVITY OF LONGEVITY SPINACH (*Gynura procumbens*) PLANT

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ABSTRACT

Anatolia, located at the convergence and transit point of three distinct continents, has functioned as a refuge and dispersal hub for several species inhabiting the neighboring continents throughout various geological periods in history. During the Ice Age, numerous species in the Northern Hemisphere became extinct, but certain species went to Anatolia and established themselves there. As the ice age ended and the climate became more temperate, these species expanded their presence to three continents starting from Anatolia. Consequently, Anatolia possesses a highly abundant array of species variety and genetic diversity. Türkiye is home to the natural habitats of the wild progenitors of numerous domesticated animal species, as well as many cultivated plant species. Türkiye has a significantly high rate of endemic species. It is a significant asset in terms of biodiversity for Türkiye. The industries of agriculture, cattle, fishery, forestry, tourism, medicine, and pharmaceuticals, which are the foundation of Türkiye's traditional economy, rely heavily on our natural resources and species diversity as their main supply of raw materials. Furthermore, numerous live species in Türkiye are highly sought after on a worldwide level due to their value as genetic resources and as a source of raw materials. The Anatolian area is a peninsula that harbors the untamed progenitors of several plant and animal species, which play a significant role in human sustenance. Conversely, compatibility is being assessed within the Anatolian environment by the examination of plant and animal creatures that have been imported from various geographical locations. The cultivation and experimentation of new kinds of plants and animals have the potential to benefit our country. However, when it comes to plants that are native to different regions and are grown in other places, their physiological and metabolic activities may also differ based on their ability to adapt to the surroundings and their genetic traits. Observations are made regarding variations in the number and concentration of bioactive compounds present in plants, as well as the identification of variances in secondary metabolites across plants cultivated under different conditions. Intensive research is being conducted worldwide on the transformation of herbal products into medicinal compounds. The scientific analysis of changes in plant composition and the implementation of extensive profile studies play a significant role in the economy. In the Sivas region, a few producers have recently started cultivating the *Gynura procumbens* plant, also known as long-life spinach. It is believed by the

FULL TEXTS BOOK

public to have beneficial effects in treating diabetes mellitus. Nevertheless, the scientific literature does not contain any evidence of the biological activity of this plant. The objective of this study is to elucidate the antibacterial properties of the *G. procumbens* plant. Growers have extracted the *Gynura procumbens* plant by using ethanol, methanol, ethyl acetate, and water to obtain extracts from its green leaves. The extract's antibacterial activities on different bacterial and fungal strains have been investigated using the Minimum Inhibition Concentration (MIC) method. The majority of plant extracts have been found to possess a moderate level of antibacterial activity against specific types of microbes.
Keywords: *Gynura procumbens*, long-life spinach, extraction, antimicrobial activity.

INTRODUCTION

Biological richness and diversity can be defined as the comprehensive knowledge and genuine comprehension of the full range of possibilities within a particular group of living organisms, taking into account both the temporal and spatial aspects of each taxonomic category. To comprehensively achieve the goals of biodiversity, it is imperative to thoroughly examine and elucidate not only the genetic, species, and ecosystem diversity of an ecosystem, but also its functional diversity (Işık, 2014). It is crucial to understand the composition of plant organisms, the advantages of their metabolites, the assessment of their efficacy, and the practical applications of utilizing them. While it is acknowledged that there are recognized plant species globally, there is currently no comprehensive study on the composition and behavior of these species, both at a national level and in populations cultivated under varying geographical conditions. Humans have consistently derived advantages from plants and herbal remedies to fulfill their dietary requirements and enhance their well-being. Currently, medicinal and aromatic plants are the most abundant sources in contemporary medicine, traditional medicine, culinary traditions, the development of synthetic drugs, and pharmaceutical research (Baytop, 1999; Ncube et al., 2008; Farnsworth et al., 1985; Ekim et al., 1989, Erik and Tarıkahya, 2004). Technological and industrial progress has expedited people's access to information and resources, effectively reducing the global scale for humanity. Individuals are endeavoring to cultivate plants that they have imported from foreign countries, particularly in their local regions, and the majority of these plants are thriving. The plant under investigation in this study is *Gynura procumbens*, which is not native to Anatolia. It has been cultivated and utilized in regions like as Indonesia and Malaysia due to its purported health benefits. This investigation has examined the chemical features of this plant, which is capable of thriving in Sivas circumstances, as well as its antibacterial action against specific microorganisms. Therefore, it was feasible to examine different instances of a plant referred to as "Sabungai" or "long-life spinach" in other countries. This plant is extensively utilized for both culinary and health purposes. It was cultivated in the ecological conditions of Sivas, and its activity values were documented in literature. The experiment isolates water, ethanol, methanol, and ethyl acetate from the plant "*Gynura procumbens*". Once again, the data on the antibacterial activity of the plant "*Gynura procumbens*", which is utilized in ethno-pharmacology, has been assessed.

METHODOLOGY

Material

The "*Gynura procumbens*" plant leaves utilized in the study were gathered from the breeder garden located in the province of Sivas during the months of August and October. The plant leaves that were gathered were dehydrated in a shaded area and then crushed into a fine powder using a gentle homogenizer (Figure 1).

FULL TEXTS BOOK

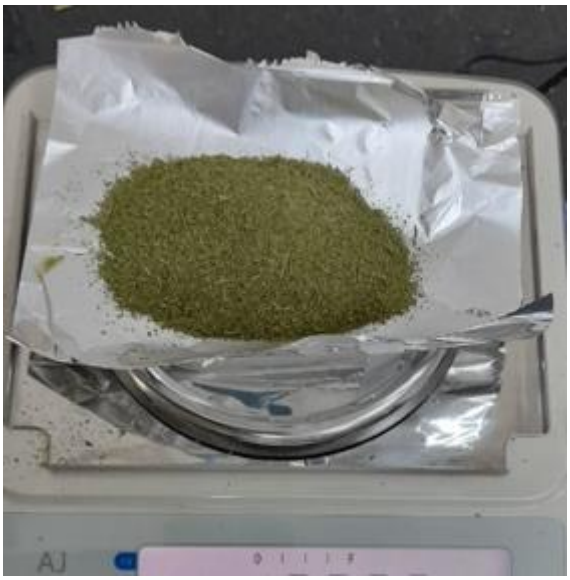


Figure 1. Dry leaf mowed sample and weight measurement

Obtaining the Plant Extracts

The plant's desiccated leaves have been extracted by ethanol, methanol, ethyl acetate, and water extraction techniques. For the extraction of ethanol, methanol, and ethyl acetate, each solvent was applied to the melted sections of the plant at a concentration of 1 part solvent to 10 parts plant material by weight/volume. The mixture was then incubated in a dark atmosphere in a water bath while continuous mixing for a duration of 3 days, as shown in Figure 2.



Figure 2. Adding a solvent to the mowed plant sample.

The maceration has been fully executed through the process of scratching. After 24 hours, the maserates were emptied and 100 mL of new solvent was introduced back to the plant material (Figure 3, 4). The macerates obtained after a 3-day maceration process were separated from the solvents using a low temperature (40°C) vacuum in the rotary evaporator (Figure 5). They were then combined in glass containers with a dark-colored lid and stored in the refrigerator at -20°C until they were used in experimental studies. The efficiency of the macerates was determined by calculating the percentage.

FULL TEXTS BOOK



Figure 3. The process of incubation in a water bath in order to interact with the solvent.



Figure 4. The process of draining the macerates.



Figure 5. The process of removing the solvent in the Rotary evaporator.

The water extract has undergone infusion. A total of 10 grams of vegetable material was combined and diluted. Subsequently, 100 milliliters of hot distilled water were added, and the mixture was left at room temperature for a duration of 10 to 15 minutes, with the container sealed. Afterward, the mixture was further diluted, and an additional 100 milliliters of hot water were added to the vegetable materials. Following three successive iterations, the water included in the extract was transferred to the lyophilizer in order to achieve total removal (Figure 6). Prior to being placed in the lyophilizer, the samples should be frozen in the deep freezer. A freezer with a temperature of -80°C is utilized for the purpose of storing items for an extended period of time. The water extracts that seeped into the sample containers were subjected to freezing at a temperature of -80°C for a duration of 3 days. Once the water extracts were frozen, the lids were then opened and placed into the lyophilizer. A lyophilizer is a device that uses the process of sublimation to extract water from frozen substances by converting ice crystals directly into vapor. The solid phase of water, known as ice crystals, undergoes sublimation when the ambient atmospheric pressure is reduced, transitioning directly from a solid to a gas. The frozen water extracts are dehydrated using a lyophilizer at a temperature of -80°C. The lyophilizer was run at a pressure of 4-6 atm and a temperature of -40°C for approximately 6 days. The desiccated samples were extracted from glass containers with an opaque lid and preserved in a freezer at -20°C until further analysis of biological activity was conducted.



Figure 6. Application of lyofilizer to samples in the water extraction process.

Stock solutions have been produced from each extract at a concentration of 1 mg/mL for the purpose of conducting research on biological activity. The stock solution concentrations for the tests were obtained by dissolving the water extract in distilled water and the other extracts in dimethyl sulfoxide (DMSO).

Antimicrobial Activity Testing

The Minimum Inhibition Concentration (MIC) of leaf extracts from the *Gynura procumbens* plant against microorganisms was determined using the Microdistribution Broth method in the investigation (Eloff, 1998). The study employed microorganisms including *Staphylococcus aureus, Pseudomonas aeruginosa, Escherichia coli, Bacillus cereus,* and *Candida albicans*. The extracts are dissolved in a solution containing 40% Dimethyl sulphoxide (DMSO) and then prepared by sequentially irrigating with dilution solutions following the preparation of skin-like solutions. Mueller Hinton Broth (Accumix® AM1072) is used for culturing bacteria, while Saboraud Dekstroz broth (Himedia ME033)

FULL TEXTS BOOK

is used for culturing yeast and molds (CLSI, 2002; CLSI, 2012). Initially, 90 microliters were added to the first row of 96 microtitrate plates, while the remaining rows received 50 microliters each. 11. The subsequent stacks were utilized as controls to ensure sterility, and 100 µl of nutrients were introduced. 12. The subsequent stacks were employed as reproductive control groups. A volume of 10 µL of extract was added to the first row of wells and thereafter subjected to a series of irrigations. The suspension was generated using McFarland's 0.5 optical density standard, derived from microorganisms cultured on agar medium. A 50 µL suspension of microorganisms has been added to each bucket, resulting in a concentration of 5×10^5 CFU/mL for bacterial strains and $0.5\text{-}2.5\times10^3$ CFU/mL for the marine strain. Bacterial stem plaques were cultured at a temperature of 37 °C, while myrtle stem plaques were cultured at a temperature of 35 °C for a duration of 16 to 24 hours. The first pits where the bacterial colony's appearance diminished were considered as the minimum inhibitory concentration (MIC) value. The analyses were conducted thrice (Saraç et al., 2018a, 2018b).

RESULTS

The study performed four distinct extractions of the *Gynura procumbens* plant, which is currently being cultivated in the province of Sivas. The study then assessed the antibacterial activity of these extracts in certain microbe cultures. The plant underwent extraction using four distinct solvents: water, methanol, ethanol, and ethyl acetate. The obtained extracts were formulated at a concentration of 1mg/mL in stock form, and subsequently used in diluted forms for the studies. The yield accounts are determined as percentages by determining the quantities of extracts initially used and obtained during the process of extraction (Table 1). The plant often exhibits a greater production of ethanol extract; however, the yield of water extract has been observed to be lower. (Table 1).

Table 1. Yield percentages of extracts

Extract	Yield %
Gynura procumbens Water Extract	2.1 %
Gynura procumbens Ethanol Extract	13.3 %
Gynura procumbens Ethyl Acetate Extract	7.5 %
Gynura procumbens Methanol Extract	7.8 %

Table 2 displays the antibacterial properties of several extracts derived from the *Gynura procumbens* plant. The material exhibits strong antimicrobial properties when the minimum inhibitory concentration (MIC) values are equal to or less than 0.1 mg/mL. The substance is moderately effective against microbes when the MIC values are greater than 0.1 mg/mL but less than or equal to 0.625 mg/mL. Substances with MIC values in this range are considered to have moderate effectiveness. Substances with MIC values above 0.625 mg/mL are classed as having poor antimicrobial activity (Kuete, 2010; Awouafack et al., 2013). Based on the obtained results, the plant extracts generated with 4 different solvents exhibited significant antibacterial activity against the pathogens we investigated. Overall, the ethanol extracts showed a positive impact on all the microorganisms examined in this investigation. Furthermore, it has been discovered that plant extracts demonstrate superior antibacterial efficacy against *E. coli, S. aureu*s, and *P. aeruginosa* bacteria in all extracts, as seen in Table 2 and Figure 7.

FULL TEXTS BOOK

Tablo 2. Antimicrobial activity test results of different extracts of the plant

Plant	No	Extracts	*E. coli*	*S. aureus*	*P. aeruginosa*	*B. cereus*	*C. albicans*
Gynura procumbens	1	Water	0.313	0.313	0.313	1.25	0.625
	2	Ethanol	0.156	0.156	0.156	0.313	0.313
	3	Ethyl acetate	0.313	0.156	0.156	1.25	0.625
	4	Methanol	0.313	0.313	0.313	0.625	0.625

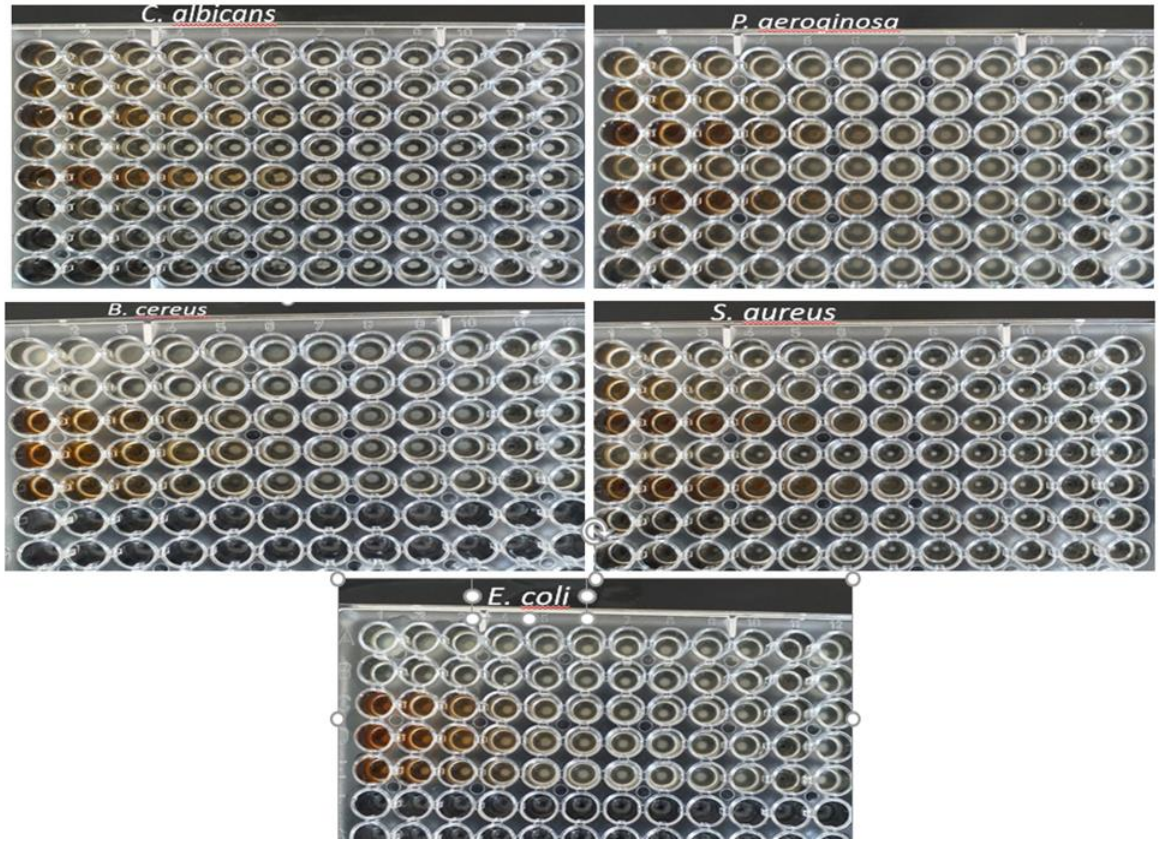


Figure 7. Microplate views for MIC testing

CONCLUSION AND DISCUSSION

In recent years, there has been a significant increase in interest in natural resources due to several factors. These include the potential side effects of synthetic and semi-synthetic drugs used in modern medicine, the economic burden on countries, the development of resistance by microorganisms to these antimicrobial drugs, and concerns about the chemical ingredients used for food preservation purposes (Ünlü, 2016). In the aftermath of the global Covid-19 epidemic, individuals are seeking to utilize a diverse array of items that will enhance their immune system, combat illness, and foster the creation of novel products. Studying the bioactive components of natural and nourishing foods is crucial due to their advantageous effects on health.

Research has demonstrated that samples obtained from various geographic areas of a plant have distinct morphological characteristics, and furthermore, their vegetable composition might vary. However, variations in the chemical makeup of plants are also known to result in various levels of bioavailability, as they can modify the biological activity that the plant displays. Consequently, while doing pre-clinical research using plant extracts from various locales, notable variations in activity have been detected in

FULL TEXTS BOOK

both laboratory and animal models. Consequently, the therapeutic benefits of items obtained from various places will vary. Significantly, plant products exhibit chemical compositions that reflect the floral, geographical, soil, geological, and climatic characteristics of the specific place from which they are derived. It is crucial to analyze the composition of each plant, compare them across different regions, identify their biological and therapeutic capabilities, and adjust their usage for daily therapeutic dietary consumption. This is necessary for various reasons.

However, due to climate change and enhanced global transportation, we are currently exploring the growth of plants that are not native to our country. Surprisingly, some of these plants are being produced with great productivity. The *Gynura procumbens* plant, which is currently available for sale in our country, has demonstrated exceptional adaptability to the environmental conditions of the Sivas region. The present investigation involved the extraction of green leaves from the *Gynura procumbens* plant using four distinct solvents: ethanol, methanol, ethyl acetate, and water. The antibacterial efficacy of these extracts was subsequently evaluated against five diverse microorganisms. The study has demonstrated that the plant extracts possess moderate to strong antibacterial properties against these pathogens. The ethyl alcohol extract, in particular, has demonstrated efficacy on all of the additional factors we examined. The efficacy of water extract seems to be slightly inferior to that of other extracts. However, it would be more beneficial in the future to examine the extended consequences of these extracts on a wider range of bacterial species.

Gynura procumbens is a medicinal plant that is extensively utilized in tropical Asian nations including China, Thailand, Indonesia, Malaysia, and Vietnam. However, other from a comprehensive study conducted in Malaysia in 2016 that compiled information on the overall biological properties of this plant, there is a lack of specific details available in the literature (Tan et al., 2016). In this respect, we believe that the results of our work will contribute to the existing literature and inspire new studies.

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FULL TEXTS BOOK

THE DISCOVERY OF ASHAB AL AIKAHH IN JORDAN VALLEY- SOUTHERN LEVANT

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ABSTRACT

The Ashab Al Aikah civilization in the Jordan Valley extend from the Wadi Shuaib area in the north to the area of Sweima and, Wadi Husban in the south, and the Jordan River in the west, while it is bordered on the east by a series of highlands up to the region of Madaba, Amman and Balqa, The area takes a semicircular shape with a diameter of about 25 kilometers and includes the central Jordan Valley or what is termed today the Southern Shunah Brigade, which belongs to the Balqa Governorate.

Many experts and scholars have referred to the civilization of Ashab Al Aikahh through the descriptions and journeys they made over the past centuries and indicated that it dates to the civilization of the Bronze Ages, especially the Middle Bronze Age, equivalent to 2000-1600 BC .

Keywords: Archaeology, history, Heritage, Excavations, Labb Analysis.

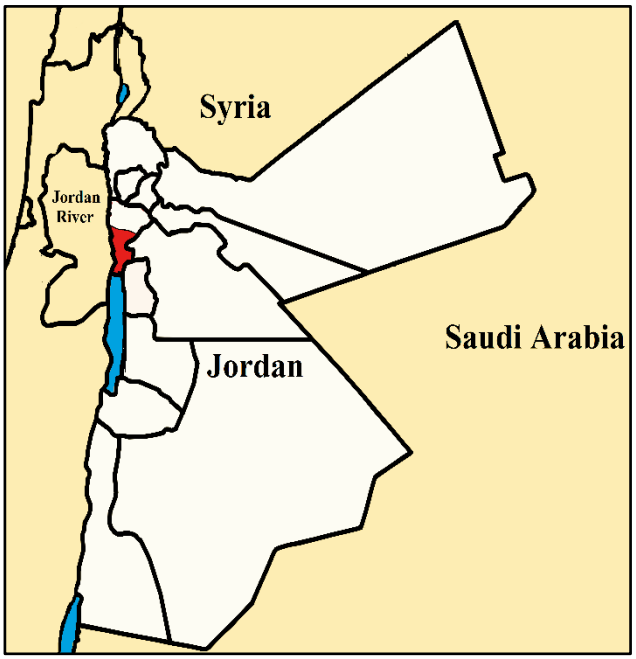


Figure 1: Map showing the location of the study area in red color and its surroundings (Waheeb:2024)

The field studies and archaeological surveys resulted valuable preliminary information that helped identify the place, and provided an opportunity for archaeologists to excavate in the region in order to obtain accurate information, where the archaeological team led by the author participated in intensive excavation and field surveys in each of the site of Tel Um Hadhar, Khirbet al-Kafrein, Tel Ramah, the site of the Baptism of Christ (Al-Maghtas) on the eastern side of the Jordan River, and also excavated the site of Ain Saleem adjacent to the plains where the remains of the civilization of Ashab Al Aikahh are located. The results confirmed the appearance of remains and destruction observed by the researchers due to several reasons. They also found pottery fragments with external surfaces melted into glass, clay bricks melted ns into bubbles due to very high temperatures, and partially melted building materials, all of which are indicators of an abnormally high temperature (about two thousand degrees Celsius) that technology at that time was not able to produce.

This confirms what some interpreters have argued that severe destruction has afflicted the area, and that historical evidence points to a kind of torment called (Al -Thella Day / the Shadow).

We have no doubt that the excavation missions were aimed at searching for the causes of the massive destruction that afflicted the area, and the results confirmed a clear correspondence between the place of the Ashab Al Aikahh and the mass destruction, in terms of results and tangible and intangible physical evidence on the ground.

On the other hand, after conducting various laboratory analyses on soil and sediments, researchers detected the presence of small globules rich in iron and silica as well as molten minerals, which confirms

FULL TEXTS BOOK

the high temperatures that led to a disaster whose effects remain to this day through archaeological evidence.

Keywords: Archaeology, history, Heritage, Excavations, Labb Analysis.

Introduction:

A lot of archaeologists, scholars and researchers tried during the last decades to find the place of Ashab Al- Aikahh in Arab countries, while others referred to the Jordanian land as a possible place of that great event mentioned in the holy Quraan.

The team of the Hashemite university initiated a campaign to find the location of Ashab A-al Aikahh in Jordan Valley, a field project started during 2020 and continued during the period of 2021-2024 under direct supervision of the article author with support from the scientific research fund from Ministry of Higher education and Scientific research.

During the field work in Medyan in southern Jordan -Keral District, the team identified remains of architecture and artifacts dated back to Middle- Late bronze Age, 2000-1500BC.

The archaeological evidence from Medyan as well as the traveleres description supported by local traditions indicated a strong relation between Shueib the Prophet and Medyan in Kerak.

The discovered archaeological remains in Wadi Shueib 10 KM to the north of Medyan revealed identical historical resemblance between Medyan, Wadi Shueib, and Livias Plains just to the east of baptism Site in Rama and Kafrein Villages.

The tow civilizations Medyan & Ashab Al-Aikahh were lived and existed at the same time or period during the Late Middle Bronze to the beginning of Late Bronze Age.

Methodology:

The scientific research methodology was adopted in the field work to evaluate & assess the recovered remains in terms of literature study, desk base assessment, survey and sites visit s, data gathering, & data sharing as well as lab analysis. Also discussing the intangible heritage belonging to the Ashab Al-Aikah narratives. Field assessment includes documentation and photographing, in addition to investigation of the surrounding zone.

Field Activities:

Field work includes survey, excavations and investigations were concentrated on the area of Kafrein and Rama in southern Shunah, the area historically called Livias and irrigated by three major Wadies, Shueib, Kafrein & Husban.

FULL TEXTS BOOK



Figure 2: Tel Rama in Livias (Waheeb:2020)

The search was ongoing to find what proves and confirms the existence of Ashab Al-Aikahh civilization in the Balqa region in general and in Wadi Shuaib and Livias in particular . The Holy Qur'an ,indicated the importance of this civilization and its role in the religious, economic and intellectual aspects. Here we cite one of the verses that mentioned "Ashab Al Aikahh":

- " And if the Ashab Al Aikahh were wrongdoers" (Al-Hijr: 78).

Many researchers and archaeologists conducted studies/surveys and archaeological excavations in Livias & ,Wadi Shuaib region during the end of the last century and the beginning of the current century where many sites were uncovered and documented.

Field surveys focused on the city of Salt and the crossroads between the valley and the city, especially what was done by Merrill in 1881, where he focused on describing Wadi Nimrin (Merrill, S. 1881) and the natural environment adjacent to Tel Nimrin, while Nelson Glueck conducted a systematic study of the valley, where he described many sites located between the southern town of Shuna (Glueck : 1951, pp. 25-28) .

As for the French Devaux, in 1938 he conducted surveys in the valley that included a number of sites near the city of Salt (Devaux. R. 1938 pp. 398-425). The Jordan Valley survey carried out by Muawiyah Ibrahim, James Sawer and Khair Yassine in 1988 recorded a number of sites in Livias and the archaeological site near Wadi Nimrin (Ibrahim, et al: 1975, 41-66).

In 1965 Raiks by exploring the central region of Wadi Shuaib and surrounding zone, he uncovered three sites, one of which was a cave dating back to the period of hunters (Epi-Paleolithic).

Several western scholars wrote about the area of livias, among of them: ((Dvorjetski:2007, Glueck :1951, Flanagan and McCreery 1990, Collins et al 2009, Albright:1924, Prag:1991, Conder and Kitchener :1881, Graves and Stripling:2011)).

A number of specialized researchers also focused their studies and field work on the Neolithic site near Nimreen Wadi Shuaib Bridge, which is located within the (Baqnis village).

Rollefson referred to this site and its importance in 1987 during his study to identify human settlement in Wadi Shuaib since the Neolithic era (Rollefson: 1987, 29-32). According to rainfall rates, the annual precipitation rate is about 400 mm (Beaumont, P 1985, PP 291-296) in this area, which allows for the emergence of a good agricultural life in the valley Test trench work carried out by a number of researchers at the site also confirmed that the Wadi Shuaib settlement was one of the largest residential centers during the Neolithic Age (Simmons: 1989, PP : 27-41).

FULL TEXTS BOOK

(Zeuner: 1957) referred to Site No. 44 near the Wadi Shuaib Bridge dating back to the PPN period (the pre-pottery Neolithic), where he indicated that it consisted of gypsum floors and various flint tools, Mellart also pointed to the settlement of Wadi Shuaib, where he referred to the vessels made of white stone and the disappearance of this settlement at the end of the seventh millennium BC (Mellart , 1975: pp. 36-38) .

A team from Durham University also conducted soil tests as part of an environmental study program for Wadi Shuaib within the Jordan River Valleys Study Project (Atkinson etal 1967) .

Limited excavations were conducted at the site in cooperation with Yarmouk University (Rollefoon, 1987: PP 521).

Waheeb from Hashemite University achieved several seasons of survey and excavations in this general area looking for archaeological sites related to ancient civilizations & narratives. (Waheeb, M:2002-2008-2009-2011-2013-2014-2015-2017-2018-2019-2020-2022).

Archaeologists and experts have found evidence of temperatures higher than 2,000 degrees Celsius, so that the charred and molten materials in Tell el-Hammam looked familiar to researchers who linked the explosion of Tell el-Hammam to identical explosion that occurred in 1908 in Tunguska, Russia, with a force of 12 megatons, when a meteorite with a height of 56-60 meters in the Earth's atmosphere over eastern Siberia. See (Collins:2007).

The explosion at Tal el-Hamam was enough to demolish the city in Livias plains and level its inhabitants to the ground. The distribution of bones indicated severe disintegration and fragmentation of the skeletons of humans killed in the explosion. The explosion may also explain the presence of abnormally high concentrations of salt in the destruction layer, averaging 4% in the sediment and reaching 25% in some samples.

Researchers believe that the meteorite impact may have partially hit the Dead Sea and contributed to its richness in salt. The local shores of the Dead Sea are also rich in salt, so the impact may have redistributed these salt crystals on a large scale in the region and increased the salinity rates in the soil and then reduced the population from tens of thousands to perhaps a few hundred, after the population migrated from the region due to the difficulty of cultivating it due to Salinity(Collins :2007).

About 7 years ago, archaeologists confirmed their discovery that the Jordanian city of Tell el-Hamam represents a site where Lot's people lived thousands of years ago, but how did they arrive at their discovery? The beginning was with the American archaeologist Stephen Collins, head of the Trinity Southwestern University mission in New Mexico, who discovered the ruins of Sodom a city with two , ,parts, an upper and a lower one. In it, a mud brick wall appeared, 10 meters high and 5.2 meters wide and the remains of temple gates appeared, as did towers. With a main square in addition to a site that , seems to have been special, because it was supported by special protections, all of which were facilities that required millions of bricks, in addition to a large number of workers. However, all aspects of life suddenly stopped at the end of the middle of the Bronze Age. It cannot be traced back to anything other than the fact that a disaster struck this region and wiped out all signs of life.

In 2021 experts published, in the scientific journal Nature a long and detailed article with illustrations , ,summarizing the results of research that lasted nearly 15 years in the Jordanian town of Tal Al-Hamam which is 12 kilometers northeast of the Dead Sea in Livias plains (Rama + Kafrein) where scientists , found during excavations in Tal Al-Hamam. On the traces of a horrific disaster that occurred on the land of what is now known as Jordan 3,600 years ago.see (Colins:2007).

Among the artifacts, scientists found so-called "cosmic particles", which are impurities of small grains of platinum, which melts at a temperature of 1800 degrees Celsius, and iridium, which has a melting point of approximately 2500 degrees Celsius, and nothing of this kind can be formed During a volcanic eruption, earthquake, or fire resulting from military operations.

The reason for what happened, as scientists believe, is a mass the size of the "Tunguska" meteorite with a diameter of 50-60 meters. It flew into the Earth's atmosphere at a speed of 61 thousand kilometers per

FULL TEXTS BOOK

hour, and exploded at an altitude of about 4 kilometers. The explosion was a thousand times stronger than the atomic bomb that was dropped On Hiroshima.

,Hence, scholars have suggested that this region in Jordan was subjected to a lightning bolt from the sky and that those who inhabited it were the people of Lot, who, according to the Holy Qur'an were subjected to the wrath of God, making its highest part its lowest part.

The Ashab Al Aikah used to make their residence in the expansive plains of Levias during the ,winter fall, and spring along Wadi Al-Ramah, Wadi Hisban, Wadi Al-Kafrin, and Wadi Nimrin which are , valleys with constant flow. In the summer, some of them moved to the Middle Slopes region, which is Wadi Shuaib,Wadi Kafrein and Wadi Husban .where the tomb of the Prophet is currently located Shuaib, and the people used to move between the Middle slopes and the lower area of Livias Plains regions as required by the working conditions in the agricultural plains, as this region is considered the widest along the length of the Jordan Valley and is opposite Jericho on the western side of the Jordan River, which separates the two regions.

Discussion and conclusion :

,Perhaps the motive for narrating the results of the discovery of the estate of Abu Sufyan in Wadi Shuaib and the reality of the location of the Ashab Al-Aikah is to prove that the region was targeted before the , period of Islamic times, and even constituted the most important points of attraction for settlement in the highland region, as archaeological sites are spread along the extension of the valley all the way to the Jordan River, where it flows. There is running water in it, and ancient caravan routes used to take this area It is most likely that the incense route made it possible to pass through . Livias & ,Wadi Shuaib and one of the most important markets of Elaf Al-Qurashi was later established in it, in which the merchants and caravans of the Arabian Peninsula and the Levant gathered at a site called to this day Khirbet Al-Souq. What is meant by this is the old market, the ruins of which are still prominent above the surface of the earth, awaiting the shovels of prospectors, especially food processing, and the many facilities that were partially uncovered in the valley, where factories, presses, and courier stations (Khashkhsh Cave) and many others are located.

Perhaps the discovery of traces of the Bronze Ages is clear and evident in the valley. The period associated with the Prophet Shuaib (**peace be upon him)** extending from the end of the last Bronze Age to the beginning of the first Iron Age, and by reviewing the results of the seasons of archaeological ,excavations that took place at the site of Tell Nimrin under the supervision of Flammingen and Yassin the remains of the village that existed during the lateBronze Age were found and confirmed. (Num e ira was destroyed during the last Bronze Age, only to appear again in the first Iron Age).

During the 1990 season, David McCreary, Flamingen, and Khair Yassin performed With archaeological excavations at Tell Nimrin at the bottom of Wadi Shuaib, in continuation of the previous seasons of exploration, studies and continuous scientific publication, where the eastern side of Tell Nimrin was uncovered, then the excavation stopped above the last Bronze Age layer.

Excavation of the Late Iron Age I layers that were crossed by the paved road continued during the 1989 season .(Yassine:1988).

During the excavation, limited pottery fragments were found covering the era between the Second Iron ,Age and the last Bronze Age, where small-sized potsherds were found, and colored fragments with red brown, black, and gray lines were found, in addition to the discovery of waste dating back to the period between the last Bronze Age. In the upper parts of the hill, where the hill still preserves its parts well (Yassine:1988).

,Through studying the plants using the flotation method, it became clear that the cultivation of wheat barley, olives, figs, and others was cared for by settled farmers in Tal al-Numairah. This clearly indicates that settled people were residing here and were not nomads, as it is most likely that they were

FULL TEXTS BOOK

selling their agricultural products on the roads, especially on the connecting road. Between the city of Jericho and Livias in ancient times during those early times in the area where the river overflows and forms a fertile flood plain (the location of the Wadi Shuaib Dam today) in addition to the Livias area close to Wadi Husban and Wadi Kafrein .

We have no doubt that the wide plain at the end of Wadi Shuaib, Husban & Kafrein was the appropriate area for commercial exchange and sale because it was a crossroads in the four directions for ancient trade caravans.

Perhaps these results confirm the importance of the region during the time of Shuaib between Middle- to Late Bronze Age as the region had continued importance since the Stone Ages, and perhaps the , arrival of the Prophet Shuaib to it to spread preaching and guidance was motivated by its fame that reached the cities, villages and countryside, people used to visit it more than others so he wanted to convey He sent his message to a large number of local residents, caravan owners, and merchants passing through the region. Many reasons combined that prompted Prophet Shuaib to reside in this place and not in any other place, as its importance is no less than the importance of Medy an. It is not strange to find a historical market in Livias and Wadi Shuaib, whose large and monumental ruins are still present next to it. This market also had, in early times, a carrier pigeon post station that was used for trade purposes.

The discovery of Medyan and Ashab Al-Aikah in both Kerak & Livias confirms the archaeological evidences, the traveler descriptions and the intangible heritage.



Figure 3: Aerial photo of Wadi Shuaib (Waheeb:2024)

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FULL TEXTS BOOK

$\hat{g}^{**}s$-COMPACTNESS IN TOPOLOGICAL SPACES

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ABSTRACT
Most references on topological spaces seem to define a compact space in terms of open coverings of a space having finite sub coverings. Formally, we say that a collection of open sets $\{U_i : i \in I\}$, indexed by some set I, is an open covering of a topological space K if $K \subseteq \bigcup_{i\in I} U_i$. We define K to be compact if there exist finitely many open sets $U_{i_1}, U_{i_2}, ..., U_{i_n}$ in the open covering such that $K \subseteq \bigcup_{j=1}^{n} U_{i_j}$. There exists a number of equivalent definitions of a compact space, which we briefly mention here. A topological space K is compact if and only if K has the finite intersection property: if $\{E_i : i \in I\}$ is a collection of a closed sets indexed by a set I such that, for any finite subset $I_0 \subseteq I$, $\bigcap_{i\in I_0} E_i \neq \phi$, then $\bigcap_{i\in I} E_i \neq \phi$. Another equivalent definition is in terms of nets. A topological space K is compact if and only if every net $(x_\alpha : \alpha \in \Lambda)$ in K has a convergent subnet. In 2020, M. Anto and S. Andrin Shahila introduced and studied properties of a new class of sets in topological spaces namely $\hat{g}^{**}s$-closed sets and $\hat{g}^{**}s$-open sets. We will extend the concept of compactness via $\hat{g}^{**}s$-open sets by introducing $\hat{g}^{**}s$-compactness in topological spaces and will investigate its characterizations by making use of generalized mappings including $\hat{g}^{**}s$-continuous functions and $\hat{g}^{**}s$-irresolute functions. The objective of this paper is to introduce the new concepts called $\hat{g}^{**}s$-compact space, $\hat{g}^{**}s$-Lindelof space, countably $\hat{g}^{**}s$-compact space, almost $\hat{g}^{**}s$-compact space, and mildly $\hat{g}^{**}s$-compact space in topological spaces and investigate fundamental properties and characterizations of these new notions in topological spaces.
2020 AMS Subject Classification. Primary: 54B05, 54D20, 54D30.
Key Words and Phrases: Topological space, $\hat{g}^{**}s$-closed set, $\hat{g}^{**}s$-open set, $\hat{g}^{**}s$-compact space, $\hat{g}^{**}s$-Lindelof space, countably $\hat{g}^{**}s$-compact space, almost $\hat{g}^{**}s$-compact space, mildly $\hat{g}^{**}s$-compact space

1. INTRODUCTION

The concept of supra topology was introduced by A. S. Mashhour et al [21] in the year 1983. They studied s-continuous functions and s^*-continuous functions. In 2008, R. Devi et al [10] introduced the concept of supra α-open sets and supra α-continuous mappings. Jamal M. Mustafa [25] studied supra b-compact and supra b-Lindelof spaces. Vidyarani et al [41] introduced the concept of supra N-compact, countably supra N-compact, supra N-Lindelof and investigated their relationships using the concept of continuity. In 2013, Missier and Rodrigo [23] introduced new class of sets in general topology called α-open (supra α-open) sets. In 2019, Amir A. Mohammed and Beyda S.

FULL TEXTS BOOK

Abdullah [24] introduced a new class of open sets in a topological space called $ii\text{-}open$ sets and investigated its fundamental properties and studied some properties and several characterizations of this class including the relation of $ii\text{-}open$ sets with many other classes of open sets. They showed that the family of $ii\text{-}open$ subsets of a topological space (X,τ) forms a topology on X which is finer than τ. . In 2020, M. Anto and S. Andrin Shahila [4] introduced and studied properties of a new class of sets in topological spaces namely $\hat{g}^{**}s$-closed sets and $\hat{g}^{**}s$-open sets. We will extend the concept of compactness via $\hat{g}^{**}s$-open sets by introducing $\hat{g}^{**}s$-compactness in topological spaces and will investigate its characterizations by making use of generalized mappings including $\hat{g}^{**}s$-continuous functions and $\hat{g}^{**}s$-irresolute functions. The objective of this paper is to introduce the new concepts called $\hat{g}^{**}s$-compact space, $\hat{g}^{**}s$-Lindelof space, countably $\hat{g}^{**}s$-compact space, almost $\hat{g}^{**}s$-compact space, and mildly $\hat{g}^{**}s$-compact space in topological spaces and investigate fundamental properties and characterizations of these new notions in topological spaces.

2. PRELIMINARIES

The (X,τ) and (Y,σ) $(or\ simply, X\ and\ Y)$ denote topological spaces on which no separation axioms are assumed unless explicitly stated and $f:(X,\tau)\to(Y,\sigma)$ means a mapping f from a topological space X to a topological space Y. A subset A of a topological space (X,τ) is said to be open if $A\in\tau$. A subset A of a topological space X is said to be closed if the set $X-A$ is open. The interior of a subset A of a topological space X is defined as the union of all open sets contained in A. It is denoted by $Int(A)$. The closure of a subset A of a topological space X is defined as the intersection of all closed sets containing A. It is denoted by $Cl(A)$. If U is a set and x is a point in X, then $N(x)$, and U^c denote respectively, the neighborhood system of x, and the complement of U, respectively. We shall define the concept of $\hat{g}^{**}s$-open set and determine its connection to the classical open set and characterize the concepts of $\hat{g}^{**}s\text{-}open$ sets.

Definition 2.1. A subset A of a topological space (X,τ) is an $\alpha\text{-}open$ set, if $A\subseteq Int\left[Cl\left(Int(A)\right)\right]$ and an $\alpha\text{-}closed$ set, if $Cl\left[Int\left(Cl(A)\right)\right]\subseteq A$.

The $\alpha\text{-}closure$ of a subset A of X denoted by $\alpha Cl(A)$ is defined to be the intersection of all $\alpha\text{-}closed$ sets containing A. The $\alpha\text{-}interior$ of A denoted by $\alpha Int(A)$ is defined to be the union of all $\alpha\text{-}open$ sets contained in A.

Definition 2.2. A subset A of a topological space (X,τ) is an $semi\text{-}open$ set, if $A\subseteq Cl\left(Int(A)\right)$ and a $semi\text{-}closed$ set if $Int\left(Cl(A)\right)\subseteq A$.

The $semi\text{-}closure$ of a subset A of X denoted by $sCl(A)$ is defined to be the intersection of all $semi\text{-}closed$ sets containing A. The $semi\text{-}interior$ of A denoted by $sInt(A)$ is defined to be the union of all $semi\text{-}open$ sets contained in A.

FULL TEXTS BOOK

Definition 2.3. A subset A of a topological space (X,τ) is called a *regular-open* set, if $A=Int(Cl(A))$ and a *regular-closed* set if $A=Cl(Int(A))$.

Definition 2.4. A subset A of a topological space (X,τ) is called a *generalized-closed* (*briefly* g*-closed*) set, if $Cl(A)\subseteq U$, whenever $A\subseteq U$ and U is *open* in (X,τ).

Definition 2.5. A subset A of a topological space (X,τ) is called a *generalized semi-closed* (*briefly* gs*-closed*) set, if $sCl(A)\subseteq U$, whenever $A\subseteq U$ and U is *open* in (X,τ).

Definition 2.6. A subset A of a topological space (X,τ) is called a $\hat{g}$*-closed* set, if $Cl(A)\subseteq U$, whenever $A\subseteq U$ and U is *semi-open* in (X,τ).

Definition 2.7. A subset A of a topological space (X,τ) is called a g*-closed* set, if $Cl(A)\subseteq U$, whenever $A\subseteq U$ and U is g*-open* in (X,τ).

Definition 2.8. A subset A of a topological space (X,τ) is called a $\hat{g}$*-closed* set, if $Cl(A)\subseteq U$, whenever $A\subseteq U$ and U is $\hat{g}$*-open* in (X,τ).

Definition 2.9. A subset A of a topological space (X,τ) is called a g**-closed* set, if $Cl(A)\subseteq U$, whenever $A\subseteq U$ and U is g**-open* in (X,τ).

Definition 2.10. A subset A of a topological space (X,τ) is called a gs*-closed* set, if $sCl(A)\subseteq U$, whenever $A\subseteq U$ and U is gs*-open* in (X,τ).

Definition 2.11. A subset A of a topological space (X,τ) is called a $\hat{g}$s*-closed* set, if $sCl(A)\subseteq U$, whenever $A\subseteq U$ and U is $\hat{g}$*-open* in (X,τ).

Definition 2.12. A subset A of a topological space (X,τ) is called a g*s**-closed* set, if $sCl(A)\subseteq U$, whenever $A\subseteq U$ and U is g**-open* in (X,τ).

Definition 2.13. A subset A of a topological space (X,τ) is called a gs**-closed* set, if $Cl(A)\subseteq U$, whenever $A\subseteq U$ and U is gs**-open* in (X,τ).

Definition 2.14. A subset A of a topological space (X,τ) is called a gs**-closed* set, if $Cl(A)\subseteq U$, whenever $A\subseteq U$ and U is gs*-open* in (X,τ).

Definition 2.15. A subset A of a topological space (X,τ) is called a $\hat{g}$**s*-closed* set if $sCl(A)\subseteq U$, whenever $A\subseteq U$ and U is $\hat{g}$**-open* in (X,τ). The complement of a $\hat{g}$**s*-closed*

FULL TEXTS BOOK

set is caaled a $\hat{g}^{**}s$-*open* set in (X,τ). The collection of all $\hat{g}^{**}s$-open $(\hat{g}^{**}s$-closed$)$ subsets of (X,τ) is denoted by $\hat{g}^{**}s$-$O(X,\tau)$ $(\hat{g}^{**}s$-$C(X,\tau))$.

Proposition 2.16. (i) Every closed (open) set is $\hat{g}^{**}s$-closed $(\hat{g}^{**}s$-open$)$ set.

(ii) Every α-*closed* $(\alpha$-*open*$)$ set is $\hat{g}^{**}s$-closed $(\hat{g}^{**}s$-open$)$ set.

(iii) Every *semi*-*closed* $(semi$-*open*$)$ set is $\hat{g}^{**}s$-closed $(\hat{g}^{**}s$-open$)$ set.

(iv) Every $g^{*}s$-*closed* $(g^{*}s$-*open*$)$ set is $\hat{g}^{**}s$-closed $(\hat{g}^{**}s$-open$)$ set.

(v) Every *regular*-*closed* $(regular$-*open*$)$ set is $\hat{g}^{**}s$-closed $(\hat{g}^{**}s$-open$)$ set.

(vi) Every g^{*}-*closed* $(g^{*}$-*open*$)$ set is $\hat{g}^{**}s$-closed $(\hat{g}^{**}s$-open$)$ set.

Proposition 2.17. Arbitrary intersection of $\hat{g}^{**}s$-closed sets is $\hat{g}^{**}s$-closed.

Proposition 2.18. Arbitrary union of $\hat{g}^{**}s$-open sets is $\hat{g}^{**}s$-open.

Definition 2.19. Let (X,τ) be a topological space and $B\subseteq X$. We define the $\hat{g}^{**}s$-closure of B $(\text{briefly } \hat{g}^{**}s\text{-Cl}(B))$ to be the intersection of all $\hat{g}^{**}s$-closed sets containing B which is denoted by $\hat{g}^{**}s$-$Cl(B)=\cap\{A: B\subseteq A \text{ and } A\in\hat{g}^{**}s\text{-}C(X,\tau)\}$. We note that $\hat{g}^{**}s$-$Cl(B)$ is the smallest $\hat{g}^{**}s$-*closed* set containing B.

Definition 2.20. Let (X,τ) be any topological space and B be a subset of X. A point p of X is called a $\hat{g}^{**}s$-*interior* point of B, if there exists a $\hat{g}^{**}s$-*open* set G such that $p\in G\subseteq B$. The set of all $\hat{g}^{**}s$-*interior* points of B is said to be $\hat{g}^{**}s$-*interior* of B $(\text{briefly } \hat{g}^{**}s\text{-Int}(B))$ and it is defined by $\hat{g}^{**}s$-$Int(B)=\cup\{A: A\subseteq B \text{ and } A\in\hat{g}^{**}s\text{-}O(X,\tau)\}$.

Proposition2.21. If U and V are sets in a topological space (X,τ), then

(1) $\hat{g}^{**}s$-$Int(\phi)=\phi$.

(2) $\hat{g}^{**}s$-$Int(X)=X$.

(3) $\hat{g}^{**}s$-$Int(U)\subseteq U$.

(4) $U\subseteq V\Rightarrow\hat{g}^{**}s$-$Int(U)\subseteq\hat{g}^{**}s$-$Int(V)$.

Proposition2.22. Let G be any subset of a topological space (X,τ). Then $x\in\hat{g}^{**}s$-$Cl(A)$ if and only if for every $\hat{g}^{**}s$-*open* set U containing x, $U\cap G\neq\phi$.

Proposition2.23. For any subset U of topological space (X,τ), $\hat{g}^{**}s$-$Int(U)\subseteq U\subseteq\hat{g}^{**}s$-$Cl(U)$.

Definition 2.24. Let A be a subset of a topological space (X,τ). A point $x\in A$ is said to be a $\hat{g}^{**}s$-*limit* point of A if for each $\hat{g}^{**}s$-*open* set U containing x, $U\cap(A-\{x\})\neq\phi$. The

FULL TEXTS BOOK

set of all $\hat{g}^{**}s$-*limit* points of A is called the $\hat{g}^{**}s$-*derived* set of A and is denoted by $\hat{g}^{**}$-$D(A)$.

Theorem 2.25. For any subset A of a topological space X, $\hat{g}^{**}s$-$Cl(A) = A \cup [\hat{g}^{**}s\text{-}D(A)]$.

Proof. Since $\hat{g}^{**}s\text{-}D(A) \subseteq \hat{g}^{**}s\text{-}Cl(A)$. $A \cup [\hat{g}^{**}s\text{-}D(A)] \subseteq \hat{g}^{**}s\text{-}Cl(A)$. On the other hand, let $x \in \hat{g}^{**}s\text{-}Cl(A)$. If $x \in A$, then the proof is complete. If $x \notin A$, each $\hat{g}^{**}s$-*open* set U containing x intersects A at a point distinct from x, so $x \in \hat{g}^{**}s\text{-}D(A)$. Thus, $\hat{g}^{**}s\text{-}Cl(A) \subseteq [A \cup (\hat{g}^{**}s\text{-}D(A))]$, which completes the proof.

Corollary 2.26. A subset A of a space X is $\hat{g}^{**}s$-*closed* if and only if it contains the set of all of its $\hat{g}^{**}s$-*limit* points.

Theorem 2.27. For subsets A, B of a space X, the following statements are true:

(1) $\hat{g}^{**}s$-$Int(A)$ is the largest $\hat{g}^{**}s$-*open* set contained in A;

(2) A is $\hat{g}^{**}s$-*open* if and only if $A = \hat{g}^{**}s$-$Int(A)$.

(3) $\hat{g}^{**}s$-$Int[\hat{g}^{**}s\text{-}Int(A)] = \hat{g}^{**}s$-$Int(A)$;

(4) $\hat{g}^{**}s$-$Int(A) = [A - (\hat{g}^{**}s\text{-}D(X - A))]$;

(5) $[X - (\hat{g}^{**}s\text{-}Cl(A))] = \hat{g}^{**}s$-$Int(X - A)$;

(6) $[X - (\hat{g}^{**}s\text{-}Int(A))] = \hat{g}^{**}s$-$Cl(X - A)$;

(7) $[\hat{g}^{**}s\text{-}Int(A)] \cup [\hat{g}^{**}s\text{-}Int(B)] \subseteq \hat{g}^{**}s$-$Int(A \cup B)$;

(8) $\hat{g}^{**}s$-$Int(A \cap B) = [\hat{g}^{**}s\text{-}Int(A)] \cap [\hat{g}^{**}s\text{-}Int(B)]$;

Proof. (4) If $x \in [A - (\hat{g}^{**}s\text{-}D(X - A))]$, then $x \notin \hat{g}^{**}s\text{-}D(X - A)$ and so there exists a $\hat{g}^{**}s$-*open* set U containing x such that $U \cap (X - A) = \phi$. Then, $x \in U \subseteq A$ and hence $x \in \hat{g}^{**}s$-$Int(A)$, that is, $[A - (\hat{g}^{**}s\text{-}D(X - A))] \subseteq \hat{g}^{**}s$-$Int(A)$. On the other hand, if $x \in \hat{g}^{**}s$-$Int(A)$, then $x \notin \hat{g}^{**}s\text{-}D(X - A)$ since $\hat{g}^{**}s$-$Int(A)$ is $\hat{g}^{**}s$-*open* and $[(\hat{g}^{**}s\text{-}Int(A)) \cap (X - A)] = \phi$. Hence, $\hat{g}^{**}s$-$Int(A) = [A - (\hat{g}^{**}s\text{-}D(X - A))]$.

(6) $X - [\hat{g}^{**}s\text{-}Int(A)] = X - [A - (\hat{g}^{**}s\text{-}D(X - A))] = (X - A) \cup [\hat{g}^{**}s\text{-}D(X - A)] = \hat{g}^{**}s$-$Cl(X - A)$.

Theorem 2.28. Let (X, τ) be a topological space and $A, B \subseteq X$. Then the following statements are true:

(1) $x \in \hat{g}^{**}s$-$Cl(A)$ if and only if for every $\hat{g}^{**}s$-*open* subset U containing x, $U \cap A \neq \phi$.

(2) $A \subseteq B$ implies that $\hat{g}^{**}s$-$Cl(A) \subseteq \hat{g}^{**}s$-$Cl(B)$.

(3) A is $\hat{g}^{**}s$-*closed* if and only if $\hat{g}^{**}s$-$Cl(A) = A$.

FULL TEXTS BOOK

(4) $\hat{g}^{**}s\text{-}Cl\left[\hat{g}^{**}s\text{-}Cl(A)\right]=\hat{g}^{**}s\text{-}Cl(A)$.

(5) $\left[\hat{g}^{**}s\text{-}Cl(A)\right]\cup\left[\hat{g}^{**}s\text{-}Cl(B)\right]=\hat{g}^{**}s\text{-}Cl(A\cup B)$.

(6) $\hat{g}^{**}s\text{-}Int(X-A)=X-\left[\hat{g}^{**}s\text{-}Cl(A)\right]$.

(7) $\hat{g}^{**}s\text{-}Cl(X-A)=X-\left[\hat{g}^{**}s\text{-}Int(A)\right]$.

Definition 2.29. $\hat{g}^{**}s\text{-}Bd(A)=A-\left[\hat{g}^{**}s\text{-}Int(A)\right]$ is said to be the $\hat{g}^{**}s\text{-}border$ of A.

Theorem 2.30. For a subset A of a space X, the following statements hold:

(1) $Bd(A)\subseteq\hat{g}^{**}s\text{-}Bd(A)$ where $Bd(A)$ denotes the border of A;

(2) $A=\hat{g}^{**}s\text{-}Int(A)\cup\hat{g}^{**}s\text{-}Bd(A)$;

(3) $\left[\hat{g}^{**}s\text{-}Int(A)\right]\cap\left[\hat{g}^{**}s\text{-}Bd(A)\right]=\phi$;

(4) A is a $\hat{g}^{**}s\text{-}open$ set if and only if $\hat{g}^{**}s\text{-}Bd(A)=\phi$;

(5) $\hat{g}^{**}s\text{-}Bd\left[\hat{g}^{**}s\text{-}Int(A)\right]=\phi$;

(6) $\hat{g}^{**}s\text{-}Int\left[\hat{g}^{**}s\text{-}Bd(A)\right]=\phi$;

(7) $\hat{g}^{**}s\text{-}Bd\left[\hat{g}^{**}s\text{-}Bd(A)\right]=\hat{g}^{**}s\text{-}Bd(A)$;

(8) $\hat{g}^{**}s\text{-}Bd(A)=A\cap\left[\hat{g}^{**}s\text{-}Cl(X-A)\right]$;

(9) $\hat{g}^{**}s\text{-}Bd(A)=\hat{g}^{**}s\text{-}D(X-A)$.

Proof. (6) If $x\in\hat{g}^{**}s\text{-}Int\left[\hat{g}^{**}s\text{-}Bd(A)\right]$, then $x\in\hat{g}^{**}s\text{-}Bd(A)$. On the other hand, since $\hat{g}^{**}s\text{-}Bd(A)\subseteq A$, $x\in\hat{g}^{**}s\text{-}Int\left[\hat{g}^{**}s\text{-}Bd(A)\right]\subseteq\hat{g}^{**}s\text{-}Int(A)$. Therefore, we get $x\in\left[\hat{g}^{**}s\text{-}Int(A)\right]\cap\left[\hat{g}^{**}s\text{-}Bd(A)\right]$, which contradicts (3). Thus, $\hat{g}^{**}s\text{-}Int\left[\hat{g}^{**}s\text{-}Bd(A)\right]=\phi$.

(8) $\hat{g}^{**}s\text{-}Bd(A)=A-\left[\hat{g}^{**}s\text{-}Int(A)\right]=A-\left[X-\left(\hat{g}^{**}s\text{-}Cl(X-A)\right)\right]=A\cap\left[\hat{g}^{**}s\text{-}Cl(X-A)\right]$.

(9) $\hat{g}^{**}s\text{-}Bd(A)=A-\left[\hat{g}^{**}s\text{-}Int(A)\right]=A-\left[A-\left(\hat{g}^{**}s\text{-}D(X-A)\right)\right]=\hat{g}^{**}s\text{-}D(X-A)$.

Definition 2.31. $\hat{g}^{**}s\text{-}Fr(A)=\left[\hat{g}^{**}s\text{-}Cl(A)\right]-\left[\hat{g}^{**}s\text{-}Int(A)\right]$ is said to be the $\hat{g}^{**}s\text{-}frontier$ of A.

Theorem 2.32. For a subset A of a space X, the following statements hold:

(1) $Fr(A)\subseteq\hat{g}^{**}s\text{-}Fr(A)$ where $Fr(A)$ denotes the frontier of A;

(2) $\hat{g}^{**}s\text{-}Cl(A)=\left[\hat{g}^{**}s\text{-}Int(A)\right]\cup\left[\hat{g}^{**}s\text{-}Fr(A)\right]$;

(3) $\left[\hat{g}^{**}s\text{-}Int(A)\right]\cap\left[\hat{g}^{**}s\text{-}Fr(A)\right]=\phi$;

(4) $\hat{g}^{**}s\text{-}Bd(A)\subseteq\hat{g}^{**}s\text{-}Fr(A)$;

FULL TEXTS BOOK

(5) $\hat{g}^{**}s\text{-}Fr(A)=[\hat{g}^{**}s\text{-}Bd(A)]\cup[\hat{g}^{**}s\text{-}D(A)];$

(6) A is a $\hat{g}^{**}s\text{-}open$ set if and only if $\hat{g}^{**}s\text{-}Fr(A)=\hat{g}^{**}s\text{-}D(A);$

(7) $\hat{g}^{**}s\text{-}Fr(A)=[\hat{g}^{**}s\text{-}Cl(A)]\cap[\hat{g}^{**}s\text{-}Cl(X-A)];$

(8) $\hat{g}^{**}s\text{-}Fr(A)=\hat{g}^{**}s\text{-}Fr(X-A);$

(9) $\hat{g}^{**}s\text{-}Fr(A)$ is $\hat{g}^{**}s\text{-}closed;$

(10) $\hat{g}^{**}s\text{-}Fr[\hat{g}^{**}s\text{-}Fr(A)]\subseteq\hat{g}^{**}s\text{-}Fr(A);$

(11) $\hat{g}^{**}s\text{-}Fr[\hat{g}^{**}s\text{-}Int(A)]\subseteq\hat{g}^{**}s\text{-}Fr(A);$

(12) $\hat{g}^{**}s\text{-}Fr[\hat{g}^{**}s\text{-}Cl(A)]\subseteq\hat{g}^{**}s\text{-}Fr(A);$

(13) $\hat{g}^{**}s\text{-}Int(A)=A-[\hat{g}^{**}s\text{-}Fr(A)].$

Proof. (2) $[\hat{g}^{**}s\text{-}Int(A)]\cup[\hat{g}^{**}s\text{-}Fr(A)]=$

$\hat{g}^{**}s\text{-}Int(A)\cup[\hat{g}^{**}s\text{-}Cl(A)-\hat{g}^{**}s\text{-}Int(A)]=\hat{g}^{**}s\text{-}Cl(A)$

(3) $[\hat{g}^{**}s\text{-}Int(A)]\cap[\hat{g}^{**}s\text{-}Fr(A)]=[\hat{g}^{**}s\text{-}Int(A)]\cap[(\hat{g}^{**}s\text{-}Cl(A))-(\hat{g}^{**}s\text{-}Int(A))]$

$=\phi.$

(5) $Since\ [\hat{g}^{**}s\text{-}Int(A)]\cup[\hat{g}^{**}s\text{-}Fr(A)]=$

$[\hat{g}^{**}s\text{-}Int(A)]\cup[\hat{g}^{**}s\text{-}Bd(A)]\cup[\hat{g}^{**}s\text{-}D(A)],$

$\hat{g}^{**}s\text{-}Fr(A)=[\hat{g}^{**}s\text{-}Bd(A)]\cup[\hat{g}^{**}s\text{-}D(A)].$

(7) $\hat{g}^{**}s\text{-}Fr(A)=[\hat{g}^{**}s\text{-}Cl(A)]-[\hat{g}^{**}s\text{-}Int(A)]=$

$[\hat{g}^{**}s\text{-}Cl(A)]\cap[\hat{g}^{**}s\text{-}Cl(X-A)].$

(9) $\hat{g}^{**}s\text{-}Cl[\hat{g}^{**}s\text{-}Fr(A)]=\hat{g}^{**}s\text{-}Cl[(\hat{g}^{**}s\text{-}Cl(A))\cap(\hat{g}^{**}s\text{-}Cl(X-A))]\subseteq$

$\hat{g}^{**}s\text{-}Cl[\hat{g}^{**}s\text{-}Cl(A)]\cap\hat{g}^{**}s\text{-}Cl[\hat{g}^{**}s\text{-}Cl(X-A)]$

$=[\hat{g}^{**}s\text{-}Cl(A)]\cap\hat{g}^{**}s\text{-}[\hat{g}^{**}s\text{-}Cl(X-A)]=\hat{g}^{**}s\text{-}Fr(A).$ Hence $\hat{g}^{**}s\text{-}Fr(A)$ is $\hat{g}^{**}s\text{-}closed.$

(10) $\hat{g}^{**}s\text{-}Fr[\hat{g}^{**}s\text{-}Fr(A)]=$

$\hat{g}^{**}s\text{-}Cl[\hat{g}^{**}s\text{-}Fr(A)]\cap\hat{g}^{**}s\text{-}Cl[X-(\hat{g}^{**}s\text{-}Fr(A))]\subseteq$

$\hat{g}^{**}s\text{-}Cl[\hat{g}^{**}s\text{-}Fr(A)]=\hat{g}^{**}s\text{-}Fr(A).$

(12) $\hat{g}^{**}s\text{-}Fr[\hat{g}^{**}s\text{-}Cl(A)]=\hat{g}^{**}s\text{-}Cl[\hat{g}^{**}s\text{-}Cl(A)]-\hat{g}^{**}s\text{-}Int[\hat{g}^{**}s\text{-}Cl(A)]=$

$[\hat{g}^{**}s\text{-}Cl(A)]-[\hat{g}^{**}s\text{-}Int(\hat{g}^{**}s\text{-}Cl(A))]\subseteq$

$[(\hat{g}^{**}s\text{-}Cl(A))-(\hat{g}^{**}s\text{-}Int(A))]=\hat{g}^{**}s\text{-}Fr(A).$

(13) $A-[\hat{g}^{**}s\text{-}Fr(A)]=A-[(\hat{g}^{**}s\text{-}Cl(A))-(\hat{g}^{**}s\text{-}Int(A))]=\hat{g}^{**}s\text{-}Int(A).$

FULL TEXTS BOOK

Definition 2.33. A subset A of a topological space (X,τ) is called a $\hat{g}^{**}s$-*neighbourhood* of a point x in X if there exists a $\hat{g}^{**}s$-*open* set U in X such that $x\in U\subseteq A$. The set of all $\hat{g}^{**}s$-*neighbourhoods* of an element x in X will be denoted by: $\hat{g}^{**}s\text{-}N_x=\hat{g}^{**}s\text{-}N_x(X)=\{A\subseteq X : A \text{ is a } \hat{g}^{**}s\text{-neighbourhood of } x\}$.

Proposition 2.34. A subset A of a topological space (X,τ) is $\hat{g}^{**}s$-*open* if and only if it is a $\hat{g}^{**}s$-*neighbourhood* of each of its points.

Proof. If A is $\hat{g}^{**}s$-*open* in X, then $x\in A\subseteq A$ for each $x\in A$. Thus A is a $\hat{g}^{**}s$-*neighbourhood* of each of its points. Conversely, suppose that A is a $\hat{g}^{**}s$-*neighbourhood* of each of its points. Then for each $x\in A$, there exists a $\hat{g}^{**}s$-*open* set U_x in X such that $x\in U_x\subseteq A$. Hence $\bigcup_{x\in A}U_x\subseteq A$. Since $A\subseteq\bigcup_{x\in A}U_x$, therefore $A=\bigcup_{x\in A}U_x$. Thus A is a $\hat{g}^{**}s$-*open* set in X, since it is a union of $\hat{g}^{**}s$-*open* sets

Definition 2.35. A mapping $f:(X,\tau)\to(Y,\sigma)$ is called $\hat{g}^{**}s$-*irresolute* at a point $x\in X$ if for all $\hat{g}^{**}s$-*open* subsets V in Y containing $f(x)$, there is a $\hat{g}^{**}s$-*open* subset U of X such that $x\in U$ and $f(U)$ is a subset of V. The function f will be called $\hat{g}^{**}s$-*irresolute* if f is $\hat{g}^{**}s$-*irresolute* at each point $x\in X$.

Theorem 2.36. Let $f:(X,\tau)\to(Y,\sigma)$ be a function. Then the following statements are equivalent.

(1) f is $\hat{g}^{**}s$-*irresolute*.

(2) For each $x\in X$ and each $\hat{g}^{**}s$-*neighbourhood* V of $f(x)$ in Y, there is a $\hat{g}^{**}s$-*neighborhood* U of x such that $f(U)\subseteq V$.

(3) The inverse image of every $\hat{g}^{**}s$-*closed* subset of Y is a $\hat{g}^{**}s$-*closed* subset of X.

(4) The inverse image of every $\hat{g}^{**}s$-*open* subset of Y is a $\hat{g}^{**}s$-*open* subset of X.

Definition 2.37. A function $f:(X,\tau)\to(Y,\sigma)$ is called $\hat{g}^{**}s$-*continuous* if $f^{-1}(V)$ is $\hat{g}^{**}s$-*open* set in X for every open set V in Y.

Proposition 2.38. A function $f:(X,\tau)\to(Y,\sigma)$ is called $\hat{g}^{**}s$-*continuous* if and only if $f^{-1}(V)$ is $\hat{g}^{**}s$-*closed* set in X for every closed set V in Y.

Definition 2.39. A function $f:(X,\tau)\to(Y,\sigma)$ is called *Pre*-$\hat{g}^{**}s$-*open* if and only if the image set $f(U)$ is $\hat{g}^{**}s$-*open* set in Y for every $\hat{g}^{**}s$-*open* set U in X.

Proposition 2.40. A bijection function $\hat{g}^{**}s$-*irreseolute* function $f:(X,\tau)\to(Y,\sigma)$ is called $\hat{g}^{**}s$-*homeomorphism* if f is *pre*-$\hat{g}^{**}s$-*open* and

Definition 2.41. A function $f:(X,\tau)\to(Y,\sigma)$ is called perfectly $\hat{g}^{**}s$-*continuous* if the inverse image $f^{-1}(V)$ of every $\hat{g}^{**}s$-*open* set V of Y is both open and closed in X.

FULL TEXTS BOOK

Definition 2.42. A function $f:(X,\tau)\to(Y,\sigma)$ is called strongly $\hat{g}^{**}s$-*continuous* if the inverse image $f^{-1}(V)$ of every $\hat{g}^{**}s$-*open* V in Y is open in X.

3. $\hat{g}^{**}s$-COMPACT SPACES

Definition 3.1. A collection $\{A_i : i\in I\}$ of $\hat{g}^{**}s$-*open* sets in a topological space (X,τ) is called a $\hat{g}^{**}s$-*open* cover of a subset B of X if $B\subseteq \mathrm{U}\{A_i : i\in I\}$ holds.

Definition 3.2. A topological space (X,τ) is called $\hat{g}^{**}s$-*compact* if every $\hat{g}^{**}s$-*open* cover of X has a finite subcover.

Definition 3.3. A subset B of a topological space (X,τ) is said to be $\hat{g}^{**}s$-*compact* relative to (X,τ) if, for every collection $\{A_i : i\in I\}$ of $\hat{g}^{**}s$-*open* subsets of X such that $B\subseteq \mathrm{U}\{A_i : i\in I\}$ there exists a finite subset I_0 of I such that $B\subseteq \mathrm{U}\{A_i : i\in I_0\}$.

Definition 3.4. A subset B of a topological space (X,τ) is said to be $\hat{g}^{**}s$-*compact* if B is $\hat{g}^{**}s$-*compact* as a subspace of X.

Definition 3.5. Every $\hat{g}^{**}s$-*compact* space is compact.

Proof. Let $\{A_i : i\in I\}$ be an open cover of (X,τ). Since every open set in X is $\hat{g}^{**}s$-*open* in X. So $\{A_i : i\in I\}$ is an $\hat{g}^{**}s$-*open* cover of (X,τ). Since (X,τ) is $\hat{g}^{**}s$-*compact*, $\hat{g}^{**}s$-*open* cover $\{A_i : i\in I\}$ of (X,τ) has a finite sub cover say $\{A_i : i=1,2,3,...,n\}$ for X. Hence (X,τ) is a compact space.

Definition 3.6. Every $\hat{g}^{**}s$-*closed* subset of a $\hat{g}^{**}s$-*compact* space (X,τ) is $\hat{g}^{**}s$-*compact* relative to X.

Proof. Let A be a $\hat{g}^{**}s$-*closed* subset of a topological space (X,τ). Then A^c is $\hat{g}^{**}s$-*open* in (X,τ). Let $\Gamma=\{A_i : i\in I\}$ be a $\hat{g}^{**}s$-*open* cover of A by $\hat{g}^{**}s$-*open* subsets of (X,τ). Then $\Gamma^{*}=\Gamma\,\mathrm{U}\{A^c\}$ is a $\hat{g}^{**}s$-*open* cover of (X,τ). That is $X=\left(\mathrm{U}_{i\in I}A_i\right)\mathrm{U}A^c$. By hypothesis, (X,τ) is a $\hat{g}^{**}s$-*compact* space and hence Γ^{*} is reducible to a finite subcover of (X,τ) say $X=\left(\mathrm{U}_{i\in I_0}A_i\right)\mathrm{U}A^c$ for some finite subset I_0 of I. But A and A^c are disjoint. Hence $A\subseteq \mathrm{U}\{A_i : i\in I_0\}$. Thus $\hat{g}^{**}s$-*open* cover $\Gamma=\{A_i : i\in I\}$ of A contains a finite subcover. Hence A is $\hat{g}^{**}s$-*compact* relative to (X,τ).

Theorem 3.7. A $\hat{g}^{**}s$-*continuous* image of a $\hat{g}^{**}s$-*compact* space is compact.

Proof. Let $f:(X,\tau)\to(Y,\sigma)$ be a $\hat{g}^{**}s$-*continuous* mapping from a $\hat{g}^{**}s$-*compact* topological space (X,τ) onto a topological space (Y,σ). Let $\Gamma=\{A_i : i\in I\}$ be an open cover of Y. Therefore $f^{-1}(\Gamma)=\{f^{-1}(A_i) : i\in I\}$ is a $\hat{g}^{**}s$-*open* cover of X, as f is $\hat{g}^{**}s$-*continuous*. Since X is $\hat{g}^{**}s$-*compact*, the $\hat{g}^{**}s$-*open* cover $f^{-1}(\Gamma)=\{f^{-1}(A_i) : i\in I\}$ of X, has a finite

FULL TEXTS BOOK

subcover say $\{f^{-1}(A_i): i=1,2,3,...,n\}$. Therefore $X=\bigcup_{i=1}^{n} f^{-1}(A_i)$, which implies $Y=f(X)=\bigcup_{i=1}^{n} A_i$. That is $\{A_i: i=1,2,3,...,n\}$ is a finite subcover of $\Gamma=\{A_i: i\in I\}$. Hence (Y,σ) is compact.

Theorem 3.8. Suppose that a function $f:(X,\tau)\to(Y,\sigma)$ is $\hat{g}^{**}s$-*irresolute* and a subset S of X is $\hat{g}^{**}s$-*compact* relative to (X,τ), then the image $f(S)$ is $\hat{g}^{**}s$-*compact* relative to (Y,σ).

Proof. Let $\Gamma=\{A_i: i\in I\}$ be a collection of $\hat{g}^{**}s$-*open* subsets of (Y,σ), such that $f(S)\subseteq \mathrm{U}\{A_i: i\in I\}$. Since f is $\hat{g}^{**}s$-*irresolute*. So $S\subseteq \mathrm{U}\{f^{-1}(A_i): i\in I\}$, where $\{f^{-1}(A_i): i\in I\}\subseteq \hat{g}^{**}s\text{-}O(X,\tau)$. Since S is $\hat{g}^{**}s$-*compact* relative to (X,τ), there exists a finite sub collection $\{f^{-1}(A_1), f^{-1}(A_2),\ldots, f^{-1}(A_n)\}$ such that $S\subseteq \mathrm{U}\{f^{-1}(A_1), f^{-1}(A_2),\ldots, f^{-1}(A_n)\}$. That is $f(S)\subseteq \mathrm{U}\{A_1,A_2,...,A_n\}$. Hence $f(S)$ is $\hat{g}^{**}s$-*compact* relative to (Y,σ).

Theorem 3.9. Suppose that a mapping $f:(X,\tau)\to(Y,\sigma)$ is strongly $\hat{g}^{**}s$-*continuous* mapping from a compact space (X,τ) onto a topological space (Y,σ). Then (Y,σ) is $\hat{g}^{**}s$-*compact*.

Proof. Let $\{A_i: i\in I\}$ be a $\hat{g}^{**}s$-*open* cover of (Y,σ). Since f is strongly $\hat{g}^{**}s$-*continuous*, $\{f^{-1}(A_i): i\in I\}$ is an open cover of (X,τ). Again, since (X,τ) is compact, the open cover $\{f^{-1}(A_i): i\in I\}$ of (X,τ) has a finite sub cover say $\{f^{-1}(A_i): i=1,2,3,...,n\}$. Therefore $X=\mathrm{U}\{f^{-1}(A_i): i=1,2,3,...,n\}$, which implies $f(X)=\mathrm{U}\{A_i: i=1,2,3,...,n\}$, so that $Y=\mathrm{U}\{A_i: i=i=1,2,3,...,n\}$. Thus $\{A_1,A_2,...,A_n\}$ is a finite subcover of $\{A_i: i\in I\}$ for (Y,σ). Hence (Y,σ) is $\hat{g}^{**}s$-*compact*.

Theorem 3.10. Suppose that a mapping $f:(X,\tau)\to(Y,\sigma)$ is perfectly $\hat{g}^{**}s$-*continuous* mapping from a compact space (X,τ) onto a topological space (Y,σ). Then (Y,σ) is $\hat{g}^{**}s$-*compact*.

Proof. Let $\{A_i: i\in I\}$ be a $\hat{g}^{**}s$-*open* cover of (Y,σ). Since f is perfectly $\hat{g}^{**}s$-*continuous*, $\{f^{-1}(A_i): i\in I\}$ is an open cover of (X,τ). Again, since (X,τ) is compact, the open cover $\{f^{-1}(A_i): i\in I\}$ of (X,τ) has a finite sub cover say $\{f^{-1}(A_i): i=1,2,3,...,n\}$. Therefore $X=\mathrm{U}\{f^{-1}(A_i): i=1,2,3,...,n\}$, which implies $f(X)=\mathrm{U}\{A_i: i=1,2,3,...,n\}$, so that $Y=\mathrm{U}\{A_i: i=1,2,3,...,n\}$. That is $\{A_1, A_2,\ldots, A_n\}$ is a finite subcover of $\{A_i: i\in I\}$ for (Y,σ). Hence (Y,σ) is $\hat{g}^{**}s$-*compact*.

FULL TEXTS BOOK

Theorem 3.11. Suppose that a function $f:(X,\tau)\to(Y,\sigma)$ is a $\hat{g}^{**}s$-*irresolute* mapping from a $\hat{g}^{**}s$-*compact* space (X,τ) onto a topological space (Y,σ). Then (Y,σ) is $\hat{g}^{**}s$-*compact*.

Proof. Let $f:(X,\tau)\to(Y,\sigma)$ be a $\hat{g}^{**}s$-*irresolute* mapping from a $\hat{g}^{**}s$-*compact* space (X,τ) onto a topological space (Y,σ). Let $\{A_i : i\in I\}$ be a $\hat{g}^{**}s$-*open* cover of (Y,σ). Then $\{f^{-1}(A_i) : i\in I\}$ is a $\hat{g}^{**}s$-*open* cover of (X,τ), since f is $\hat{g}^{**}s$-*irresolute*. As (X,τ) is $\hat{g}^{**}s$-*compact*, the $\hat{g}^{**}s$-*open* cover $\{f^{-1}(A_i) : i\in I\}$ of (X,τ) has a finite sub cover say $\{f^{-1}(A_i) : i=1,2,3,...,n\}$. Therefore $X=\mathrm{U}\{f^{-1}(A_i) : i=1,2,3,...,n\}$, which implies $f(X)=\mathrm{U}\{A_i : i=1,2,3,...,n\}$, so that $Y=\mathrm{U}\{A_i : i=1,2,3,...,n\}$. That is $\{A_1, A_2, \ldots, A_n\}$ is a finite subcover of $\{A_i : i\in I\}$ for (Y,σ). Hence (Y,σ) is $\hat{g}^{**}s$-*compact*.

Theorem 3.12. If (X,τ) is compact and every $\hat{g}^{**}s$-*closed* set in X is also closed in X, then (X,τ) is $\hat{g}^{**}s$-*compact*.

Proof. Let $\{A_i : i\in I\}$ be a $\hat{g}^{**}s$-*open* cover of X. Since every $\hat{g}^{**}s$-*closed* set in X is also closed in X. Thus $\{X-A_i : i\in I\}$ is a closed cover of X and hence $\{A_i : i\in I\}$ is an open cover of X. Since (X,τ) is compact. So there exists a finite subcover $\{A_i : i=1,2,3,...,n\}$ of $\{A_i : i\in I\}$ such that $X=\mathrm{U}\{A_i : i=1,2,3,...,n\}$. Hence (X,τ) is $\hat{g}^{**}s$-*compact*.

Theorem 3.13. A topological space (X,τ) is $\hat{g}^{**}s$-*compact* if and only if every family of $\hat{g}^{**}s$-*closed* sets of (X,τ) having finite intersection property has a nonempty intersection.

Proof. Suppose (X,τ) is $\hat{g}^{**}s$-*compact*. Let $\{A_i : i\in I\}$ be a family of $\hat{g}^{**}s$-*closed* sets with finite intersection property. Suppose $\mathrm{I}_{i\in I} A_i=\phi$, then $X-\mathrm{I}(\{A_i : i\in I\})=X$. This implies $\mathrm{U}\{(X-A_i) : i\in I\}=X$. Thus the cover $\{(X-A_i) : i\in I\}$ is a $\hat{g}^{**}s$-*open* cover of (X,τ). Then as (X,τ) is $\hat{g}^{**}s$-*compact*, the $\hat{g}^{**}s$-*open* cover $\{(X-A_i) : i\in I\}$ has a finite sub cover say $\{(X-A_i) : i=1,2,3,...,n\}$. This implies that $X=\mathrm{U}\{(X-A_i) : i=1,2,3,...,n\}$ which implies $X=X-\mathrm{I}\{A_i : i=1,2,3,...,n\}$, which implies $X-X=X-[X-\mathrm{I}\{A_i : i=1,2,3,...,n\}]$, which implies $\phi=\mathrm{I}\{A_i : i=1,2,3,...,n\}$. This disproves the assumption. Hence $\mathrm{I}\{A_i : i\in I\}\neq\phi$.

Conversely, suppose (X,τ) is not $\hat{g}^{**}s$-*compact*. Then there exits a $\hat{g}^{**}s$-*open* cover of (X,τ) say $\{G_i : i\in I\}$ having no finite subcover. This implies for any finite subfamily $\{G_i : i=1,2,3,...,n\}$ of $\{G_i : i\in I\}$, we have $\mathrm{U}\{G_i : i=1,2,3,...,n\}\neq X$, which implies $X-(\mathrm{U}\{G_i : i=1,2,3,...,n\})\neq X-X$, therefore $\mathrm{I}\{X-G_i : i=1,2,3,...,n\}\neq\phi$. Then the family $\{X-G_i : i\in I\}$ of $\hat{g}^{**}s$-*closed* sets has a finite intersection property. Also by assumption

FULL TEXTS BOOK

I $\{X - G_i : i \in I\} \neq \phi$ which implies $X - (\mathrm{U}\{G_i : i \in I\}) \neq \phi$, so that $\mathrm{U}\{G_i : i \in I\} \neq X$. This implies $\{G_i : i \in I\}$ is not a cover of (X, τ). This disproves the fact that $\{G_i : i \in I\}$ is a cover for (X, τ). Therefore a $\hat{g}^{**}s$-*open* cover $\{G_i : i \in I\}$ of (X, τ) has a finite sub cover $\{G_i : i = 1,2,3,...,n\}$. Hence (X, τ) is $\hat{g}^{**}s$-*compact*.

Theorem 3.14. Let A be a $\hat{g}^{**}s$-*compact* set relative to a topological space X and B be a $\hat{g}^{**}s$-*closed* subset of X. Then $A \mathrm{I}\ B$ is $\hat{g}^{**}s$-*compact* relative to X.

Proof. Let A be $\hat{g}^{**}s$-*compact* relative to X. Let $\{A_i : i \in I\}$ be a cover of $A \mathrm{I}\ B$ by $\hat{g}^{**}s$-*open* sets in X. Then $\{A_i : i \in I\} \mathrm{U} \{B^C\}$ is a cover of A by $\hat{g}^{**}s$-*open* sets in X, but A is $\hat{g}^{**}s$-*compact* relative to X, so there exists a finite subset $I_0 = \{i_1, i_2, i_3, \ldots, i_n\} \subseteq I$ such that $A \subseteq (\mathrm{U}\{A_{i_k} : k = 1, 2, 3, \ldots, n\}) \mathrm{U}\, B^C$. Then $A \mathrm{I}\ B \subseteq \mathrm{U}\{A_{i_k} \mathrm{I}\ B : k = 1, 2, 3, \ldots, n\} \subseteq \mathrm{U}\{A_{i_k} : k = 1,2,3,...,n\}$. Hence $A \mathrm{I}\ B$ is $\hat{g}^{**}s$-*compact*.

Theorem 3.15. Suppose that a function $f : (X, \tau) \to (Y, \sigma)$ is $\hat{g}^{**}s$-*irresolute* and a subset B of X is $\hat{g}^{**}s$-*compact* relative to X. Then $f(B)$ is $\hat{g}^{**}s$-*compact* relative to Y.

Proof. Let $\{A_i : i \in I\}$ be a cover of $f(B)$ by $\hat{g}^{**}s$-*open* subsets of Y. Since f is $\hat{g}^{**}s$-*irresolute*. Then $\{f^{-1}(A_i) : i \in I\}$ is a cover of B by $\hat{g}^{**}s$-*open* subsets of X. Since B is $\hat{g}^{**}s$-*compact* relative to X, $\{f^{-1}(A_i) : i \in I\}$ has a finite sub cover say $\{f^{-1}(A_1), f^{-1}(A_2), \ldots, f^{-1}(A_n)\}$ for B. Then it implies that $\{A_i : i = 1,2,3,...,n\}$ is a finite subcover of $\{A_i : i \in I\}$ for $f(B)$. So $f(B)$ is $\hat{g}^{**}s$-*compact* relative to Y.

Definition 3.16. Let (X, τ) be a topological space and let E be a subset of X. Let $\tau_E^{\hat{g}^{**}s} = \{A \mathrm{I}\ E : A \in \hat{g}^{**}s\text{-}O(X, \tau)\}$. Then $(E, \tau_E^{\hat{g}^{**}s})$ is a topological space.

Theorem 3.17. Let (X, τ) be a topological space and let E be a subset of X. Then $(E, \tau_E^{\hat{g}^{**}s})$ is compact if and only if for any $\hat{g}^{**}s$-*open* cover Γ of E has a finite subcover of E.

Proof. Suppose E is compact. Let $\Gamma \subseteq \hat{g}^{**}s\text{-}O(X, \tau)$ such that $E \subseteq \mathrm{U}\Gamma$. Let $\Gamma_E = \{A \mathrm{I}\ E : A \in \Gamma\}$. Then $E = \mathrm{U}\Gamma_E$ and $\Gamma_E \subseteq \tau_E^{\hat{g}^{**}s}$. By hypothesis, there exists a finite subset $\Gamma_E^* = \{A_i \mathrm{I}\ E : i = 1,2,3,...,n\} \subseteq \Gamma_E$ such that $E = \mathrm{U}\Gamma_E^*$. Then $\Gamma^* = \{A_i : i = 1,2,3,...,n\} \subseteq \Gamma$ and $E \subseteq \mathrm{U}\Gamma^*$.

Conversely, let $\Upsilon = \{A_i \mathrm{I}\ E : i \in I\} \subseteq \tau_E^{\hat{g}^{**}s}$ such that $E = \mathrm{U}\Upsilon$. Then $\Upsilon^* = \{A_i : i \in A\}$ is a $\hat{g}^{**}s$-*open* covering of E. By hypothesis, there exists $\Upsilon^{**} = \{A_i : i = 1,2,3,...,n\}$ a finite subset of Υ^* such that $E \subseteq \mathrm{U}\Upsilon^{**}$. Then $\Upsilon^{\#} = \{A_i \mathrm{I}\ E : i = 1,2,3,...,n\}$ is a finite subset of Υ such that $E = \mathrm{U}\Upsilon^{\#}$. This proves that $(E, \tau_E^{\hat{g}^{**}s})$ is compact.

FULL TEXTS BOOK

4. COUNTABLY $\hat{g}^{**}s$-COMPACT SPACES

In this section, we present the concept of countably $\hat{g}^{**}s$-*compactness* and its properties.

Definition 4.1. A topological space (X,τ) is said to be countably $\hat{g}^{**}s$-*compact* if every countable $\hat{g}^{**}s$-*open* cover of X has a finite sub cover.

Theorem 4.2. If (X,τ) is a countably $\hat{g}^{**}s$-*compact* space, then (X,τ) is countably compact.

Proof. Let (X,τ) be a countably $\hat{g}^{**}s$-*compact* space. Let $\{A_i : i\in I\}$ be a countable open cover of (X,τ). Since $\tau\subseteq \hat{g}^{**}s\text{-}O(X,\tau)$. So $\{A_i : i\in I\}$ is a countable $\hat{g}^{**}s$-*open* cover of (X,τ). Since (X,τ) is countably $\hat{g}^{**}s$-*compact*, therefore countable $\hat{g}^{**}s$-*open* cover $\{A_i : i\in I\}$ of (X,τ) has a finite sub cover say $\{A_i : i=1,2,3,\ldots,n\}$ for X. Hence (X,τ) is a countably compact space.

Theorem 4.3. If (X,τ) is countably compact and every $\hat{g}^{**}s$-*closed* subset of X is closed in X, then (X,τ) is countably $\hat{g}^{**}s$-*compact*.

Proof. Let (X,τ) be a countably compact space. Let $\{A_i : i\in I\}$ be a countable $\hat{g}^{**}s$-*open* cover of (X,τ). Since every $\hat{g}^{**}s$-*closed* subset of X is closed in X. Thus every $\hat{g}^{**}s$-*open* set in X is open in X. Therefore $\{A_i : i\in I\}$ is a countable open cover of (X,τ). Since (X,τ) is countably compact, so countable open cover $\{A_i : i\in I\}$ of (X,τ) has a finite sub cover say $\{A_i : i=1,2,3,...,n\}$ for X. Hence (X,τ) is a countably $\hat{g}^{**}s$-*compact* space.

Theorem 4.4. Every $\hat{g}^{**}s$-*compact* space is countably $\hat{g}^{**}s$-*compact*.

Proof. Let (X,τ) be a $\hat{g}^{**}s$-*compact* space. Let $\{A_i : i\in I\}$ be a countable $\hat{g}^{**}s$-*open* cover of (X,τ). Since (X,τ) is $\hat{g}^{**}s$-*compact*, so $\hat{g}^{**}s$-*open* cover $\{A_i : i\in I\}$ of (X,τ) has a finite sub cover say $\{A_i : i=1,2,3,...,n\}$ for (X,τ). Hence (X,τ) is countably $\hat{g}^{**}s$-*compact* space.

Theorem 4.5. Let $f:(X,\tau)\to(Y,\sigma)$ be a $\hat{g}^{**}s$-*continuous* onjective mapping. If X is countably $\hat{g}^{**}s$-*compact* space, then (Y,σ) is countably compact.

Proof. Let $f:(X,\tau)\to(Y,\sigma)$ be a $\hat{g}^{**}s$-*continuous* mapping from a countably $\hat{g}^{**}s$-*compact* space (X,τ) onto a topological space (Y,σ). Let $\{A_i : i\in I\}$ be a countable open cover of Y. Then $\{f^{-1}(A_i) : i\in I\}$ is a countable $\hat{g}^{**}s$-*open* cover of X, as f is $\hat{g}^{**}s$-*continuous*. Since X is countably $\hat{g}^{**}s$-*compact*, the countable $\hat{g}^{**}s$-*open* cover $\{f^{-1}(A_i) : i\in I\}$ of X has a finite sub cover say $\{f^{-1}(A_i) : i=1,2,3,...,n\}$. Therefore $X=\mathrm{U}\{f^{-1}(A_i) : i=1,2,3,...,n\}$, which implies $Y=f(X)=\mathrm{U}\{A_i : i=1,2,3,...,n\}$. That is $\{A_i : i=1,2,3,...,n\}$ is a finite sub cover of $\{A_i : i\in I\}$ for Y. Hence Y is countably compact.

FULL TEXTS BOOK

Theorem 4.6. Suppose that a mapping $f:(X,\tau)\to(Y,\sigma)$ is perfectly $\hat{g}^{**}s$-*continuous* mapping from a countably compact space (X,τ) onto a topological space (Y,σ). Then (Y,σ) is countably $\hat{g}^{**}s$-*compact*.

Proof. Let $\{A_i : i\in I\}$ be a countable $\hat{g}^{**}s$-*open* cover of (Y,σ). Since f is perfectly $\hat{g}^{**}s$-*continuous*, $\{f^{-1}(A_i) : i\in I\}$ is a countable open cover of (Y,σ). Again, since (X,τ) is countably $\hat{g}^{**}s$-*compact*, the countable open cover $\{f^{-1}(A_i) : i\in I\}$ of (X,τ) has a finite sub cover say $\{f^{-1}(A_i) : i=1,2,3,...,n\}$. Therefore $X=\mathrm{U}\{f^{-1}(A_i) : i=1,2,3,...,n\}$, which implies $f(X)=\mathrm{U}\{A_i : i=1,2,3,...,n\}$, so that $Y=\mathrm{U}\{A_i : i=1,2,3,...,n\}$. That is $\{A_1,A_2,\ldots,A_n\}$ is a finite subcover of $\{A_i : i\in I\}$ for (Y,σ). Hence (Y,σ) is countably $\hat{g}^{**}s$-*compact*.

Theorem 4.7. Suppose that a mapping $f:(X,\tau)\to(Y,\sigma)$ is strongly $\hat{g}^{**}s$-*continuous* mapping from a countably compact space (X,τ) onto a topological space (Y,σ). Then (Y,σ) is countably $\hat{g}^{**}s$-*compact*.

Proof. Let $\{A_i : i\in I\}$ be a countable $\hat{g}^{**}s$-*open* cover of (Y,σ). Since f is strongly $\hat{g}^{**}s$-*continuous*, $\{f^{-1}(A_i) : i\in I\}$ is a countable open cover of (X,τ). Again, since (X,τ) is countably compact, the countable open cover $\{f^{-1}(A_i) : i\in I\}$ of (X,τ) has a finite sub cover say $\{f^{-1}(A_i) : i=1,2,3,...,n\}$. Therefore $X=\mathrm{U}\{f^{-1}(A_i) : i=1,2,3,...,n\}$, which implies $f(X)=\mathrm{U}\{A_i : i=1,2,3,...,n\}$, so that $Y=\mathrm{U}\{A_i : i=1,2,3,...,n\}$. That is $\{A_1,A_2,...,A_n\}$ is a finite subcover of $\{A_i : i\in I\}$ for (Y,σ). Hence (Y,σ) is countably $\hat{g}^{**}s$-*compact*.

Theorem 4.8. The image of a countably $\hat{g}^{**}s$-*compact* space under a $\hat{g}^{**}s$-*irresolute* mapping is countably $\hat{g}^{**}s$-*compact*.

Proof. Suppose that a mapping $f:(X,\tau)\to(Y,\sigma)$ is a $\hat{g}^{**}s$-*irresolute* mapping from a countably $\hat{g}^{**}s$-*compact* space (X,τ) onto a topological space (Y,σ). Let $\{A_i : i\in I\}$ be a countable $\hat{g}^{**}s$-*open* cover of (Y,σ). Then $\{f^{-1}(A_i) : i\in I\}$ is a countable $\hat{g}^{**}s$-*open* cover of (X,τ), since f is $\hat{g}^{**}s$-*irresolute*. As (X,τ) is countably $\hat{g}^{**}s$-*compact*, the countable $\hat{g}^{**}s$-*open* cover $\{f^{-1}(A_i) : i\in I\}$ of (X,τ) has a finite sub cover say $\{f^{-1}(A_i) : i=1,2,3,...,n\}$. Then it follows that $X=\mathrm{U}\{f^{-1}(A_i) : i=1,2,3,...,n\}$, which implies $f(X)=\mathrm{U}\{A_i : i=1,2,3,...,n\}$, so that $Y=\mathrm{U}\{A_i : i=1,2,3,...,n\}$. That is $\{A_1,A_2,\ldots,A_n\}$ is a finite subcover of $\{A_i : i\in I\}$ for (Y,σ). Hence (Y,σ) is countably $\hat{g}^{**}s$-*compact*.

Theorem 4.9. Let (X,τ) be a topological space and $x\in X$. A point $x\in X$ is said to be $\hat{g}^{**}s$-*limit* point of $A\subseteq X$ provided that every $\hat{g}^{**}s$-*neighbourhood* of x contains at least one point of A different from x.

Theorem 4.10. Every infinite subset of a $\hat{g}^{**}s$-*compact* space has a $\hat{g}^{**}s$-*limit* point.

FULL TEXTS BOOK

Proof. Let A be an infinite subset of a $\hat{g}^{**}s$-*compact* space (X,τ). Suppose that A has not a $\hat{g}^{**}s$-*limit* point. Then for each $x \in X$, there exists a $\hat{g}^{**}s$-*open* set G_x containing at most one point of A. Now, the collection $\Lambda = \{G_x : x \in X\}$ forms a $\hat{g}^{**}s$-*open* cover of X. As X is $\hat{g}^{**}s$-*compact*, then there exist $x_1, x_2, \ldots, x_n$ in X such that $X = \bigcup_{i=1}^{i=n} G_{x_i}$. Therefore X has at most n points of A. This implies that A is finite. But this contradicts that A is infinite. Thus A has a $\hat{g}^{**}s$-*limit* point.

5. $\hat{g}^{**}s$--LINDELOF SPACES

In this section, we concentrate on the concept of $\hat{g}^{**}s$-*Lindelöf* space and its properties.

Definition 5.1. A topological space (X,τ) is said to be $\hat{g}^{**}s$-*Lindelöf* space if every $\hat{g}^{**}s$-*open* cover of X has a countable subcover.

Definition 5.2. Every $\hat{g}^{**}s$-*Lindelöf* space (X,τ) is *Lindelöf* space.

Proof. Let (X,τ) be a $\hat{g}^{**}s$-*Lindelöf* space. Let $\{A_i : i \in I\}$ be an open cover of (X,τ). Since $\tau \subseteq \hat{g}^{**}s\text{-}O(X,\tau)$. Therefore $\{A_i : i \in I\}$ is a $\hat{g}^{**}s$-*open* cover of (X,τ). Since (X,τ) is $\hat{g}^{**}s$-*Lindelöf* space. So there exists a countable subset I_0 of I such that $\{A_i : i \in I_0\}$ is a $\hat{g}^{**}s$-*open* subcover of (X,τ). Hence (X,τ) is a *Lindelöf* space.

Theorem 5.3. Every $\hat{g}^{**}s$-*compact* space is $\hat{g}^{**}s$-*Lindelöf*.

Proof. Let (X,τ) be a $\hat{g}^{**}s$-*compact* space. Let $\{A_i : i \in I\}$ be a $\hat{g}^{**}s$-*open* cover of (X,τ). Since (X,τ) is $\hat{g}^{**}s$-*compact* space. Then $\{A_i : i \in I\}$ has a finite sub cover say $\{A_i : i = 1,2,3,\ldots,n\}$. Since every finite subcover is always countable subcover and therefore $\{A_i : i = 1,2,3,\ldots,n\}$ is a countable subcover of $\{A_i : i \in I\}$. Hence (X,τ) is $\hat{g}^{**}s$-*Lindelöf* space.

Theorem 5.4. Every $\hat{g}^{**}s$-*closed* subset of a $\hat{g}^{**}s$-*Lindelöf* space is $\hat{g}^{**}s$-*Lindelöf*.

Proof. Let F be a $\hat{g}^{**}s$-*closed* subset of X and $\{G_i : i \in I\}$ be $\hat{g}^{**}s$-*open* cover of F. Then F^c is $\hat{g}^{**}s$-*open* and $F \subseteq \mathrm{U}\{G_i : i \in I\}$. Hence $X = (\mathrm{U}\{G_i : i \in I\}) \mathrm{U} F^c$. Since X is $\hat{g}^{**}s$-*Lindelöf*, then $X = (\mathrm{U}\{G_i : i \in I_0\}) \mathrm{U} F^c$ for some countable subset I_0 of I. Therefore $F \subseteq \mathrm{U}\{G_i : i \in I_0\}$. Thus F is $\hat{g}^{**}s$-*Lindelöf*.

Theorem 5.5. Let A be a $\hat{g}^{**}s$-*Lindelöf* subset of X and B be a $\hat{g}^{**}s$-*closed* subset of X. Then $A \mathrm{I}\ B$ is $\hat{g}^{**}s$-*Lindelöf*.

Proof. Let $\{G_i : i \in I\}$ be a $\hat{g}^{**}s$-*open* cover of $A \mathrm{I}\ B$. Then $A \subseteq (\bigcup_{i \in I} G_i) \mathrm{U} B^c$. Since A is $\hat{g}^{**}s$-*Lindelöf*, then there exists a countable subset I_0 of I such that $A \subseteq (\bigcup_{i \in I_0} G_i) \mathrm{U} B^c$. Therefore $A \mathrm{I}\ B \subseteq \bigcup_{i \in I_0} G_i$. Thus $A \mathrm{I}\ B$ is $\hat{g}^{**}s$-*Lindelöf*.

FULL TEXTS BOOK

Theorem 5.6. A topological space (X,τ) is $\hat{g}^{**}s$-*Lindelöf* if and only if every collection of $\hat{g}^{**}s$-*closed* subsets of X satisfying the countable intersection property, has, itself, a non-empty intersection.

Necessity: Let $\Lambda=\{F_i : i\in I\}$ be a collection of $\hat{g}^{**}s$-*closed* subsets of X which has the countable intersection property. Assume that $\bigcap_{i\in I} F_i=\phi$. Then $X=\bigcup_{i\in I} F_i^c$. Since X is $\hat{g}^{**}s$-*Lindelöf*, then there exists a countable subset I_0 of I such that $X=\bigcup_{i\in I_0} F_i^c$. Therefore, $\bigcap_{i\in I_0} F_i=\phi$ contradicts that Λ has the countable intersection property. Thus Λ has, itself, a non-empty intersection.

Sufficiency: Let $\{G_i : i\in I\}$ be a $\hat{g}^{**}s$-*open* cover of X. Suppose $\{G_i : i\in I\}$ has no countable subcover. Then $X-\bigcup_{i\in J} G_i\neq\phi$, for any countable subset J of I. Now, $\bigcap_{i\in J} G_i^c\neq\phi$ implies that $\{G_i^c : i\in I\}$ is a collection of $\hat{g}^{**}s$-*closed* subsets of X which has the countable intersection property. Therefore $\bigcap_{i\in I} G_i^c\neq\phi$. Thus $X\neq\bigcup_{i\in I} G_i$ contradicts that $\{G_i : i\in I\}$ is a $\hat{g}^{**}s$-*open* cover of X. Hence X is $\hat{g}^{**}s$-*Lindelöf*.

Theorem 5.7. A $\hat{g}^{**}s$-*continuous* image of a $\hat{g}^{**}s$-*Lindelöf* space is a *Lindelöf* space.

Proof. Let $f:(X,\tau)\to(Y,\sigma)$ be a $\hat{g}^{**}s$-*continuous* mapping from a $\hat{g}^{**}s$-*Lindelöf* space X onto a topological space Y. Let $\{A_i : i\in I\}$ be an open cover of Y. Then $\{f^{-1}(A_i) : i\in I\}$ is a $\hat{g}^{**}s$-*open* cover of X, as f is $\hat{g}^{**}s$-*continuous*. Since X is $\hat{g}^{**}s$-*Lindelöf* space, the $\hat{g}^{**}s$-*open* cover $\{f^{-1}(A_i) : i\in I\}$ of X has a countable subcover say $\{f^{-1}(A_i) : i\in I_0\}$ for some countable set $I_0\subseteq I$. Therefore $X=\mathrm{U}\{f^{-1}(A_i) : i\in I_0\}$, which implies $f(X)=\mathrm{U}\{A_i : i\in I_0\}$, then $Y=\mathrm{U}\{A_i : i\in I_0\}$. That is $\{A_i : i\in I_0\}$ a countable subcover of $\{A_i : i\in I\}$ for Y. Hence (Y,σ) is a *Lindelöf* space.

Theorem 5.8. The image of a $\hat{g}^{**}s$-*Lindelöf* space under a $\hat{g}^{**}s$-*irresolue* mapping is $\hat{g}^{**}s$-*Lindelöf*.space.

Proof. Suppose that a mapping $f:(X,\tau)\to(Y,\sigma)$ is a $\hat{g}^{**}s$-*irresolue* mapping from a $\hat{g}^{**}s$-*Lindelöf* space (X,τ) onto a topological space (Y,σ). Let $\{B_i : i\in I\}$ be a $\hat{g}^{**}s$-*open* cover of (Y,σ). Since f is $\hat{g}^{**}s$-*irresolue*. Therefore $\{f^{-1}(B_i) : i\in I\}$ is a $\hat{g}^{**}s$-*open* cover of (X,τ). As (X,τ) is $\hat{g}^{**}s$-*Lindelöf* space, the $\hat{g}^{**}s$-*open* cover $\{f^{-1}(B_i) : i\in I\}$ of (X,τ) has a countable subcover say $\{f^{-1}(B_i) : i\in I_0\}$ for some countable set $I_0\subseteq I$. Therefore $X=\mathrm{U}\{f^{-1}(B_i) : i\in I_0\}$, which implies $f(X)=\mathrm{U}\{B_i : i\in I_0\}$, so that $Y=\mathrm{U}\{B_i : i\in I_0\}$. That is $\{B_i : i\in I_0\}$ a countable subcover of $\{B_i : i\in I\}$ for Y. Hence (Y,σ) is a $\hat{g}^{**}s$-*Lindelöf* space.

Theorem 5.9. If (X,τ) is $\hat{g}^{**}s$-*Lindelöf* space and countably $\hat{g}^{**}s$-*compact* space, then (X,τ) is $\hat{g}^{**}s$-*compact* space.

FULL TEXTS BOOK

Proof. Suppose (X,τ) is $\hat{g}^{**}s$-*Lindelöf* space and countably $\hat{g}^{**}s$-*compact* space. Let $\{A_i : i \in I\}$ be a $\hat{g}^{**}s$-*open* cover of (X,τ). Since (X,τ) is $\hat{g}^{**}s$-*Lindelöf* space, $\{A_i : i \in I\}$ has a countable subcover say $\{A_i : i \in I_0\}$ for some countable set $I_0 \subseteq I$. Therefore $\{A_i : i \in I_0\}$ is a countable $\hat{g}^{**}s$-*open* cover of (X,τ). Again, since (X,τ) is countably $\hat{g}^{**}s$-*compact* space, $\{A_i : i \in I_0\}$ has a finite subcover and say $\{A_i : i = 1,2,3,...,n\}$. Therefore $\{A_i : i = 1,2,3,...,n\}$ is a finite subcover of $\{A_i : i \in I\}$ for (X,τ). Hence (X,τ) is a $\hat{g}^{**}s$-*compact* space.

Theorem 5.10. If a function $f:(X,\tau)\to(Y,\sigma)$ is $\hat{g}^{**}s$-*irresolue* and a subset A of X is $\hat{g}^{**}s$-*Lindelöf* relative to X, then $f(A)$ is $\hat{g}^{**}s$-*Lindelöf* relative to Y.

Proof. Let $\{B_i : i \in I\}$ be a cover of $f(A)$ by $\hat{g}^{**}s$-*open* subsets of Y. By hypothesis, f is $\hat{g}^{**}s$-*irresolue* and so $\{f^{-1}(B_i) : i \in I\}$ is a cover of A by $\hat{g}^{**}s$-*open* subsets of X. Since A is $\hat{g}^{**}s$-*Lindelöf* relative to X, $\{f^{-1}(B_i) : i \in I\}$ has a countable subcover say $\{f^{-1}(B_i) : i \in I_0\}$ for A, where I_0 is a countable subset of I. Now $\{B_i : i \in I_0\}$ is a countable subcover of $\{B_i : i \in I\}$ for $f(A)$. So $f(A)$ is $\hat{g}^{**}s$-*Lindelöf* relative to Y.

6. ALMOST $\hat{g}^{**}s$-COMPACT SPACES

Definition 6.1. A topological space (X,τ) is called almost $\hat{g}^{**}s$-*compact* $(resp.\ almost\ \hat{g}^{**}s\text{-}Lindelöf)$ provided that every $\hat{g}^{**}s$-*open* cover of X has a finite (resp. countable) sub-collection, the $\hat{g}^{**}s$-*closure* of whose members cover X.

The proofs of the following four propositions are straightforward and therefore will be omitted.

Proposition 6.2. Every almost $\hat{g}^{**}s$-*compact* space is almost $\hat{g}^{**}s$-*Lindelöf* space.

Proposition 6.3. Every $\hat{g}^{**}s$-*compact* space $(resp.\ \hat{g}^{**}s\text{-}Lindelöf\ space)$ is almost $\hat{g}^{**}s$-*compact* $(resp.\ almost\ \hat{g}^{**}s\text{-}Lindelöf)$.

Proposition 6.4. Any finite (resp. countable) topological space (X,τ) is almost $\hat{g}^{**}s$-*compact* $(resp.\ almost\ \hat{g}^{**}s\text{-}Lindelöf)$.

Proposition 6.5. A finite (resp. countable) union of almost $\hat{g}^{**}s$-*compact* $(resp.\ almost\ \hat{g}^{**}s\text{-}Lindelöf)$ subsets of (X,τ) is almost $\hat{g}^{**}s$-*compact* $(resp.\ almost\ \hat{g}^{**}s\text{-}Lindelöf)$.

Definition 6.6. A subset E of (X,τ) is called $\hat{g}^{**}s$-*clopen* provided that it is $\hat{g}^{**}s$-*open* and $\hat{g}^{**}s$-*closed*.

Theorem 6.7. Let F be a $\hat{g}^{**}s$-*clopen* subset of an almost $\hat{g}^{**}s$-*compact* $(resp.\ almost\ \hat{g}^{**}s\text{-}Lindelöf)$ space (X,τ). Then F is almost $\hat{g}^{**}s$-*compact* $(resp.\ almost\ \hat{g}^{**}s\text{-}Lindelöf)$.

FULL TEXTS BOOK

Proof. Let F be a $\hat{g}^{**}s$-*clopen* subset of an almost $\hat{g}^{**}s$-*compact* space X and $\{G_i : i \in I\}$ be a $\hat{g}^{**}s$-*open* cover of F. Then F^c is $\hat{g}^{**}s$-*open* and $X \subseteq \left(\cup\{G_i : i \in I\}\right) \cup F^c$. Since X is almost $\hat{g}^{**}s$-*compact*, then there exists a finite subset I_0 of I such that $X = \left(\cup\{\hat{g}^{**}s\text{-}Cl(G_i) : i \in I_0\}\right) \cup F^c$. Thus it follows that $F \subseteq \cup\{\hat{g}^{**}s\text{-}Cl(G_i) : i \in I_0\}$. Hence F is almost $\hat{g}^{**}s$-*compact*.

The proof is similar in the case of almost $\hat{g}^{**}s$-*Lindelöf*.

Theorem 6.8. If A is an almost $\hat{g}^{**}s$-*compact* $(resp.\ almost\ \hat{g}^{**}s\text{-}Lindelöf)$ subset of (X, τ) and B is a $\hat{g}^{**}s$-*clopen* subset of X, then $A \cap B$ is almost $\hat{g}^{**}s$-*compact* $(resp.\ almost\ \hat{g}^{**}s\text{-}Lindelöf)$.

Proof. Let $\Lambda = \{G_i : i \in I\}$ be a $\hat{g}^{**}s$-*open* cover of $A \cap B$. Then $A \subseteq \left(\cup\{G_i : i \in I\}\right) \cup B^c$. Since A is almost $\hat{g}^{**}s$-*compact*, then there exists a finite subset I_0 of I such that $A \subseteq \left(\cup\{\hat{g}^{**}s\text{-}Cl(G_i) : i \in I_0\}\right) \cup B^c$. Hence $A \cap B \subseteq \cup\{\hat{g}^{**}s\text{-}Cl(G_i) : i \in I_0\}$. Thus $A \cap B$ is almost $\hat{g}^{**}s$-*compact*.

The proof is similar in the case of almost $\hat{g}^{**}s$-*Lindelöf*.

Theorem 6.9. Let a mapping $f : (X, \tau) \to (Y, \sigma)$ be $\hat{g}^{**}s$-*irresolute*. Suppose that A is almost $\hat{g}^{**}s$-*compact* $(resp.\ almost\ \hat{g}^{**}s\text{-}Lindelöf)$ subset of X. Then $f(A)$ is almost $\hat{g}^{**}s$-*compact* $(resp.\ almost\ \hat{g}^{**}s\text{-}Lindelöf)$.

Proof. Suppose that $\{G_i : i \in I\}$ is $\hat{g}^{**}s$-*open* cover of $f(A)$. Then $f(A) \subseteq \cup\{G_i : i \in I\}$. Now $A \subseteq \cup\{f^{-1}(G_i) : i \in I\}$. Since f is $\hat{g}^{**}s$-*irresolute*, then $\{f^{-1}(G_i) : i \in I\}$ is a $\hat{g}^{**}s$-*open* cover of A. By hypothesis, A is almost $\hat{g}^{**}s$-*compact*, then there exists a finite subset I_0 of I such that $A \subseteq \cup\{\hat{g}^{**}s\text{-}Cl[f^{-1}(G_i)] : i \in I_0\}$. Since f is $\hat{g}^{**}s$-*irresolute*, then $\hat{g}^{**}s\text{-}Cl(f^{-1}(G_i)) \subseteq f^{-1}[\hat{g}^{**}s\text{-}Cl(G_i)]$, for all $i \in I_0$. Hence it follows that $f(A) \subseteq \cup_{i \in I_0} f[f^{-1}(\hat{g}^{**}s\text{-}Cl(G_i))] \subseteq \cup_{i \in I_0} \hat{g}^{**}s\text{-}Cl(G_i)$, which implies that $f(A) \subseteq \cup_{i \in I_0} \hat{g}^{**}s\text{-}Cl(G_i)$. Thus $f(A)$ is almost $\hat{g}^{**}s$-*compact*.

The proof is similar in the case of almost $\hat{g}^{**}s$-*Lindelöf*.

Theorem 6.10. Let $f : (X, \tau) \to (Y, \sigma)$ be a $\hat{g}^{**}s$-*open* bijective mapping and (Y, σ) is almost $\hat{g}^{**}s$-*compact*. Then (X, τ) is almost compact.

Proof. Let $\{G_i : i \in I\}$ be an open cover of X. Then $f(X) = f(\cup_{i \in I} G_i)$. Therefore $Y = \cup_{i \in I} f(G_i)$. Now, Y is almost $\hat{g}^{**}s$-*compact*, then there exists a finite subset I_0 of I such that $Y = \cup_{i \in I_0} \hat{g}^{**}s\text{-}Cl[f(G_i)]$. Since f is $\hat{g}^{**}s$-*open* bijective mapping, then f is $\hat{g}^{**}s$-*closed* mapping. Therefore, we have $\hat{g}^{**}s\text{-}Cl[f(G_i)] \subseteq f[Cl(G_i)]$, for all $i \in I_0$. Thus

FULL TEXTS BOOK

$Y \subseteq \bigcup_{i\in I_0} f\left[Cl(G_i)\right] \subseteq f\left[\bigcup_{i\in I_0} Cl(G_i)\right]$, which implies that $X = f^{-1}(Y) \subseteq \bigcup_{i\in I_0} Cl(G_i)$. Thus $X = \bigcup_{i\in I_0} Cl(G_i)$. Hence X is almost compact.

Theorem 6.11. If every collection of $\hat{g}^{**}s$-*closed* subsets of (X,τ), satisfying the finite (resp. countable) intersection property, has, itself, a non-empty intersection, then X is almost $\hat{g}^{**}s$-*compact* $(resp.\ almost\ \hat{g}^{**}s\text{-}Lindelöf)$.

Proof. Let $\{G_i : i \in I\}$ be a $\hat{g}^{**}s$-*open* cover of X. Suppose $\{G_i : i \in I\}$ has no finite sub collection such that the $\hat{g}^{**}s$-*closure* of whose members cover X. Then $X - \bigcup_{i=1}^{i=n} \hat{g}^{**}s\text{-}Cl(G_i) \neq \phi$, for any $n \in N$. Therefore $X - \bigcup_{i=1}^{i=n} G_i \neq \phi$. Now, $\bigcap_{i=1}^{n} G_i^c \neq \phi$ implies $\{G_i^c : i \in I\}$ is a collection of $\hat{g}^{**}s$-*closed* subsets of X which has the finite intersection property. Thus $\bigcap_{i\in I} G_i^c \neq \phi$ implies $X \neq \bigcup_{i\in I} G_i$. But this is a contradiction. Hence X is almost $\hat{g}^{**}s$-*compact*.

A similar proof is given in the case of *almost* $\hat{g}^{**}s$-*Lindelöf*.

7. MILDLY $\hat{g}^{**}s$-COMPACT SPACES

Definition 7.1. A topological space (X,τ) is called mildly $\hat{g}^{**}s$-*compact* $(resp.\ mildly\ \hat{g}^{**}s\text{-}Lindelöf)$ provided that every $\hat{g}^{**}s$-*clopen* cover of X has a finite (resp. countable) subcover.

Definition 7.2. Every mildly $\hat{g}^{**}s$-*compact* space is mildly $\hat{g}^{**}s$-*Lindelöf*.

Proof. It is straightforward.

Theorem 7.3. Every almost $\hat{g}^{**}s$-*compact* $(resp.\ almost\ \hat{g}^{**}s\text{-}Lindelöf)$ space (X,τ) is mildly $\hat{g}^{**}s$-*compact* $(resp.\ mildly\ \hat{g}^{**}s\text{-}Lindelöf)$.

Proof. Let $\Lambda = \{H_i : i \in I\}$ be a $\hat{g}^{**}s$-*clopen* cover of (X,τ). Since (X,τ) is almost $\hat{g}^{**}s$-*compact*, then there exists a finite subset I_0 of I such that $X = \bigcup_{i\in I_0} \hat{g}^{**}s\text{-}Cl(H_i)$. Now, $\hat{g}^{**}s\text{-}Cl(H_i) = H_i$. Thus (X,τ) is mildly $\hat{g}^{**}s$-*compact*.

A similar proof is given when (X,τ) is *almost* $\hat{g}^{**}s$-*Lindelöf*.

Corollary 7.4. Every $\hat{g}^{**}s$-*compact* $(resp.\ \hat{g}^{**}s\text{-}Lindelöf)$ space is mildly $\hat{g}^{**}s$-*compact* $(resp.\ mildly\ \hat{g}^{**}s\text{-}Lindelöf)$.

Theorem 7.5. If F is a $\hat{g}^{**}s$-*clopen* subset of a mildly $\hat{g}^{**}s$-*compact* $(resp.\ mildly\ \hat{g}^{**}s\text{-}Lindelöf)$ space X, then F is mildly $\hat{g}^{**}s$-*ompact* $(resp.\ mildly\ \hat{g}^{**}s\text{-}Lindelöf)$.

Proof. Let F be a $\hat{g}^{**}s$-*clopen* subset of X and $\{G_i : i \in I\}$ be a $\hat{g}^{**}s$-*clopen* cover of F. Then F^c is a $\hat{g}^{**}s$-*clopen* set and $F \subseteq \bigcup_{i\in I} G_i$. Therefore $X = \left(\bigcup_{i\in I} G_i\right) \cup F^c$. Since X is

FULL TEXTS BOOK

mildly $\hat{g}^{**}s$-*compact*, then there exists a finite subset I_0 of I such that $X=\left(\bigcup_{i\in I_0}G_i\right)\cup F^c$. So $F\subseteq\left(\bigcup_{i\in I_0}G_i\right)$. Hence F is mildly $\hat{g}^{**}s$-*compact*.

The proof is similar in a case of mildly $\hat{g}^{**}s$-*Lindelöf*.

Theorem 7.6. If A is a mildly $\hat{g}^{**}s$-*compact* (*resp. mildly* $\hat{g}^{**}s$-*Lindelöf*) subset of X and B is a $\hat{g}^{**}s$-*clopen* subset of X, then $A\cap B$ is mildly $\hat{g}^{**}s$-*compact* (*resp. mildly* $\hat{g}^{**}s$-*Lindelöf*).

Proof. Let $\Lambda=\{G_i:i\in I\}$ be a $\hat{g}^{**}s$-*clopen* cover of $A\cap B$. Then $A\subseteq\left(\bigcup_{i\in I}G_i\right)\cup B^c$. Since A is mildly $\hat{g}^{**}s$-*compact*, then there exists a finite subset I_0 of I such that $A\subseteq\left(\bigcup_{i\in I_0}G_i\right)\cup B^c$. Therefore $A\cap B\subseteq\bigcup_{i\in I_0}G_i$. Thus $A\cap B$ is mildly $\hat{g}^{**}s$-*compact*.

The proof is similar in case of mildly $\hat{g}^{**}s$-*Lindelöf*.

Theorem 7.7. If $f:(X,\tau)\to(Y,\sigma)$ is a $\hat{g}^{**}s$-*open* bijective mapping and (Y,σ) is mildly $\hat{g}^{**}s$-*compact*, then (X,τ) is mildly compact.

Proof. Let $\{G_i:i\in I\}$ be a clopen cover for X. Then $f(X)=f\left(\bigcup_{i\in I}G_i\right)$. Hence $Y=\bigcup_{i\in I}f(G_i)$. Since f is $\hat{g}^{**}s$-*open* bijective mapping, then f is $\hat{g}^{**}s$-*closed*. Therefore $\{f(G_i):i\in I\}$ is a $\hat{g}^{**}s$-*clopen* cover of X. Since Y is mildly $\hat{g}^{**}s$-*compact*, then there exists a finite subset I_0 of I such that $Y=\bigcup_{i\in I_0}f(G_i)$. Therefore $X=\bigcup_{i\in I_0}G_i$. Thus X is mildly compact.

Proposition 7.8. A subset A of (X,τ) is mildly compact (*resp. mildly Lindelöf*) if and only if (A,τ_A) is mildly compact (*resp. mildly Lindelöf*).

8. CONCLUSIONS

We have used $\hat{g}^{**}s$-*open* sets to introduce the new concepts of notions in topological spaces namely $\hat{g}^{**}s$-*compact* space, countably $\hat{g}^{**}s$-*compact* space, $\hat{g}^{**}s$-*Lindelöf* space, almost $\hat{g}^{**}s$-*compact* space, and mildly $\hat{g}^{**}s$-*compact* space and have investigated several properties and characterization of these new concepts.

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FULL TEXTS BOOK

$\hat{g}^{**}s$-MAPPINGS IN TOPOLOGICAL SPACES

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ABSTRACT

Analysis is one of the greatest achievements in the history of mathematics. The achievement opens a new era of mathematical progress and plays an important role in the development of physics, astronomy, signal processing and other disciplines. At the end of the 19th century, mathematicians deduced many properties of continuous functions on closed intervals, which undoubtedly promoted the development of analytical theory. Bolzano's Function Theory gives the earliest proofs of the Boundedness theorem and the Extreme value theorem and Weierstrass proved the Extreme value theorem in Berlin lecture. The Intermediate value theorem was first proved in 1817 by Bolzano, and then Cauchy gave a proof in 1821. The definition of uniform continuity is proposed by Heine, and he published a proof of the Uniform continuity theorem. There are some important properties of continuous functions on closed intervals including Weierstrass second theorem: Boundedness theorem, Weierstrass first theorem: Extreme value theorem, Bolzano-Cauchy second theorem: Intermediate value theorem, Cantor theorem: Uniform continuity theorem. Continuous functions have four fundamental properties on closed intervals: Boundedness theorem, Extreme value theorem, Intermediate value theorem, Uniform continuity theorem. These theorems are the basis of mathematical analysis and the direct expression of real number theory in functions. In 2020, M. Anto and S. Shahila Andrin [2] inroduced a new class of closed sets called $\hat{g}^{**}$closed sets in topological spaces and investigated some basic properties. In this paper, we introduce $\hat{g}^{**}$continuous function, $\hat{g}^{**}$irresolute function, $\hat{g}^{**}$open function, $\hat{g}^{**}$closed function, pre$-\hat{g}^{**}$open function, and pre$-\hat{g}^{**}$closed function, and investigate several properties and characterizations of these new types of mappings in topological spaces.

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1. INTRODUVTION

Introducing new versions of open sets in a topological space which may acquire either weaker or stronger properties is often studied. The first attempt was done by Levine [14], where he introduced the concepts of semi-open set, semi-closed set, and semi-continuity of a function. In 2020, M. Anto and S. Shahila Andrin [2] inroduced a new class of closed sets called $\hat{g}^{**}$closed sets in topological spaces and investigated some basic properties. In this paper, we introduce $\hat{g}^{**}$continuous function, $\hat{g}^{**}$irresolute function, $\hat{g}^{**}$open function, $\hat{g}^{**}$closed function, pre$-\hat{g}^{**}$open function, and pre$-\hat{g}^{**}$closed function, and investigate several properties and characterizations of these new types of mappings in topological spaces.

FULL TEXTS BOOK

2. BASIC PROPERTIES AND APPLICATIONS OF $\hat{g}^{**}s$- OPEN SETS

In this section, we shall define the concept of $\hat{g}^{**}s$- open set and determine its connection to the classical open set and characterize the concepts of $\hat{g}^{**}s$- *open* sets.

Definition 2.1. A subset A of a topological space (X,τ) is an α- *open* set, if $A \subseteq Int\left[Cl\left(Int\left(A\right)\right)\right]$ and an α- *closed* set, if $Cl\left[Int\left(Cl\left(A\right)\right)\right] \subseteq A$.

The α- *closure* of a subset A of X denoted by $\alpha Cl\left(A\right)$ is defined to be the intersection of all α- *closed* sets containing A. The α- *interior* of A denoted by $\alpha Int\left(A\right)$ is defined to be the union of all α- *open* sets contained in A.

Definition 2.2. A subset A of a topological space (X,τ) is a *semi* - *open* set, if $A \subseteq Cl\left(Int\left(A\right)\right)$ and a *semi* - *closed* set if $Int\left(Cl\left(A\right)\right) \subseteq A$.

The *semi* - *closure* of a subset A of X denoted by $sCl\left(A\right)$ is defined to be the intersection of all *semi* - *closed* sets containing A. The *semi* - *interior* of A denoted by $sInt\left(A\right)$ is defined to be the union of all *semi* - *open* sets contained in A.

Definition 2.3. A subset A of a topological space (X,τ) is called a *regular* - *open* set, if $A = Int\left(Cl\left(A\right)\right)$ and a *regular* - *closed* set if $A = Cl\left(Int\left(A\right)\right)$.

Definition 2.4. A subset A of a topological space (X,τ) is called a *generalized* - *closed* (*briefly* g- *closed*) set, if $Cl\left(A\right) \subseteq U$, whenever $A \subseteq U$ and U is *open* in (X,τ).

Definition 2.5. A subset A of a topological space (X,τ) is called a *generalized semi* - *closed* (*briefly* gs- *closed*) set, if $sCl\left(A\right) \subseteq U$, whenever $A \subseteq U$ and U is *open* in (X,τ).

Definition 2.6. A subset A of a topological space (X,τ) is called a $\hat{g}$- *closed* set, if $Cl\left(A\right) \subseteq U$, whenever $A \subseteq U$ and U is *semi* - *open* in (X,τ).

Definition 2.7. A subset A of a topological space (X,τ) is called a g^{*}-*closed* set, if $Cl\left(A\right) \subseteq U$, whenever $A \subseteq U$ and U is g- *open* in (X,τ).

Definition 2.8. A subset A of a topological space (X,τ) is called a $\hat{g}^{*}$-*closed* set, if $Cl\left(A\right) \subseteq U$, whenever $A \subseteq U$ and U is $\hat{g}$- *open* in (X,τ).

Definition 2.9. A subset A of a topological space (X,τ) is called a g^{**}- *closed* set, if $Cl\left(A\right) \subseteq U$, whenever $A \subseteq U$ and U is g^{*}-*open* in (X,τ).

FULL TEXTS BOOK

Definition 2.10. A subset A of a topological space (X,τ) is called a g^*s-*closed* set, if $sCl(A)\subseteq U$, whenever $A\subseteq U$ and U is gs-*open* in (X,τ).

Definition 2.11. A subset A of a topological space (X,τ) is called a $\hat{g}^*s$-*closed* set, if $sCl(A)\subseteq U$, whenever $A\subseteq U$ and U is $\hat{g}$-*open* in (X,τ).

Definition 2.12. A subset A of a topological space (X,τ) is called a g^*s^*-*closed* set, if $sCl(A)\subseteq U$, whenever $A\subseteq U$ and U is g^*-*open* in (X,τ).

Definition 2.13. A subset A of a topological space (X,τ) is called a gs^{**}-*closed* set, if $Cl(A)\subseteq U$, whenever $A\subseteq U$ and U is gs^*-*open* in (X,τ).

Definition 2.14. A subset A of a topological space (X,τ) is called a gs^*-*closed* set, if $Cl(A)\subseteq U$, whenever $A\subseteq U$ and U is gs-*open* in (X,τ).

Definition 2.15. A subset A of a topological space (X,τ) is called a $\hat{g}^{**}s$-*closed* set if $sCl(A)\subseteq U$, whenever $A\subseteq U$ and U is $\hat{g}^*$-*open* in (X,τ). The complement of a $\hat{g}^{**}s$-*closed* set is caaled a $\hat{g}^{**}s$-*open* set in (X,τ). The collection of all $\hat{g}^{**}s$-open $(\hat{g}^{**}s$-closed$)$ subsets of (X,τ) is denoted by $\hat{g}^{**}s$-$O(X,\tau)$ $(\hat{g}^{**}s$-$C(X,\tau))$.

Proposition 2.16. (i) Every closed (open) set is $\hat{g}^{**}s$-closed $(\hat{g}^{**}s$-open$)$ set.

(ii) Every α-*closed* $(\alpha$-*open*$)$ set is $\hat{g}^{**}s$-closed $(\hat{g}^{**}s$-open$)$ set.

(iii) Every *semi*-*closed* $(semi$-*open*$)$ set is $\hat{g}^{**}s$-closed $(\hat{g}^{**}s$-open$)$ set.

(iv) Every g^*s-*closed* $(g^*s$-*open*$)$ set is $\hat{g}^{**}s$-closed $(\hat{g}^{**}s$-open$)$ set.

(v) Every *regular*-*closed* $(regular$-*open*$)$ set is $\hat{g}^{**}s$-closed $(\hat{g}^{**}s$-open$)$ set.

(vi) Every g^*-*closed* $(g^*$-*open*$)$ set is $\hat{g}^{**}s$-closed $(\hat{g}^{**}s$-open$)$ set.

Proposition 2.17. Arbitrary intersection of $\hat{g}^{**}s$-closed sets is $\hat{g}^{**}s$-closed.

Proposition 2.18. Arbitrary union of $\hat{g}^{**}s$-open sets is $\hat{g}^{**}s$-open.

Definition 2.19. Let (X,τ) be a topological space and $B\subseteq X$. We define the $\hat{g}^{**}s$-closure of B $(\text{briefly } \hat{g}^{**}s\text{-Cl(B)})$ to be the intersection of all $\hat{g}^{**}s$-closed sets containing B which is denoted by $\hat{g}^{**}s$-$Cl(B)=\text{I}\{A: B\subseteq A \text{ and } A\in \hat{g}^{**}s\text{-}C(X,\tau)\}$. We note that $\hat{g}^{**}s$-$Cl(B)$ is the smallest $\hat{g}^{**}s$-*closed* set containing B.

FULL TEXTS BOOK

Definition 2.20. Let (X,τ) be any topological space and B be a subset of X. A point p of X is called a $\hat{g}^{**}s$-*interior* point of B, if there exists a $\hat{g}^{**}s$-*open* set G such that $p \in G \subseteq B$. The set of all $\hat{g}^{**}s$-*interior* points of B is said to be $\hat{g}^{**}s$-*interior* of B $\left(\text{briefly } \overset{\circ}{\hat{g}}{}^{**}s\text{-Int}(B)\right)$ and it is defined by $\hat{g}^{**}s\text{-}Int(B) = \cup\{A : A \subseteq B \text{ and } A \in \overset{\circ}{\hat{g}}{}^{**}s\text{-}O(X,\tau)\}$.

Proposition2.21. If U and V are sets in a topological space (X,τ), then

(1) $\hat{g}^{**}s\text{-}Int(\phi) = \phi$.

(2) $\hat{g}^{**}s\text{-}Int(X) = X$.

(3) $\hat{g}^{**}s\text{-}Int(U) \subseteq U$.

(4) $U \subseteq V \Rightarrow \hat{g}^{**}s\text{-}Int(U) \subseteq \hat{g}^{**}s\text{-}Int(V)$.

Proposition2.22. Let G be any subset of a topological space (X,τ). Then $x \in \hat{g}^{**}s\text{-}Cl(A)$ if and only if for every $\hat{g}^{**}s$-*open* set U containing x, $U \cap G \neq \phi$.

Proposition2.23. For any subset U of topological space (X,τ), $\hat{g}^{**}s\text{-}Int(U) \subseteq U \subseteq \hat{g}^{**}s\text{-}Cl(U)$.

Definition 2.24. Let A be a subset of a topological space (X,τ). A point $x \in A$ is said to be an $\hat{g}^{**}s$-*limit* point of A if for each $\hat{g}^{**}s$-*open* set U containing x, $U \cap (A - \{x\}) \neq \phi$. The set of all $\hat{g}^{**}s$-*limit* points of A is called the $\hat{g}^{**}s$-*derived* set of A and is denoted by $\hat{g}^{**}\text{-}D(A)$.

Theorem 2.25. For any subset A of a topological space X, $\hat{g}^{**}s\text{-}Cl(A) = A \cup [\hat{g}^{**}s\text{-}D(A)]$.

Proof. Since $\hat{g}^{**}s\text{-}D(A) \subseteq \hat{g}^{**}s\text{-}Cl(A)$. $A \cup [\hat{g}^{**}s\text{-}D(A)] \subseteq \hat{g}^{**}s\text{-}Cl(A)$. On the other hand, let $x \in \hat{g}^{**}s\text{-}Cl(A)$. If $x \in A$, then the proof is complete. If $x \notin A$, each $\hat{g}^{**}s$-*open* set U containing x intersects A at a point distinct from x, so $x \in \hat{g}^{**}s\text{-}D(A)$. Thus, $\hat{g}^{**}s\text{-}Cl(A) \subseteq [A \cup (\hat{g}^{**}s\text{-}D(A))]$, which completes the proof.

Corollary 2.26. A subset A of a space X is $\hat{g}^{**}s$-*closed* if and only if it contains the set of all of its $\hat{g}^{**}s$-*limit* points.

Theorem 2.27. For subsets A, B of a space X, the following statements are true:

(1) $\hat{g}^{**}s\text{-}Int(A)$ is the largest $\hat{g}^{**}s$-*open* set contained in A;

(2) A is $\hat{g}^{**}s$-*open* if and only if $A = \hat{g}^{**}s\text{-}Int(A)$.

(3) $\hat{g}^{**}s\text{-}Int[\hat{g}^{**}s\text{-}Int(A)] = \hat{g}^{**}s\text{-}Int(A)$;

(4) $\hat{g}^{**}s\text{-}Int(A) = [A - (\hat{g}^{**}s\text{-}D(X - A))]$;

(5) $[X - (\hat{g}^{**}s\text{-}Cl(A))] = \hat{g}^{**}s\text{-}Int(X - A)$;

FULL TEXTS BOOK

$(6)\left[X-\left(\hat{g}^{**}s\text{-}Int(A)\right)\right]=\hat{g}^{**}s\text{-}Cl(X-A);$

$(7)\left[\hat{g}^{**}s\text{-}Int(A)\right]\cup\left[\hat{g}^{**}s\text{-}Int(B)\right]\subseteq\hat{g}^{**}s\text{-}Int(A\cup B);$

$(8)\ \hat{g}^{**}s\text{-}Int(A\cap B)=\left[\hat{g}^{**}s\text{-}Int(A)\right]\cap\left[\hat{g}^{**}s\text{-}Int(B)\right];$

Proof. (4) If $x\in\left[A-\left(\hat{g}^{**}s\text{-}D(X-A)\right)\right]$, then $x\notin\hat{g}^{**}s\text{-}D(X-A)$ and so there exists a $\hat{g}^{**}s\text{-}open$ set U containing x such that $U\cap(X-A)=\phi$. Then, $x\in U\subseteq A$ and hence $x\in\hat{g}^{**}s\text{-}Int(A)$, that is, $\left[A-\left(\hat{g}^{**}s\text{-}D(X-A)\right)\right]\subseteq\hat{g}^{**}s\text{-}Int(A)$. On the other hand, if $x\in\hat{g}^{**}s\text{-}Int(A)$, then $x\notin\hat{g}^{**}s\text{-}D(X-A)$ since $\hat{g}^{**}s\text{-}Int(A)$ is $\hat{g}^{**}s\text{-}open$ and $\left[\left(\hat{g}^{**}s\text{-}Int(A)\right)\cap(X-A)\right]=\phi$. Hence, $\hat{g}^{**}s\text{-}Int(A)=\left[A-\left(\hat{g}^{**}s\text{-}D(X-A)\right)\right]$.

$(6)\ X-\left[\hat{g}^{**}s\text{-}Int(A)\right]=X-\left[A-\left(\hat{g}^{**}s\text{-}D(X-A)\right)\right]=(X-A)\cup\left[\hat{g}^{**}s\text{-}D(X-A)\right]=\hat{g}^{**}s\text{-}Cl(X-A).$

Theorem 2.28. Let (X,τ) be a topological space and $A, B\subseteq X$. Then the following statements are true:

(1) $x\in\hat{g}^{**}s\text{-}Cl(A)$ if and only if for every $\hat{g}^{**}s\text{-}open$ subset U containing x, $U\cap A\neq\phi$.

(2) $A\subseteq B$ implies that $\hat{g}^{**}s\text{-}Cl(A)\subseteq\hat{g}^{**}s\text{-}Cl(B)$.

(3) A is $\hat{g}^{**}s\text{-}closed$ if and only if $\hat{g}^{**}s\text{-}Cl(A)=A$.

(4) $\hat{g}^{**}s\text{-}Cl\left[\hat{g}^{**}s\text{-}Cl(A)\right]=\hat{g}^{**}s\text{-}Cl(A)$.

(5) $\left[\hat{g}^{**}s\text{-}Cl(A)\right]\cup\left[\hat{g}^{**}s\text{-}Cl(B)\right]=\hat{g}^{**}s\text{-}Cl(A\cup B)$.

(6) $\hat{g}^{**}s\text{-}Int(X-A)=X-\left[\hat{g}^{**}s\text{-}Cl(A)\right]$.

(7) $\hat{g}^{**}s\text{-}Cl(X-A)=X-\left[\hat{g}^{**}s\text{-}Int(A)\right]$.

Definition 2.29. $\hat{g}^{**}s\text{-}Bd(A)=A-\left[\hat{g}^{**}s\text{-}Int(A)\right]$ is said to be the $\hat{g}^{**}s\text{-}border$ of A.

Theorem 2.30. For a subset A of a space X, the following statements hold:

(1) $Bd(A)\subseteq\hat{g}^{**}s\text{-}Bd(A)$ where $Bd(A)$ denotes the border of A;

(2) $A=\hat{g}^{**}s\text{-}Int(A)\cup\hat{g}^{**}s\text{-}Bd(A)$;

(3) $\left[\hat{g}^{**}s\text{-}Int(A)\right]\cap\left[\hat{g}^{**}s\text{-}Bd(A)\right]=\phi$;

(4) A is a $\hat{g}^{**}s\text{-}open$ set if and only if $\hat{g}^{**}s\text{-}Bd(A)=\phi$;

(5) $\hat{g}^{**}s\text{-}Bd\left[\hat{g}^{**}s\text{-}Int(A)\right]=\phi$;

(6) $\hat{g}^{**}s\text{-}Int\left[\hat{g}^{**}s\text{-}Bd(A)\right]=\phi$;

(7) $\hat{g}^{**}s\text{-}Bd\left[\hat{g}^{**}s\text{-}Bd(A)\right]=\hat{g}^{**}s\text{-}Bd(A)$;

(8) $\hat{g}^{**}s\text{-}Bd(A)=A\cap\left[\hat{g}^{**}s\text{-}Cl(X-A)\right]$;

FULL TEXTS BOOK

$(9)\ \hat{g}^{**}s\text{-}Bd(A)=\hat{g}^{**}s\text{-}D(X-A).$

Proof. (6) If $x\in\hat{g}^{**}s\text{-}Int\left[\hat{g}^{**}s\text{-}Bd(A)\right]$, then $x\in\hat{g}^{**}s\text{-}Bd(A)$. On the other hand, since $\hat{g}^{**}s\text{-}Bd(A)\subseteq A,\quad x\in\hat{g}^{**}s\text{-}Int\left[\hat{g}^{**}s\text{-}Bd(A)\right]\subseteq\hat{g}^{**}s\text{-}Int(A)$. Therefore, we get $x\in\left[\hat{g}^{**}s\text{-}Int(A)\right]\cap\left[\hat{g}^{**}s\text{-}Bd(A)\right]$, which contradicts (3). Thus, $\hat{g}^{**}s\text{-}Int\left[\hat{g}^{**}s\text{-}Bd(A)\right]=\phi.$

$(8)\ \hat{g}^{**}s\text{-}Bd(A)=A-\left[\hat{g}^{**}s\text{-}Int(A)\right]=A-\left[X-\left(\hat{g}^{**}s\text{-}Cl(X-A)\right)\right]=A\cap\left[\hat{g}^{**}s\text{-}Cl(X-A)\right].$

$(9)\ \hat{g}^{**}s\text{-}Bd(A)=A-\left[\hat{g}^{**}s\text{-}Int(A)\right]=A-\left[A-\left(\hat{g}^{**}s\text{-}D(X-A)\right)\right]=\hat{g}^{**}s\text{-}D(X-A).$

Definition 2.31. $\hat{g}^{**}s\text{-}Fr(A)=\left[\hat{g}^{**}s\text{-}Cl(A)\right]-\left[\hat{g}^{**}s\text{-}Int(A)\right]$ is said to be the $\hat{g}^{**}s$- *frontier* of A.

Theorem 2.32. For a subset A of a space X, the following statements hold:

$(1)\ Fr(A)\subseteq\hat{g}^{**}s\text{-}Fr(A)$ where $Fr(A)$ denotes the frontier of A;

$(2)\ \hat{g}^{**}s\text{-}Cl(A)=\left[\hat{g}^{**}s\text{-}Int(A)\right]\cup\left[\hat{g}^{**}s\text{-}Fr(A)\right];$

$(3)\ \left[\hat{g}^{**}s\text{-}Int(A)\right]\cap\left[\hat{g}^{**}s\text{-}Fr(A)\right]=\phi;$

$(4)\ \hat{g}^{**}s\text{-}Bd(A)\subseteq\hat{g}^{**}s\text{-}Fr(A);$

$(5)\ \hat{g}^{**}s\text{-}Fr(A)=\left[\hat{g}^{**}s\text{-}Bd(A)\right]\cup\left[\hat{g}^{**}s\text{-}D(A)\right];$

$(6)\ A$ is a $\hat{g}^{**}s$-*open* set if and only if $\hat{g}^{**}s\text{-}Fr(A)=\hat{g}^{**}s\text{-}D(A);$

$(7)\ \hat{g}^{**}s\text{-}Fr(A)=\left[\hat{g}^{**}s\text{-}Cl(A)\right]\cap\left[\hat{g}^{**}s\text{-}Cl(X-A)\right];$

$(8)\ \hat{g}^{**}s\text{-}Fr(A)=\hat{g}^{**}s\text{-}Fr(X-A);$

$(9)\ \hat{g}^{**}s\text{-}Fr(A)$ is $\hat{g}^{**}s$-*closed;*

$(10)\ \hat{g}^{**}s\text{-}Fr\left[\hat{g}^{**}s\text{-}Fr(A)\right]\subseteq\hat{g}^{**}s\text{-}Fr(A);$

$(11)\ \hat{g}^{**}s\text{-}Fr\left[\hat{g}^{**}s\text{-}Int(A)\right]\subseteq\hat{g}^{**}s\text{-}Fr(A);$

$(12)\ \hat{g}^{**}s\text{-}Fr\left[\hat{g}^{**}s\text{-}Cl(A)\right]\subseteq\hat{g}^{**}s\text{-}Fr(A);$

$(13)\ \hat{g}^{**}s\text{-}Int(A)=A-\left[\hat{g}^{**}s\text{-}Fr(A)\right].$

Proof. $(2)\ \left[\hat{g}^{**}s\text{-}Int(A)\right]\cup\left[\hat{g}^{**}s\text{-}Fr(A)\right]=\hat{g}^{**}s\text{-}Int(A)\cup\left[\hat{g}^{**}s\text{-}Cl(A)-\hat{g}^{**}s\text{-}Int(A)\right]=\hat{g}^{**}s\text{-}Cl(A)$

$(3)\ \left[\hat{g}^{**}s\text{-}Int(A)\right]\cap\left[\hat{g}^{**}s\text{-}Fr(A)\right]=\left[\hat{g}^{**}s\text{-}Int(A)\right]\cap\left[\left(\hat{g}^{**}s\text{-}Cl(A)\right)-\left(\hat{g}^{**}s\text{-}Int(A)\right)\right]=\phi.$

FULL TEXTS BOOK

(5) $Since\left[\hat{g}^{**}s\text{-}Int(A)\right]\cup\left[\hat{g}^{**}s\text{-}Fr(A)\right]=$
$\left[\hat{g}^{**}s\text{-}Int(A)\right]\cup\left[\hat{g}^{**}s\text{-}Bd(A)\right]\cup\left[\hat{g}^{**}s\text{-}D(A)\right],$
$\hat{g}^{**}s\text{-}Fr(A)=\left[\hat{g}^{**}s\text{-}Bd(A)\right]\cup\left[\hat{g}^{**}s\text{-}D(A)\right].$

(7) $\hat{g}^{**}s\text{-}Fr(A)=\left[\hat{g}^{**}s\text{-}Cl(A)\right]-\left[\hat{g}^{**}s\text{-}Int(A)\right]=\left[\hat{g}^{**}s\text{-}Cl(A)\right]\cap\left[\hat{g}^{**}s\text{-}Cl(X-A)\right].$

(9) $\hat{g}^{**}s\text{-}Cl\left[\hat{g}^{**}s\text{-}Fr(A)\right]=\hat{g}^{**}s\text{-}Cl\left[\left(\hat{g}^{**}s\text{-}Cl(A)\right)\cap\left(\hat{g}^{**}s\text{-}Cl(X-A)\right)\right]\subseteq$
$\hat{g}^{**}s\text{-}Cl\left[\hat{g}^{**}s\text{-}Cl(A)\right]\cap\hat{g}^{**}s\text{-}Cl\left[\hat{g}^{**}s\text{-}Cl(X-A)\right]$
$=\left[\hat{g}^{**}s\text{-}Cl(A)\right]\cap\hat{g}^{**}s\text{-}\left[\hat{g}^{**}s\text{-}Cl(X-A)\right]=\hat{g}^{**}s\text{-}Fr(A)$. Hence $\hat{g}^{**}s\text{-}Fr(A)$ is $\hat{g}^{**}s\text{-}closed$.

(10) $\hat{g}^{**}s\text{-}Fr\left[\hat{g}^{**}s\text{-}Fr(A)\right]=\hat{g}^{**}s\text{-}Cl\left[\hat{g}^{**}s\text{-}Fr(A)\right]\cap\hat{g}^{**}s\text{-}Cl\left[X-\left(\hat{g}^{**}s\text{-}Fr(A)\right)\right]\subseteq$
$\hat{g}^{**}s\text{-}Cl\left[\hat{g}^{**}s\text{-}Fr(A)\right]=\hat{g}^{**}s\text{-}Fr(A).$

(12) $\hat{g}^{**}s\text{-}Fr\left[\hat{g}^{**}s\text{-}Cl(A)\right]=\hat{g}^{**}s\text{-}Cl\left[\hat{g}^{**}s\text{-}Cl(A)\right]-\hat{g}^{**}s\text{-}Int\left[\hat{g}^{**}s\text{-}Cl(A)\right]=$
$\left[\hat{g}^{**}s\text{-}Cl(A)\right]-\left[\hat{g}^{**}s\text{-}Int\left(\hat{g}^{**}s\text{-}Cl(A)\right)\right]\subseteq$
$\left[\left(\hat{g}^{**}s\text{-}Cl(A)\right)-\left(\hat{g}^{**}s\text{-}Int(A)\right)\right]=\hat{g}^{**}s\text{-}Fr(A).$

(13) $A-\left[\hat{g}^{**}s\text{-}Fr(A)\right]=A-\left[\left(\hat{g}^{**}s\text{-}Cl(A)\right)-\left(\hat{g}^{**}s\text{-}Int(A)\right)\right]=\hat{g}^{**}s\text{-}Int(A).$

Definition 2.33. A subset A of a topological space (X,τ) is called a $\hat{g}^{**}s\text{-}neighbourhood$ of a point x in X if there exists a $\hat{g}^{**}s\text{-}open$ set U in X such that $x\in U\subseteq A$. The set of all $\hat{g}^{**}s\text{-}neighbourhoods$ of an element x in X will be denoted by: $\hat{g}^{**}s\text{-}N_x=\hat{g}^{**}s\text{-}N_x(X)=$ $\{A\subseteq X: A\ is\ a\ \hat{g}^{**}s\text{-}neighbourhood\ of\ x\}$.

Proposition 2.34. A subset A of a topological space (X,τ) is $\hat{g}^{**}s\text{-}open$ if and only if it is a $\hat{g}^{**}s\text{-}neighbourhood$ of each of its points.

Proof. If A is $\hat{g}^{**}s\text{-}open$ in X, then $x\in A\subseteq A$ for each $x\in A$. Thus A is a $\hat{g}^{**}s\text{-}neighbourhood$ of each of its points. Conversely, suppose that A is a $\hat{g}^{**}s\text{-}neighbourhood$ of each of its points. Then for each $x\in A$, there exists a $\hat{g}^{**}s\text{-}open$ set U_x in X such that $x\in U_x\subseteq A$. Hence $\bigcup_{x\in A}U_x\subseteq A$. Since $A\subseteq\bigcup_{x\in A}U_x$, therefore $A=\bigcup_{x\in A}U_x$. Thus A is a $\hat{g}^{**}s\text{-}open$ set in X, since it is a union of $\hat{g}^{**}s\text{-}open$ sets

3-8: CHARACTERIZATIONS OF $\hat{g}^{**}s$-MAPPINGS

The purpose of this part is to introduce $\hat{g}^{**}s\text{-}continuous$, $\hat{g}^{**}s\text{-}irresolute$, $\hat{g}^{**}s\text{-}open$, $\hat{g}^{**}s\text{-}closed$, $pre\text{-}\hat{g}^{**}s\text{-}open$, and $pre\text{-}\hat{g}^{**}s\text{-}closed$ functions and explore properties and characterizations of these functions.

3. $\hat{g}^{**}s$-CONTINUOUS FUNCTIONS

The purpose of this section is to investigate the properties and characterizations of $\hat{g}^{**}s\text{-}continuous$ functions.

FULL TEXTS BOOK

Definition 3.1. *A function* $f:(X,\tau)\to(Y,\sigma)$ *is said to be* $\hat{g}^{**}s$*-continuous if* $f^{-1}(V)\in \hat{g}^{**}s\text{-}O(X,\tau)$ *for every* $V\in\sigma$.

Theorem 3.2. *Let* $f:(X,\tau)\to(Y,\sigma)$ *be a function. Then the following statements are equivalent:*

(1) f is $\hat{g}^{**}s$*-continuous.*

(2) *The inverse image of each closed set in* Y *is a* $\hat{g}^{**}s$*-closed set in* X*;*

(3) $\hat{g}^{**}s\text{-}Cl\left[f^{-1}(V)\right]\subseteq f^{-1}\left[Cl(V)\right]$*, for every* $V\subseteq Y$*;*

(4) $f\left[\hat{g}^{**}s\text{-}Cl(U)\right]\subseteq Cl\left[f(U)\right]$*, for every* $U\subseteq X$*;*

(5) *For any point* $x\in X$ *and any open set* V *of* Y *containing* $f(x)$*, there exists* $U\in \hat{g}^{**}s\text{-}O(X,\tau)$ *such that* $x\in U$ *and* $f(U)\subseteq V$*;*

(6) $\hat{g}^{**}s\text{-}Bd\left[f^{-1}(V)\right]\subseteq f^{-1}\left[\hat{g}^{**}s\text{-}d(V)\right]$*, for every* $V\subseteq Y$*;*

(7) $f\left[\hat{g}^{**}s\text{-}D(U)\right]\subseteq Cl\left[f(U)\right]$*, for every* $U\subseteq X$*;*

(8) $f^{-1}\left[Int(V)\right]\subseteq \hat{g}^{**}s\text{-}Int\left[f^{-1}(V)\right]$*, for every* $V\subseteq Y$*;*

Proof. $(1)\Rightarrow(2)$: *Let* $F\subseteq Y$ *be closed. Since* f is $\hat{g}^{**}s$*-continuous,* $f^{-1}(Y-F)=X-f^{-1}(F)$ *is* $\hat{g}^{**}s$*-open. Therefore,* $f^{-1}(F)$ *is* $\hat{g}^{**}s$*-closed in* X.

$(2)\Rightarrow(3)$: *Since* $Cl(V)$ *is closed for every* $V\subseteq Y$*, then* $f^{-1}\left[Cl(V)\right]$ *is* $\hat{g}^{**}s$*-closed. Therefore* $f^{-1}\left[Cl(V)\right]=\hat{g}^{**}s\text{-}Cl\left[f^{-1}\left(Cl(V)\right)\right]\supseteq \hat{g}^{**}s\text{-}Cl\left[f^{-1}(V)\right]$.

$(3)\Rightarrow(4)$: *Let* $U\subseteq X$ *and* $f(U)=V$. *Then* $\hat{g}^{**}s\text{-}Cl\left[f^{-1}(V)\right]\subseteq f^{-1}\left[Cl(V)\right]$. *Thus* $\hat{g}^{**}s\text{-}Cl(U)\subseteq \hat{g}^{**}s\text{-}Cl\left[f^{-1}\left(f(U)\right)\right]\subseteq f^{-1}\left[Cl\left(f(U)\right)\right]$ *and* $f\left[\hat{g}^{**}s\text{-}Cl(U)\right]\subseteq Cl\left[f(U)\right]$.

$(4)\Rightarrow(2)$: *Let* $W\subseteq Y$ *be a closed set, and* $U=f^{-1}(W)$. *Then* $f\left[\hat{g}^{**}s\text{-}Cl(U)\right]\subseteq Cl\left[f(U)\right]$ $=Cl\left[f\left(f^{-1}(W)\right)\right]\subseteq Cl(W)=W$. *Thus* $\hat{g}^{**}s\text{-}Cl(U)\subseteq f^{-1}\left[f\left(\hat{g}^{**}s\text{-}Cl(U)\right)\right]\subseteq f^{-1}(W)$ $=U$. *So* U *is* $\hat{g}^{**}s$*-closed.*

$(2)\Rightarrow(1)$: *Let* $V\subseteq Y$ *be an open set. Then* $Y-V$ *is closed. Then* $f^{-1}(Y-V)=X-f^{-1}(V)$ *is* $\hat{g}^{**}s$*-closed in* X *and hence* $f^{-1}(V)$ *is* $\hat{g}^{**}s$*-open in* X.

$(1)\Rightarrow(5)$: *Let* $f:(X,\tau)\to(Y,\sigma)$ *be* $\hat{g}^{**}s$*-continuous. For any* $x\in X$ *and any open set* V *of* Y *containing* $f(x)$, $U=f^{-1}(V)\in \hat{g}^{**}s\text{-}O(X,\tau)$, *and* $f(U)=f\left[f^{-1}(V)\right]\subseteq V$.

$(5)\Rightarrow(1)$: *Let* $V\in\sigma$. *We prove* $f^{-1}(V)\in \hat{g}^{**}s\text{-}O(X,\tau)$. *Let* $x\in f^{-1}(V)$. *Then* $f(x)\in V$ *and there exists* $U\in \hat{g}^{**}s\text{-}O(X,\tau)$ *such that* $x\in U$ *and* $f(x)\in f(U)\subseteq V$. *Hence* $x\in U\subseteq f^{-1}\left[f(U)\right]\subseteq f^{-1}(V)$. *It shows that* $f^{-1}(V)$ *is a* $\hat{g}^{**}s$*-neighborhood of each of its points. Therefore* $f^{-1}(V)\in \hat{g}^{**}s\text{-}O(X,\tau)$.

FULL TEXTS BOOK

$(6)\Rightarrow(8)$: *Let* $V\subseteq Y$. *Then by hypothesis,* $\hat{g}^{**}s\text{-}Bd\left[f^{-1}(V)\right]\subseteq f^{-1}\left[Bd(V)\right]$

$\Rightarrow f^{-1}(V)-\left[\hat{g}^{**}s\text{-}Int\left(f^{-1}(V)\right)\right]\subseteq f^{-1}\left[V-Int(V)\right]=f^{-1}(V)-f^{-1}\left[Int(V)\right]$

$\Rightarrow f^{-1}\left[Int(V)\right]\subseteq\hat{g}^{**}s\text{-}Int\left[f^{-1}(V)\right]$.

$(8)\Rightarrow(6)$: *Let* $V\subseteq Y$. *Then by hypothesis,* $f^{-1}\left[Int(V)\right]\subseteq\hat{g}^{**}s\text{-}Int\left[f^{-1}(V)\right]$

$\Rightarrow f^{-1}(V)-\left[\hat{g}^{**}s\text{-}Int\left(f^{-1}(V)\right)\right]\subseteq f^{-1}(V)-f^{-1}\left[Int(V)\right]=f^{-1}\left[V-Int(V)\right]$

$\Rightarrow\hat{g}^{**}s\text{-}Bd\left[f^{-1}(V)\right]\subseteq f^{-1}\left[Bd(V)\right]$.

$(1)\Rightarrow(7)$: *It is obvious, since* f *is* $\hat{g}^{**}s$*-continuous and by* (4) $f\left[\hat{g}^{**}s\text{-}Cl(U)\right]\subseteq Cl\left[f(U)\right]$ *for each* $U\subseteq X$. *So* $f\left[\hat{g}^{**}s\text{-}D(U)\right]\subseteq Cl\left[f(U)\right]$.

$(7)\Rightarrow(1)$: *Let* $U\subseteq Y$ *be an open set,* $V=Y-U$ *and* $f^{-1}(V)=W$. *Then by hypothesis* $f\left[\hat{g}^{**}s\text{-}D(W)\right]\subseteq Cl\left[f(W)\right]$. *Thus* $f\left[\hat{g}^{**}s\text{-}D\left(f^{-1}(V)\right)\right]\subseteq Cl\left[f\left(f^{-1}(V)\right)\right]\subseteq Cl(V)$ $=V$. *Then* $\hat{g}^{**}s\text{-}D\left[f^{-1}(V)\right]\subseteq f^{-1}(V)$ *and* $f^{-1}(V)$ *is* $\hat{g}^{**}s$*-closed. Therefore,* f *is* $\hat{g}^{**}s$*-continuous.*

$(1)\Rightarrow(8)$: *Let* $V\subseteq Y$. *Then* $f^{-1}\left[Int(V)\right]$ *is* $\hat{g}^{**}s$*-open in* X. *Thus* $f^{-1}\left[Int(V)\right]=$ $\hat{g}^{**}s\text{-}Int\left[f^{-1}\left(Int(V)\right)\right]\subseteq\hat{g}^{**}s\text{-}Int\left[f^{-1}(V)\right]$. *Hence* $f^{-1}\left[Int(V)\right]\subseteq\hat{g}^{**}s\text{-}Int\left[f^{-1}(V)\right]$.

$(8)\Rightarrow(1)$: *Let* $V\subseteq Y$ *be an open set. Then* $f^{-1}(V)=f^{-1}\left[Int(V)\right]\subseteq\hat{g}^{**}s\text{-}Int\left[f^{-1}(V)\right]$. *Therefore,* $f^{-1}(V)$ *is* $\hat{g}^{**}s$*-open. Hence* f *is* $\hat{g}^{**}s$*-continuous.*

In the next Theorem, $\#\hat{g}^{**}s\text{-}c.$ *denotes the set of points* x *of* X *for which a function* $f:(X,\tau)\to(Y,\sigma)$ *is not* $\hat{g}^{**}s$*-continuous.*

Theorem 3.3. $\#\hat{g}^{**}s\text{-}c.$ *is identical with the union of the* $\hat{g}^{**}s$*- frontiers of the inverse images of* $\hat{g}^{**}s$*-open sets containing* $f(x)$.

Proof. *Suppose that* f *is not* $\hat{g}^{**}s$*-continuous at a point* x *of* X. *Then there exists an open set* $V\subseteq Y$ *containing* $f(x)$ *such that* $f(U)$ *is not a subset of* V *for every* $U\in\hat{g}^{**}s\text{-}O(X,\tau)$. *containing* x. *Hence, we have* $U\cap f^{-1}\left(X-f^{-1}(V)\right)\neq\phi$ *for every* $U\in\hat{g}^{**}s\text{-}O(X,\tau)$ *containing* x. *It follows that* $x\in\left[\hat{g}^{**}s\text{-}Cl\left(X-f^{-1}(V)\right)\right]$. *We also have* $x\in f^{-1}(V)\subseteq\hat{g}^{**}s\text{-}Cl\left[f^{-1}(V)\right]$. *This means that* $x\in\hat{g}^{**}s\text{-}Fr\left[f^{-1}(V)\right]$. *Now, let* f *be* $\hat{g}^{**}s$*-continuous at* $x\in X$ *and* $V\subseteq Y$ *any open set containing* $f(x)$. *Then,* $x\in f^{-1}(V)$ *is a* $\hat{g}^{**}s$*-open set of* X. *Thus.* $x\in\hat{g}^{**}s\text{-}Int\left[f^{-1}(V)\right]$ *and therefore* $x\notin\hat{g}^{**}s\text{-}Fr\left[f^{-1}(V)\right]$ *for every open set* V *containing* $f(x)$.

Remarks 3.4. (1) *Every* $\hat{g}^{**}s$*-continuous function is continuous, but the converse may not be true.*

FULL TEXTS BOOK

(2) *If a function* $f:(X,\tau)\to(Y,\sigma)$ *is* $\hat{g}^{**}s$*-continuous and a function* $g:(Y,\sigma)\to(Z,\vartheta)$ *is* $\hat{g}^{**}s$*-continuous, then* $gof:(X,\tau)\to(Z,\vartheta)$ *is* $\hat{g}^{**}s$*-continuous.*

(3) *If a function* $f:(X,\tau)\to(Y,\sigma)$ *is* $\hat{g}^{**}s$*-continuous and a function* $g:(Y,\sigma)\to(Z,\vartheta)$ *is continuous, then* $gof:(X,\tau)\to(Z,\vartheta)$ *is* $\hat{g}^{**}s$*-continuous.*

(4) *Let* (X,τ) *and* (Y,σ) *be topological spaces. If* $f:(X,\tau)\to(Y,\sigma)$ *is a function, and one of the following*

(a) $f^{-1}\left[Int(B)\right]\subseteq \hat{g}^{**}s\text{-}Int\left[f^{-1}(B)\right]$ *for each* $B\subseteq Y$.

(b) $\hat{g}^{**}s\text{-}Cl\left[f^{-1}(B)\right]\subseteq f^{-1}\left[Cl(B)\right]$ *for each* $B\subseteq Y$.

(c) $f\left[\hat{g}^{**}s\text{-}Cl(A)\right]\subseteq Cl\left[f(A)\right]$ *for each* $A\subseteq X$ *holds, then* f *is continuous.*

Lemma 3.5. *Let* $A\subseteq Y\subseteq X$, Y *is* $\hat{g}^{**}s$*-open in* X *and* A *is* $\hat{g}^{**}s$*-open in* Y. *Then* A *is* $\hat{g}^{**}s$*-open in* X.

Proof. *Since* A *is* $\hat{g}^{**}s$*-open in* Y, *there exists a* $\hat{g}^{**}s$*-open set* $U\subseteq X$ *such that* $A=Y\cap U$. *Thus* A *being the intersection of two* $\hat{g}^{**}s$*-open sets in* X, *is* $\hat{g}^{**}s$*-open in* X.

Theorem 3.6. *Let* $f:(X,\tau)\to(Y,\sigma)$ *be a mapping and* $\{U_i:i\in I\}$ *be a cover of* X *such that* $U_i\in\hat{g}^{**}s\text{-}O(X,\tau)$ *for each* $i\in I$. *Then prove that* f *is* $\hat{g}^{**}s$*-continuous.*

Proof. *Let* $V\subseteq Y$ *be an open set, then* $\left(f|U_i\right)^{-1}(V)$ *is* $\hat{g}^{**}s$*-open in* U_i *for each* $i\in I$. *Since* U_i *is* $\hat{g}^{**}s$*-open in* X *for each* $i\in I$. *So by* Lemma 3.5, $\left(f|U_i\right)^{-1}(V)$ *is* $\hat{g}^{**}s$*-open in* X *for each* $i\in I$. *But,* $f^{-1}(V)=\cup\left\{\left(f|U_i\right)^{-1}(V):i\in I\right\}$, *then* $f^{-1}(V)\in\hat{g}^{**}s\text{-}O(X,\tau)$ *because* $\hat{g}^{**}s\text{-}O(X,\tau)$ *is closed under union. This implies that* f *is* $\hat{g}^{**}s$*-continuous.*

4. $\hat{g}^{**}s$-IRRESOLUTE FUNCTIONS

In this section, the functions to be considered are those for which inverses of $\hat{g}^{**}s$*-open sets are* $\hat{g}^{**}s$*-open. We investigate some properties and characterizations of such functions.*

Definition 4.1. *Let* (X,τ) *and* (Y,σ) *be topological spaces. A function* $f:(X,\tau)\to(Y,\sigma)$ *is called* $\hat{g}^{**}s$*-irresolute if the inverse image of each* $\hat{g}^{**}s$*-open set of* Y *is a* $\hat{g}^{**}s$*-open set in* X.

Theorem 4.2. *Let* $f:(X,\tau)\to(Y,\sigma)$ *be a function between topological spaces. Then the following statements are equivalent:*

(1) f *is* $\hat{g}^{**}s$*-irresolute;*

(2) *The inverse image of each* $\hat{g}^{**}s$*-closed set in* (Y,σ) *is a* $\hat{g}^{**}s$*-closed set in* (X,τ),

(3) $\hat{g}^{**}s\text{-}Cl\left[f^{-1}(B)\right]\subseteq f^{-1}\left[\hat{g}^{**}s\text{-}Cl(B)\right]\subseteq f^{-1}\left[Cl(B)\right]$, *for each* $B\subseteq Y$,

(4) $f\left[\hat{g}^{**}s\text{-}Cl(A)\right]\subseteq\hat{g}^{**}s\text{-}Cl\left[f(A)\right]\subseteq Cl\left[f(A)\right]$, *for each* $A\subseteq X$,

FULL TEXTS BOOK

(5) $f^{-1}\left[\hat{g}^{**}s\text{-}Int(B)\right]\subseteq\hat{g}^{**}s\text{-}Int\left[f^{-1}(B)\right]$, *for each* $B\subseteq Y$,

(6) $\hat{g}^{**}s\text{-}Bd\left[f^{-1}(B)\right]\subseteq f^{-1}\left[\hat{g}^{**}s\text{-}Bd(B)\right]$, *for each* $B\subseteq Y$,

(7) $\hat{g}^{**}s\text{-}b\left[f^{-1}(B)\right]\subseteq f^{-1}\left[\hat{g}^{**}s\text{-}b(B)\right]$, *for each* $B\subseteq Y$,

(8) $f\left[\hat{g}^{**}s\text{-}b(A)\right]\subseteq\hat{g}^{**}s\text{-}b\left[f(A)\right]$, *for each* $A\subseteq X$,

(9) $f\left[\hat{g}^{**}s\text{-}Cl(A)\right]\subseteq\hat{g}^{**}s\text{-}Cl\left[f(A)\right]$, *for each* $A\subseteq X$.

Proof. $(1)\Rightarrow(2)$: *Obvious.*

$(2)\Rightarrow(3)$: *Let* $B\subseteq Y$ *and* $B\subseteq\hat{g}^{**}s\text{-}Cl(B)\subseteq Cl(B)$. *Then by* (2) $\hat{g}^{**}s\text{-}Cl\left[f^{-1}(B)\right]\subseteq\hat{g}^{**}s\text{-}Cl\left[f^{-1}\left(\hat{g}^{**}s\text{-}Cl(B)\right)\right]=f^{-1}\left[\hat{g}^{**}s\text{-}Cl(B)\right]\subseteq f^{-1}\left[Cl(B)\right]$.

$(3)\Rightarrow(4)$: *Immediately by replacing* B *by* $f(A)$ *in (3).*

$(4)\Rightarrow(1)$: *Let* $W\in\hat{g}^{**}s\text{-}O(Y)$ *and* $F=Y-W\in\hat{g}^{**}s\text{-}C(Y)$. *Then by (4),* $f\left[\hat{g}^{**}s\text{-}Cl\left(f^{-1}(F)\right)\right]\subseteq\hat{g}^{**}s\text{-}Cl\left[f\left(f^{-1}(F)\right)\right]\subseteq\hat{g}^{**}s\text{-}Cl(F)=F$. *So* $\hat{g}^{**}s\text{-}Cl\left[f^{-1}(F)\right]\subseteq f^{-1}(F)$ *and hence,* $f^{-1}(F)=X-f^{-1}(F)\in\hat{g}^{**}s\text{-}C(X)$, *thus* $f^{-1}(W)\in\hat{g}^{**}s\text{-}O(X)$. *Therefore* f *is* $\hat{g}^{**}s$*-irresolute.*

$(1)\Rightarrow(5)$: *Let* $B\subseteq Y$. *Then* $\hat{g}^{**}s\text{-}Int(B)$ *is* $\hat{g}^{**}s$*-open in* Y. *By (1),* $f^{-1}\left[\hat{g}^{**}s\text{-}Int(B)\right]$ *is* $\hat{g}^{**}s$*-open in* X. *Hence* $f^{-1}\left[\hat{g}^{**}s\text{-}Int(B)\right]=\hat{g}^{**}s\text{-}Int\left[f^{-1}\left(\hat{g}^{**}s\text{-}Int(B)\right)\right]\subseteq\hat{g}^{**}s\text{-}Int\left[f^{-1}(B)\right]$.

$(5)\Rightarrow(6)$: *Let* $B\subseteq Y$. *Then by (5),* $f^{-1}\left[\hat{g}^{**}s\text{-}Int(B)\right]\subseteq\hat{g}^{**}s\text{-}Int\left[f^{-1}(B)\right]$ *we have* $f^{-1}(B)-\hat{g}^{**}s\text{-}Int\left[f^{-1}(B)\right]\subseteq f^{-1}(B)-f^{-1}\left[\hat{g}^{**}s\text{-}Int(B)\right]$. *Therefore we obtain* $\hat{g}^{**}s\text{-}Bd\left[f^{-1}(B)\right]\subseteq f^{-1}\left[\hat{g}^{**}s\text{-}Bd(B)\right]$.

$(6)\Rightarrow(5)$: *Let* $B\subseteq Y$. *Then by (6),* $\hat{g}^{**}s\text{-}Bd\left[f^{-1}(B)\right]=f^{-1}(B)-\hat{g}^{**}s\text{-}Int\left[f^{-1}(B)\right]\subseteq f^{-1}\left[\hat{g}^{**}s\text{-}Bd(B)\right]=f^{-1}\left[B-\left(\hat{g}^{**}s\text{-}Int(B)\right)\right]=f^{-1}(B)-f^{-1}\left[Int(B)\right]$. *This implies* $f^{-1}\left[\hat{g}^{**}s\text{-}Int(B)\right]\subseteq\hat{g}^{**}s\text{-}Int\left[f^{-1}(B)\right]$.

$(5)\Rightarrow(1)$: *Let* $B\subseteq Y$ *be* $\hat{g}^{**}s$*-open. Then* $B=\hat{g}^{**}s\text{-}Int(B)$. *Hence by (5) we have* $f^{-1}(B)=f^{-1}\left[\hat{g}^{**}s\text{-}Int(B)\right]\subseteq\hat{g}^{**}s\text{-}Int\left[f^{-1}(B)\right]$. *Thus* $f^{-1}(B)$ *is* $\hat{g}^{**}s$*-open in* X. *So,* f *is* $\hat{g}^{**}s$*-irresolute.*

$(1)\Rightarrow(7)$: *Let* $B\subseteq Y$, *by (3), we have*

$\hat{g}^{**}s\text{-}b\left[f^{-1}(B)\right]=\hat{g}^{**}s\text{-}Cl\left[f^{-1}(B)\right]-\hat{g}^{**}s\text{-}Int\left[f^{-1}(B)\right]\subseteq f^{-1}\left[\hat{g}^{**}s\text{-}Cl(B)\right]$
$-\hat{g}^{**}s\text{-}Int\left[f^{-1}(B)\right]\subseteq f^{-1}\left[\hat{g}^{**}s\text{-}b(B)\cup\hat{g}^{**}s\text{-}Int(B)\right]-\hat{g}^{**}s\text{-}Int\left[f^{-1}(B)\right]\subseteq$

FULL TEXTS BOOK

$f^{-1}\left[\hat{g}^{**}s\text{-}b(B)\cup\hat{g}^{**}s\text{-}Int(B)\right]-\hat{g}^{**}s\text{-}Int\left[f^{-1}\left(\alpha^{*}\text{-}Int(B)\right)\right]$. *By (1) we have* $\hat{g}^{**}s\text{-}b\left[f^{-1}(B)\right]\subseteq\left[f^{-1}\left(\hat{g}^{**}s\text{-}b(B)\right)\cup f^{-1}\left(\hat{g}^{**}s\text{-}Int(B)\right)\right]-f^{-1}\left[\hat{g}^{**}s\text{-}Int(B)\right]$ $=f^{-1}\left[\hat{g}^{**}s\text{-}b(B)\right]$.

(7)⇒(1): *Let* $B\in\hat{g}^{**}s\text{-}C(Y)$ *and* $\hat{g}^{**}s\text{-}b\left[f^{-1}(B)\right]\subseteq f^{-1}\left[\hat{g}^{**}s\text{-}b(B)\right]$. *Then,* $\hat{g}^{**}s\text{-}b\left[f^{-1}(B)\right]\subseteq f^{-1}\left[\hat{g}^{**}s\text{-}Cl(B)-\hat{g}^{**}s\text{-}Int(B)\right]=f^{-1}(B)-\hat{g}^{**}s\text{-}Int(B)=f^{-1}\left[\hat{g}^{**}s\text{-}Bd(B)\right]\subseteq f^{-1}(B)$, *we have,* $f^{-1}(B)\in\hat{g}^{**}s\text{-}C(X)$. *Therefore,* f *is* $\hat{g}^{**}s$*-irresolute.*

(7)⇒(8): *Follows by replacing* $f(A)$ *instead of* B *in (7).*

(8)⇒(7): *Let* $B\subseteq Y$, *by (8), we have* $f\left[\hat{g}^{**}s\text{-}b\left(f^{-1}(B)\right)\right]\subseteq\hat{g}^{**}s\text{-}b\left[f\left(f^{-1}(B)\right)\right]\subseteq\hat{g}^{**}s\text{-}b(B)$ *and therefore* $\hat{g}^{**}s\text{-}b\left[f^{-1}(B)\right]\subseteq f^{-1}\left[\hat{g}^{**}s\text{-}b(B)\right]$.

(1)⇒(9): *Let* $A\subseteq X$. *Then by (4),* $f\left[\hat{g}^{**}s\text{-}d(A)\right]\subseteq f\left[\hat{g}^{**}s\text{-}Cl(A)\right]\subseteq\hat{g}^{**}s\text{-}Cl\left[f(A)\right]$.

(9)⇒(1): *Let* F *be a* $\hat{g}^{**}s$*-closed set in* Y, *by (7),* $f\left[\hat{g}^{**}s\text{-}d\left(f^{-1}(F)\right)\right]\subseteq\hat{g}^{**}s\text{-}Cl\left[f\left(f^{-1}(F)\right)\right]\subseteq\hat{g}^{**}s\text{-}Cl(F)=F$, *then* $\hat{g}^{**}s\text{-}d\left[f^{-1}(F)\right]\subseteq f^{-1}(F)$. *We have* $f^{-1}(F)\in\hat{g}^{**}s\text{-}C(X)$. *Therefore* f *is* $\hat{g}^{**}s$*-irresolute.*

Definition 4.3. *Let* (X,τ) *be a topological space. Let* $x\in X$ *and* $N\subseteq X$. *We say that* N *is an* $\hat{g}^{**}s$*-neighborhood of* x *if there exists a* $\hat{g}^{**}s$*-open set* M *of* x *such that* $x\in M\subseteq N$.

Theorem 4.4. *Prove that a function* $f:(X,\tau)\to(Y,\sigma)$ *is* $\hat{g}^{**}s$*-irresolute if and only if for each* x *in* X, *the inverse image of every* $\hat{g}^{**}s$*-neighborhood of* $f(x)$, *is an* $\hat{g}^{**}s$*-neighborhood of* x.

Proof. *Necessity. Let* $x\in X$ *and let* B *be a* $\hat{g}^{**}s$*-neighborhood of* $f(x)$. *Then there exists* $U\in\hat{g}^{**}s\text{-}O(Y,\sigma)$ *such that* $f(x)\in U\subseteq B$. *This implies that* $x\in f^{-1}(U)\subseteq f^{-1}(B)$. *Since* f *is* $\hat{g}^{**}s$*-irresolute, so* $f^{-1}(U)\in\hat{g}^{**}s\text{-}O(X,\tau)$. *Hence* $f^{-1}(B)$ *is a* $\hat{g}^{**}s$*-neighborhood of* x. *Sufficiency. Let* $B\in\hat{g}^{**}s\text{-}O(Y,\sigma)$. *Put* $A=f^{-1}(B)$. *Let* $x\in A$. *Then* $f(x)\in B$. *But then,* B *being* $\hat{g}^{**}s$*-open set, is a* $\hat{g}^{**}s$*-neighborhood of* $f(x)$. *So by hypothesis,* $A=f^{-1}(B)$ *is a* $\hat{g}^{**}s$*-neighborhood of* x. *Hence by definition, there exists* $A_x\in\hat{g}^{**}s\text{-}O(X,\tau)$ *such that* $x\in A_x\subseteq A$. *Thus* $A=\cup\{A_x:x\in A\}$. *It follows that* A *is a* $\hat{g}^{**}s$*-open set in* X. *Therefore* f *is* $\hat{g}^{**}s$*-irresolute.*

FULL TEXTS BOOK

Theorem 4.5. *Prove that a function* $f:(X,\tau)\to(Y,\sigma)$ *is* $\hat{g}^{**}s$*-irresolute if and only if for each point* p *in* X *and each* $\hat{g}^{**}s$*-open set* B *in* Y *with* $f(p)\in B$*, there is a* $\hat{g}^{**}s$*-open set* A *in* X *such that* $p\in A$*,* $f(A)\subseteq B$*.*

Proof. *Necessity. Let* $p\in X$ *and* $B\in\hat{g}^{**}s\text{-}O(Y,\sigma)$ *such that* $f(p)\in B$*. Let* $A=f^{-1}(B)$*. Since* f *is* $\hat{g}^{**}s$*-irresolute,* A *is* $\hat{g}^{**}s$*-open in* X*. Also* $p\in f^{-1}(B)=A$ *as* $f(p)\in B$*. Thus we have* $f(A)=f\left[f^{-1}(B)\right]\subseteq B$*.*

Sufficiency. Let $B\in\hat{g}^{**}s\text{-}O(Y,\sigma)$*, and* $A=f^{-1}(B)$*. We show that* A *is* $\hat{g}^{**}s$*-open in* X*. For this let* $x\in A$*. It implies that* $f(x)\in B$*. Then by hypothesis, there exists* $A_x\in\hat{g}^{**}s\text{-}O(X,\tau)$ *such that* $x\in A_x$ *and* $f(A_x)\subseteq B$*. Then* $A_x\subseteq f^{-1}\left[f(A_x)\right]\subseteq f^{-1}(B)=A$*. Thus* $A=\mathrm{U}\{A_x:x\in A\}$*. It follows that* A *is* $\hat{g}^{**}s$*-open in* X*. Hence* f *is* $\hat{g}^{**}s$*-irresolute.*

Definition 4.6. *Let* (X,τ) *be a topological space. Let* $x\in X$ *and* $N\subseteq X$*. We say that* N *is a* $\hat{g}^{**}s$*-neighborhood of* x *if there exists a* $\hat{g}^{**}s$*-open set* M *of* x *such that* $x\in M\subseteq N$*.*

Theorem 4.7. *Prove that a function* $f:(X,\tau)\to(Y,\sigma)$ *is* $\hat{g}^{**}s$*-irresolute if and only if for each* x *in* X*, the inverse image of every* $\hat{g}^{**}s$*-neighborhood of* $f(x)$*, is a* $\hat{g}^{**}s$*-neighborhood of* x*.*

Proof. *Necessity. Let* $x\in X$ *and let* B *be a* $\hat{g}^{**}s$*-neighborhood of* $f(x)$*. Then there exists* $U\in\hat{g}^{**}s\text{-}O(Y,\sigma)$ *such that* $f(x)\in U\subseteq B$*. This implies that* $x\in f^{-1}(U)\subseteq f^{-1}(B)$*. Since* f *is* $\hat{g}^{**}s$*-irresolute, so* $f^{-1}(U)\in\hat{g}^{**}s\text{-}O(X,\tau)$*. Hence* $f^{-1}(B)$ *is a* $\hat{g}^{**}s$*-neighborhood of* x*.*

Sufficiency. Let $B\in\hat{g}^{**}s\text{-}O(Y,\sigma)$*. Put* $A=f^{-1}(B)$*. Let* $x\in A$*. Then* $f(x)\in B$*. But then,* B *being* $\hat{g}^{**}s$*-open set, is a* $\hat{g}^{**}s$*-neighborhood of* $f(x)$*. So by hypothesis,* $A=f^{-1}(B)$ *is a* $\hat{g}^{**}s$*-neighborhood of* x*. Hence by definition, there exists* $A_x\in\hat{g}^{**}s\text{-}O(X,\tau)$ *such that* $x\in A_x\subseteq A$*. Thus* $A=\mathrm{U}\{A_x:x\in A\}$*. It follows that* A *is a* $\hat{g}^{**}s$*-open set in* X*. Therefore* f *is* $\hat{g}^{**}s$*-irresolute.*

Theorem 4.8. *Prove that a function* $f:(X,\tau)\to(Y,\sigma)$ *is* $\hat{g}^{**}s$*-irresolute if and only if for each* x *in* X *and each* $\hat{g}^{**}s$*-neighborhood* U *of* $f(x)$*, there is a* $\hat{g}^{**}s$*-neighborhood* V *of* x *such that* $f(V)\subseteq U$*.*

Proof. *Necessity. Let* $x\in X$ *and let* U *be a* $\hat{g}^{**}s$*-neighborhood of* $f(x)$*. Then there exists* $O_{f(x)}\in\hat{g}^{**}s\text{-}O(Y,\sigma)$ *such that* $f(x)\in O_{f(x)}\subseteq U$*. It follows that* $x\in f^{-1}\left[O_{f(x)}\right]\subseteq f^{-1}(U)$*. By hypothesis,* $f^{-1}\left[O_{f(x)}\right]\in\hat{g}^{**}s\text{-}O(X,\tau)$*. Let* $V=f^{-1}(U)$*. Then it follows that* V *is a* $\hat{g}^{**}s$*-neighborhood of* x *and* $f(V)=f\left[f^{-1}(U)\right]\subseteq U$*.*

FULL TEXTS BOOK

Sufficiency. Let $B \in \hat{g}^{**}s\text{-}O(Y,\sigma)$. *Put* $O = f^{-1}(B)$. *Let* $x \in O$. *Then* $f(x) \in B$. *Thus* B *is a* $\hat{g}^{**}s$-*neighborhood of* $f(x)$. *So by hypothesis, there exists a* $\hat{g}^{**}s$-*neighborhood* V_x *of* x *such that* $f(V_x) \subseteq B$. *Thus it follows that* $x \in V_x \subseteq f^{-1}[f(V_x)] \subseteq f^{-1}(B) = O$. *Since* V_x *is a* $\hat{g}^{**}s$-*neighborhood of* x, *so there exists an* $O_x \in \hat{g}^{**}s\text{-}O(X,\tau)$ *such that* $x \in O_x \subseteq V_x$. *Hence* $x \in O_x \subseteq O$, $O_x \in \hat{g}^{**}s\text{-}O(X,\tau)$. *Thus* $O = \cup\{O_x : x \in O\}$. *It follows that* O *is* $\hat{g}^{**}s$-*open in* X. *Therefore,* f *is* $\hat{g}^{**}s$-*irresolute.*

Theorem 4.9. *Prove that a function* $f:(X,\tau) \to (Y,\sigma)$ *is* $\hat{g}^{**}s$-*irresolute if and only if* $f[\hat{g}^{**}s\text{-}D(A)] \subseteq f(A) \cup [\hat{g}^{**}s\text{-}D(f(A))]$, *for all* $A \subseteq X$.

Proof. *Necessity. Let* $f:(X,\tau) \to (Y,\sigma)$ *be* $\hat{g}^{**}s$-*irresolute. Let* $A \subseteq X$, *and* $a_0 \in \hat{g}^{**}s\text{-}D(A)$. *Assume that* $f(a_0) \notin f(A)$ *and let* V *denote a* $\hat{g}^{**}s$-*neighborhood of* $f(a_0)$. *Since* f *is* $\hat{g}^{**}s$-*irresolute, so by* Theorem 4.8, *there exists a* $\hat{g}^{**}s$-*neighborhood* U *of* a_0 *such that* $f(U) \subseteq V$. *From* $a_0 \in \hat{g}^{**}s\text{-}D(A)$, *it follows that* $U \cap A \neq \phi$; *there exists, therefore, at least one element* $a \in U \cap A$ *such that* $f(a) \in f(A)$ *and* $f(a) \in f(V)$. *Since* $f(a_0) \notin f(A)$, *we have* $f(a) \neq f(a_0)$. *Thus every* $\hat{g}^{**}s$-*neighborhood of* $f(a_0)$ *contains an element of* $f(A)$ *different from* $f(a_0)$, *consequently,* $f(a_0) \in \hat{g}^{**}s\text{-}D[f(A)]$. *This proves necessity of the condition.*

Sufficiency. Assume that f *is not* $\hat{g}^{**}s$-*irresolute. Then by* Theorem 4.6, *there exists* $a_0 \in X$ *and a* $\hat{g}^{**}s$-*neighborhood* V *of* $f(a_0)$ *such that every* $\hat{g}^{**}s$-*neighborhood* U *of* a_0 *contains at least one element* $a \in U$ *for which* $f(a) \notin V$. *Put* $A = \{a \in X : f(a) \notin V\}$. *Then* $a_0 \notin A$ *since* $f(a_0) \in V$, *and therefore* $f(a_0) \notin A$; *also* $f(a_0) \notin \hat{g}^{**}s\text{-}D[f(A)]$ *since* $V \cap (V - \{f(a_0)\}) = \phi$. *Thus,* $f(a_0) \in f[\hat{g}^{**}s\text{-}D(A)] - [f(A) \cup (\hat{g}^{**}s\text{-}D(f(A)))] \neq \phi$, *which is a contradiction to the given condition. The condition of the Theorem is therefore sufficient, and the theorem is proved.*

Theorem 4.10. *Let* $f:(X,\tau) \to (Y,\sigma)$ *be a one-to-one function. Then* f *is* $\hat{g}^{**}s$-*irresolute if and only if* $f[\hat{g}^{**}s\text{-}D(A)] \subseteq \hat{g}^{**}s\text{-}D[f(A)]$, *for all* $A \subseteq X$.

Proof. *Necessity. Let* f *be* $\hat{g}^{**}s$-*irresolute. Let* $A \subseteq X$, $a_0 \in \hat{g}^{**}s\text{-}D(A)$ *and* V *be a* $\hat{g}^{**}s$-*neighborhood of* $f(a_0)$. *Since* f *is* $\hat{g}^{**}s$-*irresolute, so by* Theorem 4.8, *there exists a* $\hat{g}^{**}s$-*neighborhood* U *of* a_0 *such that* $f(U) \subseteq V$. *But* $a_0 \in \hat{g}^{**}s\text{-}D(A)$; *hence there exists an element* $a \in U \cap A$ *such that* $a \neq a_0$; *then* $f(a) \in f(A)$ *and since* f *is one to one,* $f(a) \neq f(a_0)$. *Thus every* $\hat{g}^{**}s$-*neighborhood* V *of* $f(a_0)$ *contains an element of* $f(A)$

FULL TEXTS BOOK

different from $f(a_0)$; *consequently* $f(a_0) \in \hat{g}^{**}s\text{-}D[f(A)]$. *We have therefore* $f[\hat{g}^{**}s\text{-}D(A)] \subseteq \hat{g}^{**}s\text{-}D[f(A)]$.

Sufficiency. Follows from Theorem 4.9.

5. $\hat{g}^{**}s$-OPEN FUNCTIONS

The purpose of this section is to investigate some characterizations of $\hat{g}^{**}s$-*open mappings.*

Definition 5.1. *Let* (X, τ) *and* (Y, σ) *be topological spaces. A function* $f:(X, \tau) \to (Y, \sigma)$ *is called* $\hat{g}^{**}s$-*open if for every open set* G *in* X, $f(G)$ *is a* $\hat{g}^{**}s$-*open set in* Y.

Theorem 5.2. *Prove that a mapping* $f:(X, \tau) \to (Y, \sigma)$ *is* $\hat{g}^{**}s$-*open if and only if for each* $x \in X$, *and* $U \in \tau$ *such that* $x \in U$, *there exists a* $\hat{g}^{**}s$-*open set* $W \subseteq Y$ *containing* $f(x)$ *such that* $W \subseteq f(U)$.

Proof. *Follows immediately from* Definition 5.1.

Theorem 5.3. *Let* $f:(X, \tau) \to (Y, \sigma)$ *be* $\hat{g}^{**}s$-*open. If* $W \subseteq Y$ *and* $F \subseteq X$ *is a closed set containing* $f^{-1}(W)$, *then there exists a* $\hat{g}^{**}s$-*closed set* $H \subseteq Y$ *containing* W *such that* $f^{-1}(H) \subseteq F$.

Proof. *Let* $H = Y - f(Y - F)$. *Since* $f^{-1}(W) \subseteq F$, *we have* $f^{-1}(Y - F) \subseteq (Y - W)$. *Since* f *is* $\hat{g}^{**}s$-*open, then* H *is* $\hat{g}^{**}s$-*closed and* $f^{-1}(H) = X - f^{-1}[f(X - F)] \subseteq X - (X - F) = F$.

Theorem 5.4. *Let* $f:(X, \tau) \to (Y, \sigma)$ *be a* $\hat{g}^{**}s$-*open function and let* $B \subseteq Y$. *Then* $f^{-1}[\hat{g}^{**}s\text{-}Cl(\hat{g}^{**}s\text{-}Int(\hat{g}^{**}s\text{-}Cl(B)))] \subseteq Cl[f^{-1}(B)]$.

Proof. $Cl[f^{-1}(B)]$ *is closed in* X *containing* $f^{-1}(B)$. *By* Theorem 5.3, *there exists a* $\hat{g}^{**}s$-*closed set* $B \subseteq H \subseteq Y$ *such that* $f^{-1}(H) \subseteq Cl[f^{-1}(B)]$. *Thus,*

$f^{-1}[\hat{g}^{**}s\text{-}Cl(\hat{g}^{**}s\text{-}Int(\hat{g}^{**}s\text{-}Cl(B)))] \subseteq f^{-1}[\hat{g}^{**}s\text{-}Cl(\hat{g}^{**}s\text{-}Int(\hat{g}^{**}s\text{-}Cl(H)))]$

$\subseteq f^{-1}[H] \subseteq Cl[f^{-1}(B)]$.

Theorem 5.5. *Prove that a function* $f:(X, \tau) \to (Y, \sigma)$ *is* $\hat{g}^{**}s$-*open if and only if* $f[Int(A)] \subseteq \hat{g}^{**}s\text{-}Int[f(A)]$, *for all* $A \subseteq X$.

Proof. *Necessity. Let* $A \subseteq X$ *and* $x \in Int(A)$. *Then there exists* $U_x \in \tau$ *such that* $x \in U_x \subseteq A$. *So* $f(x) \in f(U_x) \subseteq f(A)$. *and by hypothesis,* $f(U_x) \in \hat{g}^{**}s\text{-}O(Y, \sigma)$. *Hence* $f(x) \in \hat{g}^{**}s\text{-}Int[f(A)]$. *Thus* $f[Int(A)] \subseteq \hat{g}^{**}s\text{-}Int[f(A)]$.

Sufficiency. Let $U \in \tau$. *Then by hypothesis,* $f[Int(U)] \subseteq \hat{g}^{**}s\text{-}Int[f(U)]$. *Since* $Int(U) = U$ *as* U *is open. Also,* $\hat{g}^{**}s\text{-}Int[f(U)] \subseteq f(U)$. *Hence* $f(U) = \hat{g}^{**}s\text{-}Int[f(U)]$. *Thus* $f(U)$ *is* $\hat{g}^{**}s$-*open open in* Y. *So* f *is* $\hat{g}^{**}s$-*open.*

Remark 5.6. *The equality may not hold in the preceding Theorem.*

FULL TEXTS BOOK

Theorem 5.7. *Prove that a function* $f:(X,\tau)\to(Y,\sigma)$ *is* $\hat{g}^{**}s$*-open if and only if* $Int\left[f^{-1}(B)\right]\subseteq f^{-1}\left[\hat{g}^{**}s\text{-}Int(B)\right]$, *for all* $B\subseteq Y$.

Proof. *Necessity. Let* $B\subseteq Y$. *Since* $Int\left[f^{-1}(B)\right]$ *is open in* X *and* f *is* $\hat{g}^{**}s$*-open,* $f\left[Int\left(f^{-1}(B)\right)\right]$ *is* $\hat{g}^{**}s$*-open in* Y. *Also we have* $f\left[Int\left(f^{-1}(B)\right)\right]\subseteq f\left[f^{-1}(B)\right]\subseteq B$. *Hence,* $f\left[Int\left(f^{-1}(B)\right)\right]\subseteq\hat{g}^{**}s\text{-}Int(B)$. *Therefore* $Int\left(f^{-1}(B)\right)\subseteq f^{-1}\left[\hat{g}^{**}s\text{-}Int(B)\right]$.

Sufficiency. Let $A\subseteq X$. *Then* $f(A)\subseteq Y$. *Hence by hypothesis, we obtain* $Int(A)\subseteq Int\left[f^{-1}\left(f(A)\right)\right]\subseteq f^{-1}\left[\hat{g}^{**}s\text{-}Int\left(f(A)\right)\right]$. *Thus* $f\left[int(A)\right]\subseteq\hat{g}^{**}s\text{-}Int\left[f(A)\right]$, *for all* $A\subseteq X$. *Hence, by* Theorem 5.5, f *is* $\hat{g}^{**}s$*-open.*

Theorem 5.8. *Let* $f:(X,\tau)\to(Y,\sigma)$ *be a mapping. Then a necessary and sufficient condition for* f *to be* $\hat{g}^{**}s$*-open is that* $f^{-1}\left[\hat{g}^{**}s\text{-}Cl(B)\right]\subseteq Cl\left[f^{-1}(B)\right]$ *for every subset* B *of* Y.

Proof. *Necessity. Assume* f *is* $\hat{g}^{**}s$*-open. Let* $B\subseteq Y$. *Let* $x\in f^{-1}\left[\hat{g}^{**}s\text{-}Cl(B)\right]$. *Then* $f(x)\in\hat{g}^{**}s\text{-}Cl(B)$. *Let* $U\in\tau$ *such that* $x\in U$. *Since* f *is* $\hat{g}^{**}s$*-open, then* $f(U)$ *is a* $\hat{g}^{**}s$*-open set in* Y. *Therefore,* $B\cap f(U)\neq\phi$. *Then* $U\cap f^{-1}(B)\neq\phi$. *Hence* $x\in Cl\left[f^{-1}(B)\right]$. *We conclude that* $f^{-1}\left[\hat{g}^{**}s\text{-}Cl(B)\right]\subseteq Cl\left[f^{-1}(B)\right]$.

Sufficiency. Let $B\subseteq Y$. *Then* $(Y-B)\subseteq Y$. *By hypothesis,* $f^{-1}\left[\hat{g}^{**}s\text{-}Cl(Y-B)\right]\subseteq Cl\left[f^{-1}(Y-B)\right]$. *This implies that* $X-Cl\left[f^{-1}(Y-B)\right]\subseteq X-f^{-1}\left[\hat{g}^{**}s\text{-}Cl(Y-B)\right]$. *Therefore* $X-Cl\left[X-f^{-1}(B)\right]\subseteq f^{-1}\left[Y-\left(\hat{g}^{**}s\text{-}Cl(Y-B)\right)\right]$. *This implies that* $Int\left[f^{-1}(B)\right]\subseteq f^{-1}\left[\hat{g}^{**}s\text{-}Int(B)\right]$. *Now form* Theorem 5.7, *it follows that* f *is* $\hat{g}^{**}s$*-open.*

6. $\hat{g}^{**}s$-CLOSED FUNCTIONS

In this section, we introduce $\hat{g}^{**}s$*-closed functions and study certain properties and characterizations of these types of functions.*

Definition 6.1. *A mapping* $f:(X,\tau)\to(Y,\sigma)$ *is called* $\hat{g}^{**}s$*-closed if the image of each closed set in* X *is a* $\hat{g}^{**}s$*-closed set in* Y.

Theorem 6.2. *Prove that a mapping* $f:(X,\tau)\to(Y,\sigma)$ *is* $\hat{g}^{**}s$*-closed if and only if* $\hat{g}^{**}s\text{-}Cl\left[f(A)\right]\subseteq f\left[Cl(A)\right]$ *for each* $A\subseteq X$.

Proof. *Necessity. Let* f *be* $\hat{g}^{**}s$*-closed and let* $A\subseteq X$. *Then* $f(A)\subseteq f\left[Cl(A)\right]$ *and* $f\left[Cl(A)\right]$ *is a* $\hat{g}^{**}s$*-closed set in* Y. *Thus* $\hat{g}^{**}s\text{-}Cl\left[f(A)\right]\subseteq f\left[Cl(A)\right]$.

FULL TEXTS BOOK

Sufficiency. Suppose that $\hat{g}^{**}s\text{-}Cl[f(A)] \subseteq f[Cl(A)]$, *for each* $A \subseteq X$. *Let* $A \subseteq X$ *be a closed set. Then* $\hat{g}^{**}s\text{-}Cl[f(A)] \subseteq f[Cl(A)] = f(A)$. *This shows that* $f(A)$ *is a* $\hat{g}^{**}s$*-closed set. Hence* f *is* $\hat{g}^{**}s$*-closed.*

Theorem 6.3. *Let* $f:(X,\tau)\to(Y,\sigma)$ *be* $\hat{g}^{**}s$*-closed. If* $V \subseteq Y$ *and* $E \subseteq X$ *is an open set containing* $f^{-1}(V)$, *then there exists an* $\hat{g}^{**}s$*-open set* $G \subseteq Y$ *containing* V *such that* $f^{-1}(G) \subseteq E$.

Proof. *Let* $G = Y - f(X-E)$. *Since* $f^{-1}(V) \subseteq E$, *we have* $f(X-E) \subseteq Y - V$. *Since* f *is* $\hat{g}^{**}s$*-closed, then* G *is a* $\hat{g}^{**}s$*-open set and also* $f^{-1}(G) = X - f^{-1}[f(X-E)] \subseteq X - (X-E) = E$.

Theorem 6.4. *Suppose that* $f:(X,\tau)\to(Y,\sigma)$ *is an* $\hat{g}^{**}s$*-closed mapping. Then* $\hat{g}^{**}s\text{-}Int[\hat{g}^{**}s\text{-}Cl(f(A))] \subseteq f[Cl(A)]$ *for every subset* A *of* X.

Proof. *Suppose* f *is a* $\hat{g}^{**}s$*-closed mapping and* A *is an arbitrary subset of* X. *Then* $f[Cl(A)]$ *is* $\hat{g}^{**}s$*-closed in* Y. *Then* $\hat{g}^{**}s\text{-}Int[\hat{g}^{**}s\text{-}Cl(f(Cl(A)))] \subseteq f[Cl(A)]$. *But also* $\hat{g}^{**}s\text{-}Int[\hat{g}^{**}s\text{-}Cl(f(A))] \subseteq \hat{g}^{**}s\text{-}Int[\hat{g}^{**}s\text{-}Cl(f(Cl(A)))]$. *Therefore,* $\hat{g}^{**}s\text{-}Int[\hat{g}^{**}s\text{-}Cl(f(A))] \subseteq f[Cl(A)]$.

Theorem 6.5. *Let* $f:(X,\tau)\to(Y,\sigma)$ *be a* $\hat{g}^{**}s$*-closed function, and* $B, C \subseteq Y$.

Proof. (1) *If* U *is an open neighborhood of* $f^{-1}(B)$, *then there exists a* $\hat{g}^{**}s$*-open neighborhood* V *of* B *such that* $f^{-1}(B) \subseteq f^{-1}(V) \subseteq U$.

(2) *If* f *is also onto, then if* $f^{-1}(B)$ *and* $f^{-1}(C)$ *have disjoint open neighborhoods, so have* B *and* C.

Proof. (1) *Let* $V = Y - f(X-U)$. *Then* $V^c = Y - V = f(U^c)$. *Since* f *is* $\hat{g}^{**}s$*-closed, so* V *is a* $\hat{g}^{**}s$*-open set. Since* $f^{-1}(B) \subseteq U$, *we have* $V^c = f(U^c) \subseteq f[f^{-1}(B^c)] \subseteq B^c$. *Hence,* $B \subseteq V$, *and thus* V *is a* $\hat{g}^{**}s$*-open neighborhood of* B. *Further* $U^c \subseteq f^{-1}[f(U^c)] = f^{-1}(V^c) = [f^{-1}(V)]^c$. *This proves that* $f^{-1}(V) \subseteq U$.

(2) *If* $f^{-1}(B)$ *and* $f^{-1}(C)$ *have disjoint open neighborhoods* M *and* N, *then by* (1), *we have* $\hat{g}^{**}s$*-open neighborhoods* U *and* V *of* B *and* C *respectively such that* $f^{-1}(B) \subseteq f^{-1}(U) \subseteq \hat{g}^{**}s\text{-}Int(M)$ *and* $f^{-1}(C) \subseteq f^{-1}(V) \subseteq \hat{g}^{**}s\text{-}Int(N)$. *Since* M *and* N *are disjoint, so are* $\hat{g}^{**}s\text{-}Int(M)$ *and* $\hat{g}^{**}s\text{-}Int(N)$, *hence so* $f^{-1}(U)$ *and* $f^{-1}(V)$ *are disjoint as well. It follows that* U *and* V *are disjoint too as* f *is onto.*

Theorem 6.6. *Prove that a surjective mapping* $f:(X,\tau)\to(Y,\sigma)$ *is* $\hat{g}^{**}s$*-closed, if and only if for each subset* B *of* Y *and each open set* U *in* X *containing* $f^{-1}(B)$, *there exists a* $\hat{g}^{**}s$*-open set* V *in* Y *containing* B *such that* $f^{-1}(V) \subseteq U$.

FULL TEXTS BOOK

Proof. *Necessity. This follows from* (1) *of* Theorem 6.5.

Sufficiency. Suppose F *is an arbitrary closed set in* X. *Let* y *be an arbitrary point in* $Y - f(F)$. *Then* $f^{-1}(y) \subseteq X - f^{-1}[f(F)] \subseteq (X - F)$ *and* $(X - F)$ *is open in* X. *Hence by hypothesis, there exists a* $\hat{g}^{**}s$-*open set* V_y *containing* y *such that* $f^{-1}(V_y) \subseteq (X - F)$. *This implies that* $y \in V_y \subseteq [Y - f(F)]$. *Thus* $Y - f(F) = \cup\{V_y : y \in Y - f(F)\}$. *Hence* $Y - f(F)$, *being a union of* $\hat{g}^{**}s$-*open sets, is* $\hat{g}^{**}s$-*open. Thus its complement* $f(F)$ *is* $\hat{g}^{**}s$-*closed. This shows that* f *is* $\hat{g}^{**}s$-*closed.*

Theorem 6.7. *Let* $f : (X, \tau) \to (Y, \sigma)$ *be a bijection. Then the following are equivalent:*

(a) f *is* $\hat{g}^{**}s$-*closed.*

(b) f *is* $\hat{g}^{**}s$-*open.*

(c) f^{-1} *is* $\hat{g}^{**}s$-*continuous.*

Proof. (a) $\Rightarrow$ (b): *Let* $U \in \tau$. *Then* $X - U$ *is closed in* X. *By* (a), $f(X - U)$ *is* $\hat{g}^{**}s$-*closed in* Y. *But* $f(X - U) = f(X) - f(U) = Y - f(U)$. *Thus* $f(U)$ *is* $\hat{g}^{**}s$-*open in* Y. *This shows that* f *is* $\hat{g}^{**}s$-*open.*

(b) $\Rightarrow$ (c): *Let* $U \subseteq X$. *be an open set. Since* f *is* $\hat{g}^{**}s$-*open. So* $f(U) = (f^{-1})^{-1}(U)$ *is* $\hat{g}^{**}s$-*open in* Y. *Hence* f^{-1} *is* $\hat{g}^{**}s$-*continuous.*

(c) $\Rightarrow$ (a): *Let* A *be an arbitrary closed set in* X. *Then* $X - A$ *is open in* X. *Since* f^{-1} *is* $\hat{g}^{**}s$-*continuous,* $(f^{-1})^{-1}(X - A)$ $\hat{g}^{**}s$-*open in* Y. *But* $(f^{-1})^{-1}(X - A) = f(X - A) = Y - f(A)$. *Thus* $f(A)$ *is* $\hat{g}^{**}s$-*closed in* Y. *This shows that* f *is* $\hat{g}^{**}s$-*closed.*

Remark 6.8. *A bijection* $f : (X, \tau) \to (Y, \sigma)$ *may be open and closed but neither* $\hat{g}^{**}s$-*open nor* $\hat{g}^{**}s$-*closed.*

7. PRE-$\hat{g}^{**}s$-OPEN FUNCTIONS

The purpose of this section is to introduce and discuss certain properties and characterizations of pre-$\hat{g}^{**}s$-*open functions.*

Definition 7.1. *Let* (X, τ) *and* (Y, σ) *be topological spaces. Then a function* $f : (X, \tau) \to (Y, \sigma)$ *is said to be pre-*$\hat{g}^{**}s$-*open if and only if for each* $A \in \hat{g}^{**}s\text{-}O(X, \tau)$, $f(A) \in \hat{g}^{**}s\text{-}O(Y, \sigma)$.

Theorem 7.2. *Let* $f : (X, \tau) \to (Y, \sigma)$ *and* $g : (Y, \sigma) \to (Z, \mu)$ *be any two pre-*$\hat{g}^{**}s$-*open functions. Then the composition function* $gof : (X, \tau) \to (Z, \mu)$ *is a pre-*$\hat{g}^{**}s$-*open function.*

Proof. *Let* $U \in \hat{g}^{**}s\text{-}O(X, \tau)$. *Then* $f(U) \in \hat{g}^{**}s\text{-}O(Y, \sigma)$. *Since* f *is pre-*$\hat{g}^{**}s$-*open. But then* $g(f(U)) \in \hat{g}^{**}s\text{-}O(Z, \mu)$ *as* g *is pre-*$\hat{g}^{**}s$-*open. Hence,* gof *is pre-*$\hat{g}^{**}s$-*open.*

FULL TEXTS BOOK

Theorem 7.3. *Prove that a mapping* $f:(X,\tau)\to(Y,\sigma)$ *is* $pre\text{-}\hat{g}^{**}s\text{-}open$ *if and only if for each* $x\in X$ *and any* $U\in\hat{g}^{**}s\text{-}O(X,\tau)$ *such that* $x\in U$, *there exists* $V\in\hat{g}^{**}s\text{-}O(Y,\sigma)$ *such that* $f(x)\in V$ *and* $V\subseteq f(U)$.

Proof. *Routine.*

Theorem 7.4. *Prove that a mapping* $f:(X,\tau)\to(Y,\sigma)$ *is* $pre\text{-}\hat{g}^{**}s\text{-}open$ *if and only if for each* $x\in X$ *and for any* $\hat{g}^{**}s\text{-}neighborhood$ U *of* x *in* X, *there exists a* $\hat{g}^{**}s\text{-}neighborhood$ V *of* $f(x)$ *in* Y *such that* $V\subseteq f(U)$.

Proof. *Necessity. Let* $x\in X$ *and let* U *be a* $\hat{g}^{**}s\text{-}neighborhood$ *of* x. *Then there exists* $W\in\hat{g}^{**}s\text{-}O(X,\tau)$ *such that* $x\in W\subseteq U$. *Then* $f(x)\in f(W)\subseteq f(U)$. *But* $f(W)\in\hat{g}^{**}s\text{-}O(Y,\sigma)$ *as* f *is* $pre\text{-}\hat{g}^{**}s\text{-}open$. *Hence* $V=f(W)$ *is an* $\hat{g}^{**}s\text{-}neighborhood$ *of* $f(x)$ *and* $V\subseteq f(U)$.

Sufficiency. Let $U\in\hat{g}^{**}s\text{-}O(X,\tau)$ *and let* $x\in U$. *Then* U *is a* $\hat{g}^{**}s\text{-}neighborhood$ *of* x. *So by hypothesis, there exists a* $\hat{g}^{**}s\text{-}neighborhood$ $V_{f(x)}$ *of* $f(x)$ *such that* $f(x)\in V_{f(x)}\subseteq f(U)$. *It follows at once that* $f(U)$ *is an* $\hat{g}^{**}s\text{-}neighborhood$ *of each of its points. Therefore* $f(U)$ *is* $\hat{g}^{**}s\text{-}open$. *Hence* f *is* $pre\text{-}\hat{g}^{**}s\text{-}open$.

Theorem 7.5. *Prove that a function* $f:(X,\tau)\to(Y,\sigma)$ *is* $pre\text{-}\hat{g}^{**}s\text{-}open$ *if and only if* $f\left[\hat{g}^{**}s\text{-}Int(A)\right]\subseteq\hat{g}^{**}s\text{-}Int\left[f(A)\right]$, *for all* $A\subseteq X$.

Proof. *Necessity. Let* $A\subseteq X$ *and* $x\in\hat{g}^{**}s\text{-}Int(A)$. *Then there exists* $U_x\in\hat{g}^{**}s\text{-}O(X,\tau)$ *such that* $x\in U_x\subseteq A$. *So* $f(x)\in f(U_x)\subseteq f(A)$ *and by hypothesis,* $f(U_x)\in\hat{g}^{**}s\text{-}O(Y,\sigma)$. *Hence* $f(x)\in\hat{g}^{**}s\text{-}Int\left[f(A)\right]$. *Thus* $f\left[\hat{g}^{**}s\text{-}Int(A)\right]\subseteq\hat{g}^{**}s\text{-}Int\left[f(A)\right]$.

Sufficiency. Let $U\in\hat{g}^{**}s\text{-}O(X,\tau)$. *Then by hypothesis,* $f\left[\hat{g}^{**}s\text{-}Int(U)\right]\subseteq\hat{g}^{**}s\text{-}Int\left[f(U)\right]$. *Since* $\hat{g}^{**}s\text{-}Int(U)=U$ *as* U *is* $\hat{g}^{**}s\text{-}open$. *Also* $\hat{g}^{**}s\text{-}Int\left[f(U)\right]\subseteq f(U)$. *Hence* $f(U)=\hat{g}^{**}s\text{-}Int\left[f(U)\right]$. *Thus* $f(U)$ *is* $\hat{g}^{**}s\text{-}open$ *in* Y. *So* f *is* $pre\text{-}\hat{g}^{**}s\text{-}open$.

We remark that the equality does not hold in Theorem 7.5 *as the following example shows.*

Example 7.6. *Let* $X=Y=\{1,2\}$. *suppose* X *is anti-discrete and* Y *is discrete. Let* $f=Id.$, $A=\{1\}$. *Then* $\phi=f\left[\hat{g}^{**}s\text{-}Int(A)\right]\neq\hat{g}^{**}s\text{-}Int\left[f(A)\right]=\{1\}$.

Theorem 7.7. *Prove that a function* $f:(X,\tau)\to(Y,\sigma)$ *is* $pre\text{-}\hat{g}^{**}s\text{-}open$ *if and only if* $\hat{g}^{**}s\text{-}Int\left[f^{-1}(B)\right]\subseteq f^{-1}\left[\hat{g}^{**}s\text{-}Int(B)\right]$, *for all* $B\subseteq Y$.

Proof. *Necessity. Let* $B\subseteq Y$. *Since* $\hat{g}^{**}s\text{-}Int\left[f^{-1}(B)\right]$ *is* $\hat{g}^{**}s\text{-}open$ *in* X *and* f *is* $pre\text{-}\hat{g}^{**}s\text{-}open$, $f\left[\hat{g}^{**}s\text{-}Int\left(f^{-1}(B)\right)\right]$ $\hat{g}^{**}s\text{-}open$ *in* Y. *Also we have*

FULL TEXTS BOOK

$f\left[\hat{g}^{**}s\text{-}Int\left(f^{-1}(B)\right)\right]\subseteq f\left[f^{-1}(B)\right]\subseteq B$. *Hence,* $f\left[\hat{g}^{**}s\text{-}Int\left(f^{-1}(B)\right)\right]\subseteq\hat{g}^{**}s\text{-}Int(B)$. *Therefore* $\hat{g}^{**}s\text{-}Int\left[f^{-1}(B)\right]\subseteq f^{-1}\left[\hat{g}^{**}s\text{-}Int(B)\right]$.

Sufficiency. Let $A\subseteq X$. *Then* $f(A)\subseteq Y$. *Hence by hypothesis, we obtain* $\hat{g}^{**}s\text{-}Int(A)\subseteq\hat{g}^{**}s\text{-}Int\left[f^{-1}\left(f(A)\right)\right]\subseteq f^{-1}\left[\hat{g}^{**}s\text{-}Int\left(f(A)\right)\right]$. *This implies that* $f\left[\hat{g}^{**}s\text{-}Int(A)\right]\subseteq f\left[f^{-1}\left(\hat{g}^{**}s\text{-}Int\left(f(A)\right)\right)\right]\subseteq\hat{g}^{**}s\text{-}Int\left[f(A)\right]$. *Thus* $f\left[\hat{g}^{**}s\text{-}Int(A)\right]\subseteq\ \hat{g}^{**}s\text{-}Int\left[f(A)\right]$, *for all* $A\subseteq X$. *Hence, by* Theorem 7.5, f *is pre-*$\hat{g}^{**}s$*-open.*

Theorem 7.8. *Prove that a mapping* $f:(X,\tau)\to(Y,\sigma)$ *is pre-*$\hat{g}^{**}s$*-open if and only if* $f^{-1}\left[\hat{g}^{**}s\text{-}Cl(B)\right]\subseteq\hat{g}^{**}s\text{-}Cl\left[f^{-1}(B)\right]$, *for every subset* B *of* Y.

Proof. *Necessity. Let* $B\subseteq Y$ *and let* $x\in f^{-1}\left[\hat{g}^{**}s\text{-}Cl(B)\right]$. *Then* $f(x)\in\hat{g}^{**}s\text{-}Cl(B)$. *Let* $U\in\hat{g}^{**}s\text{-}O(X,\tau)$ *such that* $x\in U$. *By hypothesis,* $f(U)\in\hat{g}^{**}s\text{-}O(Y,\sigma)$ *and* $f(x)\in f(U)$. *Thus* $f(U)\cap B\neq\phi$. *Hence* $U\cap f^{-1}(B)\neq\phi$. *Therefore,* $x\in\hat{g}^{**}s\text{-}Cl\left[f^{-1}(B)\right]$, *So we obtain* $f^{-1}\left[\hat{g}^{**}s\text{-}Cl(B)\right]\subseteq\hat{g}^{**}s\text{-}Cl\left[f^{-1}(B)\right]$.

Sufficiency. Let $B\subseteq Y$. *Then* $(Y-B)\subseteq Y$. *By hypothesis,* $f^{-1}\left[\hat{g}^{**}s\text{-}Cl(Y-B)\right]\subseteq\hat{g}^{**}s\text{-}Cl\left[f^{-1}(Y-B)\right]$. *This implies that* $X-\left[\hat{g}^{**}s\text{-}Cl\left(f^{-1}(Y-B)\right)\right]\subseteq X-f^{-1}\left[\hat{g}^{**}s\text{-}Cl(Y-B)\right]$. *Therefore,* $X-\hat{g}^{**}s\text{-}Cl\left[X-f^{-1}(B)\right]\subseteq f^{-1}\left[Y-\left(\hat{g}^{**}s\text{-}Cl(Y-B)\right)\right]$. *Then this implies that* $\hat{g}^{**}s\text{-}Int\left[f^{-1}(B)\right]\subseteq f^{-1}\left[\hat{g}^{**}s\text{-}Int(B)\right]$. *Now by* Theorem 7.7, *it follows that* f *is pre-*$\hat{g}^{**}s$*-open.*

Theorem 7.9. *Let* $f:(X,\tau)\to(Y,\sigma)$ *and* $g:(Y,\sigma)\to(Z,\mu)$ *be two mappings such that* $gof:(X,\tau)\to(Z,\mu)$ *is* $\hat{g}^{**}s$*-irrsolute. Then*

(1) *If* g *is a pre-*$\hat{g}^{**}s$*-open injection, then* f *is* $\hat{g}^{**}s$*-irrsolute.*

(2) *If* f *is a pre-*$\hat{g}^{**}s$*-open surjection, then* g *is* $\hat{g}^{**}s$*-irrsolute.*

Proof. (1) *Let* $U\in\hat{g}^{**}s\text{-}O(Y,\sigma)$. *Then* $g(U)\in\hat{g}^{**}s\text{-}O(Z,\mu)$ *since* g *is pre-*$\hat{g}^{**}s$*-open Also* gof *is* $\hat{g}^{**}s$*-irrsolute. Therefore, we have* $(gof)^{-1}\left[g(U)\right]\in\hat{g}^{**}s\text{-}O(X,\tau)$. *Since* g *is an injection, so we have :* $(gof)^{-1}\left[g(U)\right]=\left(f^{-1}og^{-1}\right)\left[g(U)\right]=\ f^{-1}\left[g^{-1}\left(g(U)\right)\right]=f^{-1}(U)$. *Consequently* $f^{-1}(U)$ *is* $\hat{g}^{**}s$*-open in* X. *This proves that* f *is* $\hat{g}^{**}s$*-irrsolute.*

(2) *Let* $V\in\hat{g}^{**}s\text{-}O(Z,\mu)$. *Then* $(gof)^{-1}(V)\in\hat{g}^{**}s\text{-}O(X,\tau)$ *since* gof *is* $\hat{g}^{**}s$*-irrsolute. Also* f *is pre-*$\hat{g}^{**}s$*-open,* $f\left[(gof)^{-1}(V)\right]$ *is* $\hat{g}^{**}s$*-open in* Y. *Since* f *is surjective, we note*

FULL TEXTS BOOK

that $f\left[(gof)^{-1}(V)\right]=\left[fo(gof)^{-1}\right](V)=\left[fo\left(f^{-1}og^{-1}\right)\right](V)=\left[\left(fof^{-1}\right)og^{-1}(V)\right]$ $=g^{-1}(V)$. *Hence* g *is* $\hat{g}^{**}s$-*irrsolute.*

8. PRE-$\hat{g}^{**}s$-CLOSED FUNCTIONS

In this last section, we introduce and explore several properties and characterizations of *pre*-$\hat{g}^{**}s$-*closed functions.*

Definition 8.1. *A function* $f:(X,\tau)\to(Y,\sigma)$ *is said to be* *pre*-$\hat{g}^{**}s$-*closed if and only if the image set* $f(A)$ *is* $\hat{g}^{**}s$-*closed for each* $\hat{g}^{**}s$-*closed subset* A *of* X.

Theorem 8.2. *The composition of two* *pre*-$\hat{g}^{**}s$-*closed mappings is a* *pre*-$\hat{g}^{**}s$-*closed mapping.*

Proof. *The straightforward proof is omitted.*

Theorem 8.3. *Prove that a mapping* $f:(X,\tau)\to(Y,\sigma)$ *is* *pre*-$\hat{g}^{**}s$-*closed if and only if* $\hat{g}^{**}s$-$Cl\left[f(A)\right]\subseteq f\left[\hat{g}^{**}s\text{-}Cl(A)\right]$ *for every subset* A *of* X.

Proof. *Necessity. Suppose* f *is a* *pre*-$\hat{g}^{**}s$-*closed mapping and* A *is an arbitrary subset of* X. *Then* $f\left[\hat{g}^{**}s\text{-}Cl(A)\right]$ *is* $\hat{g}^{**}s$-*closed in* Y. *Since* $f(A)\subseteq f\left[\hat{g}^{**}s\text{-}Cl(A)\right]$, *we obtain* $\hat{g}^{**}s$-$Cl\left[f(A)\right]\subseteq f\left[\hat{g}^{**}s\text{-}Cl(A)\right]$.

Sufficiency. Suppose F *is an arbitrary* $\hat{g}^{**}s$-*closed set in* X. *By hypothesis, we obtain* $f(F)\subseteq\hat{g}^{**}s$-$Cl\left[f(F)\right]\subseteq f\left[\hat{g}^{**}s\text{-}Cl(F)\right]=f(F)$. *Hence* $f(F)=\hat{g}^{**}s$-$Cl\left[f(F)\right]$. *Thus* $f(F)$ *is* $\hat{g}^{**}s$-*closed in* Y. *It follows that* f *is* *pre*-$\hat{g}^{**}s$-*closed.*

Theorem 8.4. *Let* $f:(X,\tau)\to(Y,\sigma)$ *be a* *pre*-$\hat{g}^{**}s$-*closed function, and* $B,C\subseteq Y$.

(1) *If* U *is a* $\hat{g}^{**}s$-*open neighborhood of* $f^{-1}(B)$, *then there exists a* $\hat{g}^{**}s$-*open neighborhood* V *of* B *such that* $f^{-1}(B)\subseteq f^{-1}(V)\subseteq U$.

(2) *If* f *is also onto, then if* $f^{-1}(B)$ *and* $f^{-1}(C)$ *have disjoint* $\hat{g}^{**}s$-*open neighborhoods, so have* B *and* C.

Proof. (1) *Let* $V=Y-f(X-U)$. *Then* $V^c=Y-V=f\left(U^c\right)$. *Since* f *is* *pre*-$\hat{g}^{**}s$-*closed,* *so* V *is* $\hat{g}^{**}s$-*open. Since* $f^{-1}(B)\subseteq U$, *we have* $V^c=f\left(U^c\right)\subseteq f\left[f^{-1}\left(B^c\right)\right]\subseteq B^c$. *Hence,* $B\subseteq V$, *and thus* V *is a* $\hat{g}^{**}s$-*open neighborhood of* B. *Further* $U^c\subseteq f^{-1}\left[f\left(U^c\right)\right]=f^{-1}\left(V^c\right)=\left[f^{-1}(V)\right]^c$. *This proves that* $f^{-1}(V)\subseteq U$.

(2) *If* $f^{-1}(B)$ *and* $f^{-1}(C)$ *have disjoint* $\hat{g}^{**}s$-*open neighborhoods* M *and* N, *then by* (1), *we have* $\hat{g}^{**}s$-*open neighborhoods* U *and* V *of* B *and* C *respectively such that* $f^{-1}(B)\subseteq f^{-1}(U)\subseteq\hat{g}^{**}s$-$Int(M)$ *and* $f^{-1}(C)\subseteq f^{-1}(V)\subseteq\hat{g}^{**}s$-$Int(N)$. *Since* M *and* N *are disjoint, so are* $\hat{g}^{**}s$-$Int(M)$ *and* $\hat{g}^{**}s$-$Int(N)$, *and hence so* $f^{-1}(U)$ *and* $f^{-1}(V)$ *are disjoint as well. It follows that* U *and* V *are disjoint too as* f *is onto.*

FULL TEXTS BOOK

Theorem 8.5. *Prove that a surjective mapping* $f:(X,\tau)\to(Y,\sigma)$ *is pre-*$\hat{g}^{**}s$*-closed if and only if for each subset* B *of* Y *and each* $\hat{g}^{**}s$*-open set* U *in* X *containing* $f^{-1}(B)$*, there exists a* $\hat{g}^{**}s$*-open set* V *in* Y *containing* B *such that* $f^{-1}(V)\subseteq U$.

Proof. *Necessity. This follows from* (1) *of* Theorem 8.4.

Sufficiency. Suppose F *is an arbitrary* $\hat{g}^{**}s$*-closed set in* X*. Let* y *be an arbitrary point in* $Y-f(F)$*. Then* $f^{-1}(y)\subseteq X-f^{-1}[f(F)]\subseteq(X-F)$ *and* $(X-F)$ *is* $\hat{g}^{**}s$*-open in* X*. Hence by hypothesis, there exists a* $\hat{g}^{**}s$*-open set* V_y *containing* y *such that* $f^{-1}(V_y)\subseteq(X-F)$*. This implies that* $y\in V_y\subseteq[Y-f(F)]$*. Thus* $Y-f(F)=\cup\{V_y\,|\,y\in Y-f(F)\}$*. Hence* $Y-f(F)$*, being a union of* $\hat{g}^{**}s$*-open sets is* gsg*-open. Thus its complement* $f(F)$ *is* $\hat{g}^{**}s$*-closed. This shows that* f *is* $\hat{g}^{**}s$*-closed.*

Theorem 8.6. *Let* $f:(X,\tau)\to(Y,\sigma)$ *be a bijection. Then the following are equivalent:*

(1) f *is pre-*$\hat{g}^{**}s$*-closed.*

(2) f *is pre-*$\hat{g}^{**}s$*-open.*

(3) f^{-1} *is* $\hat{g}^{**}s$*-irresolute.*

Proof. $(1)\Rightarrow(2)$: *Let* $U\in\hat{g}^{**}s$*-*$O(X,\tau)$*. Then* $X-U$ *is* $\hat{g}^{**}s$*-closed in* X*. By* (1)*,* $f(X-U)$ *is* $\hat{g}^{**}s$*-closed in* Y*. But* $f(X-U)=f(X)-f(U)=Y-f(U)$*. Thus* $f(U)$ *is* $\hat{g}^{**}s$*-open in* Y*. This shows that* f *is pre-*$\hat{g}^{**}s$*-open.*

$(2)\Rightarrow(3)$: *Let* $A\subseteq X$*. Since* f *is pre-*$\hat{g}^{**}s$*-open, so by* Theorem 7.8, $f^{-1}[\hat{g}^{**}s\text{-}Cl(f(A))]\subseteq\hat{g}^{**}s\text{-}Cl[f^{-1}(f(A))]$*. It implies that* $\hat{g}^{**}s\text{-}Cl[f(A)]\subseteq f[\hat{g}^{**}s\text{-}Cl(A)]$.

Thus $\hat{g}^{**}s\text{-}Cl[(f^{-1})^{-1}(A)]\subseteq(f^{-1})^{-1}[\hat{g}^{**}s\text{-}Cl(A)]$*, for all* $A\subseteq X$*. Then by* Theorem 4.8*, it follows that* f^{-1} *is* $\hat{g}^{**}s$*-irresolute.*

$(3)\Rightarrow(1)$: *Let* A *be an arbitrary* $\hat{g}^{**}s$*-closed set in* X*. Then* $X-A$ *is* $\hat{g}^{**}s$*-open in* X*. Since* f^{-1} *is* $\hat{g}^{**}s$*-irresolute,* $(f^{-1})^{-1}(X-A)$ *is* $\hat{g}^{**}s$*-open in* Y*. But* $(f^{-1})^{-1}(X-A)=f(X-A)=Y-f(A)$*. Thus* $f(A)$ *is* $\hat{g}^{**}s$*-closed in* Y*. This shows that* f *is pre-*$\hat{g}^{**}s$*-closed.*

9. CONCLUSIONS

In this article, we have used $\hat{g}^{**}s$*-open and* $\hat{g}^{**}s$*-closed to introduce new types of mappings in topological spaces namely* $\hat{g}^{**}s$-continuous *function and* $\hat{g}^{**}s$-irresolute *function,* $\hat{g}^{**}s$-open *function,* $\hat{g}^{**}s$-closed *function,* pre$-\hat{g}^{**}s$-open *function and* pre$-\hat{g}^{**}s$-closed *function and have investigated several properties and characterizations of these mappings in topological spaces.*

FULL TEXTS BOOK

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FULL TEXTS BOOK

THE CHALLENGE FOR SUSTAINABLE DEVELOPMENT OF RURAL TOURISM - THE ALBANIA CASE

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ABSTRACT
Albania has a population of 2,761,785 inhabitants on January 1, 2023 (INSTAT, 2023). The largest percentage of the population is being concentrated in urban areas, abandoning rural areas. Faced with this phenomenon, the Albanian state has set priorities and drafted policies to develop rural areas and return the population there where one of the possibilities is through the sustainable development of rural tourism.
In this paper, we aim to answer the research questions:
a) Does Albania have the potential to develop rural tourism?
b) What are its challenges to develop?

To identify not only the opportunities for the development of rural tourism in Albania but also the challenges that the sustainable development of rural tourism in Albania faces today.
The methodology we will use is in the function of the topic "The challenge for sustainable development of rural tourism - the Albania case". Through the analytical and comparative method, we will identify the current situation and the future of rural tourism in rural areas; through a questionnaire, we will identify the perception that the population has for the development of rural tourism, and we will statistically process the data collected in SPPS.
At the end, the paper will be closed with the SWOT analysis.
Keywords: Rural Tourism, culture, Agriculture, rural areas, sustainable development

1. Introduction

Albania is located in the southeastern part of Europe, in the western part of the Balkan Peninsula. It has a mainly hilly-mountainous relief. It has a population of 2,761,785 inhabitants on January 1, 2023 (INSTAT, 2023). The largest percentage of the population is being concentrated in urban areas, abandoning rural areas.
The development of rural tourism in Albania has favorable conditions for development: diverse relief, rich water resources, fauna, and flora that are of interest to tourists.
Rural areas offer a rich cultural heritage such as archaeological, historical, ethnographic, culinary, religious, etc.
Nowadays, rural areas in Albania are facing problems such as abandonment by the population, changes in the structure of the age pyramid, and loss of public services, but on the other hand, they possess a favorable natural and cultural potential for the development of tourism. (B. Avdia, K. Ngjeci, 2021). To mitigate the negative social, economic, and environmental effects, it has been assessed by the government, experts, and researchers to develop rural tourism.
The development of rural tourism will be a complement to two government priorities a) the development of tourism and b) the agricultural sector. (Government Program 2021-2025)
The purpose of the paper is to identify not only the opportunities for the development of rural tourism in Albania but also the challenges that the sustainable development of rural tourism faces today. Also, we aim to answer the research questions:

FULL TEXTS BOOK

Does Albania have the potential for the development of rural tourism?
What are its challenges to develop?
Where through the method of literature research, questionnaires, the analysis of collected data will affirm or deny the research questions raised.
The paper will be organized: an introduction, literature review, research methods, results, discussions, and conclusions.
The development of rural tourism in Albania is a good opportunity for the community. They will engage in the establishment of tourism businesses such as the opening of guesthouses, Agri-tourism, employment as local guides, etc. This means that the development of rural tourism in Albania will affect the revitalization of life in the village, but also of the sectors in function of the development of tourism. This paper will be of interest to researchers in the field, rural institutions in Albania and other actors involved in the tourism sector.

2. Literature review

Albania has a favorable natural and cultural potential for the development of Tourism. Favorable geographical position, natural and cultural wealth, and supporting policies influenced the development of tourism. The population of Albania on September 18, 2023, turned out to be 2,402,113 inhabitants, but Albania for the year 2023 is ranked fourth in the world with an increase in international tourists of 56% in 2019 (UN Tourism, April 9, 2024). In 2023, Albania welcomed 10.1 million international tourists. In 2021, the Gross Domestic Product (GDP) recorded an increase in real terms (in volume) of 8.91%, compared to 2020, after an increase of -3.30% in 2020, compared to 2019. The main contribution to this growth was given by economic activities such as: "Trade, transport, accommodation and food service" with +1.64 percentage points; "Agriculture, forests and fishing" with +0.35 percentage points; (INSTAT, 2021). In terms of the GDP structure according to economic activities, the largest weight in the economy for 2021 continues to be occupied by Services in total with 47.86%, marking an increase in real terms of 8.41%. Industry and Construction account for 20.75% of GDP, marking growth in real terms of 10.44% and 18.01%, respectively. Agriculture, hunting, forestry, and fishing account for 18.36% of GDP with an increase in real terms of 1.80%.
These data show the importance of the service sector and agriculture in improving the economic and social life of the population.

Tourism and agriculture in Albania are priorities of the Albanian government, as such rural tourism takes on a special importance to develop. The development is also related to other sectors of the economy such as agriculture, light food industry, crafts, services, etc.
In the national strategy for the sustainable development of tourism 2019 - 2023, rural tourism is analyzed within the framework of natural tourism about the potential that these areas offer such as (rafting, parachuting, mountain biking, fishing, trekking, mountain climbing, nature walking- hiking, horseback riding, study tours.
In the national strategy for the development of agrotourism in Albania, Agrotourism is seen as an opportunity to further develop rural tourism.
In the strategy of agriculture and rural development 2013-2020, rural tourism will be developed within small businesses.
The development of rural tourism in Albania relies on the best models of neighboring countries such as Italy.
In relation to scientific works on rural tourism for Albania, there are not many, identifying the fact that Albania has a still unexplored tourism potential.

FULL TEXTS BOOK

Despite the challenges faced by rural areas such as depopulated villages, abandoned agricultural lands, lack of services and unmaintained roads, they carry a rich cultural and natural heritage to develop tourism. (B. Avdia, 2021)

The development of rural tourism is an opportunity to mitigate the negative social and economic phenomena that rural areas face today.

Rural tourism will play a key role in the multifunctional development of agriculture in Albania by expanding the field of action of farms operating in the agricultural sector. Agricultural and rural development policies have contributed significantly to the economic, environmental and social development of agriculture and rural communities.

3. Research Method

The purpose of this study is to identify the challenges of sustainable rural tourism development in Albania.

For the realization of the paper, the following research questions were raised:

- *Does Albania have the potential for the development of rural tourism?*
- *What are its challenges to develop?*

For the realization of the work, after reviewing the literature, a questionnaire was drawn up to obtain the opinion on the challenges that Albania has for the development of rural tourism.

The questionnaire was randomly distributed online. The instrument used for data collection is a Google Forms-type questionnaire and consists of open and closed questions. Participants who completed the questionnaire in this study were informed about the purpose of the study. Also, ethical aspects have been taken into account in the use of questionnaires, ensuring that the anonymity, confidentiality, and fair treatment of the participants are maintained. The questionnaire focused on: identifying the potential, challenges of rural areas for tourism development. Then, through the SPSS program, we analyzed the collected data to identify the findings and give the corresponding recommendations, the identification of the religious object in the tourist route.

60 people who work in different professions in Albania, both in rural and urban areas and aged 18+, participate in the questionnaire, 64.4% are women and 35.6% are men. The participants in the questionnaire are from different professions, but those who work in the education sector predominate. Completing the questionnaire by people from different professions will help us to make the results of our study as close to reality as possible.

4. Results

The development of sustainable rural tourism is a challenge for rural areas. This is related not only to the drafting of efficient policies, and the lack of investments but also to the perceptions of the population. In the questionnaire organized on the Challenges of sustainable rural development, they stated that:

In rural areas in Albania, age 65+ predominates with 54.2% of their answers, showing that the population is aging and that young people have left. (Figure 1)

FULL TEXTS BOOK

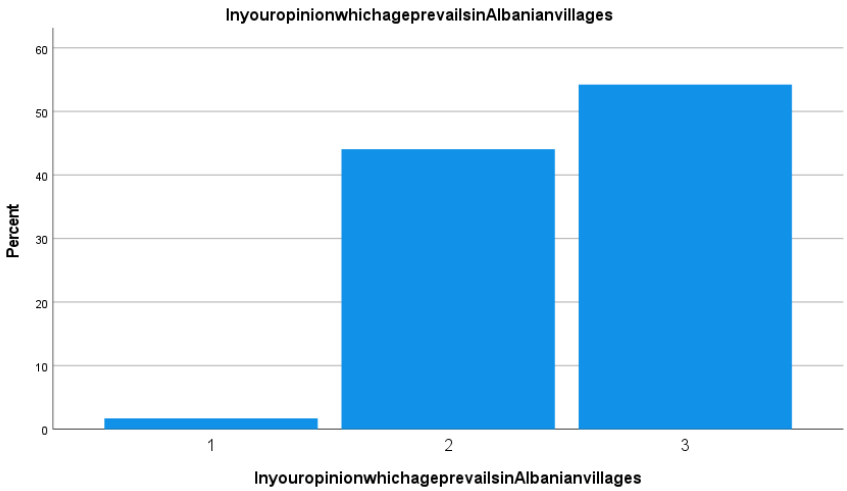


Figure 1. In your opinion which age prevails in Albania Villages

Regarding employment, 84.2% of the participants said that unemployment prevails. (Figure 2). This shows the importance of encouraging new investments to create jobs.

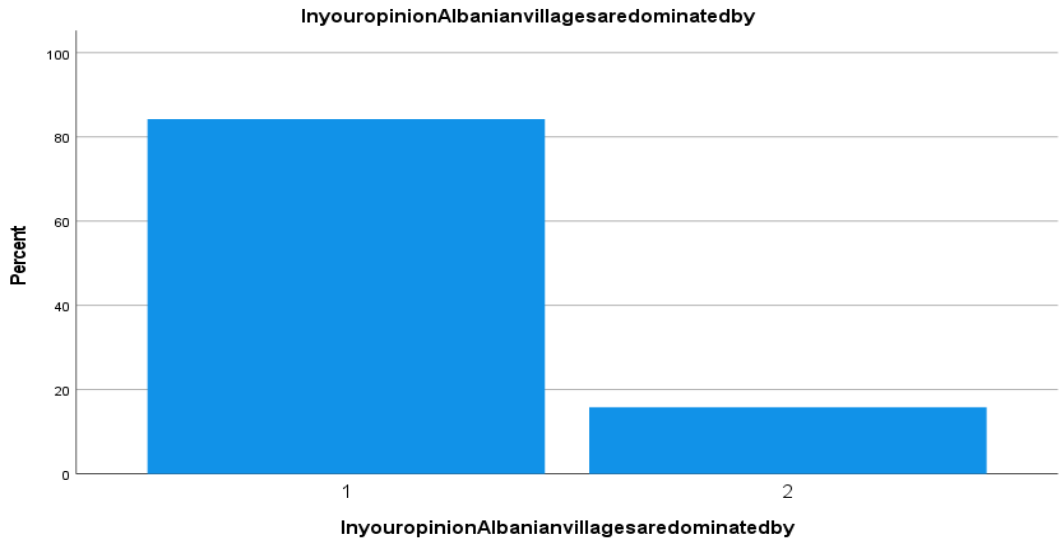
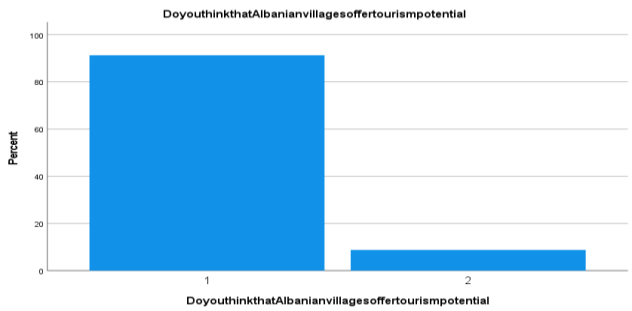
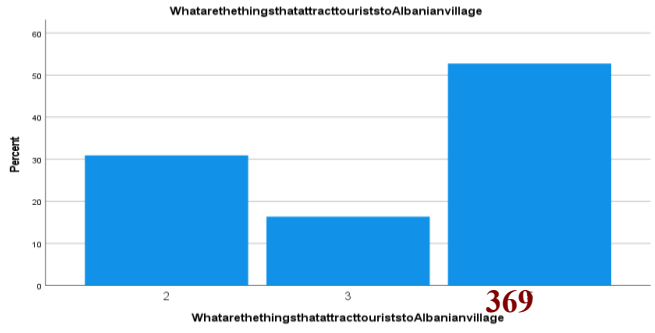


Figure 2 In your opinion Albanian villages are dominated by: 1) unemployment or 2) employment

Albanian villages are distinguished from each other by natural features, history, culinary traditions, hospitality, authenticity, and architecture. Along with the values that constitute potential, they are also distinguished by problems such as depopulation, aging of the population, expansion of unplanned constructions, and out of their tradition.

Despite this, 91.2% of the responses of the survey participants say that Albanian villages have the potential for the development of tourism. The factors that attract tourists are the landscape (30.9.%), hospitality and standard (16.4%), and the cultural program they offer (52.7%). (Figure 3)





FULL TEXTS BOOK

Figure 3. Do you think Albania villages offer tourism potential; What are the things that attract tourists to Albania villages: 1) cultural program 2) landscape 3) Hospitality and standards 4) History 5) all

More than half of them say that Albanian villages are famous for hospitality, history, and cuisine. But they are distinguished from each other by the holidays they have and celebrate, the presence of which enriches the tourist offer, so it is required to work on their marketing and promotion.
Most of the income in rural areas is provided by agriculture with 86.2% of the answers given, followed by the services sector with 10.3% of them.

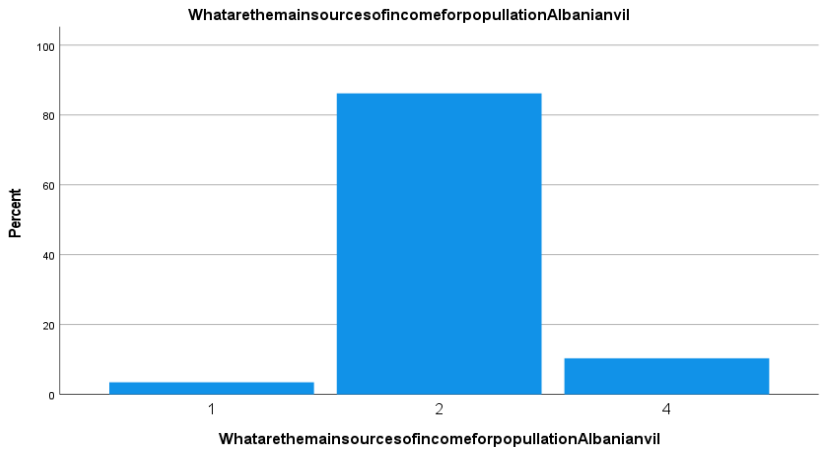


Figure 4. What are the main sources of income for the population in Albania Villages: 1) administration 2) agriculture 3) Industry 4) service sector
Regarding the infrastructure of the respondents, they answered that it is not good at all, penalizing the accessibility of rural areas for tourist purposes.
Regardless of the fact that in rural areas there are projects that develop tourism and have a good position in relation to promoted tourist destinations such as Butrinti, Apollonia, Durrës, etc.

Activities that will promote the development of tourism are the establishment of agro-tourism, the organization of fairs for agricultural and livestock products, sports games such as horse-riding, canoeing, cycling, and mountaineering, Traditional games; participation of tourists in crops, harvests, Transhumance. Also, the branding of tourist attractions, the description and promotion of tourist attractions, and the publication of the area's holiday calendar to organize various activities; road infrastructure, and standard hostels will be a factor that will attract tourists to rural areas.

Rural areas in Albania can produce products that can be offered to tourists, respondents say that they can be: handicrafts, wine, cheese, and canned products (jam, gliko, pickles, etc.) (Figure 5)

FULL TEXTS BOOK



Figure 5 Give them an idea of what the soil can produce in Albanian villages

More than half of the respondents say that for the development of rural tourism there is a spirit of cooperation between public and private institutions, local government and the community. They are of the opinion that rural tourism will serve to mitigate the social, economic and environmental phenomena that rural areas face today.

The development of rural tourism in Albania relies on the variety of authentic products that can be offered to tourists, such as artisanal products, dairy products, meat products, dough products, pies, mesnik, and traditional drinks such as brandy, wine, cider, lemonade from flowers, etc. olive oil.

According to the respondents, rural tourism should be the responsibility of local, central, community, and other actors operating in tourism. Attention should be paid to the development of infrastructure and the increase of the capacity of hostels, to maintain authenticity, the development of rural areas through community-based projects; the development of rural tourism while preserving the environment; the involvement of the community as local guides, why not the teachers of the area..

Supporting businesses and stimulating agricultural production with a secure market. Provide water supply, electricity, telecommunications, etc.

Based on the answers of the respondents, it is evident that the lack of knowledge of a foreign language remains a hindering factor. They think that rural tourism is a factor that affects the development of rural areas, but it is not the main responsibility.

Czechs are the ones who participate more in rural tourism in Albania, followed by Germans and Albanians. According to the respondents, the government should pay more attention to the development of rural areas.

To understand the future of rural tourism, a correlation was made between the question "Any spirit of cooperation between agencies and institutions" and the question "The interest of the rural community to invest in development". From this correlation, it turned out that the community needs to cooperate with all actors for the development of rural stability.

FULL TEXTS BOOK

Table 1
Correlations

		Any spirit of cooperation between agencies and institutions	The interest of the rural community to invest in development
Any spirit of cooperation between agencies and institutions	Pearson Correlation	1	.327*
	Sig. (2-tailed)		.013
	N	57	57
The interest of the rural community to invest in development	Pearson Correlation	.327*	1
	Sig. (2-tailed)	.013	
	N	57	58

*. Correlation is significant at the 0.05 level (2-tailed).

5. Discussions and conclusions

The challenges of sustainable rural development in Albania are great. This is seen in the study of the literature and the results obtained from the questionnaire.

Through a SWOT analysis, we identified the indicators that should be taken into account by the actors who operate in the field of tourism in rural areas.

Tab. 2 SWOT Analysis

Strengths	Weak points
• Diverse natural features • Rich and traditional cuisine • Hospitality • The rich natural and cultural heritage, • Development of the variety of tourism branches: white, green, river, etc. • The entrepreneurial spirit of the community	• Lack of vision • Lack of infrastructure • Agriculture, lacks modern technology • Overlapping of owners on properties • Lack of investment
Opportunity	The Risks

FULL TEXTS BOOK

• Returning dignity to the villages • The towers should be revitalized by turning them into hostels and adding new hostels • Subsidy from the local and central government to encourage entrepreneurship and investments in infrastructure • Diverse natural and cultural wealth still underutilized • Investments in the development of Agrotourism • The collection of medical plants in the area, the possibility of fruit for packaging, and the creation of a safe sales market • Promotion of local businesses and employment of young people • Motivating farmers with soft loans from the state. • The right management of projects and donations, the involvement of the community in the development of rural tourism	• Being neglected by the institutions • Abandonment of villages by the population • MIGRATION • Environmental pollution and degradation of forests and land • High prices • lack of stores for food, fuel, etc. • Lack of funds for development and lack of manpower • The risk of losing authenticity

Rural areas in Albania have the potential for the development of tourism, but they face many problems such as infrastructural, lack of investment, but also human resources.
Despite the fact that the Government has priority for the development of tourism and agriculture, challenges for the development of sustainable rural tourism appear before it, such as:

- Drafting development plans for rural areas with a focus on tourism
- Development of road infrastructure, tourism, telecommunications and public services
- Investment incentives for the return of towers to hostels
- The return of young people to the village and their employment
- Increasing the number of professional local guides
- Awareness of the environment and the importance of preserving it
- Preserving the authenticity of the natural and cultural heritage
- Encouraging the application of communities for projects in the field of rural development
- Maintaining the balance between prices and tourist offer
- Management from overloading the number of tourists
- To maintain the balance of children's involvement in work (in rural areas we mainly have family businesses)

As a conclusion, we say that Albania has potential for the development of rural tourism, despite the challenges it will face.

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FULL TEXTS BOOK

RESTORING HISTORICAL BUILDINGS FOR BARRIER-FREE ACCESS (KONYA ALÂEDDIN MOSQUE)

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ABSTRACT

Historical buildings represent the rich cultural heritage and architectural ingenuity of societies, offering insights into the values, beliefs, and ways of life of past civilisations. However, many of these structures were not designed with accessibility in mind, posing challenges for individuals with disabilities or mobility limitations. As societies become more inclusive, ensuring barrier-free access in historical sites after restoration is crucial for preserving cultural treasures for all people. This study evaluates the suitability of the recently restored Alaaddin Mosque in Konya, Turkey, a renowned 13th-century Seljuk architectural masterpiece, for achieving barrier-free access.

A comprehensive literature review examines existing guidelines, approaches, and case studies related to implementing accessible design in historical buildings while preserving their cultural integrity. The study employs a mixed-methods approach, combining site observations, measurements, and interviews with experts and stakeholders involved in the mosque's restoration. The evaluation criteria encompass physical accessibility, wayfinding, and information dissemination, with the objective of assessing the mosque's barrier-free features.

The findings highlight the strengths and limitations of the restoration efforts in accommodating accessibility requirements. Innovative solutions implemented, such as ramps and inclusive signage, are analysed alongside remaining barriers posed by structural constraints and heritage conservation considerations. The discussion interprets these findings within the context of current literature and provides recommendations for future restoration projects, policy implications, and potential areas for further research.

By evaluating the Alaaddin Mosque's barrier-free accessibility, this study contributes to the ongoing discourse on integrating universal design principles in historical sites. Ultimately, the study aims to promote inclusivity and equal access to cultural heritage for all individuals.

Keywords: barrier-free access, historical buildings, restoration, cultural heritage preservation

INTRODUCTION

Historical and cultural heritage sites, such as religious buildings, monuments, and architectural wonders, are indeed very important because they represent in a tangible way the riches in terms of cultural identity and tradition of a people. These structures are embodiments of the ingenuity, art, and craft of past civilizations, dealing in ways that offer an insight into their beliefs, values, and ways of life. But it appears evident that the majority of these historical sites have been built during an era when there was hardly any consideration to be made for the disabled individuals or reduced mobilities. Due to the changing outlook of society and the growing concern towards preparing barrier-free and universally acceptable environments, renovation and modification of heritage structures present several unique challenges.

Barrier-free access—or, equivalently, universal design or inclusive design—is the concept of designing the environment and space for use by everyone—regardless of physical abilities, sensory impairments, or age. And this approach acknowledges a fact—the disability should not be treated as an inherent characteristic of a human being but as a result of the inadequacy of the built environment that minimally caters to diverse needs. Appending barrier-free access to all historical buildings after their restoration

FULL TEXTS BOOK

are paramount in securing affirmative actions, keeping cultural assets available to everyone, and—principally—securing equal opportunities and participation.

One of the most important problems that could be raised due to this act is shown in the case of Alâeddin Mosque in Konya, Turkey. This 13th-century Seljuk masterpiece is one of the most important examples of architectural greatness and historical richness in the mosque typology under focus and has been restored recently. The restoration was to protect the structural entity of the mosque and provide it with improved aesthetics for furthering use as a place of worship and cultural significance. However, the major question is: to what extent does this restored Alâeddin Mosque include barrier-free access, so that people with disabilities or locomotion handicaps are able to visit and enjoy this important historical place?

Earlier research has examined the challenges and strategies by which historical buildings are made accessible to all. Most of the literature focused on finding sensitive balances between keeping cultural and architectural values of such places and simultaneously developing them to be more inclusive using accessible design—together with. These guidelines for integration, such as the Americans with Disabilities Act and principles from the International Council on Monuments and Sites, establish frameworks for integrating features of accessibility into heritage sites while maintaining principles of heritage conservation.

The researchers listed some of the identified practices intended for making historical buildings accessible without barriers, including innovative design solutions involving assistive technologies, and systems of inclusive interpretation and wayfinding. Accessible through illustrative case studies, such a success story ranges from the Guggenheim Museum in Bilbao, Spain, to the Royal Crescent in Bath, United Kingdom—sharing creative solutions that balance accessibility with the preservation of historical character movingly.

The literature, however, also points out challenges and limitations in the way of realizing furthest possible accessibility without barriers in historic buildings. These could range from structural issues to heritage conservation stipulations and even the issue of finding a balance between accessibility and conservation of original architectural features and materials without alteration.

This study evaluates the appropriateness, in relation to barrier-free access, of the recently renovated Alâeddin Mosque in Konya, Turkey. The present study further attempts to show the positive and negative sides of the detailed special measures in specific functions or parts of a building, regarding their overall accessibility at one common site. The study is conducted with the aim of contributing to the ongoing discourse on integration issues with reference to barrier-free access in historical buildings while preserving their cultural and architectural values.

LEGISLATION GOVERNING ACCESS TO HISTORIC STRUCTURES

Access to historic buildings and places does not only make them more serviceable, but it can also be used as a means of emphasizing their cultural, social, and economic culture. In principle, accessible design in heritage buildings contributes to, but also helps to meet, society's requirement of the protection of architectural heritage and equal access for all. It is an approach that can save these sites in a manner where each maintains its intrinsic cultural value but is also fitted for uses relevant to modern needs (ENAT, 2012).

"Barrier-free accessibility" itself explains that when a person with a certain disability cannot do something which others can easily do or access, only then it becomes a handicap. And when such barriers are removed, then persons with a disability can also get equal opportunities like any other person, hence improving the quality of their lives (AFIL, 2022). Barrier-free designs and renovations, such as building ramps for safe access, are part of this initiative (B. F. P., 2024). This is the method focused on making historical buildings more accessible by creating environments-that are inclusive: heedful of all individuals' needs, making them more functional.

FULL TEXTS BOOK

The barrier-free access to historical buildings has been a center of research and discussion, whereby through scholars and practitioners, the antithetic concerns of preservation of cultural heritage versus access for all are weighed off. The guidelines, such as the Americans with Disabilities Act (ADA) Standards for Accessible Design and those developed by the International Council on Monuments and Sites, take into consideration the unique challenges of including accessibility features in such a way that it preserves the cultural and architectural integrity of a historic site (U.S. Department of Justice, 2010). These standards highlight a balanced approach that could allow creative solutions using alternative routes, temporary or reversible modifications, and assistive technologies in order to preserve accessibility without affecting historical character.

It is possible to access historic structures for the disabled, but again this is a procedure that requires the appreciation of how the ADA legislation relates to buildings. First what is even a "historic' building under the ADA?. The ADA considers historic properties to be properties listed on or eligible for listing on the National Register of Historic Places under the National Historic Preservation Act, or properties designated as historic under state or local law (Uzeta, 2023). Accessibility is standard for new construction today but wasn't always so. Federal accessibility laws started with the Architectural Barriers Act of 1968 which declared that all buildings designed and constructed, and since altered, by the federal government be accessible (Lacke, 2020).

Also according to the Architectural Barriers Act, modifications to federal buildings were supposed to be in line with the Uniform Federal Accessibility Standards (UFAS) that have special provisions for historic buildings, which 'may be threatened or destroyed by full accessibility requirements (Technical Preservation Services (U.S. National Park Service), n.d.)

Under Title II of the ADA, state and local governments are required to eliminate access barriers by either relocating services and programs to buildings with accessibility or by retrofitting in existing buildings. For example, a licensing office may be relocated into the accessible first-floor space; if this is not feasible, mail service could be provided. However, historic preservation State and local government facilities whose primary purpose is historic preservation but have the characteristics of place of public accommodation facilities, such as state-owned historic museums and historic state capitols offering tours, 12 must meet the physical accessibility standards. For historic properties subject to the requirements of the ADA, owners are, therefore, required to consult with people with disabilities, disability organizations, and their State Historic Preservation Officer (SHPO) in developing a determination as to whether special accessibility provisions for historic property can be utilized. If it is determined, in consultation with the SHPO, that these provisions would also "threaten or destroy" the significance of a property, alternative methods of access, such as home delivery and audiovisual programs, must be used instead (Lacke, 2020).

Regardless of their historic status, all existing places of public accommodation are required to remove barriers where readily achievable and comply as much as possible with the ADA. The degree of modification necessary will vary greatly from property to property, and an accessibility consultant lets a business take the least invasive approach toward compliance to assure that historic buildings retain their character while being accessible for all to enjoy (Christy, 2019).

Finally, the ADA National Network has a number of more in-depth resources available related to the impact of the ADA on historic properties, including clarifying that historic properties are not exempt from the accessibility requirements of the ADA and may only be permitted to use alternative requirements in discharging their accessibility commitments. (Uzeta, 2023).

Historic or not, all such places of public accommodation must eliminate barriers that are easily obtainable and become as compliant with the ADA to the maximum feasible extent Facilities vary widely in their extent of modifications that will need to be required, and an accessibility consultant can help identify the least-invasive approach to compliance that will assure that historic buildings retain their character while being enjoyed by all. Finally, the ADA National Network provides much

FULL TEXTS BOOK

information on the field concerning the impacts that the ADA had on historic properties but, by the fact, the historic properties are not exempt from the ADA requirements on access, the accommodations can be done with the use of alternative requirements to meet their accessibility obligations (Uzeta, 2023).

CURRENT STATE OF ACCESSIBILITY AT ALÂEDDİN MOSQUE

According to the Altunapa Foundation, the structure located in Konya, the capital of the Anatolian Seljuks, is situated in the inner castle at the heart of the Taht neighborhood. During this period, the area where the mosque currently stands was home to the Medrese-i Sultaniye, the Seljuk Palace, and the Eflatun Mescidi, a church from the Byzantine era (Konyalı, 1965).

The Alâeddin Mosque, located in the historic city of Konya, is a 13th-century Seljuk architectural masterpiece renowned for its grandeur and cultural significance. The mosque recently underwent a comprehensive restoration process, aiming to preserve its structural integrity, enhance its aesthetic appeal, and ensure its continued use as a place of worship and cultural heritage. This study focused on the restored mosque as the primary research site.

Alaeddin Mosque, located on an eponymous hill in the very center of Konya, is one of the most important and yet problematic monuments from the period of the Seljuks in Anatolia. It has a southern prayer hall with a courtyard to the north, U-shaped around the northern side. The hall of prayer is composed of three heterogeneous sections: an east-west oriented seven-aisle section parallel to the qibla wall, a multi-columned unit with a domed space in front of the mihrab, and a western wing with five aisles also parallel to the qibla wall. The southern wall of the mosque curves slightly to the north at the point where the multi-columned unit and the domed space in front of the mihrab meet, before continuing west. As a consequence of this adjustments, though the multi-columned unit has deviated from the qibla direction, the domed unit in front of the mihrab is aligned exactly in the qibla direction (Asutay-Effenberger, 2006).

Within the courtyard are two adjacent tombs: the eastern ten-sided, also bears an inscription attributed to Kilij Arslan II, while the western octagonal tomb remains unknown and was never completed. The courtyard walls have no consistency whatsoever: the Eastern and northeastern sides are quite plain, while the northwestern side reuses columns, bears inscriptions, and two gateways give it monumentality. Excavations into the courtyard have revealed several remains to the exterior beyond the buildings as they exist today. Repairs to the mosque at various times were so extensive that very little of its original form is left today, and few of its original materials survive.

While its architectural value cannot be disproved, assessing its accessibility to the disabled is important in light of the modern dimensions of accessible design. Having viewed the current status at Alaeddin Mosque, this assessment documents the points which require improvements so that this site can be fully made accessible to all categories of visitors.

However, this first approach was not a significant problem for people with physical disabilities. Roads surrounding Alaeddin Mosque are very smooth and negotiable, making easy wheelchair access to the main entrance of the mosque. That would be a good feature since it qualifies this condition that visitors using a chair or having some other difficulty of mobility may easily approach the mosque. This, however, does not mean that from the very start all parts of the mosque have been easily accessible, as will be elaborated in the following sections.

From the description above, it can be noted that Alaeddin's main entrance door was poorly designed for the disabled. The main issue of using a mosque as a scenario for hosting a disabled person is first the placement of the shoe racks and need to strip shoes off even before entering. Those are two things that make the entrance quite hectic and cumbersome for people with physical disabilities, more so those using wheelchairs or other walking aids. No alternative arrangements or facilities, like ramps or lifts, which can help disabled persons get into the mosque, are provided for easier entry into the mosque. This

FULL TEXTS BOOK

lacuna seriously impinges on the accessibility of the mosque as it builds a threshold at the very entrance itself.

A warning and guidance system for the visually challenged is absent inside the mosque. According to the new concepts of accessibility, tactile pathways, audio cues, and braille signage play an important role in enabling a visually impaired person to move around in public spaces. Alaeddin Mosque does not have these facilities, meaning that visually impaired visitors will view movement as a risky and relatively arduous exercise. According to this survey, there lies a drastic gap in the accessibility provision of the mosque, and it testifies that a substantive amount of effort has to be injected for accommodating all.

The inner courtyard of the mosque, where several tombs are located, also does not have facilities that would make it convenient for disabled persons. There is no facility for ramps or other ways through which a wheelchaired or otherwise disabled person could move. Steps and uneven surfaces present great barriers to disabled persons visiting these very historically significant mausoleums. This fact further limits every opportunity for full enjoyment and appreciation of all historical and cultural values the mosque represents for people with disabilities.

CONCLUSION AND RECOMMENDATIONS

This accessibility assessment identifies quite a good number of issues that need to be improved in order to make Alâeddin Mosque more inclusive for all its visitors. The path that goes to this mosque can be accessed by all, including persons with different kinds of physical disability, but access to the main entrance remains a hurdle due to a lack of facilities to take off shoes and position racks where shoes can be kept. Moreover, there is no guideline or tactile system to guide the visually impaired person, nor any audio guidance within the compound of the mosque, highly limiting access to people with these kinds of disabilities. Moreover, the courtyard and mausoleums are inaccessible to subjects with mobility impairments.

To this regard, following are the suggested recommendations:

Entrance modification: Ramps or other aids should be fitted to help disabled persons to remove their shoes and enter the mosque with a certain level of ease.

Interior navigation aids Tactile pathways, Braille signage, and audio guidance systems would make interior navigation of the mosque safe for any visually impaired visitors.

Courtyard and Mausoleum Accessibility: Ramps should be provided, and pathways to the mausoleums will need to be smoothed out and paved for accessibility by wheelchair and people with mobility impairment.

Since these are executed, accessibility to the Alâeddin Mosque will be greatly enhanced, hence able to help all its visitors, regardless of their physical abilities in visiting this historic site in comparison to others. This degree of inclusiveness is not simply to obey modern requirements; rather, it is prevailing hospitality of the mosque.

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FULL TEXTS BOOK

ACCESSIBILITY AS A CORNERSTONE OF CULTURAL ENGAGEMENT: LESSONS FROM THE ÇATALHÖYÜK

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ABSTRACT

The role of the museum is very vital for the preservation of cultural heritage and the encouragement of education and understanding. However, challenges to inaccessibility are barriers to most of the visitors when exploring and experiencing such cultural institutions. This paper critically assesses the measures for accessibility taken at Çatalhöyük in Konya, Turkey, which is one of the most important archaeological sites and museums in the region.

Using a truly mixed-method approach that pairs on-site observations with visitor surveys and interviews, this research will assess the current state of accessibility in the Çatalhöyük. This study is particularly concentrated on physical access in relation to wheelchair accessibility, tactile guidance, and seating provisions. In addition, this research will cover the means of assistive technologies, such as audio guides, captioning, and sensory accommodations for visitors with visual impairments or deafness/hearing impairments.

The findings present a very mixed picture for the accessibility initiatives at the museum. It would not be remiss to say that some attempts have been commendable, like the installation of ramps and provision of audio guides, but huge gaps remained.

Added to international good practice in accessible design worldwide, elsewhere, this paper suggests the establishment of an internal set of recommendations for infrastructure modifications, universal design practices, staff training programs, and the adoption of inclusive interpretative strategies, all in place to assist visitors to Çatalhöyük in their overall experience. Through working with these issues of access, the museum could become more of a culture ambassador, promoting greater possibilities for many more to discover and become attune to the significance of the rich cultural heritage of Çatalhöyük.

Keywords: Accessibility, Çatalhöyük, Cultural Heritage, Inclusive Design

INTRODUCTION

Museums are a critical part of cultural identity, heritage preservation, education, and more profound understanding among the different populations. However, accessibility poses a serious constraint that narrows the potential for realization in most visitors to such institutions. The following investigation aims to critically inspect the access measures of the Çatalhöyük Museum in Konya, Turkey-arguably one of the most important archaeological sites and museums in the region-in order to have an informed understanding of how access has the means to inform cultural engagement and be improved in a way that reflects international best practice.

The concept of accessibility in museums has undergone many changes in the past couple of decades, shifting from simple physical access to a holistic approach that shall allow the integration in order to incorporate the diverse visitor needs. This is supported by a modern view on museums as agencies of social inclusion and their responsibility to society as well as the need to provide for users from all sectors of society.

However, archaeological museums such as the Çatalhöyük have to balance these preservation needs with accessibility requirements. Archaeological material is of delicate nature and in most cases carries complex stories and demands innovative modes of interpretation and display (Opitz & Herrmann, 2018). Besides, the physical structure of an archaeological site, and its related museums, can represent an

FULL TEXTS BOOK

obstacle to accessibility, especially because they involve special needs mostly with regard to visitors' mobility problems (Mesquita & Carneiro, 2016).

The archaeological site of Çatalhöyük is one of the most important Neolithic settlements ever to be discovered in the 1950s. The associated museum has a very important in the interpretation and presentation of the findings made at the site to the local populace. Nevertheless, to what extent this cultural engagement is efficient is highly related to the accessibility of the museum. The museum's accessibility, according to Weisen(2008), does imply not only being able to physically access it but also being given intellect as well as emotional contact with its contents.

It is supported by research that there are huge benefits to be had from greater accessibility to the experiences and learning outcomes of visitors in museums. For example, Hein proved that multi-sensory exhibitions and universal design have clearly favored the understanding and enjoyment by visitors coming from diverse audiences. Cock et al. showed this can vastly improve the museum experience for visually impaired visitors by using assistive technologies like audio guides and tactile models.

Thus, the majority of museums, even with this development, especially in developing countries or connected to archaeological sites, still indeed experience serious challenges in implementing a wide-ranging accessibility program—in fact, this disparity opens the way for investigation into targeted practical improvement options and a contribution to the broad discourse of museum accessibility.

The study seeks to fill this gap by critically assessing the current situation on accessibility at the Çatalhöyük and proposing evidence-based recommendations for its enhancement. This focus is hoped to have much to offer to the fast-growing literature on accessibility in a museum context and the understanding of how the lessons learned from it can be comparatively applied to other similar institutions globally.

MUSEUM ACCESSIBILITY: THEORETICAL FRAMEWORK

Accessibility from the concept of museums has been changing for the last few decades and has replaced the previously existing pure physical access by much elaborated in considering the needs of different visitors. Thus, according to Rappolt-Schlichtmann and Daley, "true museum accessibility is physical, cognitive, and socially barrier-free museum education.". This indeed affirms their research on universal design principles in the exhibition development, and how universal design principles are advantageous to everyone, not just for specified disabled individuals.

Based on this premise, Mesquita and Carneiro conducted a study in 2016 on the access provided by European museums to users with visual impairment. Their findings reflect enormous differences in access measures not only from country to country, but also between different types of museums. The authors emphasize the urgent need for standardized guidelines for all-round access measures and insist on enhanced training for staff to enable the implementation of inclusive practices coherently and effectively.

Universal Design Principles in a Cultural Institution

Interest in applying universal design principles in the museum environment has increased, in that it allows for the making of more inclusive settings. Persson et al. have researched how universal design has been put into practice within Swedish museums and have established that while a large number of institutions recognize its importance, practical application often falls far behind. Key challenges identified by the authors include resources and a lack of skills among staff. It also highlights case studies on the important role universal design has played in increasing the visitor experience at exhibitions.

Handa et al. (2010) provide a universal design review and discuss taking its principles into museums. These authors state that adherence to these principles does not only help visitors in terms of accessibility, but it/the result is added value for enhancement of the museum experience in general for all patrons. The authors give concrete examples of how each principle might be used in the design of exhibits, wayfinding systems, and interactive displays.

FULL TEXTS BOOK

Assistive Technologies in Museum Settings

Recent research has paid special attention to the ways through which assistive technologies can enhance accessibility to museums. Reichinger et al. (2016) have explored 3D printing technology in applying this vision of creating tactile replicas of artworks so that visually impaired people can get a feel for them. Their work consisted of tests showing that such tactile models may significantly lead to considerable improvements in understanding and appreciation regarding visual art, hence rendering approaches to a rather more inclusive museum experience.

Pretto et al., (2020) focused on the subject of the effectiveness of audio description technologies within an art museum environment. Their work showed that well-designed audio guides could hugely enhance the experience of visually impaired visitors but also benefit sighted visitors by providing additional content and encouraging closer observation of works of art.

Visitor Experience and Engagement in Archaeological Museums

Archaeological museums pose both challenges and opportunities related to accessibility. Langer et al. (2018) evaluated the potential of technologies such as 3D printing and augmented reality for improving engagement with audiences within an archaeological museum environment. Their findings demonstrate how these technologies can begin to close the gap between rich data about archaeology and public understanding, therefore improving access to exhibitions for a diverse audience.

In a case study on the Acropolis Museum in Athens, Gazi (2014) evaluated the impact of multisensory exhibits on engaging viewers with an archaeological site's artifacts. The paper explains how touch experiences, sound installations, and interactive digital displays can enhance the inclusiveness of a museum environment by catering to the different learning styles and abilities of visitors.

CURRENT STATE OF ACCESSIBILITY AT ÇATALHÖYÜK

The Çatalhöyük Promotion and Welcome Centre project strives to rejuvenate and welcome visitors effectively to Çatalhöyük—a UNESCO World Heritage Site. The Çatalhöyük Promotion and Reception Centre is the largest wooden public building in Turkey and was fast becoming one of the city's most popular attractions, implemented by Konya Metropolitan Municipality with the support of the Ministry of Culture and Tourism. Constructed totally of wood on a 28,500 square meter site, the center bears the title of the largest 'wooden public investment' in Turkey, having an indoor area of 4,500 square meters (Konya Büyükşehir Belediyesi, 2023).

Other facilities, such as comprehensive facilities, cafeterias, and big exhibition spaces, have been outfitted to guarantee total satisfaction of the demands of visitors. A summary is that wider audiences get familiar with the rich cultural heritage of Çatalhöyük, which makes a great contribution towards the tourism of Konya. The center uses environmentally friendly wooden architecture and therefore refers to bureaucracy for sustainable tourism. This is definitely a great step toward preserving cultural heritage and increasing touristic potential (Konya Büyükşehir Belediyesi, n.d.).

Accessibility features at the Çatalhöyük Promotion and Welcome Centre are some of the most striking, making visits easier and more comfortable for people with disabilities. The present paper scrutinizes the accessibility features of this centre for disabled persons and investigates some of the good practices regarding this aspect.

First of all, the entrance to the car park is disabled person-friendly. There are places specifically set aside for the handicapped or physically challenged visitors within the car park area near the center, so that when they get out of their vehicle, a disabled person can comfortably reach the centre. This arrangement greatly facilitates the approach of visitors who are physically handicapped or older and have reduced mobility.

The centre's entrance stairs that have disability ramps enable the disabled to access the centre without depending on other people for their movement. It provides huge convenience for visitors using wheelchairs, families with prams, and others who face difficulties in movement. These ramps have

FULL TEXTS BOOK

proper angles of inclination and surface materials, ensuring smooth and safe passage in a non-slippery manner.

The corridors at the Reception Centre are wide, thus granting easy access to the disabled. While these wide corridors would provide an ideal area for wheelchair users and their companions to move around, they also mean that, in case of an emergency, there will be a quick and safe evacuation. It is in this design that comfortable circulation, especially for people with disabilities but for everybody else during periods of heavy visitor traffic, can be provided.

Another example is the sensitivity of the centre regarding disabled accessibility. On the right side of the entrance door, it has a disabled WC. Wide doors, washbasins, and toilet seats at the right height, all kinds of equipment needed to allow disabled persons to fulfill all their needs on their own. Moreover, such areas with emergency call buttons add safety by giving them a chance to call for help in case of some kind of problem.

Another important facility for visually impaired visitors is an audio system in a headset that narrates digital and visual content. These audio narratives describe in minute detail the historical and archaeological importance of Çatalhöyük and hence make the richness of this cultural heritage a reality for the visually impaired. The headset audio system will also be appealing to international visitors by having options in different languages.

Another important accessibility feature observable at this site is the presence of a long metal ramp on the road from the reception centre to the excavation site. Such a ramp would make the excavation site safely accessible to people who are either using wheelchairs or have a general reduction in mobility. The fact that the ramp is built with durable materials and features an inclination angle that is suitable increases safety and ease of use.

On the security side, however, one inadequacy discovered is the inability to access the model living area located at the 1st floor and only accessible by stairways. A lift or additional ramp system installation is necessary to have access to this. In this way, wheelchair-bound people and those who have problems with mobility will be able to visit this very significant site.

Consequently, the Çatalhöyük Promotion and Welcome Centre is a fine model with facilities accessible to all kinds of people with many kinds of practices. So, this includes practices such as parking provisions, ramps for the disabled, wide corridors, disabled toilets, audio narration systems, and ramps that manifest inclusion in their design for people with disabilities. Nevertheless, the scraping away of some these inadequacies, such as access to the model living space, will further set a higher standard in accessibility at this centre. Such initiatives will strongly support Çatalhöyük's goal of opening its rich cultural heritage to all people.

CONCLUSION

The Çatalhöyük Promotion and Welcome Centre is an outstanding example of what could be done with regard to accessibility in heritage sites. Responses to specific questions on the design of the Centre and facilities availed to it clearly show that due regard has been taken to provide access to those with disabilities. Disabled parking, entrance ramps, wide corridors, and accessible toilets provide physical ease and independence for those with mobility issues throughout the center. Specifically, it is much easier for the audio translation system to allow the visually impaired view, hence opening up the rich history of Çatalhöyük to many more people. The centre has increased access due to the installment of a long metal ramp at the site of the excavation.

While there have been numerous successes, there is still room to improve. For example, at the moment, the showroom on the first floor is still a big access challenge for clients using a wheelchair or having other mobility impairments, since it lacks a lift or ramps. This deficiency will be filled by the installation of suitable access solutions. by enhancing the facilities, making the Çatalhöyük Promotion and Welcome

FULL TEXTS BOOK

Centre accessible by overcoming the existing barriers in its management, it will raise the standard of accessibility and inclusiveness in the sphere of cultural tourism.

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FULL TEXTS BOOK

EFFECT OF DIFFERENT GEOMETRIC DESIGNS AND CHANGE OF MATERIALS ON PISTON HEAD THERMAL ANALYSIS

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ABSTRACT
The piston is one of the most important elements that set the vehicle in motion by converting combustion energy into mechanical energy. In internal combustion engines, combustion usually takes place in the space between the piston crown and the cylinder head. In this study, the shape of the piston crown was modified to obtain different types of combustion chamber shapes in direct injection engines. Also, three different piston head designs were used to investigate the thermal convection effects. These are described as crown, curved, and flat. Since the strength of the material at high temperatures is also important, three different materials were analyzed. These are referred to as Partially Stabilized Zirconia (PSZ), 38MnVS6, 42CrMo. A total of nine analyzes were carried out with three different designs and three different materials. The ANSYS program was used to see if the piston would transfer the required amount of heat in the thermal simulation. The results of the thermal analysis were then compared to determine the most suitable material and design. It is also interesting to note that more and more heat was concentrated in the center of the piston. The reason for this is that the heat accumulated in the center has to travel a long way to spread. This situation was observed in all piston geometries. In this design, a temperature of 750 °C on the upper surface of the piston and a temperature of 300 °C on the wall edges were used as boundary conditions. The results displayed that the design that transmitted the best temperature was curved and the PSZ material defined design had a maximum temperature of 749.32 C° and a minimum temperature of 300 C°. It was found that the flat design with 42CrMo material had the lowest thermal conductivity. While the flat design with 42CrMo material had the lowest thermal conductivity, the analysis results revealed that the maximum temperature value was 597.96 C° and the minimum temperature value was 310.29 C°. When compared in terms of geometries, when the material was the same, piston head designs with curved design had the highest temperature, while the lowest temperatures were reached in piston head designs with flat design.
Keywords: Piston Head, Geometric Design, Material Change, Thermal Analysis, Temperature

INTRODUCTION
Internal combustion engines are defined as machines that convert chemical energy into mechanical energy. In combustion engines, thermal energy is obtained from chemical energy by burning a fuel. Mechanical energy is generated by using thermal energy. In internal combustion engines, energy is generated in the same volume. Approximately 25-30% of the thermal energy generated during the combustion of fuels in conventional engines can be converted into mechanical energy in gasoline engines and approximately 30% in diesel engines. The remaining part of the energy is emitted by the exhaust gasses, converted into heat by friction, and absorbed by the components surrounding the combustion chamber (Heywood, 1988). The pistons are most affected by the energy conversions, pressure, and high temperatures that take place inside the engine. Developing a piston that can withstand these stresses and ensure more efficient combustion is one of the most critical phases in the development of an engine. More efficient combustion can be achieved by making changes to the piston. These changes can be achieved through the geometry of the combustion chamber and the materials. The area

FULL TEXTS BOOK

of the piston that is most stressed is the top surface facing the combustion chamber. (Satyanarayana et al., 2015) Many studies have been done and continue to be done on piston geometry designs. Most of the studies in the literature on the effects of thermal loads on the piston are studies analyzed using the finite element method (Büyükkaya,2008).

In addition to geometry, the type of material is also an important parameter for the high pressure, temperature, and load in the pistons. Since the dawn of mankind, the use of materials and energy has played a decisive role in the development of human life. Even today, despite advanced materials science, it is still not possible to obtain materials with all the desired properties. Therefore, studies to improve the quality of materials are becoming increasingly important. Advances in material science are expanding the applications of materials by improving their chemical and physical properties. Problems such as wear and tear of materials lead to deformation of the active parts due to effects such as heating, stress, and friction, which is one of the biggest challenges. Some of the reasons for the increase in research and studies on engine materials are the requirements for the development of vehicle engines used in the automotive industry. These requirements include objectives such as improving the wear and friction properties of the parts, ensuring a long service life of the parts, increasing engine efficiency, and improving fuel consumption. Studies carried out in this direction increase the performance and durability of engines, benefiting both users and the environment (Moffa et al., 1973).

There are many studies in the literature regarding piston geometry and the use of different materials on the piston. Morel and Keribar analyzed the temperature and heat flow distribution of a gasoline engine. In their study, they carried out calculations using two methods: a theoretical approach with pressure, temperature, and volume calculations and a numerical simulation with elliptical piston profile analysis using ANSYS software. As a result of the comparisons, the numerical results were found to be compatible with the theoretical results (Morel and Keribar,1990). Singh and Parmanik performed a thermal simulation in ANSYS by defining three different materials on three different piston geometries. They stated in the results that the aluminum material piston design with a flat design provides the most optimum performance in cooling (Singh and Parmanik 2015). Winkler and Parker investigated the effects of thermal barrier coatings on the performance of diesel engines and the service life of the components. In their study, they compared experimental and simulation methods and observed a high degree of agreement between the results obtained. Using the simulation program they developed, they successfully simulated piston ring movements and blow-by/blow-back flows. Although there is no algebraic equation for the ring profile, they found that the simulation technique they developed is suitable for the complex surfaces of pistons and rings (Winkler and Parker, 1993). Gustov determined the temperature distribution in the piston at the start of operation of a turbocharged diesel engine using a two-zone combustion model and the finite element method. Numerical calculations have shown that the original two-zone combustion model and the finite element method can be successfully used to analyze the values and the transient temperature distribution on the individual surfaces of the piston. (Gustov, 2009). Wannatong et al. aimed to determine the thermal properties of the piston in the design of a piston. In order to determine stresses and deformations, the temperature distribution of the piston must be determined. The dynamics of piston rings play an important role in the lubrication characteristics of piston engines, leading to engine wear and high consumption of lubricating oil. Due to the complexity of the movement, a study of piston ring movements and effects is usually performed in a simulation program. Therefore, this study was analyzed using the ANSYS simulation program to minimize piston wear (Wannatong et al., 2008).

In this paper, thermal analysis studies were performed on three different materials and three different geometries that have not been combined before in the literature. The results are compared in terms of heat flux and temperature and the optimum material and geometric design is presented.

FULL TEXTS BOOK

MATERIAL

In the study, three different materials (42CrMo, Partially Stabilized Zirconia (PSZ), 38MnVS6 and three different designs (flat shape, crown shape, curved shape) were used in the analysis. The material properties are given in Table 1.

Table 1. Material characteristics (Büyükkaya and Cerit, 2007; Lu et al., 2017; Vedharaj et al.,2017)

	38MnVS6	42CrMo	Partially Stabilized Zirconia (PSZ)
Density [kg/m ^{3}]	7780	7900	5600
Thermal conductivity [W/mK]	38	40	1.68
Young modulus [GPa]	208	206	48
Average linear thermal expansion [10^6m/mK]	13.1	12.1	10.5
Poisson ratio	0.29	0.28	0.25

METHOD

In this study, the designs were created using the CATIA V5 program. The analyzes were carried out using the ANSYS program. The dimensions of the piston were taken from a previous study and used for the design. The temperature of the top of the piston was set at 750 °C and the temperature of the piston walls at 300 °C. The analyzes were carried out after the design had reached the maximum number of meshes. Figure 1 gives a technical drawing of piston head geometry. CATIA view of piston design is presented in Figure 2. Changes were only made to the upper surface of the piston.

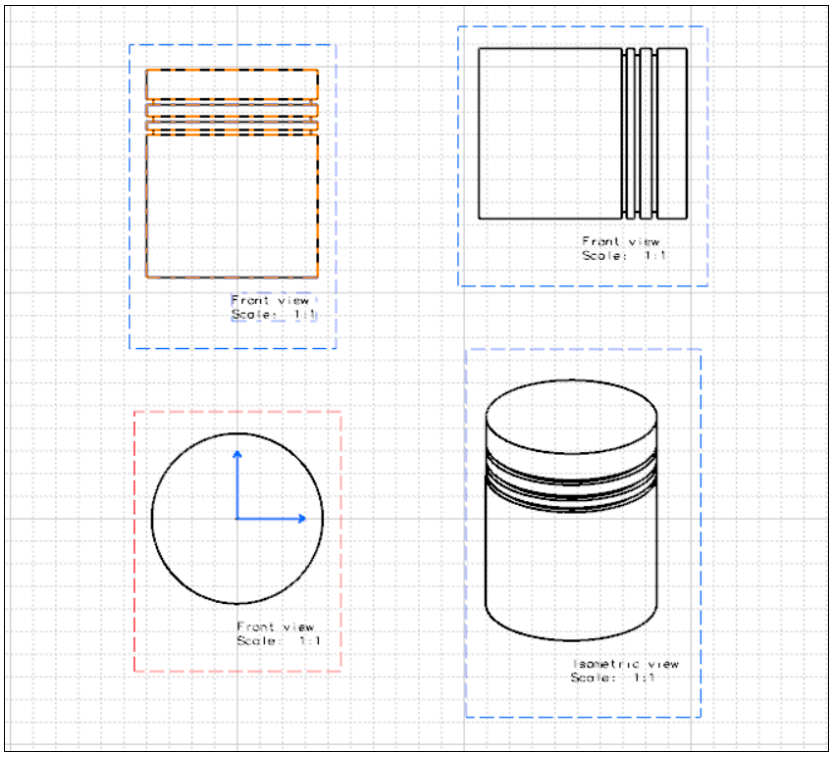
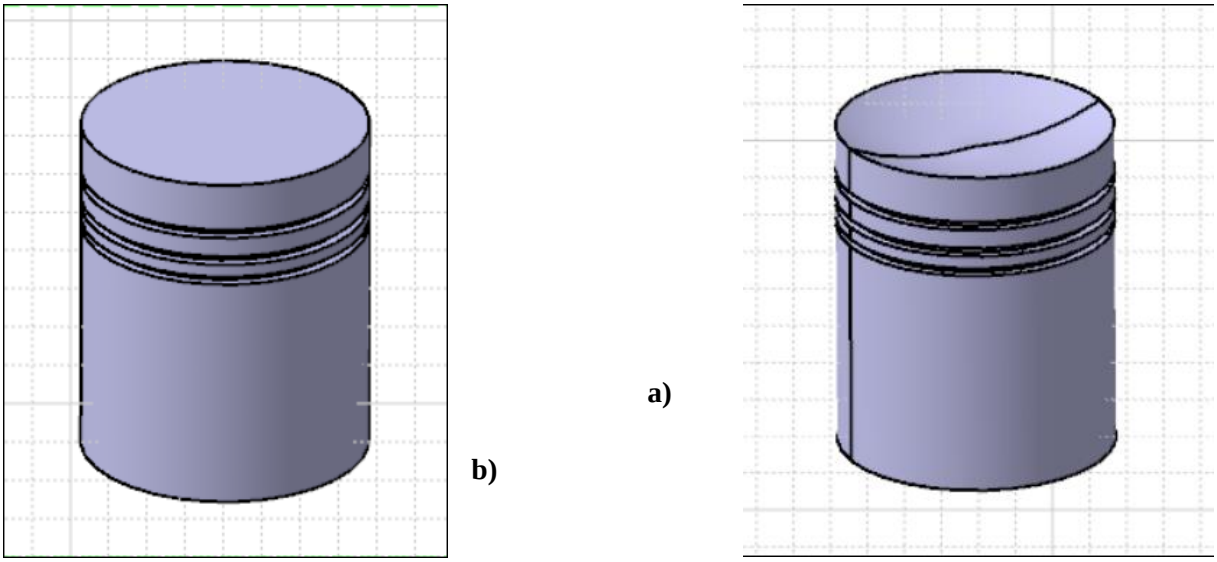


Figure 1. General technical drawing of the piston

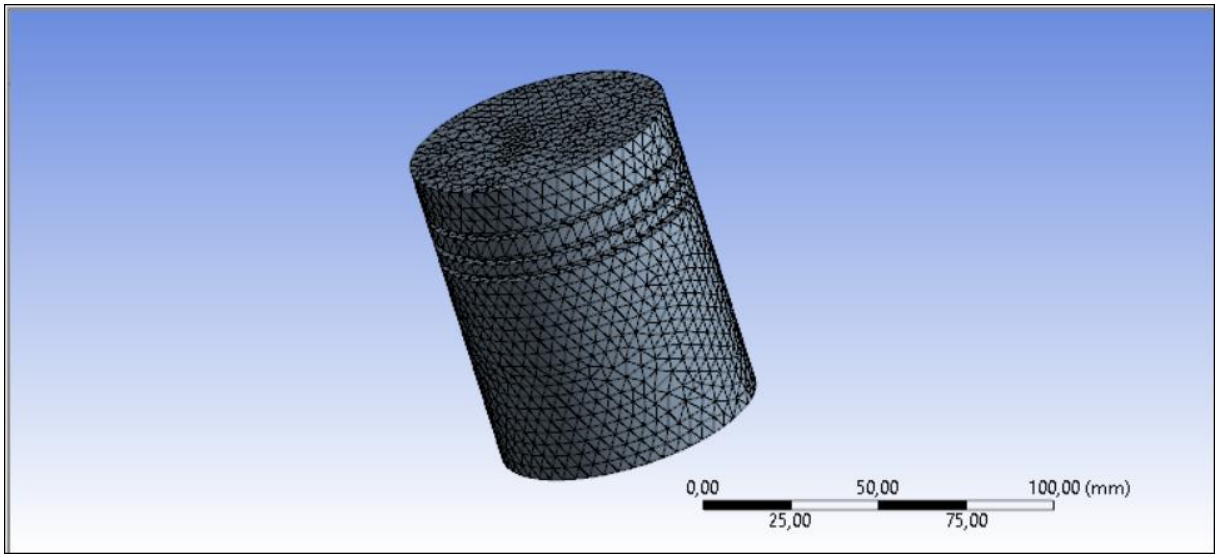
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a) **b)** **c)**

Figure 2. The CATIA view of **a)** flat shape **b)** curved shape **c)** crown shape

Figure 3 displays the mesh view of the piston head. As a result of the meshing process, 24053 nodes and 13296 elements were obtained. The mesh was enlarged until the mesh quality was stable. Figure 4 indicates the surface and edge meshes. Surface and edge meshing were optimized for accuracy of analysis.



FULL TEXTS BOOK

Figure 3. Design mesh view of piston head

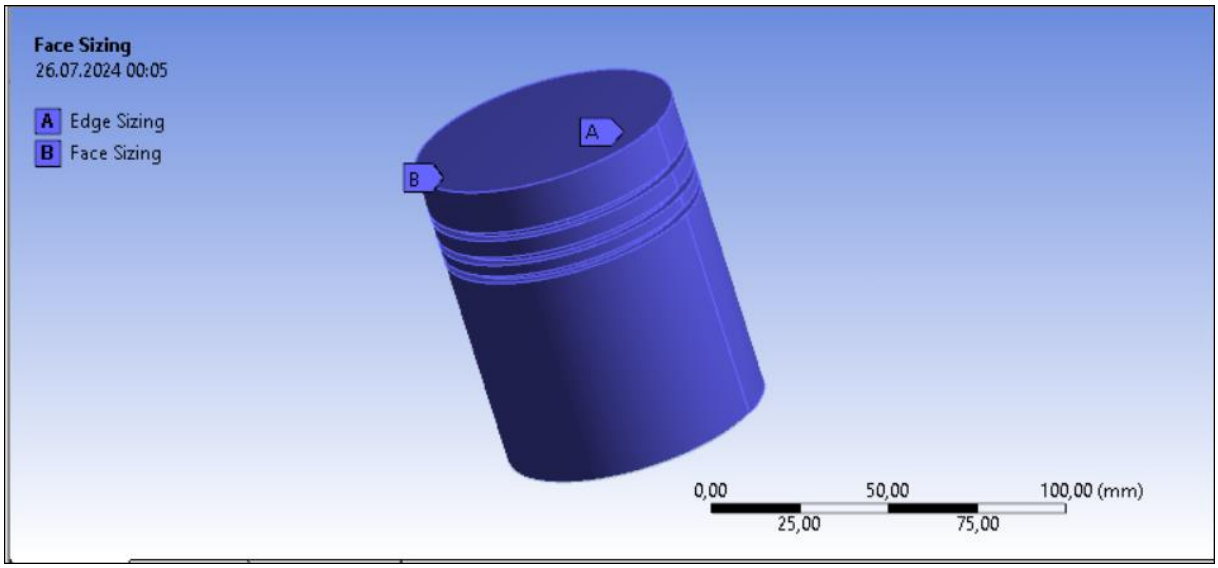


Figure 4. Edge and surface mesh view of the piston head

A temperature of 750 °C was applied to the top of the bottom of the piston head as displayed in Figure 5. A temperature of 300 °C was applied to the sides of the flask shown in Figure 6. The temperature values were determined taking into account the experiments and research carried out today. High temperatures were chosen because high-quality analysis cannot be performed at low temperatures. In this way, a better observation can be made when comparing the selected materials.

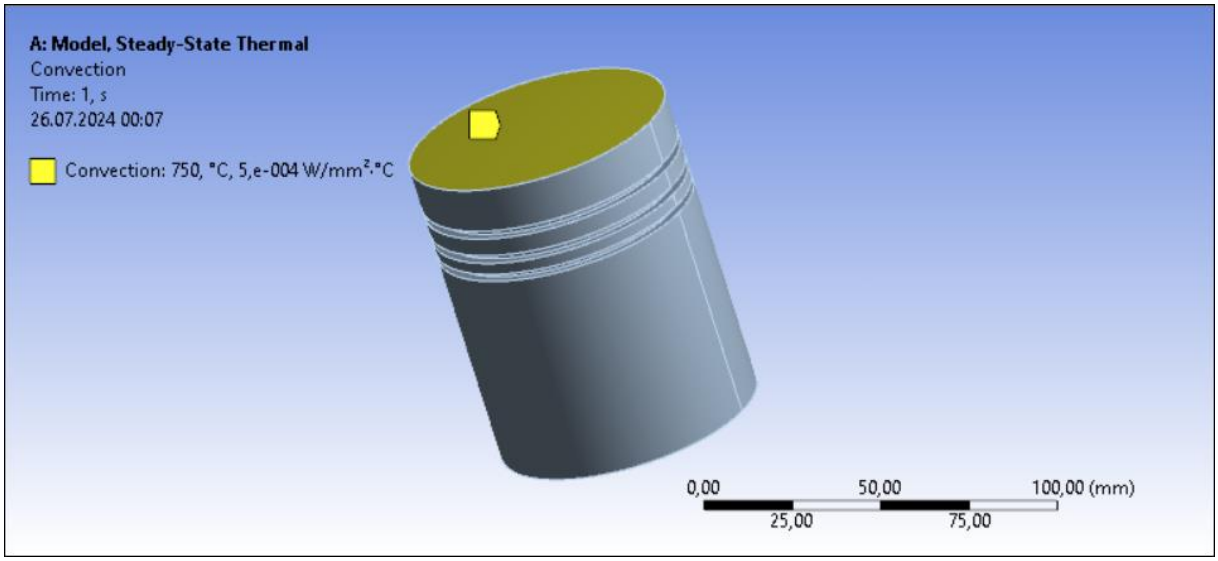


Figure 5. Temperature distribution on the upper surface of the piston head

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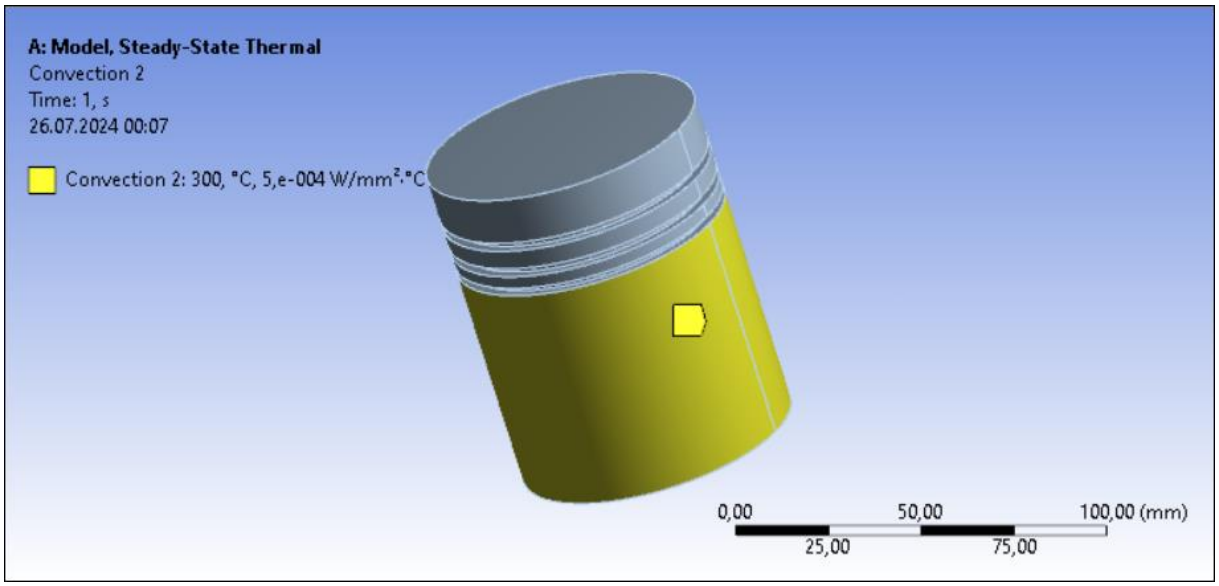


Figure 6. Temperature distribution on the side surface of the piston head

CONCLUSION AND DISCUSSION

The numerical results of the analysis are presented in Table 2 and Table 3. When comparing the materials, it was found that the material that conducts the most heat is PSZ, followed by the material 38MnVS6, and the material with the lowest value was 42CrMo. It was found that the temperature differences between the material 42CrMo and the material 38MnVS6 are very low. When comparing the designs, it was found that the design with the highest temperature was the crown shape, followed by the curved shape and the design with the lowest temperature was the flat shape. For the flat shape, the material that conducted the best temperature was found to be PSZ material with a total heat flux of 0.0449 and a temperature of 741.14 °C. After that, the temperature was 602.02 °C and 0.3557 with the material 38MnVS6. In the material 42CrMo design, the lowest temperature is 597.96°C with a total heat flow of 0.363. For the crown shape, the material PSZ was found to have the highest temperature of 749.32°C and a total heat flux of 0.0469. The material with the best results was determined to be 38MnVS6 with a temperature of 629.65°C and a total heat flux of 0.357. In this design, the material 42CrMo was found to have the lowest temperature with a temperature of 625.29°C and a total heat flux of 0.365. When comparing the materials in the curved form, it was found that the material PSZ had the highest temperature with a temperature of 746.72°C and a total heat flux of 0.047. 38MnVS6 with a temperature of 616.08°C and a total heat flow of 0.372 was found to be the material with the average best temperature. The material with the lowest temperature was found to be 42CrMo with a temperature of 611.86°C and a total heat flow of 0.38. When examining the numerical results, it becomes clear that the temperature result of the model and the result of the total heat flow are inversely proportional. It was found that the PSZ material, which gives the highest temperature result among the materials, also has the lowest total heat flux. It was found that the 42CrMo material, which gave the lowest temperature result, also had the highest total heat flux.

FULL TEXTS BOOK

Table 2. Temperature results

	Flat shape	Crown shape	Curved shape
42CrMo	597.96°C	625.29°C	611.86°C
38MnVS6	602.02°C	629.65°C	616.08°C
PSZ	741.14°C	749.32°C	746.72°C

Table 3. Total heat flux results

	Flat shape	Crown shape	Curved shape
42CrMo	0.363 W/mm^2	0.365 W/mm^2	0.38 W/mm^2
38MnVS6	0.3557 W/mm^2	0.357 W/mm^2	0.372 W/mm^2
PSZ	0.0449 W/mm^2	0.0469 W/mm^2	0.047 W/mm^2

Figure 7 to Figure 12 indicate the total heat flux and temperature distribution of 42CrMo material with three piston head designs.

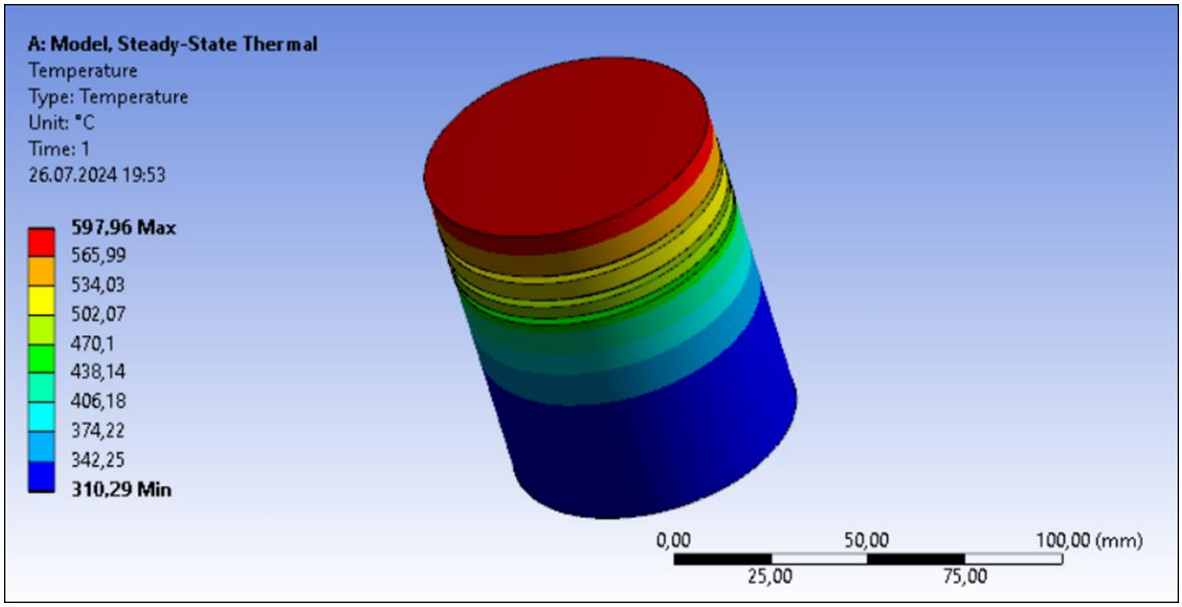


Figure 7. Temperature distribution of the model with 42CrMo material and flat shape geometry

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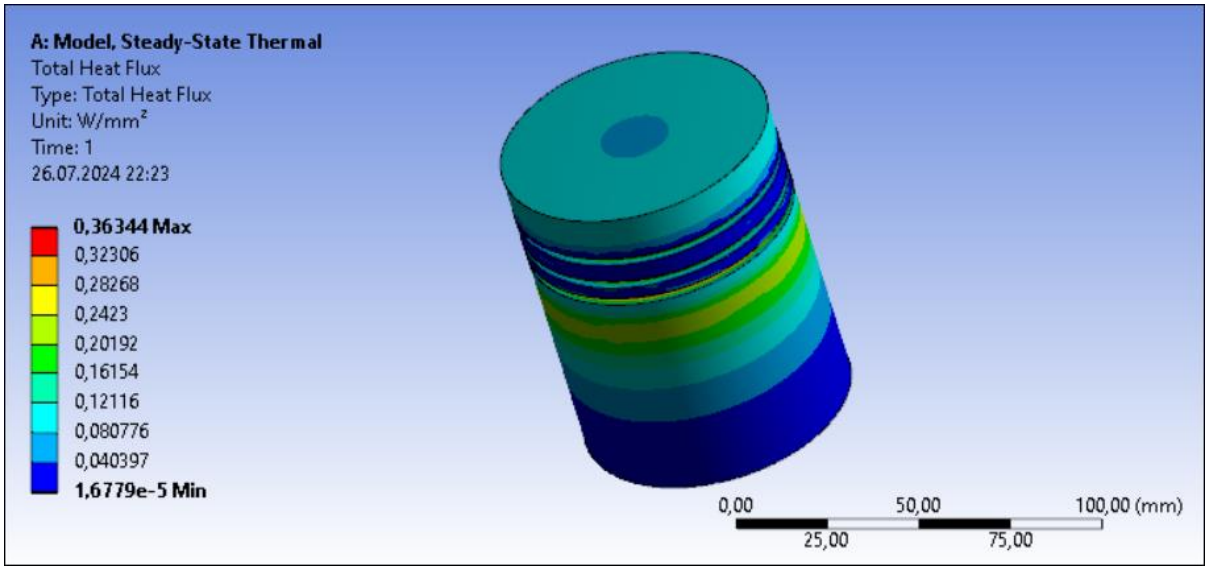


Figure 8. Total heat flux of the model with 42CrMo material and flat shape geometry

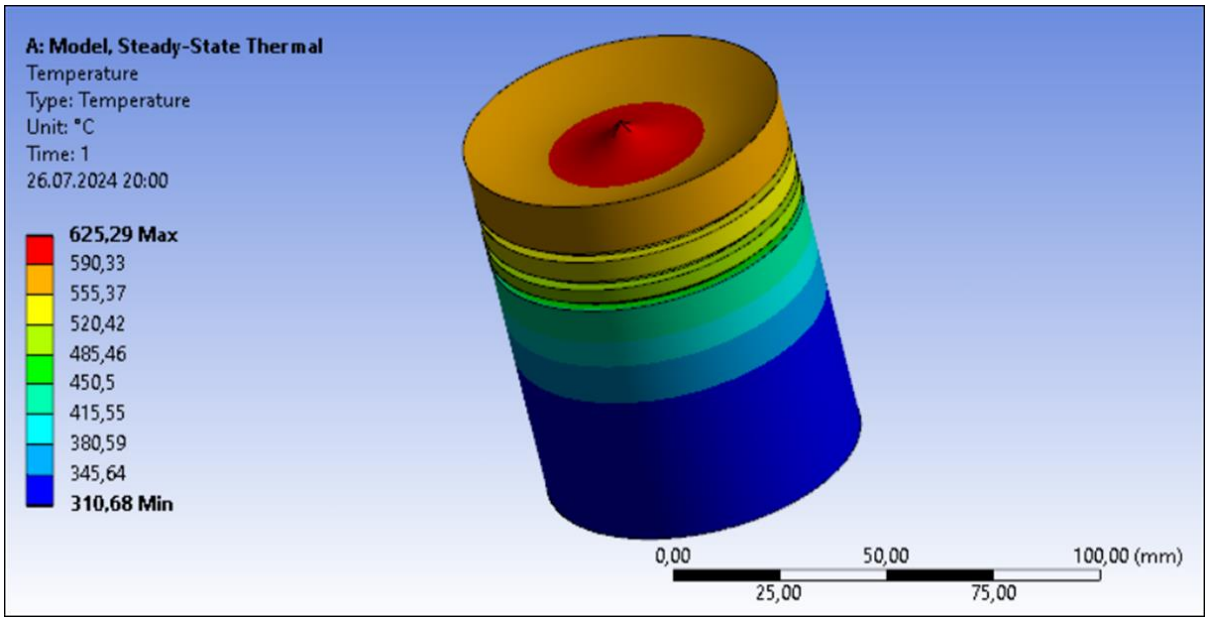


Figure 9. Temperature distribution of the model with 42CrMo material and crown shape geometry

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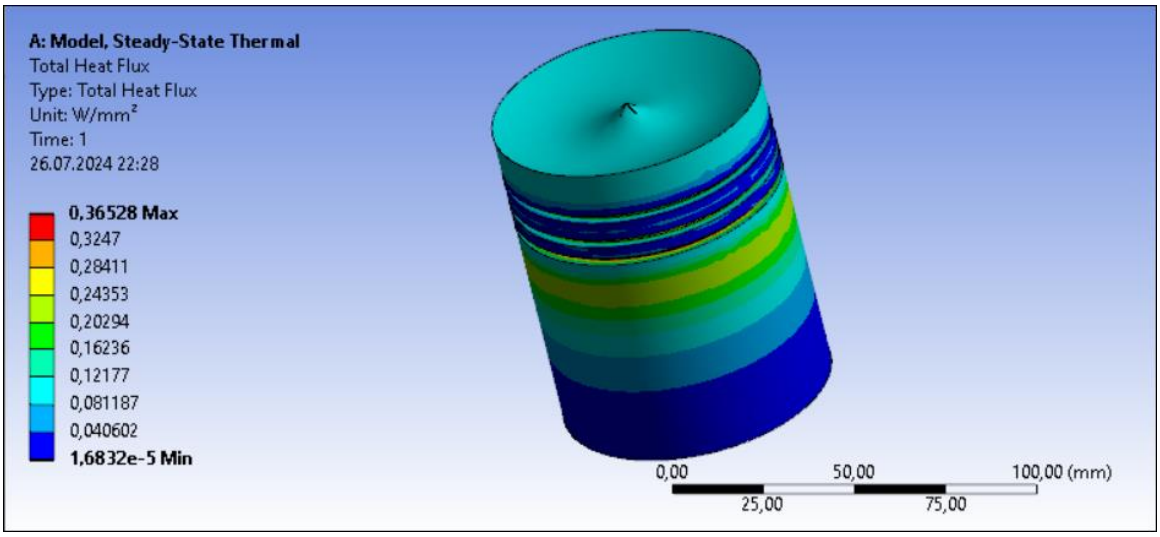


Figure 10. Total heat flux of the model with 42CrMo material and crown shape geometry

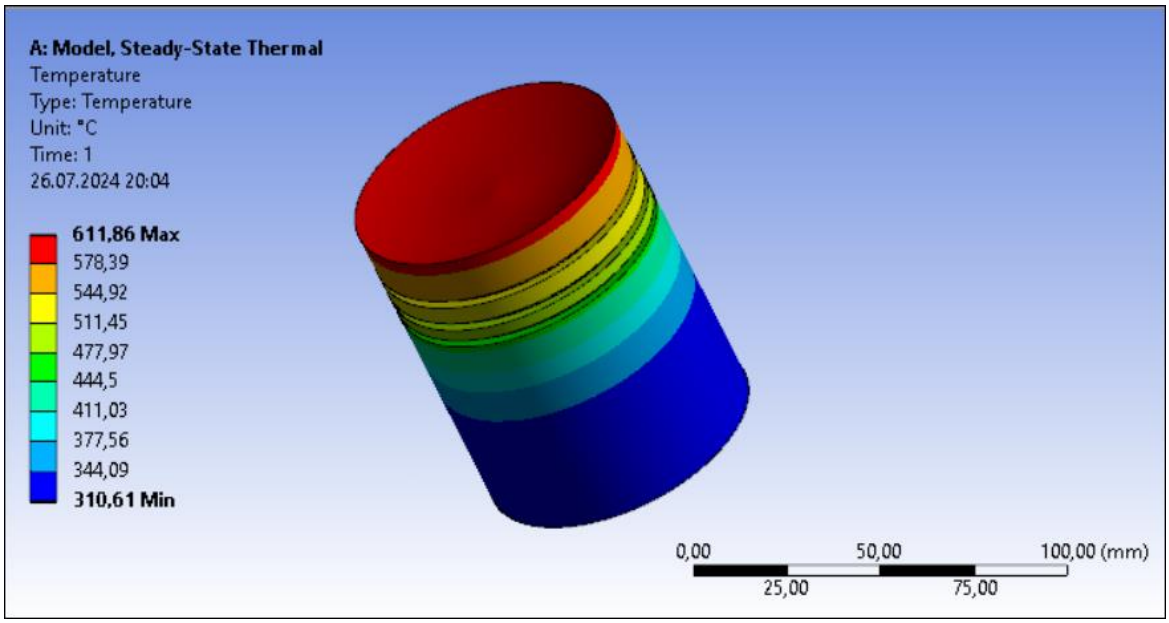


Figure 11. Temperature distribution of the model with 42CrMo material and curved shape geometry

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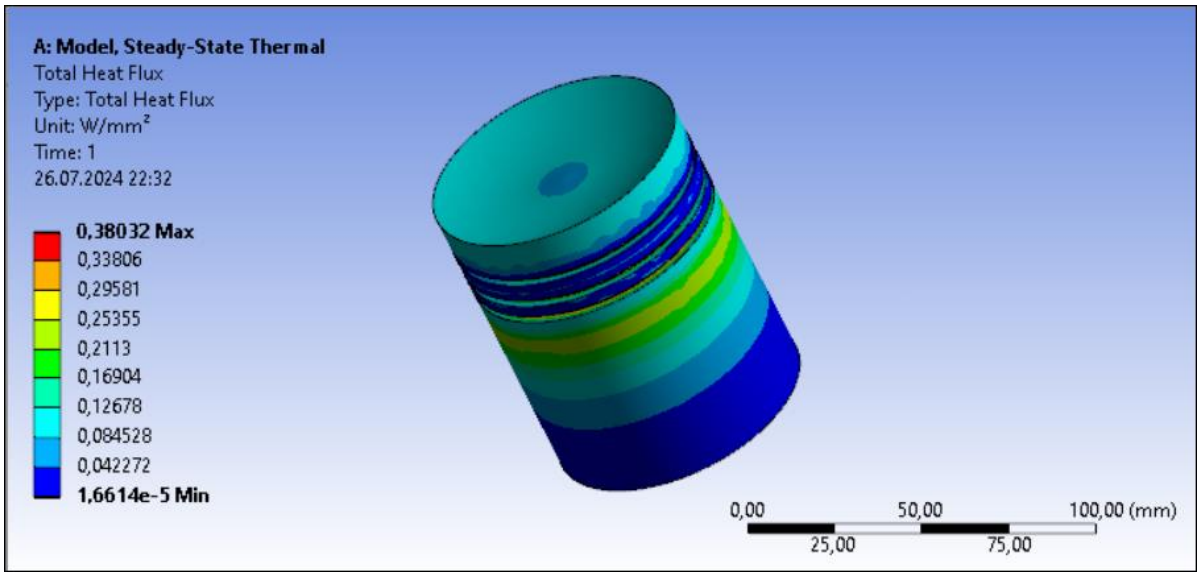


Figure 12. Total heat flux of the model with 42CrMo material and curved shape geometry

Figure 13 to Figure 18 indicate the total heat flux and temperature distribution of 38MnVS6 material with three piston head designs.

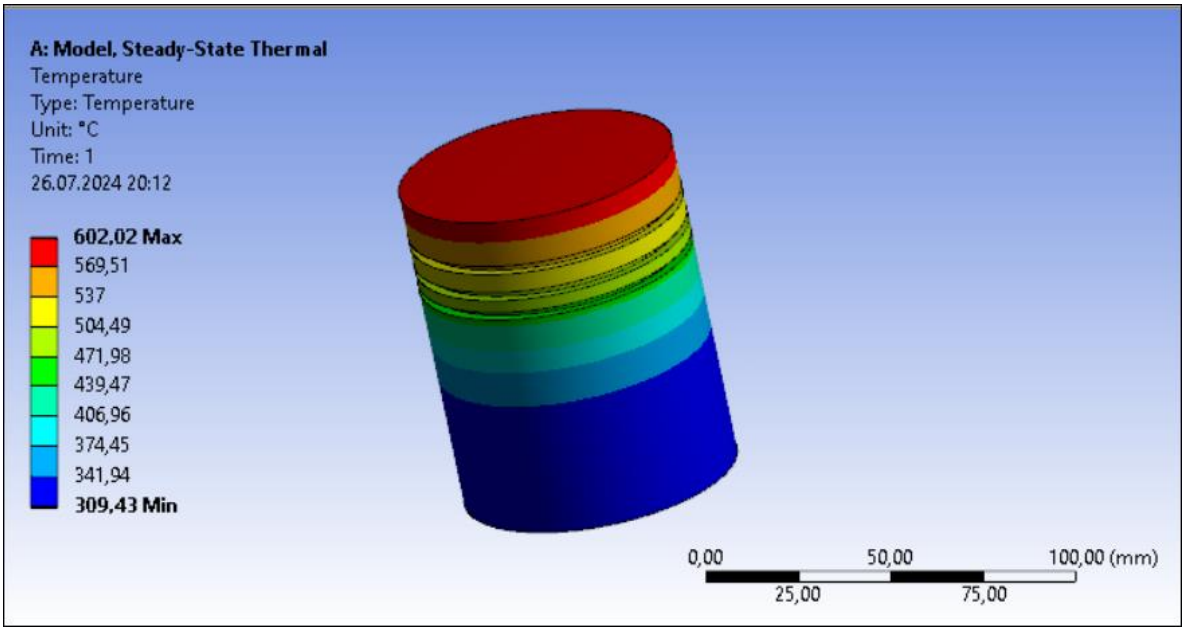


Figure 13. Temperature distribution of the model with 38MnVS6 material and flat shape geometry

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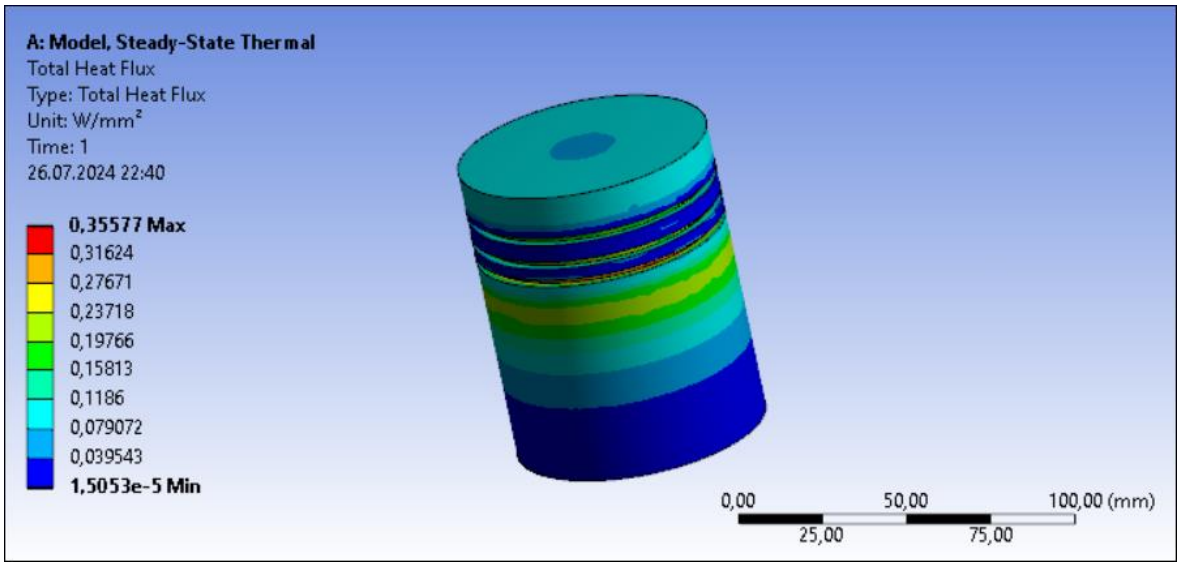


Figure 14. Total heat flux of the model with 38MnVS6 material and flat shape geometry

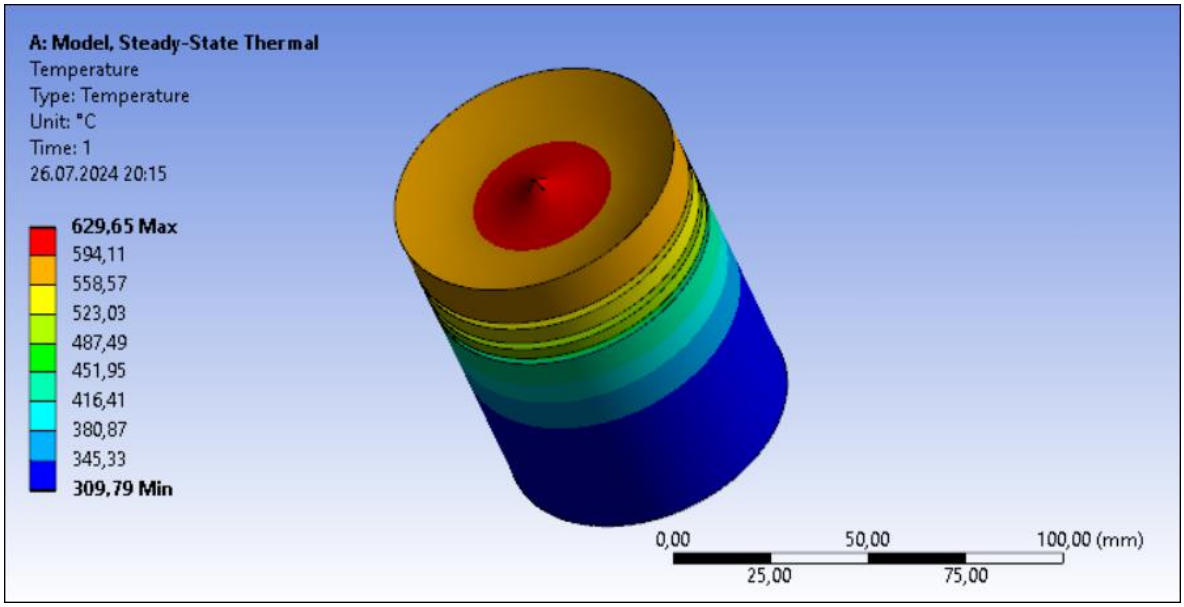


Figure 15. Temperature distribution of the model with 38MnVS6 material and crown shape geometry

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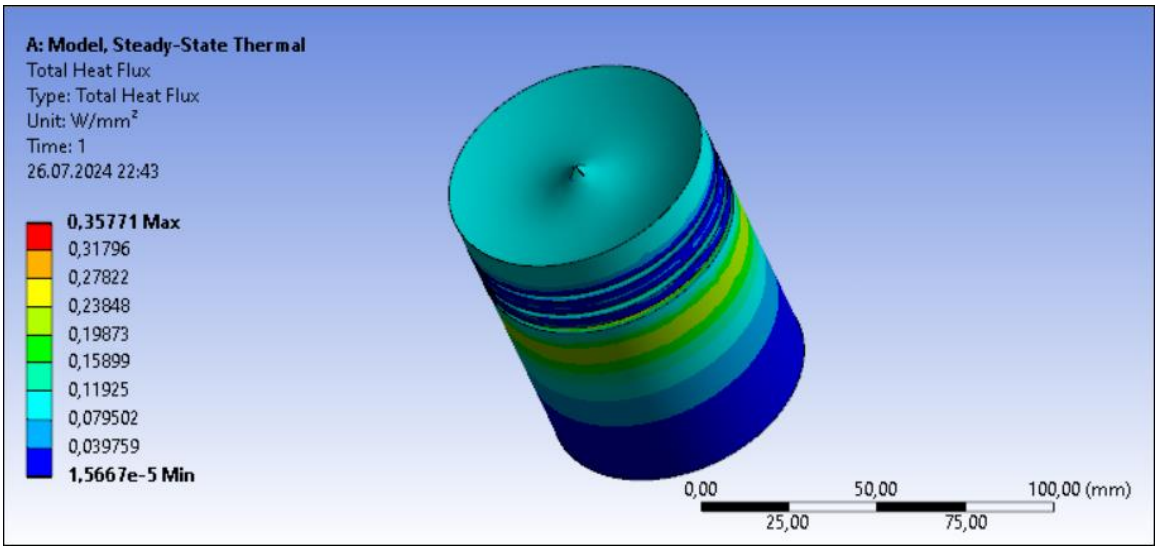


Figure 16. Total heat flux of the model with 38MnVS6 material and crown shape geometry

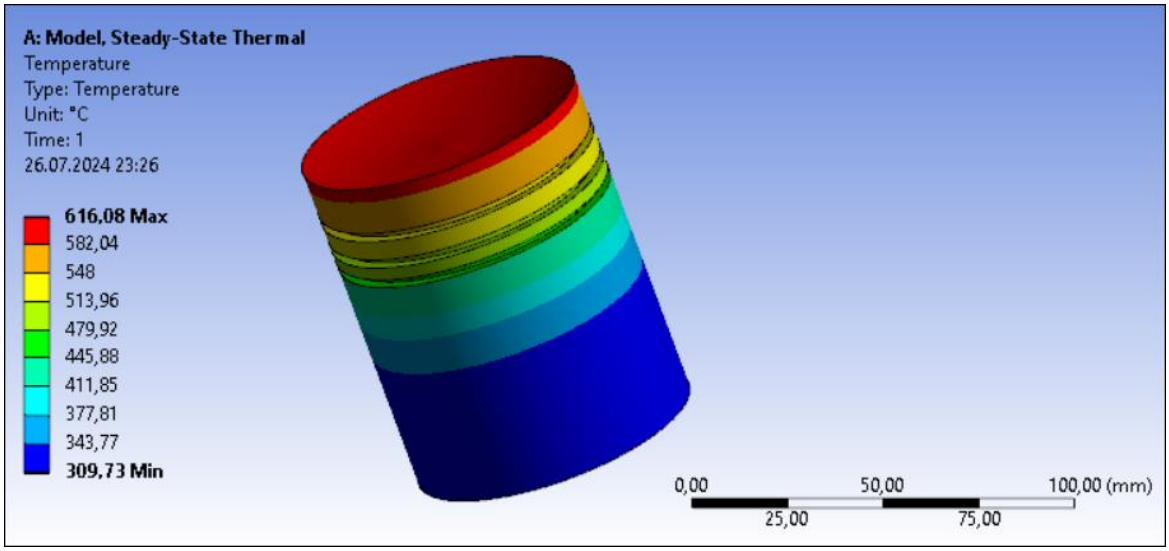


Figure 17. Temperature distribution of the model with 38MnVS6 material and curved shape geometry

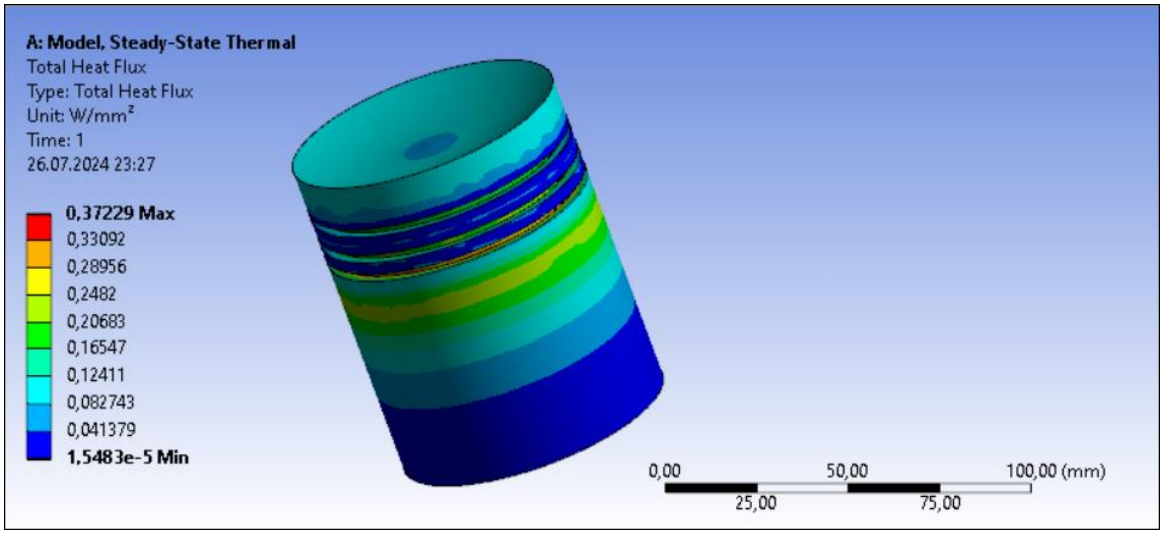


Figure 18. Total heat flux of the model with 38MnVS6 material and curved shape geometry

FULL TEXTS BOOK

Figure 19 to Figure 24 indicate the total heat flux and temperature distribution of PSZ material with three piston head designs.

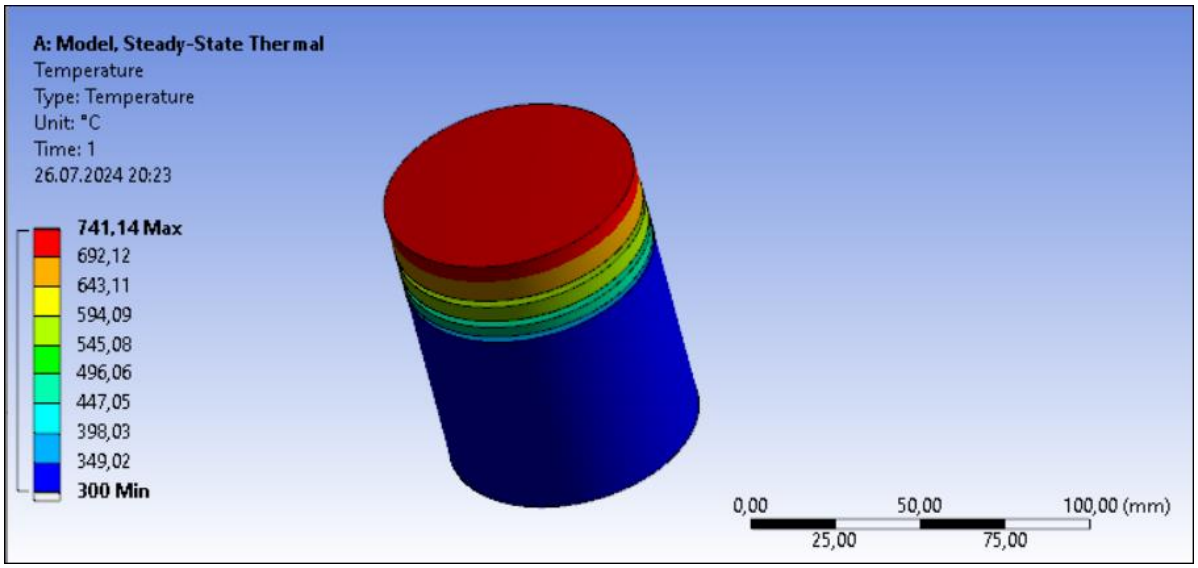


Figure 19. Temperature distribution of the model with PSZ material and flat shape geometry

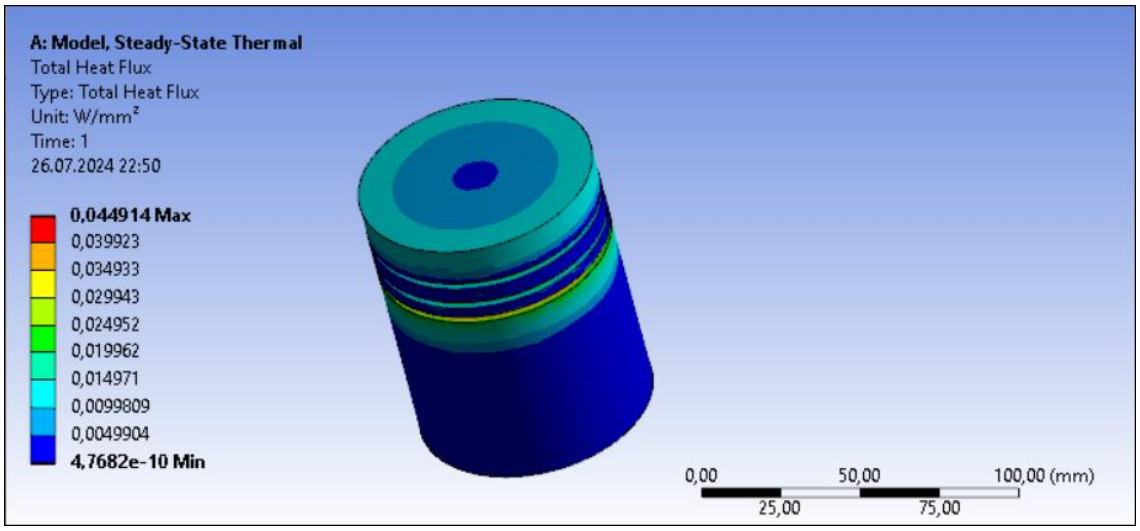


Figure 20. Total heat flux of the model with PSZ material and flat shape geometry

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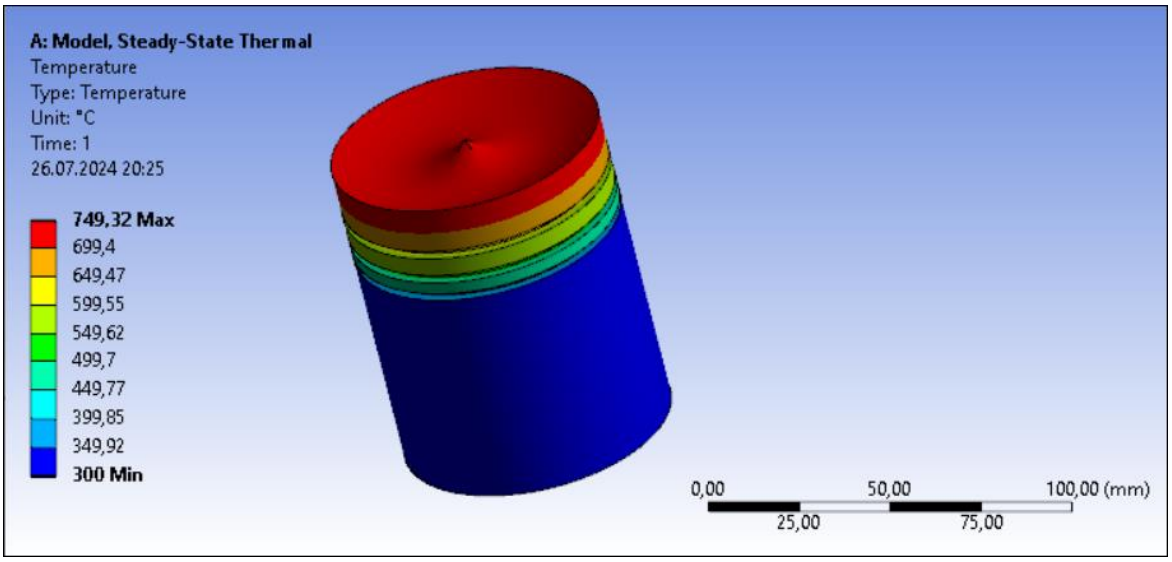


Figure 21. Temperature distribution of the model with PSZ material and crown shape geometry

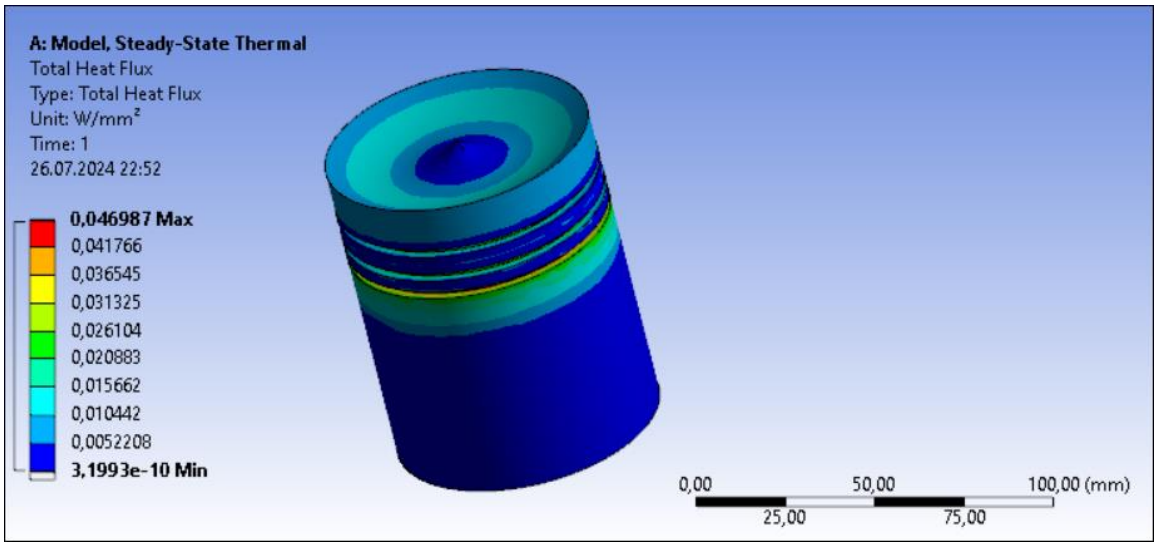


Figure 22. Total heat flux of the model with PSZ material and crown shape geometry

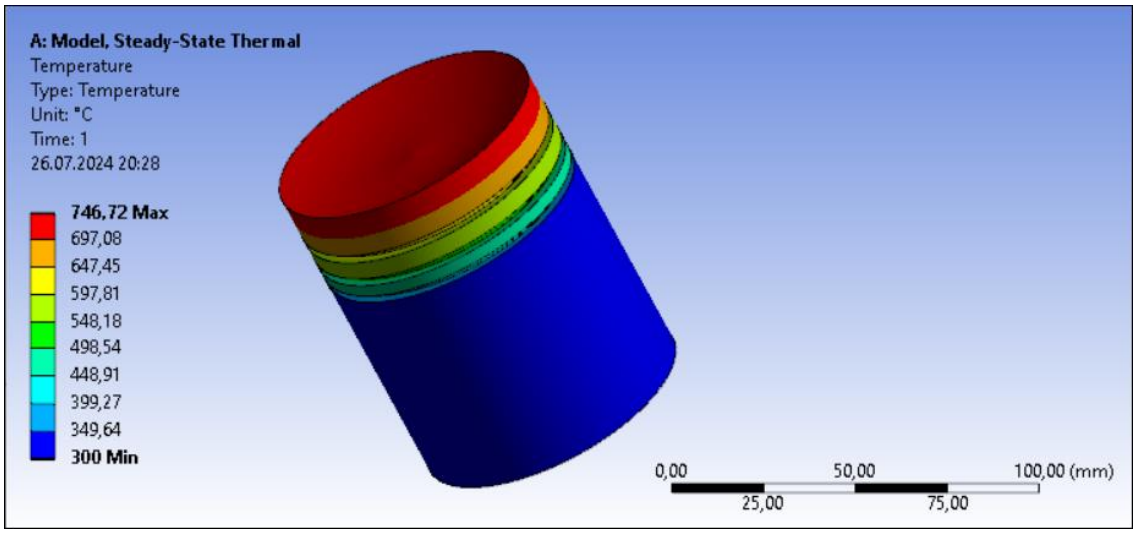


Figure 23. Temperature distribution of the model with PSZ material and curved shape geometry

FULL TEXTS BOOK

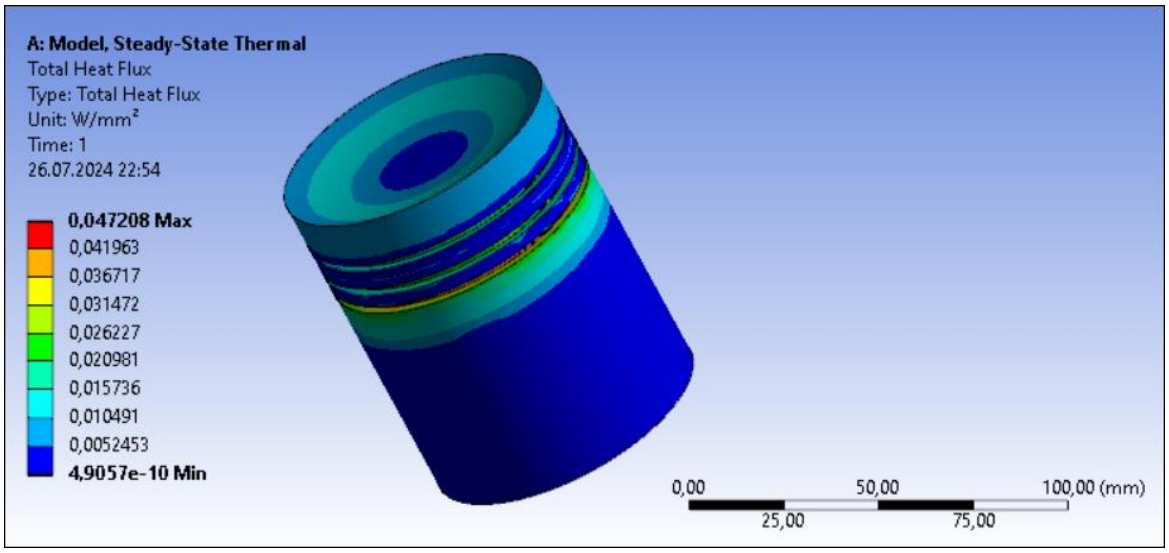


Figure 24. Total heat flux of the model with PSZ material and curved shape geometry

As a result of the study, the following conclusions were reached:

- Examination of the analysis results showed that the design that delivered the best temperature among nine different models had a crown shape geometry and the material PSZ.
- According to analysis, the temperature result of the model and the result of the total heat flow are inversely proportional.
- It was found that the PSZ material, which gives the highest temperature result among the materials, also has the lowest total heat flux. It was found that the 42CrMo material, which gave the lowest temperature result, also had the highest total heat flux.
- The analysis using PSZ material and flat design proved to be the best option for internal combustion engines. A piston head designed for specific loads helps to reduce specific fuel consumption.

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FULL TEXTS BOOK

BIOGAS PRODUCTION: CURRENT TRENDS AND FUTURE PROSPECTS

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ABSTRACT
Biogas, produced via anaerobic digestion, is a renewable and eco-friendly energy source with methane content ranging from 45% to 75%, translating to an energy content of 16 to 28 MJ/m^3. It is suitable for various applications, including heat production, combined heat and power generation, and as a vehicle fuel. While primarily used for electricity generation, its economic feasibility as a sole electricity source is challenged by higher costs compared to wind and solar photovoltaic (PV) systems. The future trend leans towards upgrading biogas to biomethane for direct injection into existing gas grids or use as renewable transport fuel, supporting the decarbonization of the transport sector. Promoting biogas and biomethane through competitive policies and supportive energy environments is crucial for their role in long-term carbon reduction strategies and meeting sustainable energy goals.
Keywords: Biogas, renewable energy, decarbonization

INTRODUCTION
Energy is crucial for daily life. Many countries, especially developing ones, rely heavily on fossil fuels. Industries are expanding, and their primary energy source, fossil fuels, is decreasing. The rapid development of renewable energy is crucial for global energy security and combating climate change. Countries globally seek sustainable energy solutions. Rising economic growth and energy demand have increased oil and gas prices, reducing reliance on these sources. This has led many nations to prioritize energy security and overhaul their energy strategies (IEA, 2020; Mai-Moulin et al., 2021; Kabeyi et al.,2022; IEA, 2023; Jameel et al., 2024; IEA, 2024). By the end of 2022, 46% of Turkey's total electricity capacity and 58% of its gross electricity production came from fossil fuels. Since Turkey imports nearly all its fossil fuel oil and natural gas, it is highly vulnerable to global price increases. Hence, transitioning to low-carbon energy is crucial for reducing foreign energy dependence and mitigating current account deficit fragility (TSKB, 2023).
Renewable energy sources are gradually replacing fossil fuels around the world. Biomass, geothermal, hydro, solar, and wind are poised to become key energy sources (Yavuz et al., 2022). Bioenergy, which is derived from biomass such as plants, animal waste, and organic materials, is alternative energy sources. Bioenergy is a form of secondary energy obtained from biomass, which includes options such as bioethanol, biogas, biodiesel, biohydrogen, electricity generation, etc. (Duarah et al., 2022). Biogas is a type of bioenergy produced through the anaerobic digestion of biomass like agricultural waste, manure, and organic waste. It is considered a second-generation biofuel because it uses non-food-based materials, unlike first-generation biofuels that come from food crops such as corn or sugarcane. Biogas production helps reduce greenhouse gas emissions and avoids the food-versus-fuel conflict. It can be used for generating electricity, heating, or upgraded to biomethane for vehicle fuel or natural gas grid injection (Torrijos, 2016; Korbag et al., 2021; Duarah et al. 2022; WBA, 2023). Biomethane is an alternative to natural gas and can be utilized as a transportation fuel, achieving an emission reduction of

FULL TEXTS BOOK

60-80% based on the biogas production feedstock (Kabeyi, et al.,2022) This makes biogas a sustainable and eco-friendly energy source.

RENEWABLE ENERGY SOURCE: BIOGAS

Biogas and biomethane are renewable energy sources with numerous benefits both locally and globally. Biogas is produced from biomass, including agricultural waste, municipal waste, and animal excrement, etc. It is produced through anaerobic digestion, where bacteria break down organic matter in the absence of oxygen. The biogas production process involves anaerobic digestion, which includes four main stages: hydrolysis, acidogenesis, acetogenesis, and methanogenesis. Biogas is produced by mixing organic materials with an equal volume of water, homogenizing the mixture, and placing it in a digestion reservoir. During hydrolysis, Anaerobic bacteria break down complex organic molecules like proteins, carbohydrates, and fats into smaller compounds such as volatile fatty acids, ammonia, and carbon dioxide. Acidogenesis further breaks these down into volatile fatty acids, which are then converted into acetic acid, hydrogen, and carbon dioxide during acetogenesis. After an appropriate retention period, methane and carbon dioxide gas is generated through anaerobic digestion by methanogenic bacteria. Proper conditions are required to balance acid and methane production. Optimal conditions, such as temperature and pH levels, are crucial for efficient and economic methane production (Sher et al., 2024). Biogas, primarily composed of methane and carbon dioxide, can be used for heating, generating electricity, making it a versatile and sustainable energy option. The calorific value of biogas depends on its composition, primarily the methane content. Typically, the heating value ranges from 21 to 23.5 MJ/m^3, meaning that 1 m^3 of biogas is equivalent to 0.5-0.6 liters of diesel fuel or approximately 6 kWh of electricity. Cogeneration systems, producing both electricity and heat, are used in biogas electricity production. With an electrical efficiency of 40%, 1 cubic meter of biogas equals 2.61 kWh. Biogas reduces greenhouse gas emissions significantly, with 26 gCO_2 per kWh compared to coal's 710 gCO_2, resulting in a reduction of 684 gCO_2 per kWh (Korkmaz & Hacısalihoğlu, 2024). The methane content in biogas usually ranges from 45% to 75%. Biomethane is a purified form of biogas with a higher methane content of around 35 MJ/m^3. It is produced by upgrading biogas to remove CO_2 and other contaminants (Arshad et al.2021, Aziz et al.2019; Kabeyi et al.,2022; Jameel et al, 2024; Sher et al., 2024).

Energy Trends and Renewable Energy

Global electricity generation increased by an estimated 2.5% in 2022, reaching 28,294 terawatt-hours (TWh) This increase in electricity demand reflects the continuous expansion of global electricity needs. The increase in global energy demand increases the need for alternative energy sources and it highlights taking measures to reduce the environmental impacts resulting from the use of fossil fuels. Due to decreasing costs and the implementation of more green legislation, the share of electricity, produced from renewable energy sources, has continued to grow. By 2023, renewable energy sources accounted for approximately 32% of the world's electricity production, up from 29% in 2020. Renewable energy consumption climbed by 5% in 2023, while demand for all other fuels remained relatively stable or declined (REN21, 2024; IRENA 2024). In 2023, renewable electricity capacity increased by 507 GW, nearly 50% higher than in 2022, driven by strong policy support in over 130 countries. This growth was primarily due to China's significant expansions in solar PV and wind. The reason for the increasing share of wind and solar energy in these predictions is their ongoing cost reductions. It's anticipated that costs will continue to drop, especially for solar PV, in the coming years. The wind energy industry is facing global financial challenges, with most major western manufacturers reporting losses over the past two years. Project development outside of China has been slower than expected, leading to a downward revision of onshore wind forecasts. In large markets like India, Africa, and the Middle East, slow project progress and policy uncertainties have also caused downward revisions. In the European Union, long

FULL TEXTS BOOK

permitting times, supply chain issues, and higher costs are reducing anticipated onshore wind deployment. Offshore wind development costs have increased the most, resulting in a 16% downward revision in forecasts outside of China (IEA, 2023; IEA, 2024; IRENA 2024). Over the next five years, renewable capacity will continue to rise, with solar PV and wind making up 96% of the additions due to their lower generation costs and ongoing policy support. In addition, renewable energy is projected to surpass coal as the largest source of electricity generation globally by 2025. This progression highlights the growing dominance and importance of renewable energy in the global electricity landscape (IEA, 2024).

Although this increase is primarily driven by solar PV and wind, developments in bioenergy are also continuing, the use of bioenergy in industry has continued to increase, contributing to the overall growth in renewable energy. The global biogas plant market has seen significant growth in recent years. As of 2023, the installed capacity of biogas energy worldwide reached approximately 21.9 gigawatts (GW). This capacity is expected to continue growing, potentially reaching around 37.5 GW by 2032, driven by increasing government initiatives and the rising focus on sustainable energy sources (IMARC 2024, WBA 2023).

Future Trends for Biogas

The cost of biogas production will also continue to decline, but it will remain higher than that of solar PV. The cost of electricity generation from biogas varies considerably depending on the feedstock used and the level of sophistication of the plant and can exceed USD 50/MWh (Kabeyi, et al.,2022; Pinheiro et al.,2024). By 2028, new biogas plants may become cost-competitive with new coal and natural gas plants, but they will struggle to match the cost advantage of solar PV (IEA, 2023). Operation and maintenance costs typically account for 7.4% of the total investment for biogas plant. It takes 6 years or more for biogas plants established for electricity purposes to earn their initial investment costs (Kabeyi, et al.,2022). Therefore, biogas plants will need additional incentives and support to remain viable. It should be noted that the economics of biogas production can vary by region. For example, although growth has slowed in recent years due to changes in policy support in European countries, the biogas sector continues to grow in other markets such as China and Turkey (IEA, 2020). Biogas offers unique benefits such as waste management and the production of fertilizer, which can provide added value beyond just energy production. Therefore, it is important to provide various support mechanisms and long-term policy commitments to enhance the economic sustainability of biogas plants. Considering biogas's contribution to local energy security and its role in reducing carbon emissions, its strategic importance should be emphasized. With the right support and policies, biogas can remain a sustainable option despite its higher costs. Europe remains the leading region for biogas production, most of which are in Germany. These plants predominantly generate on-site electricity and heat, with a portion dedicated to upgrading biogas to biomethane. The ratio of renewable energies in Europe's electricity production remains low, but there is a political commitment to increase it in the future through the development of solar, wind, and biogas energies. (FNR 2019; IEA, 2020; IEA, 2023; Scarlat, et al.,2018; Sesini, et al.,2024). Figure 1 shows the projected biogas production by 2028 in different regions.

FULL TEXTS BOOK

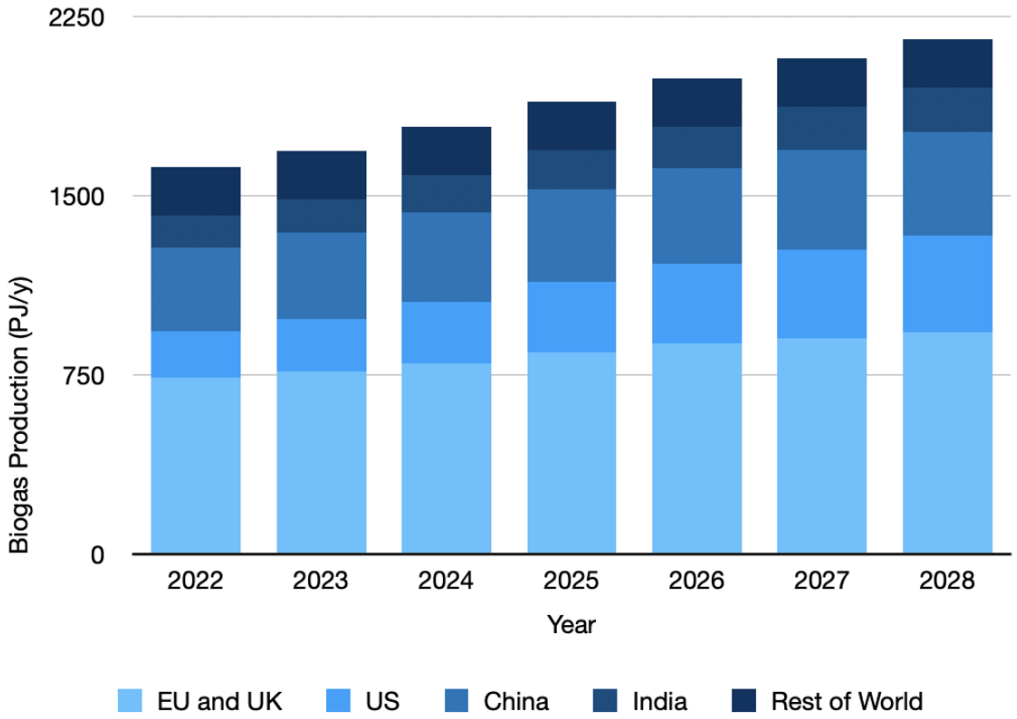


Figure 1 Biogas production forecast in different regions. (produced from IEA 2023 data)

It is expected that there will be significant increases in biogas production, especially in the European Union and the United Kingdom, as well as in the USA and China. By 2028, total biogas production is expected to reach 2157 PJ/year. However, the relatively high costs associated with biogas electricity generation suggest that future expectations for solely electricity-producing biogas facilities may be limited. Given these economic considerations, the future of biogas appears increasingly favorable for its direct use as a gas rather than for electricity generation. The future trend will therefore result in more biogas plants focusing on biogas upgrading. Upgrading biogas to biomethane allows for its direct injection into existing gas grids or use as a renewable transport fuel, offering a versatile and potentially more cost-effective solution. This approach also supports the decarbonization of the transport sector and provides a flexible energy source that can complement intermittent renewable electricity sources like wind and solar PV. Therefore, focusing on the direct utilization of biogas as gas can enhance the role of countries in achieving their sustainable energy goals.

Challenges in Biogas Sector

Biogas systems face many significant challenges that prevent their widespread development. In addition to the technical difficulties in production, there are various problems ranging from the initial investment of biogas to the use of gas in the energy sector (Kabeyi, et al.,2022; Sher et al., 2024). In a study conducted by Korkmaz & Hacısalihoğlu, (2024), several factors were identified that could negatively impact the efficiency of biogas plants. These include high initial investment and operating costs, expenses related to the collection and transportation of feedstock (such as fuel costs), potential decreases in feedstock, and risks associated with equipment failures. These challenges should be considered when evaluating the overall efficiency and viability of biogas plants. In addition, policy uncertainties, insufficient investment in grid infrastructure, lengthy permitting processes, and financing challenges are significant obstacles hindering the widespread adoption of renewable energy. Governments must respond with clearer and faster policy actions, establishing long-term targets and incentives to provide certainty for investors. It is also vital to increase investments in grid infrastructure to support the expansion of renewable energy projects. Simplifying and expediting permitting processes can reduce

FULL TEXTS BOOK

delays and project costs, facilitating quicker deployment of renewable energy initiatives. Additionally, addressing financing challenges, especially in developing countries, requires financial institutions and governments to offer guarantees and incentives to attract investment and mitigate risks in renewable energy projects. Addressing these challenges with targeted solutions will facilitate the faster and more efficient development of renewable energy, contributing to a sustainable and secure energy future.

CONCLUSIONS

The global energy market is undergoing a significant transformation, driven by the need to reduce reliance on fossil fuels and mitigate environmental impacts. Biogas production is expected to gain more value in terms of integration into the circular economy and especially in the energy policies of countries. Biogas, in particular, stands out due to its dual benefits of waste management and renewable energy production. It is economically more advantageous to use biogas directly as gas instead of producing electricity. Converting biogas into biomethane, integrating the gas into networks and using it as a renewable transportation fuel will further increase the environmental benefits of biogas. Competitive and supportive energy policies will also act as a catalyst to move the biogas market forward. Therefore, it is very important to promote biogas and biomethane. In this context, Biogas production facilities are expected to play an increasingly important role in long-term carbon reduction strategies in the next years. It is predicted that biogas production will increase if decarbonization and sustainability policies are continued on a global scale. Hence, biogas investors should focus on developing process optimization and practices that will increase biogas production efficiency.

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FULL TEXTS BOOK

EKONOMİK HAREKET; GÖÇMEN KAÇAKLIĞI SUÇU
ECONOMIC MOVEMENT; THE CRIME OF IMMIGRANT TRAFFICKING

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ÖZET
Her yıl milyonlarca insan bulundukları ülkelerde var olan ekonomik koşullara uyum sağlayamadıkları için bulundukları ülkelerden kilometrelerce uzaklıkta olan ülkelere göç etmektedirler. Çoğunlukla Ekonomik nedenlerle yapılan göç hareketleri yasal yollarla gerçekleştiği gibi yasadışı yollarla da gerçekleşmektedir. Yasal göçle ilgili kısıtlamalar ve denetimler katı oldukça yasadışı göçmen kaçaklığının artışı önem arz etmektedir. Bu durum hem bulundukları ülkeler için hem de göç ettikleri ülkeler açısından ekonomik, sosyal ,siyasi ve özellikle güvenlik açısından sorun teşkil etmektedir. Düzensiz göçmen sorunu ülkemizde olduğu gibi her ülkenin sorunu haline gelmeye devam etmektedir. İllegal yolları kullanarak ülkelere giriş yapan göçmenler kendilerini tehlikeye atmakla birlikte göç ettikleri ülkeler için de ciddi problemlere sebep olmaktadırlar.
Bu çalışma ile 2004-2008 yılları baz alınarak ülkemizde yakalanan yasadışı göçmenler, Göçmenlerin uyruklarına göre dağılımı, ülkemizde tespit edilen insan ticareti mağdurları, Yakalanan insan ticareti organizatörleri, tespit edilen insan ticareti mağdurlarının uyruklarına göre dağılımı üzerinde durularak İçişleri Bakanlığı Emniyet Genel Müdürlüğünden alınan veriler doğrultusunda değerlendirmeler yapılmıştır.
Anahtar kelimeler: Göç, Kaçakçılık, Ekonomi, Suç, Göçmen

ABSTRACT
Every year, people migrate to places that are miles away from their diversity because the existing economic segments they live in cannot adapt. Partially economic migration movements are carried out to be legalized. Restrictions and controls on legal immigration strictly concern the increase in illegal immigrant smuggling. This situation poses an economic, social, political and especially security problem for both the countries they live in and the regions they migrate to. The problem of irregular students continues, and it continues to become a problem for the country. It causes deaths of immigrants who enter using illegal means and causes serious problems for the countries they migrate to.
With this study, the data received from the Ministry's General Directorate of Security were evaluated by focusing on the immigrants released between 2004 and 2008, the current known human transportation victims according to the nationality of the immigrants, the captured human transportation areas, the situations of the detected human transportation victims according to their nationalities. .
Key Words: Immigration, Smuggling, Economy, Crime, Immigrant

GİRİŞ

Her yıl milyonlarca insan bulundukları ülkelerde var olan ekonomik koşullara uyum sağlayamadıkları için bulundukları ülkelerden kilometrelerce uzaklıkta olan ülkelere göç etmektedirler. Çoğunlukla Ekonomik nedenlerle yapılan göç hareketleri yasal yollarla gerçekleştiği gibi yasadışı yollarla da gerçekleşmektedir. Yasal göçle ilgili kısıtlamalar ve denetimler katı oldukça yasadışı göçmen kaçaklığının artışı önem arz etmektedir. Bu durum hem bulundukları ülkeler için hem de göç ettikleri ülkeler açısından ekonomik, sosyal ,siyasi ve özellikle güvenlik açısından sorun teşkil etmektedir. Düzensiz göçmen sorunu ülkemizde olduğu gibi her ülkenin soruna haline gelmeye devam etmektedir. İllegal yolları kullanarak ülkelere giriş yapan göçmenler kendilerini tehlikeye atmakla birlikte göç ettikleri ülkeler için de ciddi problemlere sebep olmaktadır. Ulusal ve uluslararası ekonomik çatışmalar, siyasi ve sosyal eşitsizlikler, savaş ve benzeri sebepler nedeniyle bulundukları ülkeleri terk etme

FULL TEXTS BOOK

zorunluluğu ile karşı karşıya kalan ulus vatandaşları kendilerince normal bir yaşam yada çoğu zaman daha iyi şartlarda yaşama umudu ile farklı coğrafyalara göç etmektedirler. Bu durumu avantaja çeviren yapısal ve ekonomik eşitsizliği sömüren yasa dışı örgütlerin ortaya çıkması hayatın olağan akışı içerisinde yer almaktadır. Ekonomik çatışma ,siyasi istikrarsızlık savaş ve benzeri nedenlerle göç edenlerle birlikte yaşam olanaklarını genişletmek amacıyla göç edenlerin bu durumunu yasadışı faaliyetlerine dahil eden suç örgütlerinin ortaya çıkması göçmen kaçakçılığını tetikleyen bir durum olarak ortaya çıkmaktadır.

Bu tarz yasadışı faaliyetlerin içerisinde yer alan organizasyonlar nispeten düşük riskler alarak yüksek kar elde etmeyi amaçlayan örgütlerdir. Bu sebeple yasadışı göçmen kaçakçılığı sürekli artma eğilimde devam etmektedir. Özellikle gelişmemiş ülkelerden gelişmiş ülkelere doğru bir göç akımı yaşanmaktadır. neredeyse her yıl on binlerce insan yasadışı yollarla ülkelere giriş yapmaktadır. Yasal yollarla giren kişiler bile yasal süre dolduktan sonra girdikleri ülkeleri terk etmemektedir. Ülkeyi terk etmeyen göçmenler barınma sorunlarıyla karşı karşıya kalırken aynı zamanda sağlık korunmasından uzak oldukları için ciddi tehlikelerle karşı karşıya kalarak hem kendi sağlıklarını hem de bulundukları ülkenin şartlarını zorlamaktadırlar. Yasadışı yollarla ülkeyi terk etmeyen göçmenler bulundukları ülkelere entegresyon noktasında sorun yaşarken aynı zamanda ekonomik bir yük oluşturarak suç oranlarının artmasına neden olmaktadırlar. Suç oranlarının artışı ile birlikte toplumsal sorunlar ortaya çıkarak siyasi ve ekonomik dengesizliğin merkezine yerleşebilmektedirler.

Ülkeden ülkeye yasadışı göç yollarını kullanarak giriş yapan göçmenlerin bu durumunu bazı grup yada örgütler illegal yollar aracılığıyla haksız kazanç sağlama girişiminde bulunmaktadırlar. Göçmen kaçaklığı suçları da haksız kazanç elde etmek amacıyla gelişim göstermektedir. İnsanların daha iyi bir hayat umuduyla ülkelerini terk etmeleri suç örgütlerini hareket geçiren ve durumu rant aracı olarak görmelerini sağlayan önemli bir durumdur. Türkiye göçmenlerin özellikle tercih ettikleri ülkeler arasında yer almaktadır. Jeopolitik konumu sebebiyle transit bir ülke konumunda görülen ülkemizde göçmen kaçakçılığı üzerinde durulan önemli bir konudur.

Aşağıda yer alan tablolar da ülkemizde yakalanan yasadışı göçmenler, 2008 yılında ülkemizde Yakalanan yasadışı göçmenlerin uyruklarına göre dağılımı, 2004-2007 yılları arasında Ülkemizde yakalanan yasadışı göçmenler, . Yıllara göre ülkemizde tespit edilen insan ticareti Mağdurları, yıllara göre ülkemizde yakalanan insan ticareti organizatörleri, 2008 yılında Ülkemizde tespit edilen insan ticareti mağdurlarının uyruklarına göre dağılımı yer almaktadır.

Tablo 1. Yıllara Göre Ülkemizde Yakalanan Yasadışı Göçmenler

2005	**2006**	**2007**	**2008**
57.428	51.983	6.429	62.459

Kaynak : İçişleri Bakanlığı Emniyet Genel Müdürlüğü

Tablo da belirtilmiş olduğu gibi ülkemizde yakalanan yasadışı göçmen sayısının en yüksek olduğu yıl 2008 iken en düşük olduğu yıl 2005 olarak görülmektedir.

Tablo 2. 2008 Yılında Ülkemizde Yakalanan Yasadışı Göçmenlerin Uyruklarına Göre Dağılımı

Irak	Filistin	Pakistan	Afganistan	Somali	Moritanya	Gürcistan	Mynmar	Suriye
4.661	6.203	9.077	10.420	3.186	1.103	2.501	4.492	866

Kaynak : İçişleri Bakanlığı Emniyet Genel Müdürlüğü

Tablo da belirtilmiş olduğu gibi ülkemizde yakalanan yasadışı göçmenlerin uyrukları incelendiğinde en yüksek göçmenin Afganistanlı olduğu görülmektedir.

Tablo 3. 2004-2007 Yılları Arasında Ülkemizde Yakalanan Yasadışı Göçmenler

FULL TEXTS BOOK

Irak	Filistin	Pakistan	Afganistan	Somali	Moritanya	Gürcistan	Burma	Suriye
9384	8313	6970	6614	3021	3830	2439	1502	1363

Kaynak : İçişleri Bakanlığı Emniyet Genel Müdürlüğü

Tablo da belirtilmiş olduğu gibi 2004-2007 yılları arasında ülkemizde yakalanan yasadışı göçmenlerin uyrukları incelendiğinde en yüksek göçmenin Irak kökenli olduğu görülmektedir.

Tablo 4. Yıllara Göre Ülkemizde Tespit Edilen İnsan Ticareti Mağdurları

2005	2006	2007	2008
256	246	148	118

Kaynak : İçişleri Bakanlığı Emniyet Genel Müdürlüğü

Tablo da belirtilmiş olduğu gibi ülkemizde tespit edilen insan ticareti mağdurlarının 2005 yılında yüksek olduğu görülürken 2008 yılına doğru istikrarlı bir şekilde düştüğü görülmektedir.

Tablo 5. Yıllara Göre Ülkemizde Yakalanan İnsan Ticareti Organizatörleri

2005	2006	2007	2008
379	422	308	248

Kaynak : İçişleri Bakanlığı Emniyet Genel Müdürlüğü

Tablo 5 te görüldüğü üzere 2006 yılında 422 olan insan ticareti organizatörleri 2008 yılında azalarak 248 olarak görülmektedir.

Tablo 6.2008 Yılında Ülkemizde Tespit Edilen İnsan Ticareti Mağdurlarının Uyruklarına Göre Dağılımı

Özbekistan	**Moldova**	**Türkmenistan**	**Rusya**	**Kırgızıstan**	**Gürcistan**	**Azerbaycan**
30	**22**	**25**	**7**	**7**	**7**	**6**

Kaynak : İçişleri Bakanlığı Emniyet Genel Müdürlüğü

Tablo 6 da görüldüğü üzere insan ticareti mağdurlarının uyruklarına bakıldığında Özbekistan uyruklu mağdurun diğer ülkelere kıyasla yüksek olduğu görülmektedir.

Tablo 7. 2008 Yılında Ülkemizde Yakalanan İnsan Ticareti Organizatörlerinin Uyruklarına Göre Dağılım

Türkiye	**Özbekistan**	**Gürcistan**	**Kırgızıstan**	**Moldova**	**Azerbaycan**	**Ukrayna**
210	**12**	**5**	**4**	**4**	**3**	**3**

Kaynak : İçişleri Bakanlığı Emniyet Genel Müdürlüğü
Tablo 7 incelendiğinde insan ticareti organizatörlerinin uyruklarına bakıldığında uyruğu Türkiye olan 210 kişinin olduğu görülmektedir.

SONUÇ

Göçmen kaçakçılığı uluslararası bir suç olarak varlık göstermekle birlikte göç ettikleri ülkelerde ekonomik ve toplumsal sorun oluşturan bir durumdur. uluslararası arenada önemlilik arz eden bu konu ile ilgili olarak pek çok ülke bu durumla mücadele etmek adına hukuki düzenlemelere başvurmuştur. göçmen kaçakçılığını bireysel olarak değil toplumsal bir durum olarak algılamak ve tedbirleri bu yönde uygulamak elzemdir. Özellikle gelişmemiş ülkelerden gelişmekte olan ülkelere ve gelişmiş ülkelere olan

FULL TEXTS BOOK

göç hareketliliği göç ettikleri ülkeleri siyasi ekonomik ve toplumsal istikrarsızlığa sürükleyen önemli bir tehdit unsuru olarak görülmektedir.

Yasal yollardan ülkelere giriş yapan göçmenlerin yasal süresi dolduktan sonra ülkeyi terk etmemeleri ve yasam alanlarını genişletmeleri ile suç organizasyonlarının odak noktası haline gelen alanlar oluşmaktadır. Göç edilen ülkelerde suç oranlarının artmasıyla birlikte sosyal düzensizliklerin önüne geçilmesi önemlilik arz etmektedir. Yasal çerçevelerin güncellenmesi geliştirilmesi ve denetlenmesi ile birlikte sosyal, siyasi ve ekonomik istikrarın bozulmasının önüne geçilmiş olunacaktır. Hukuki düzenlemeler ve emniyet güçlerinin tedbirlerini arttırması ile güvenli ortamın geliştirilmesi mümkün olabilmektedir.

KAYNAKÇA

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FULL TEXTS BOOK

YABANCI DİL ÖĞRETİMİNDE DİL BECERİLERİNİN GELİŞİMİNDE KARŞILAŞILAN PROBLEMLER

PROBLEMS ENCOUNTERED IN THE DEVELOPMENT OF LANGUAGE SKILLS IN FOREIGN LANGUAGE TEACHING

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ÖZET

Dil insanı diğer canlılardan ayıran en önemli özelliklerden biridir. İnsanlara ait bir özellik olan dil, anlamlı kelimelerden oluşan sistemli cümleler bütününü temsil eder ve insanoğlu doğduğu günden itibaren iletişim kurmak amacıyla dili kullanır. Aynı zamanda dil, bilgi aktarmayı amaçlayan fen bilimleri veya matematik gibi içerik tabanlı bir konu değil, bir beceridir. Bu nedenle, dil psikomotor alana girer ve bir şeyi iyi yapma yeteneği olarak tanımlanabilir ve yüzme veya bisiklete binmek gibi, dil de öğrenildikten sonra yapılan bir beceridir (Husain, 2015, s. 1). Küreselleşmenin de etkisiyle insanlar arasında iletişim kaçınılmaz olmuş ve bu iletişim dil aracılığıyla sağlanmaktadır. İngilizce evrensel bir dil olarak kabul görmesinden dolayı bu görevi gören en önemli araçtır. İnsanların birbirleri arasındaki iletişimin gerekliliği dil öğretimine verilen önemin de artmasına sebep olmuştur. Geçmişten günümüze dil öğretiminde farklı yaklaşımlar öne sürülürken, bu yaklaşımlarda dil becerilerinin dil öğretimindeki etkisi ön plana çıkmaktadır. Dil öğretiminde dört temel dil becerisi olan dinleme, konuşma, okuma ve yazma, öğrencilerin dil öğreniminde çok önemli bir yere sahiptir. Bu dil becerileri üretken ve alıcı beceriler olarak ikiye ayrılmaktadır. Konuşma ve yazma üretken beceriler olarak adlandırılırken, dinleme ve okuma becerileri ise alıcı becerilerdendir. Dil öğretiminde hazırlanan dil öğretim programlarında çeşitli dil yaklaşımlarından da yararlanılırken, dil becerileri üzerinde durulur ve bu öğretim programlarında öğrencilerin iletişimsel becerilerinin geliştirilmesi amaçlanmaktadır. Bu çalışma yabancı dil öğreniminde dört temel dil becerisi olan okuma, yazma, dinleme ve konuşma becerilerinin öğreniminde karşılaşılan problemleri incelemek amacıyla hazırlanmıştır. Bu amaçla ulusal ve uluslararası literatürde yabancı dil öğretiminde dil becerileri ile ilgili çalışmalar incelenmiştir. Bu çalışma nitel araştırma modeli kapsamında durum çalışması deseniyle hazırlanmıştır. Bu kapsamda ilgili literatürde yer alan dokümanlar analiz edilmiş olup elde edilen veriler ilgili bölümlerde frekans değerleriyle verilerek yorumlanmıştır. Çalışmanın sonuçları kapsamında öğrencilerin dil becerilerinde kelime bilgisinde eksiklik yaşamaları, dil becerileri stratejilerinde yetersiz olmaları, ders materyallerinden kaynaklı problem yaşamaları, dil becerileri arasında denge kurulamaması, öğretmenlerin derste yetersiz kalması, kelime telaffuzlarında sorunlar yaşanması, cümle kuramama, dersle ilgili hata yapma korkusu, derse motive olamama gibi sorunlar çalışma sonunda elde edilmiştir. Çalışma sonuçları yönünde öneriler belirtilmiştir.

Anahtar kelimeler: Dil, dil öğretimi, dil becerileri, okuma, yazma, dinleme, konuşma

ABSTRACT

Language is one of the most important features that distinguish humans from other living creatures. Language, which is a characteristic of humans, represents a set of systematic sentences consisting of meaningful words, and human beings have been using language to communicate since the day they were born. At the same time, language is a skill, not a content-based subject like science or mathematics that

FULL TEXTS BOOK

aims to convey knowledge. Therefore, language falls under the psychomotor domain and can be defined as the ability to do something well. Like swimming or riding a bicycle, language is a skill that is performed after being learned (Husain, 2015, s. 1). Due to the effect of globalization, communication between people has become inevitable and this communication is provided through language. Since English is accepted as a universal language, it is the most important tool that performs this task. The necessity of communication between people has led to an increase in the importance given to language teaching. Different approaches have been put forward in language teaching from past to present and the effect of language skills in language teaching comes to the fore in these approaches. In language teaching, the four basic language skills of listening, speaking, reading and writing have a very important place in students' language learning. These language skills are divided into two as productive and receptive skills. While speaking and writing are called productive skills, listening and reading skills are receptive skills. Besides, various language approaches are used in the language teaching programs prepared in language teaching, language skills are emphasized and it is aimed to develop the communicative skills of the students with these teaching programs. This study was prepared to examine the problems encountered in learning the four basic language skills of reading, writing, listening and speaking in foreign language learning. For this purpose, studies on language skills in foreign language teaching were examined in the national and international literature. This study was prepared with a case study design within the scope of the qualitative research model. In this context, documents in the relevant literature were analyzed and the obtained data were interpreted by giving frequency values in the relevant sections. Within the scope of the study results, several issues were identified among students in their language skills: deficiencies in vocabulary knowledge, inadequacies in language skills strategies, problems arising from course materials, imbalance among language skills, teachers being insufficient in class, problems with word pronunciation, inability to form sentences, fear of making mistakes related to the lesson, and lack of motivation for the lesson. Suggestions based on the study results are stated.
Keywords: Language, Language teaching, Language skills, reading, writing, listening, speaking

GİRİŞ

Dil, düşüncelerin ve duyguların iletişiminde, işlerde ve yönetimde, bilim, felsefe ve şiirin aktarımında önemli bir araçtır. Bir dilin önem kazanmasında, dilin içsel avantajlarından ziyade ulusların siyasi, ekonomik, teknolojik ve askeri gücü gibi dış faktörler de etkilidir. İngilizce, Fransızca, Almanca ve İspanyolca gibi diller, bu dış faktörler sayesinde önem kazanmış ve uluslararası alanda yaygın olarak kullanılmıştır. Özellikle İngilizce, dünya çapında 380 milyondan fazla kişi tarafından konuşulmakta ve siyasi, ekonomik ve teknolojik gücü sayesinde geniş bir alanda etkili olmaktadır (Baugh ve Cable, 2005).

İngilizce, 53 ülkenin resmi dili olmaktadır ve ayrıca en yaygın ikinci dil konumundadır. İş ve kültürel alanlarda önemli bir rol oynayan İngilizce pek çok ülkede okullarda ikinci dil olarak öğretilmektedir. Bunların yanı sıra İngilizce bilim, havacılık, bilgisayar, diplomasi ve turizm dili olarak da önemli bir yere sahiptir. Bu bağlamda İngilizce öğrenme sebeplerini şu şekilde sıralayabiliriz (Ilyosovna, 2020, s. 23):

- Uluslararası ortak dil olması
- Akademik bir dil olması
- Zengin yazılı medyaya erişim sağlaması
- Seyahat ederken kullanışlı olması
- Uluslararası iş dünyasında gerekli olması
- Hollywood'un dili olması

Küreselleşme çağında İngilizce, kariyer ilerlemesinde kritik bir rol oynamaktadır. Özellikle Hindistan gibi ülkelerde, İngilizce becerilerinin eksikliği genç mezunların kariyer fırsatlarını olumsuz etkilemektedir. Araştırmalar, güçlü dil becerilerinin uluslararası iletişimde ve iş performansında önemli

FULL TEXTS BOOK

olduğunu göstermekte, yetersiz İngilizce bilgisine sahip çalışanların profesyonel gelişiminde zorluklar yaşamasına neden olmaktadır (Clement ve Murugavel, 2018, s. 2).

Dil öğretimi, yirminci yüzyılda bir meslek olarak gelişmeye başladıktan sonra bu dönemde dilbilim ve psikolojiden yararlanarak daha etkili öğretim yöntemleri ve dil öğretim yaklaşımları geliştirildi. Bu yaklaşımları şu şekilde sıralayabiliriz (Richards ve Rodgers, 2001):

- Dil Bilgisi Çeviri Yöntemi
- Düzvarım Yöntemi
- İşitsel-Dilsel Yöntem
- Tüm Fiziksel Tepki Yöntemi
- Sessiz Yol
- İletişimsel Dil Öğretim Yöntemi
- Bilişsel Kod Yaklaşımı
- Grupla Dil Öğretim Yöntemi
- Telkin Yöntemi
- Doğal Yaklaşım

İngilizceyi yabancı dil olarak öğretmenin temel amacı, dinleme, konuşma, okuma ve yazma olmak üzere dört beceriyi geliştirmektir. Ancak, bu yaklaşımın uygulanması sırasında çeşitli zorluklar yaşanmıştır. Birçok öğretmen, öğrencilerinden dinledikleri veya okudukları her kelimeyi tam olarak anlamalarını veya dil öğrenme sürecinde normal olarak karşılaşılan hataları yapmadan yazmalarını ve konuşmalarını beklemektedir. Bu tür beklentiler, dil öğrenme sürecinde doğal olan hataların tolere edilmesini zorlaştırmakta ve öğrencilerin dil becerilerini geliştirme konusunda engeller yaratmaktadır (Shamsitdinova ve Salakhova, 2018, s. 2).

Araştırmanın Amacı

Bu çalışmanın genel amacı, yabancı dil öğreniminde okuma, yazma, dinleme ve konuşma becerilerinin öğretiminde karşılaşılan sorunları incelemek ve bu sorunların çözümüne yönelik öneriler geliştirmektir. Bu sebeple İngilizce öğretiminde okuma, yazma, dinleme ve konuşma becerilerinde karşılaşılan sorunlar ulusal ve uluslararası literatürdeki dokümanlar incelenerek araştırılmıştır. Ayrıca dil eğitimi üzerinde etkili olan unsurlar incelemeye çalışılmıştır.

Araştırmanın genel amacına dayalı olarak aşağıdaki araştırma sorularına cevap aranmıştır:

Konuyla ilgili yapılmış olan araştırmalara göre;

1. Yabancı dil öğretiminde okuma becerilerinde karşılaşılan sorunlar nelerdir?
2. Yabancı dil öğretiminde yazma becerilerinde karşılaşılan sorunlar nelerdir?
3. Yabancı dil öğretiminde dinleme becerilerinde karşılaşılan sorunlar nelerdir?
4. Yabancı dil öğretiminde konuşma becerilerinde karşılaşılan sorunlar nelerdir?
5. Yabancı dil öğretim sürecinde karşılaşılan diğer sorunlar nelerdir?

Araştırmanın Önemi

Bu çalışma ülkemizde yabancı dil öğretiminde dil becerilerinde karşılaşılan sorunları inceliyor olması yönünden yapılmış sayılı araştırmalardan biridir. Bu alanda bundan sonra yapılacak olan araştırmalara yol gösterici olması yönünden önemlidir. Araştırmada yabancı dil öğretiminde dil becerilerinin gelişiminde karşılaşılan sorunlar farklı yönleriyle ele alınarak şu konular üzerinde durulmuştur:

- Ülkemizde dil becerilerinde karşılaşılan sorunlar
- Diğer ülkelerde dil becerilerinde karşılaşılan sorunlar
- Dört temel dil becerisinde karşılaşılan ortak sorunlar
- Dil becerilerinin gelişimine etki eden diğer faktörler

FULL TEXTS BOOK

YÖNTEM

Araştırma Modeli

Bu çalışmada nitel araştırma modellerinden durum çalışması deseni seçilmiştir. Durum çalışması, genellikle sosyal ve yaşam bilimlerinde görülen bir araştırma metodolojisidir. Durum çalışması, bir kişi, bir grup insan veya bir birim hakkında, birçok birim üzerinde genelleme yapmayı amaçlayan çalışmalarda kullanılır. Ayrıca, araştırmacının birkaç değişkene ilişkin derinlemesine verileri incelediği tek bir birey, grup, topluluk veya başka bir birimin yoğun, sistematik bir araştırmasında da tercih edilir (Heale ve Twycross, 2018, s. 7).

Yıldırım ve Şimşek (2016) tarafından belirtilen yöntemler araştırma çalışmasında şu şekilde uygulanmıştır:

1. Araştırma sorularının formüle edilmesi
2. Alt sorunların detaylandırılması
3. Analiz odak noktasının belirlenmesi
4. İncelenecek olayın seçilmesi
5. Katılımcıların belirlenmesi
6. Verilerin toplanarak bu verilerin alt sorunlarla ilişkilendirilmesi
7. Verilerin analiz edilip değerlendirilmesi
8. Çalışmanın rapor olarak hazırlanması

Örneklem

Bu çalışma yabancı dil öğretimi ve dil becerileri ile ilgili 13 ulusal ve 3 uluslararası araştırma seçimi ile sınırlıdır. Ulusal düzeyde olan çalışmalardan 6 tez, 5 makale ve iki çalışma da bildiridir. Uluslararası olan 3 çalışma makaledir.

Çalışmalardan 11 tanesi nitel araştırma türünde durum çalışması deseninde yapılırken 4 tanesi ise nicel araştırma türlerinden deneysel araştırma deseni ile yapılmıştır. Bir çalışma ise karma araştırma yöntemiyle yapılmıştır. Bu araştırma kapsamında seçilen çalışmalara rastgele çalışma numaraları verilmiş ve çalışma numaralarına göre örneklemler kısaca çalışma numaralarıyla belirtilmiştir (Örneğin; Ç1, Çalışma 1'i ifade etmektedir).

Çalışmalar araştırma türü, örneklem ve frekansına göre Tablo 1'de sınıflandırılmıştır.

Tablo:1 İncelenen çalışmaların yöntemine göre dağılımı

Araştırma Türü	Örneklem	Çalışma No	f
Nitel	İngilizce öğretmenleri	Ç1, Ç5, Ç13	11
	Doküman	Ç3, Ç6, Ç7, Ç14, Ç15	
	İngilizce öğretmenleri-9.sınıf öğrencileri	Ç10	
	Öğretmen-Öğrenci-Veli	Ç13	
	5.sınıf öğrencileri	Ç16	
Nicel	11.sınıf öğrencileri	Ç2	4
	Üniversite düzeyi öğrenciler	Ç4	
	İngilizce öğretmenleri-8.sınıf öğrencileri	Ç8	
	İngilizce öğretmenleri	Ç9	
Karma Yöntem	İngilizce öğretmenleri	Ç11	1

FULL TEXTS BOOK

Araştırmalardan Ç1, Ç3, Ç5, Ç6, Ç7, Ç10, Ç12, Ç13, Ç14, Ç15 ve Ç16 nitel araştırma türünde olup, Ç2, Ç4, Ç8 ve Ç9 nicel araştırma türünde hazırlanmıştır. Ç11 ise karma yöntemle yapılmış bir çalışmadır.

Nitel araştırma yöntemlerinde bulunan Ç1, Ç3 ve Ç5'in örneklemini İngilizce öğretmenleri, Ç3, Ç6, Ç7, Ç14 ve Ç15'in örneklemini ise dokümanlar oluşturmaktadır. Ç10 ve Ç16'nın örneklemini ise farklı düzeydeki dil öğrenen öğrenciler oluştururken Ç13'deki çalışmada ise örneklem grubunu öğretmen, öğrenci ve veliler birlikte oluşturmaktadır.

Nicel araştırma yönteminde hazırlanmış olan Ç2 ve Ç4'de örneklemi farklı düzeyde dil öğrenen öğrenciler oluştururken, Ç9'da İngilizce öğretmenleri, Ç8'de de öğretmen ve öğrenciler örneklem grubunu birlikte oluşturmaktadır.

Karma yöntemde hazırlanmış olan Ç11'de de örneklem grubunu İngilizce öğretmenleri oluşturmaktadır.

Tablo 2'de yabancı dil öğretimi ve dil becerileri ile ilgili ulusal araştırmaların, Tablo 3'te ulusal tezlerin, Tablo 4'te de uluslararası makalelerin künyesi ve çalışma numaraları verilmiştir.

Tablo:2 Yabancı dil öğretimi ve dil becerileri ile ilgili ulusal araştırmaların dağılımı

Çalışma No	Araştırmanın Adı	Araştırmanın Türü	Yayınlandığı Dergi	Araştırmanın Yazarı	Cilt/Sayı No	Sayfa No	Yılı
Ç1	Çal Bölgesindeki Okullarda İngilizce Öğretiminin Sorunları ve Çözüm Önerileri	Sempozyum		Turan PAKER			2006
Ç2	İngilizce ile İlgili Özyeterlik İnancı Ölçeğinin Geliştirilmesi	Makale	Kastamonu Eğitim Dergisi	Burcu HANCI YANAR-Nilay T. BÜMEN	20 (1)	97-110	2012
Ç3	Türkiye'de Neden Yabancı Dil (İngilizce) Öğretemiyoruz ve Neden Öğrencilerimiz İletişim Kurabilecek Düzeyde İngilizce Öğrenemiyor?	Makale	Pamukkale University Journal of Education	Turan PAKER	32	89-94	2012
Ç4	The Four Basic Language Skills, Whole	Makale	Mediterranean Journal of Social Sciences	Hakan AYDOĞAN	5 (9)	672-680	2014

FULL TEXTS BOOK

	Language & Intergrated Skill Approach in Mainstream University Classrooms in Turkey		MCSER Publishing				
Ç5	English Teachers' Problems Encountered in Teaching Four Basic Language Skills	Makale	International Education Studies	Çiğdem Aldan KARADEMİR-Seda GÖRGÖZ	15(26)	118-127	2018
Ç6	Beşinci Sınıf İngilizce Öğretim Programı Kazanımlarının Temel Dil Becerileri Açısından Karşılaştırılması	Kongre	EJERCongress 2019 Bildiri Kitabı	Cem ŞAHİN-Nihat ÇALIŞKAN-Mehmet KART-Hayriye TORUNOĞLU	-	241-248	2019
Ç7	Yabancı Dil Öğretiminde Dört Temel Dil Becerisi Üzerine Bir İnceleme Çalışması	Makale	21. Yüzyılda Eğitim ve Toplum	Hasan ÇELTİK	11(31)	107-131	2022

Tablo:3 Yabancı dil öğretimi ve dil becerileri üzerine yazılmış ulusal tezlerin dağılımı

Çalışma No	Yıl	Tez Adı	Yazar Adı	Üniversite	Bilim Dalı
Ç8	2012	İngilizce Dil Becerilerinin Öğretimi ve Değerlendirilme Durumları Arasındaki Tutarlılığın Öğretmen ve Öğrenci Görüşlerine Göre Belirlenmesi	Ahmet YILDIRIM	Ankara Üniversitesi	Ölçme ve Değerlendirme Bilim Dalı

FULL TEXTS BOOK

Ç9	2012	İlköğretim Sekizinci Sınıf İngilizce Öğretim Programına İlişkin Öğretmen Görüşleri	Berna YÖRÜ	Eskişehir Osmangazi Üniversitesi	Eğitim Programları ve Öğretim Bilim Dalı
Ç10	2019	2018 Ortaöğretim İngilizce Dersi Öğretim Programının Uygulanmasında Karşılaşılan Sorunlara İlişkin Öğretmen ve Öğrenci Görüşleri	Merve ÇARIKCIOĞLU	Hacettepe Üniversitesi	Eğitim Programları ve Öğretim Bilim Dalı
Ç11	2019	Dokuzuncu Sınıf İngilizce Dersi Öğretim Programına İlişkin Öğretmen ve Öğrenci Görüşleri	Aytaç TÜRKBEN	Hacettepe Üniversitesi	Eğitim Programları ve Öğretim Bilim Dalı
Ç12	2021	İlkokullarda Yabancı Dil Olarak İngilizce Öğretiminde Yaşanan Problemler: Konya Örneği	Ali ÖZCAN	Necmettin Erbakan Üniversitesi	İngiliz Dili Eğitimi Bilim Dalı
Ç13	2021	Ortaokul Öğrencilerinin İngilizce Öğrenmede Yaşadıkları Zorluklar ve Çözüm Önerileri: Bir Durum Çalışması	Seda ÖZER	Mersin Üniversitesi	Eğitim Programları ve Öğretim Bilim Dalı

Tablo:4 Yabancı dil öğretimi ve dil becerileri ile ilgili uluslararası makalelerin dağılımı

Çalışma No	Makalenin Adı	Yayınlandığı Dergi	Makalenin Yazarı	Cilt/Sayı No	Sayfa No	Yılı
Ç14	Teaching the Four Language Skills in Primary EFL Classroom:	Journal of English Teaching	Eka Kurniasih	1 (1)	70-81	2011

FULL TEXTS BOOK

	Some Considerations					
Ç15	Detecting the development of language skills in current English language teaching in the Czech Republic	Procedia Social and Behavioral Sciences	Blanka Frydrychova Klimova	158	85-92	2014
Ç16	Overcoming Impediments to Learning the Four Language Skills Using Note Books	Advances in Language and Literary Studies	Anne A. Christopher	7 (1)	161-167	2015

VERİ TOPLAMA ARAÇLARI VE VERİLERİN ANALİZİ

Bu çalışmada literatürdeki yabancı dil öğretimi ve dil becerileri ile ilgili ulusal ve uluslararası düzeydeki dokümanlar taranmıştır. Verilerin toplanmasında tarama sürecinde makale taramaları için Google akademik ve Dergipark sitelerinden yararlanılmıştır. Ulusal Tez Merkezi internet adresinden ise tez araması gerçekleştirilmiştir. Tarama yapılırken, *dil öğretimi, dil becerileri, dört temel dil becerisi, İngilizce öğretimi* ve *yabancı dil öğretiminde İngilizce, İngilizce öğretim programı, dil becerilerinde karşılaşılan sorunlar, İngilizce öğretiminde karşılaşılan sorunlar* gibi anahtar sözcükler farklı kombinasyonlarda kullanılarak ilgili çalışmalara ulaşılmıştır. Bu çalışma yabancı dil öğretimi ve dil becerileri ile ilgili 16 çalışmayla sınırlıdır. Seçilen çalışmalar araştırma konusu ve araştırma sonuçları bakımından incelenerek veriler tablolar halinde düzenlenmiştir. Verilerin analizinde frekans (f) değerlerinden yararlanılmıştır. Verilerin analizinde betimsel analiz yapılmıştır. Betimsel analizlerde elde edilen sonuçlar, önceden belirlenmiş temalar doğrultusunda değerlendirilir. Bu aşamada amaç, verileri düzenli ve yorumlanmış bir şekilde sunmaktır (Yıldırım & Şimşek, 2016, s. 239). Belirlenen temalar ve çalışmaların bu temalara göre gruplandırılması Tablo 5'te sunulmuştur.

Tablo:5 İncelenen çalışmaların temalara göre dağılımı

Araştırma Konusu	Çalışma Numarası	f
Dil Öğretimi ve dil becerileri	Ç4, Ç5, Ç6, Ç7, Ç8, Ç14, Ç15, Ç16	9
İngilizce Öğretimi ile ilgili Sorunlar	Ç1, Ç3, Ç8, Ç9, Ç12, Ç13	6
İngilizce öğretim programında karşılaşılan sorunlar	Ç7, Ç9, Ç10, Ç11,	4
İngilizce dersine yönelik özyeterlik inancı	Ç2	1

Bu araştırmada en fazla konu edinilen *dil öğretimi ve dil becerileri* ilgili çalışmalar olmuştur. Dil öğretimi ve dil becerileri ile ilgili 9 çalışmaya ulaşılırken ikinci sırada bulunan *İngilizce öğretimi ile ilgili sorunlar* konusunda 6 çalışmaya erişilmiştir. Bunun yanı sıra *İngilizce öğretim programında karşılaşılan sorunlar* konusunda da 4 çalışma incelenirken *İngilizce dersine yönelik özyeterlilik inancı* konusunda *ise* bir çalışma incelenmiştir.

FULL TEXTS BOOK

BULGULAR

Elde edilen bulgulara yönelik veriler Tablo 6'da okuma becerilerine yönelik sorunlar, Tablo 7'de yazma becerilerine yönelik sorunlar, Tablo 8'de dinleme becerilerine yönelik sorunlar, Tablo 9' da konuşma becerilerine yönelik sorunlar ve Tablo 10'da da diğer karşılaşılan sorunlar olarak sınıflandırılmıştır.

Tablo:6 İncelenen çalışmaların okuma becerilerinde karşılaşılan sorunlara yönelik dağılımı

Okuma Becerilerinde Karşılaşılan Sorunlar	Çalışma Numarası	f
Okuma becerilerine az zaman ayrılması.	Ç1, Ç13	2
Sesli okumada kelimeleri telaffuz ederken problem yaşanması.	Ç5, Ç13	2
Okuma becerisi öğretim yöntem ve tekniklerinin bilinmemesi.	Ç6	1
Okuma becerisi kazanımlarının azaltılması.	Ç7	1
Kelime bilgisi eksikliğinden kaynaklı problem yaşamaları.	Ç13	1
Okuma etkinliğini yaparken özgüven eksikliği, kaygı ve endişe duygularının hâkim olması.	Ç13	1

Elde edilen bulgulara göre okuma becerilerinde karşılaşılan sorunların başında okuma becerilerine az zaman ayrılması ve öğrencilerin sesli okuma yaparken telaffuz problemi yaşamaları gelmektedir. Bu problemlere ek olarak okuma becerisi öğretim yöntem ve teknikleri yönünden bilgi eksikliği, İngilizce öğretim programında okuma becerisi kazanımlarının azaltılması, kelime bilgisi eksikliğinden kaynaklı problem yaşanması ve okuma etkinliği yaparken özgüven eksikliği, kaygı ve endişe duygularının hâkim olması da karşılaşılan diğer sorunlardır.

Tablo:7 İncelenen çalışmaların yazma becerilerinde karşılaşılan sorunlara yönelik dağılımı

Yazma Becerilerinde Karşılaşılan Sorunlar	Çalışma Numarası	f
Yazma becerilerine az zaman ayrılması.	Ç1, Ç7, Ç13	3
Cümle oluştururken dil bilgisi eksikliğinden kaynaklı sorun yaşanması.	Ç5, Ç13	2
Kelimeleri okunduğu gibi yazmaları.	Ç12, Ç13	2
Yazma becerisi öğretim yöntem ve tekniklerinin bilinmemesi.	Ç6	1
Yazma becerisi kazanımlarına 6.sınıf düzeyine kadar yer verilmemesi.	Ç7	1
Yazma becerisinin değerlendirilmesine yok denecek kadar az vakit ayırılması.	Ç8	1
Yazma becerisine karşı özyeterliliğin düşük olması.	Ç12	1
İngilizce alfabesinin Türkçeye göre farklılık göstermesi.	Ç12	1
Kelime bilgisi eksikliğinden kaynaklı problem yaşamaları.	Ç13	1

Yazma becerisinde karşılaşılan sorunların başında yazma becerilerine az zaman ayrılması gelmektedir. İngilizce öğretim programında öğrencilerin iletişim becerilerine ağırlık verilmeye çalışılmasından kaynaklı daha çok konuşma ve dinleme becerilerine ağırlık verilmektedir. Ancak yazma becerisine ise 6.sınıfa kadar yer verilmemesi karşılaşılan bir sorun olarak karşımıza çıkmaktadır.

Yazma becerilerinde karşılaşılan diğer problem de gramer bilgisi eksikliğinden kaynaklı öğrencilerin cümle kurarken problem yaşamalarıdır. Öğrenciler cümle dizimini Türkçe ile karıştırmakta ve özne yüklem ilişkisini Türkçe ile karıştırmaları yazma becerisinde karşılaşılan bir problem olarak ortaya çıkmaktadır.

Öğrencilerin Türkçedeki gibi kelimeleri okunduğu gibi yazmaları ön plana çıkan bir diğer problemdir. Öğrenciler yazma becerisinde İngilizce kelimeyi nasıl duyuyorlarsa aynı şekilde yazmaktadırlar.

FULL TEXTS BOOK

Tablo:8 İncelenen çalışmaların dinleme becerilerinde karşılaşılan sorunlara yönelik dağılımı

Dinleme Becerilerinde Karşılaşılan Sorunlar	Çalışma Numarası	f
Dinleme becerilerine hiç zaman ayrılmaması.	Ç1, Ç3	2
Dinleme metinlerinin hızlı olması.	Ç5, Ç13	2
Dinleme becerilerine az zaman ayrılması.	Ç1	1
Ana dili İngilizce olan konuşmacının aksanından dolayı problem yaşanması.	Ç5	1
Konuşmacının hızlı konuşmasından kaynaklı sorun yaşanması.	Ç5	1
Dinleme becerisi öğretim yöntem ve tekniklerinin bilinmemesi.	Ç6	1
Dinleme becerisinin değerlendirilmesine yok denecek kadar az vakit ayırılması.	Ç8	1
Öğretim programının dinleme becerilerini kazandırmada yetersiz olması.	Ç9	
Dinleme metinlerinin anlaşılır olmaması.	Ç12	1
Dinleme metinlerine öğrencilerin odaklanma problemi yaşamaları.	Ç12	1
Sınıf mevcutlarının kalabalık olmasından dolayı dinlemede problem yaşanması.	Ç12	1
Telaffuzu benzer kelimeleri karıştırma.	Ç13	1
Kelime eksikliğinden kaynaklı problem yaşamaları.	Ç13	1
Kelimelerin yazılışları ile okunuşlarının farklı olması.	Ç13	1

Dinleme becerisinde elde edilen bulgulara göre dinleme becerisine hiç zaman ayrılmaması dinleme becerisinde karşılaşılan problemlerden biridir. Bunun yanı sıra dinleme metinlerinin hızlı biçimde geçmesinden dolayı öğrenciler dinleme metinlerini anlamakta zorluk çekmektedir. Konuşmacının hızlı konuşması ve özellikle ana dili İngilizce olan konuşmacıların aksanından kaynaklı öğrencilerin dinleme metnini anlamada problem yaşamaları karşılaşılan bir diğer problemdir.

Tablo:9 İncelenen çalışmaların konuşma becerilerinde karşılaşılan sorunlara yönelik dağılımı

Konuşma Becerilerinde Karşılaşılan Sorunlar	Çalışma Numarası	f
Konuşma becerilerine az zaman ayrılması.	Ç1, Ç5, Ç13	3
Kelime bilgisi eksikliğinden cümle kuramama.	Ç5, Ç13, Ç16	3
Öğrencilerin İngilizceyi günlük hayatta kullanacakları alanların olmaması.	Ç11, Ç12, Ç13	3
Konuşma becerilerine hiç zaman ayrılmaması.	Ç1, Ç3	2
Konuşma becerisinin değerlendirilmesine yok denecek kadar az vakit ayırılması.	Ç3, Ç8	2
Konuşurken özgüven eksikliği, kaygı ve endişe duygularının hâkim olması.	Ç5, Ç13	2
Cümle kurarken dil bilgisi eksikliğinden kaynaklı sorun yaşanması.	Ç5, Ç13	2
Cümle kurarken telaffuzda sorun yaşanması.	Ç5, Ç13	1
Konuşma becerisi öğretim yöntem ve tekniklerinin bilinmemesi.	Ç6	1
Öğretim programının konuşma becerilerini kazandırmada yetersiz olması.	Ç9	1

FULL TEXTS BOOK

Sözlü iletişimin temelini oluşturan konuşma becerisinde karşılaşılan başlıca sorunlarından biri konuşma becerilerine az zaman ayrılmasıdır. Dersin daha çok dil bilgisi odaklı işlenmesi ve okuma metinleri üzerinden konuların ilerlemesinden dolayı derslerde konuşma becerilerine çok fazla zaman ayrılmaması bir problem olarak ortaya çıkmaktadır.

Öğrencilerin kelime bilgisi eksikliğinden kaynaklı sorun yaşamaları da karşılaşılan başlıca problemlerden biridir. Öğrenciler konuşurken ifade etmeye çalıştıkları düşüncelerde ihtiyaç duydukları kelimenin İngilizcesini bilmekte zorluk yaşamaktadır.

Öğrencilerin İngilizceyi günlük hayatta kullanacak bir alan bulamaması karşılaşılan bir diğer problemdir. Öğrencilerin ders dışında İngilizce pratiği yapmak için bir imkanlarının olmaması öğrencileri konuşma becerilerinde zorlamaktadır ve öğrencilerin dil gelişiminin önüne geçen bir engel olarak ortaya çıkmaktadır.

Tablo:10 İncelenen çalışmaların yabancı dil öğretim sürecine etki eden diğer faktörlere göre dağılımı

Karşılaşılan Diğer Sorunlar	Çalışma Numarası	f
Materyal eksikliğinden kaynaklı sorunlar (kitaplık, bilgisayar, CD. DVD, akıllı tahta vb.) olması	Ç1, Ç3, Ç11, Ç12, Ç16	5
İngilizce dersine karşı motivasyonlarının düşük olması.	Ç3, Ç11, Ç12	3
Ders materyallerinin öğrencilerin ilgisini çekecek düzeyde olmaması.	Ç11, Ç12, Ç14	3
Gramer odaklı ders işlenmesi	Ç1, Ç3	2
Öğretmenlerin dil öğretim stratejilerinde yetersiz kalması	Ç1, Ç12	2
Öğrencilerin dil öğretim sürecinde özyeterlik seviyesinin düşük olması.	Ç2, Ç12	2
Eğitim Fakülteleri dışında farklı fakülte mezunlarının İngilizce öğretmeni olması.	Ç9, Ç12	2
İngilizce ders saatlerinin yetersiz olması.	Ç9, Ç12	2
Dil Bilgisi Çeviri Yaklaşımı ağırlıklı ders işlenmesi.	Ç4	1
Dört becerinin entegre edilerek ders işlenmemesi.	Ç4	1
Öğretim programının öğrencilere telaffuz ve dil bilgisi öğretiminde yetersiz kalması.	Ç9	1
Dil becerilerinin değerlendirilmesinde uygulama sınavlarına yer verilmemesi.	Ç10	1
Öğrenci velilerinin İngilizce eğitimine yönelik olum algıya sahip olması.	Ç12	1
Öğretmenlerin dersi Türkçe anlatması.	Ç12	1
İngilizce ders konularının sayısının fazla olması.	Ç12	1
İngilizce dersinde sınıf yönetiminde problem yaşanması.	Ç13	1
İngilizce dersine az önem verilmesi.	Ç13	1
İngilizce öğretim programının dil becerilerine odaklanacak şekilde düzenlenmemesi.	Ç14	1
Dört temel becerileri arasında denge olmaması.	Ç15	1

Yabancı dil öğretiminde karşılaşılan diğer sorunlar incelendiğinde başı materyal eksikliğinin olmasından kaynaklı problem yaşanması çekmektedir. Okulların materyal olarak yetersiz kalması İngilizce öğretiminin etkin bir şekilde olmasının önüne geçen bir faktör olarak elde edilmiştir.

Öğrencilerin İngilizce dersine karşı tutumlarının zayıf olması ve ders materyallerinin öğrencilerin ilgisini çekecek düzeyde olmaması karşılaşılan diğer problemlerdir. Bu iki durum da öğrencilerin derse

FULL TEXTS BOOK

olan motivasyonlarını düşürmektedir ve dil becerilerinin gelişimini engellediğini verilerden elde edilmiştir.

SONUÇ, TARTIŞMA VE ÖNERİLER

Yabancı dil öğretimi ve dil becerileri ile ilgili yapılan çalışmalarda nitel araştırma modelinin daha fazla tercih edildiği görülmüştür. Dört temel dil becerisinde ortak karşılaşılan sorun kelime bilgisi eksikliğidir. Öğrencilerin İngilizce kelime bilgisinde sorun yaşaması aynı şekilde onların okuma, yazma, dinleme ve konuşma becerilerinde de problem yaşamalarına sebep olmaktadır. Bir diğer ortak sorun da öğrencilerin kelimeleri telaffuzları ederken yaşadıkları zorluklardır. Öğrenci hem kelimeyi telaffuz ederken problem yaşamakta hem de telaffuzu edilen kelimeyi anlamakta sorun yaşamaktadır. İngilizcenin Türkçedeki gibi yazıldığı gibi okunmaması bu sorunun temelini oluşturmaktadır.

İngilizce dersi öğretim programının da ayrıca dil becerilerinin öğretiminde yetersiz olduğu görülmüştür. Yazma becerisi kazanımlarına 6.sınıfa kadar yer verilmemesi yazma becerisinin diğer becerilere göre geride kaldığını göstermektedir. 2018 İngilizce Dersi Öğretim Programına göre dil öğretiminde öğrencilerin iletişim becerilerini güçlendirmek amacıyla dinleme ve konuşma becerilerinin kazanımları arttırılmış, okuma ve yazma becerilerinin kazanımları ise azaltılmıştır (MEB, 2018). Ancak araştırmanın sonucunda elde edilen bulgularda konuşma becerilerinin değerlendirilmesine zaman ayrılmaması, konuşma becerilerine yok denecek kadar az zaman ayrılması, dinleme becerilerine yok denecek kadar az zaman ayrılması gibi sonuçlar İngilizce öğretim programının amaçları ile çelişmekte ve programın etkililiğinin zayıf olduğunu göstermektedir.

Okullarda materyal eksikliğinden kaynaklı sorunların yaşanması, öğrencilerin İngilizce dersine olan ilgilerinin zayıf olması ve ders materyallerinin öğrencilerin ilgilerini çekecek düzeyde olmaması başlıca diğer karşılaşılan sorunlardandır. Dil öğretiminde öğrencilerin ilgilerini çekecek düzeyde materyal kullanılmaması öğrencilerin İngilizce dersine karşı ilgilerini düşürmekte ve öğrenciler İngilizce dersine karşı olumsuz tutumlara sahip olabilmektedir.

Yapılan bu çalışmaların sonuçları incelendiğinde yabancı dil öğretimi ve dil becerileri ile ilgili aşağıdaki noktalar öneriler yönünde belirtilebilir:

- Kelime öğretimine önem verilmeli ve öğrencilerin ilgisini çekebilmek amacıyla farklı kelime öğretim yöntem ve tekniklerinden yararlanılmalıdır.
- Öğrencilerin kelimelerin telaffuzundaki karşılaştıkları problemin önüne geçmek amacıyla öğretmenler derste mümkün olduğunca öğrenci seviyesi için uygun olacak şekilde İngilizce konuşmalı ve öğrencileri dile maruz bırakmalıdır.
- İngilizce dersi öğretim programını dört temel dil becerisini entegre ederek yeniden düzenlenmelidir.
- Okullardaki İngilizce öğretiminde kullanılan materyaller öğrencilerin ilgilerini çekecek düzeyde olmalıdır.
- Öğrencilerin kaygı ve endişelerini en aza indirmek için sınıf ortamı öğretmenler tarafından düzenlenmelidir.
- Öğrencilerin derse ilgisini çekebilmek amacıyla ders içinde oyun, şarkı, hikâye, drama vb. etkinliklere yer verilmelidir.
- İngilizce öğretmenlerine mesleki bilgi ve tecrübelerini geliştirmek amacıyla belirli aralıklarla hizmetiçi eğitim verilmelidir.
- Yapılandırmacı yaklaşım temel alınarak öğrenci merkezli eğitim verilmelidir.
- Dil becerilerinin değerlendirilmesinde uygulama sınavlarına yer verilmelidir.

FULL TEXTS BOOK

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EŞSİZ DENEYİMİN KEŞFİ: EBEVEYNLERDE BİLİNÇLİ FARKINDALIK

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ÖZET

Çocuk yetiştirme sürecinde ebeveynler çeşitli stres faktörleriyle karşı karşıya kalmaktadır (March, 2020). Ebeveyn olmanın stresi ile baş edebilmek ebeveyn ve çocuk arasındaki etkileşimin sağlıklı olması açısından oldukça önemlidir. Bu konuda ebeveynin bilinçli farkındalık düzeyi bir kaynak oluşturmaktadır (Polat ve Yaman 2020) Bilinçli farkındalık aslında bir yaşam şeklidir. Yaşamımıza entegre ettiğimizde hayat standartlarımızı yükseltecek bir öğretidir. Bilinçli farkındalık bireyin dikkatini anlık olarak, yargısız bir şekilde çevresel ve içsel deneyimlere odaklaması; geçmişte yaşadığı veya gelecekte planladığı olası duyguların ve deneyimlerin etkisinde kalmadan anlık deneyimleri yaşayarak an'ı kabul etmesi olarak tanımlanmaktadır (Atalay, 2018). Ayrıca bilinçli farkındalık otomatik pilottan kaçarak ve kişinin kendi deneyimlerinin bir gözlemcisi olarak tamamen anda olmak için pratikler sunar ve anda kalabilme özelliğinin geliştirilmesine yardımcı olabilir. Duygusal tepkiselliği yumuşatmaya, deneyimler ve duygularla başa çıkmaya yardımcı olur (Lucena ve ark., 2020). Bilinçli farkındalık düzeyinin ebeveynlerde stresin azaltılması ve bununla bağlantılı olarak psikolojik iyilik halinin artması ile ilişkili olduğunu gösteren araştırmalar vardır (Gray, 2019) Ebeveynlikte bilinçli farkındalık, bir çocuğun duyguları ve ihtiyaçları hakkında daha fazla farkındalık; hazır olma ve tüm dikkatle dinleme becerisi; iyi veya kötü her şeyi her an olduğu gibi tanımak ve kabul etmek; kişinin kendi tepkilerini tanımak ve tüm açıklık ve nezaketle daha uygun yanıt vermeyi öğrenmeyi içeren ve gitgide gelişebilecek bir süreçtir (Bögels ve Restifo, 2013). Bilinçli farkındalığı yüksek olan ebeveynlerin bu farkındalığı hayatının her anına taşınır. Çünkü bu ebeveynler çocukları ile ilişkisinde olanların farkında olur ve daha bilinçli davranışlar sergiler (Atalay, 2020). Bu bağlamda, çocukların ilgi ve ihtiyaçlarının farkına varma ve yaşadıkları olumlu ya da olumsuz tüm yaşam deneyimleri sonucu çocuklarına yönelik daha anlayışlı, kabullenici ve şefkatli yaklaşım sergilemelerinde bilinçli farkındalık önemlidir. Ebeveynlerde bilinçli farkındalık düzeyi Bilinçli Farkındalık Temelli Stres Azaltma Programı (MBSR) uygulanarak geliştirilebilmektedir. MBSR, bilinçli farkındalık uygulamalarının düzenli olarak adım adım ilerlediği, meditasyonlarla birlikte bilinçli farkında olmayı öğreten, etkisi bilimsel olarak da desteklenmiş bir grup programıdır. MBSR 8 haftalık bir süreci kapsayan, farkındalık becerilerinin geliştirilmesine özgü derslerden ve uygulama yapmayı sağlayan ödevlerden oluşmaktadır. MBSR programı tamamlayıcı, önleyici, destekleyici veya tek başına da kullanılabilmektedir (Wolf ve Serpa, 2015; Baer 2015; Atalay, 2018; Arslan, 2018; Errázuriz Concha ve ark., 2020; Pinho ve ark., 2020). Bunla birlikte aile temelli bilinçli farkındalık eğitimleri de düzenlenmekte olup bilinçli farkındalığın ebeveynler üzerindeki olumlu etkisinin arttığı görülmektedir (Aday, 2021). Bu araştırmanın amacı ebeveynlerde bilinçli farkındalık kavramını, bilinçli farkındalığın ebeveynler üzerindeki etkisini ve bilinçli farkındalığın geliştirilmesi için yapılabilecekleri üzerine literatürü derlemektir.

Anahtar Kelimeler: Bilinçli Farkındalık, Ebeveynler, Aile, Çocuk, Toplum Ruh Sağlığı

FULL TEXTS BOOK

ABSTRACT

Parents are faced with various stress factors during the child-rearing process (March, 2020). Being able to cope with the stress of being a parent is very important for the healthy interaction between the parent and the child. In this regard, the parent's level of conscious awareness is a resource (Polat, Yaman 2020). Conscious awareness is actually a way of life. It is a teaching that will raise our life standards when we integrate it into our lives. Conscious awareness is defined as the individual focusing their attention on environmental and internal experiences instantly and without judgment; accepting the moment by living instant experiences without being influenced by possible emotions and experiences they have experienced in the past or planned for the future (Atalay, 2018). In addition, conscious awareness offers practices to escape from automatic pilot and be completely in the moment as an observer of one's own experiences and can help develop the ability to stay in the moment. It helps to soften emotional reactivity and cope with experiences and emotions (Lucenave et al., 2020). There are studies showing that the level of conscious awareness is associated with reducing stress in parents and increasing psychological well-being in relation to this (Gray, 2019). Mindfulness in parenting is a process that can be developed gradually, including greater awareness of a child's emotions and needs; the ability to be ready and listen with full attention; recognizing and accepting everything, good or bad, as it is at every moment; recognizing one's own reactions and learning to respond more appropriately with all openness and kindness (Bögels and Restifo, 2013). This awareness of parents with high conscious awareness is carried over to every moment of their lives. Because these parents are aware of what is happening in their relationship with their children and exhibit more conscious behaviors (Atalay, 2020). In this context, conscious awareness is important in recognizing the interests and needs of children and in exhibiting a more understanding, accepting and compassionate approach towards their children as a result of all their positive or negative life experiences. The level of conscious awareness in parents can be developed by applying the Mindfulness-Based Stress Reduction Program (MBSR). MBSR is a group program with scientific support, where mindfulness practices progress step by step regularly, and teaches conscious awareness together with meditations. MBSR consists of lessons specific to the development of mindfulness skills and homework that allows practice over an 8-week period. The MBSR program can be used as complementary, preventive, supportive, or alone (Wolf and Serpa, 2015; Baer 2015; Atalay, 2018; Arslan, 2018; Errázuriz Concha et al., 2020; Pinho et al., 2020). In addition, family-based mindfulness trainings are also organized, and it is seen that the positive effect of mindfulness on parents increases (Aday, 2021). The purpose of this research is to compile the literature on the concept of mindfulness in parents, the effect of mindfulness on parents, and what can be done to develop mindfulness.

Key Words: Conscious Awareness, Parents, Family, Child, Community Mental Health

GİRİŞ

Bilinçli farkındalık bireyin dikkatini anlık olarak, yargısız bir şekilde çevresel ve içsel deneyimlere odaklaması; geçmişte yaşadığı veya gelecekte planladığı olası duyguların ve deneyimlerin etkisinde kalmadan anlık deneyimleri yaşayarak an'ı kabul etmesi olarak tanımlanmaktadır (Atalay, 2018). Bilinçli farkındalığın sağladığı önyargısız kabulleniş hali; bireylerin algıladıkları stresi azaltıp, duygu durumunu kontrol altına alarak yaşadıkları problemlerle etkili bir şekilde başa çıkmalarına katkı sağlamaktadır (Shapiro ve ark., 2007; Arslan, 2018; Juul ve ark., 2018; Pinho ve ark., 2020; Diachenko ve ark., 2021). Ebeveynlik paha biçilemez ve eşsiz bir deneyim olmasının yanı sıra bireyin kendi ebeveynlerinden, kültüründen, kalıp yargılardan etkilenilerek öğrenilen bir rol olduğunda bazı psikososyal sorunların ortaya çıkmasına zemin hazırlamaktadır. Ebeveynlerin çocuk yetiştirme sürecinde yaşadıkları stresi yönetebilmeleri için bilinçli farkındalık düzeyinin yüksek olması önemlidir. Bilinçli farkındalık, ebeveynlerin kendi düşüncelerinin, duygularının ve tepkilerinin farkında olmalarını, bu deneyimleri yargılamadan kabul etmelerini ve deneyimlerini nasıl karşıladıklarını fark etmelerini

FULL TEXTS BOOK

içerir. Ebeveynlikte bilinçli farkındalık kavramı aynı zamanda bir beceridir. Bu beceri ebeveynlerin çocuklarının duyguları ve ihtiyaçları hakkında daha fazla farkındalık geliştirmelerini, dikkatle dinlemeyi, her durumu olduğu gibi kabul etmeyi ve uygun tepkiler vermeyi içerir (Bögels ve Restifo, 2013). Bilinçli farkındalık, ebeveynlerin çocuklarının ihtiyaçlarını fark etmeleri, bu ihtiyaçları karşılamaları ve ebeveynlik deneyimlerine dair farkındalıklarını artırmaları açısından kritiktir (Duncan ve ark., 2009). Bilinçli farkındalığı yüksek ebeveynler, bu farkındalığı yaşamlarının her anına taşır ve çocuklarıyla ilişkilerinde daha bilinçli ve dikkatli davranışlar sergilerler (Atalay, 2020). Literatür incelendiğinde ebeveynlikte bilinçli farkındalıkla ilgili son yıllarda oldukça fazla çalışmalar yapıldığı görülmektedir (Karataş ve Ayhan,2023). Bu kapsamda aile temelli bilinçli farkındalık eğitimleri düzenlenmekte olup bilinçli farkındalığın ebeveynler üzerindeki olumlu etkisinin arttığı görülmektedir. Bu araştırmanın amacı ebeveynlerde bilinçli farkındalık kavramını, bilinçli farkındalığın ebeveynler üzerindeki etkisini ve bilinçli farkındalığın geliştirilmesi için yapılabilecekleri üzerine literatürü derlemektir.

BİLİNÇLİ FARKINDALIK NEDİR?

Bilinçli farkındalık, son yıllarda batı dünyasında dikkat çekmiş olsa da kökeni yaklaşık 2500 yıl öncesine dayanmaktadır. Buda öğretilerinin benimsediği Pali dilindeki "Sati" kelimesinden türetilmiştir. "Sati" kelimesi, hafıza anlamına gelirken, İngilizce'de "mindfulness" olarak çevrilen bu kavram, Türkçede bilinçli farkındalık olarak kullanılmaktadır (Kang ve Whittingham 2010). Günlük yaşamda birçok uyarana maruz kalıyoruz ve bazen hızlı yaşanan olaylar nedeniyle yemeğin tadından hava koşullarına kadar pek çok şeyin farkına varamıyoruz. Bu durum, hayatımızın sanki otomatik bir pilotun kontrolündeymiş gibi hissettirebilir (Brown ve Ryan 2003). Bilinçli farkındalık, yaşanılan anın getirdiklerine dikkat etmeyi ve yargılardan uzak durarak mevcut anı farkına varmayı savunan bir kavramdır. Bu kavram, kişilerin yaşadıkları anı daha derinlemesine anlamalarına ve otomatik tepkiler yerine bilinçli bir şekilde yaşantılarını yönlendirmelerine yardımcı olur (Kabat-Zinn 2012).

BİLİNÇLİ FARKINDALIĞIN YARARLARI

Bilinçli farkındalık kişinin otomatik pilottan çıkmasını ve kişinin kendi tecrübelerinin farkında bir biçimde tamamen kişinin bulunduğu anın içinde var olabilmesi için egzersizler sunar ve anda kalabilme becerisinin geliştirilmesine yardımcı olmayı amaç edinmektedir. Bilinçli farkındalık kavramı olaylara verilen tepkisel davranışları yumuşatmaya, bütün tecrübeler ve duygularla başa çıkmaya yardımcı olmayı hedeflemektedir (Lucena ve ark., 2020). Duygu ve düşüncelerimizin farkına varmayı fonksiyonel olmayan düşünceleri ve ruminasyonu önlemek ister. Bilinçli farkındalık acı ve üzüntülerimiz üzerinde sürekli ve yoğun bir şekilde düşünmeyi azaltır ve bu duygu durumlarının farklı açılardan ifade edilmesini kolaylaştırmaktadır (Bagherzadeh ve ark., 2022). Bilinçli farkındalık kavramının amacı içinde bulunulan andaki duygularımızı ve hissettiklerimizi değiştirmek değildir, bunları olduğu gibi görmemizi ve kabullenmemizi amaç edinmiştir. Bunların yanı sıra bilinçli farkındalık hali tepkilerimizi otomatik halden kurtarmak, her zaman ki alıştığımız tepki kalıplarını gözlemlemeyi ve kişinin kendisi için zararlı ve faydasız olan davranışlardan uzaklaşmasını sağlamaktadır (Bulat ve Baltacı, 2021). Farkındalığın yoğunluğunun artması, çevremize karşı daha alakalı olmamızı sağlarken, dış dünyadan ayrı olma halimizi de kendiliğinden azalmaktadır. Şimdiki ana tamamen var olmak ve bunu istemek, her şeyin daha yoğun ve daha gerçek hissedilmesini sağlamaktadır. Bu durum da kişinin stres ve kaygı durumunu azaltarak, yaşam kalitesini arttırmaktadır. Bilinçli farkındalık seviyesinin artması kişinin bütün olaylara karşı kabul durumunu da kolaylaştırmaktadır. Ayrıca bu davranış şekli kişinin kendisine ve çevresine karşı sergilediği yargılama, suçlama gibi otomatik davranış tutumunu azaltarak yaşanılan deneyimlerden daha gerçekçi sonuçlar almasına katkı sağlar. (Polat ve Yaman, 2023)

FULL TEXTS BOOK

EBEVEYNLERDE BİLİNÇLİ FARKINDALIK

Ebeveynlik, bir belirsizlik ve bilinmezlik, önemli bir stres kaynağı ve sürekli değişim ve gelişim halidir; Kabat-Zinn, ebeveynliği kişiyi dönüştüren en zorlayıcı ve stres dolu döngülerden biri olarak tanımlamıştır (Kabat Zinn, 2021). Ebeveynlikte anda kalmak, kaygıyı ve stresi yönetmek, olanı olduğu haliyle görmek ve kabullenmek, çocuğun sağlıklı gelişimi ve ebeveynin ruhsal dengesi için gereklidir ve bu süreç ebeveynlerde bilinçli farkındalık kavramıyla ilişkilidir. Ebeveynlerde bilinçli farkındalık kavramı, ebeveynlerin anda kalmalarını, anı fark etmelerini, çocuklarının ihtiyaçlarını karşılamalarını ve çocuklarıyla iletişimlerinde öz kontrollerini kullanmalarını hedefler. Bilinçli farkındalık özümsendiğinde, ebeveynlik yaklaşımında değişim meydana gelir; geleneksel bir bakış açısı olarak çocuklar üzerinde hak sahibi olma ve benmerkezci yaklaşımlardan uzaklaşarak ebeveyn-çocuk ilişkisini paydaşlı bir yaklaşıma dönüştürmeyi amaçlar. Bu değişim ve dönüşüm, ebeveynlerin çocuklarıyla daha sağlıklı ve dengeli bir ilişki kurmalarına yardımcı olur ve ebeveynlikte daha bilinçli ve etkili bir yaklaşım sağlar. (Duncan ve ark., 2009).

EBEVEYNLERİN STRES YÖNETİMİNDE BİLİNÇLİ FARKINDALIK

Ebeveynler stresten olumsuz etkilenir, çünkü stres altındaki ebeveyn çocuklarına karşı daha uzak, olumsuz ve daha denetleyici bir tavırda yaklaşır. Ebeveynliğin kolay, eğlenceli yanları olduğu gibi zorlayıcı ve olumsuz anları da mevcuttur (Atalay, 2021). Ebeveyn olmak başlı başına stresle mücadele yaratan da bir durumdur, bu süreci daha stresli hale getiren dış uyaranlar ortaya çıkabilmektedir. Yaklaşık 4 yıl önce yaşadığımız COVID-19 salgını olumsuz dış uyarana örnektir. Pandemi sürecinde ebeveynlerin stres ve depresyon yaşama seviyelerinde bir artış gösterdiği açıklanan durumlar arasındadır. Bununla birlikte ebeveynler için bilinçli farkındalık odaklı müdahaleler, ebeveynlerin stres seviyelerini azaltarak ebeveyn-çocuk ilişkilerine yardımcı olmayı hedefler (Fuller ve Fitter, 2020). Ebeveyn stresle baş edebildiğinde dikkatini çocuğuna ve onun ihtiyaçlarına yöneltip, çocuğuna fayda sağlamak cevap için kullanabilir. Bu bağlamda, ebeveynin bilinçli farkındalığı bakım sürecini ve kalitesini etkilemektedir. Bilinçli farkındalığı yüksek olan ebeveynin, çocuğunu daha özenli dinleme, kendine ve çocuğuna karşı suçlayıcı olmadan kabul etme, kendisi ve çocuğu için duygu durum farkındalığı artmakta, ebeveynin kendisine olan öz-şefkatini de artırmaktadır (Arıcı-Özcan vd., 2019)

EBEVEYNLER İÇİN GÜNLÜK YAŞAMDA UYGULANACAK BİLİNÇLİ FARKINDALIK EGZERSİZLERİ

Mindfulness'ın ebeveynlere uygulanması ile ilgili ilk önemli çalışma Myla ve Jon Kabat-Zinn tarafından yayımlanmıştır (The Inner Work of Mindfull Parenting-Kabat- Zinn,2022) Bu öncül çalışma, temelleri Massachusetts Tıp Merkezi'nde geliştirilmiş olan MBSR (Mindfullness Temelli Stres Azaltma Programı)'a dayanmaktadır. Dünyada ebeveynlikte bilinçli farkındalık ile ilgili geliştirilmiş ve araştırmalarla desteklenmiş programlar mevcuttur. Bunlardan başlıcası Susan Bögels'in bilinçli farkındalıkla ebeveynlik programıdır. Bu programın adı 'Mindful Parenting in Mental Health Care' olarak geçmektedir. (Pakdaman,2014) Başka bir araştırmacı olan Dumas, Mindfulness eğitimlerini, ebeveynler için faydalı olmayan 'otomatik' etkileşimlerini kırmaları için tek yol tanımlamıştır. Eğitimlerini 'Ebeveynlerin kendi davranışlarını ve çocuklarının davranışlarını yargısızca dikkate alabileceği, hoşa gitmeyen duygularına karşı mesafe koyabileceği, maksatlı ve seçilmiş bir eylem planı eşliğinde ebeveynlik hedefi geliştirebilecekleri uygulamalar' olarak belirtmektedir. (Karaağaç ve Deniz,2023)

Atalay (2020) tarafından 4D modeli olarak isimlendirilen ve zorlayıcı bir ebeveynlik durumuyla karşı karşıya kalındığında uygulanacak bilinçli farkındalık temelli yaklaşımlar aşağıda verilmiştir:

D1- Dur: Ne zaman stresli olduğunuzu hissederseniz onu yalnızca fark edin ve eyleme geçmeden önce bunu fark ederek içinde durun.

FULL TEXTS BOOK

D2- Dikkat et: Dikkatinizin odağını nefes alan bedenimize yönlendirin, nefesinizin verdiği duyumsamaları dikkatinizin ön planına alın. Bu süreçte zihninizin nasıl yatıştığını ve daha berraklaştığını hissedin.

D3- Deneyimle: Çevrenizde mevcut anda neler oluyor deneyimleyin. Yani gördüklerinizi, duyduklarınızı; çocuğunuzla yüz yüzeyseniz onun yüzündeki ifadeyi, ses tonunu fark edin ve deneyimleyin.

D4- Devam et: Burada eylem geçmeniz gerekir. Bu eylemin içeriği duruma göre değişir. Mevcut durumda tepki vermemek, ne düşündüğünüzü ve hissettiğinizi ifade etmek, başka bir işle meşgul olmak bunların her birisi devam ettiğiniz aşamada bir seçenek olabilir. Buradaki anahtar kelime seçimdir ve bu duruma bilgece yanıt vermektir. Yani sıcak bir kalp ve serin bir baş yolunuzu aydınlatabilir.

Duncan ve arkadaşlarına (2009) göre ebeveynlikte bilinçli farkındalığın beş boyutu vardır. Bahsedilen 5 boyut aslında günlük yaşama dahil edilip uygulamaya konulabilecek, egzersiz haline getirilebilecek çalışmalar için de öncü olmaktadır.

Egzersiz tekniği olarak kullanılabilecek yaklaşımlar aşağıda verilmiştir:

1. Çocuğunu tüm dikkatiyle dinlemek
2. Kendini ve çocuğunu yargısız kabul etmek
3. Kendi ve çocuğu için duygusal farkında olmak
4. Anne baba olarak kendini kontrol etme yeteneği
5. Kendisi ve diğerlerine şefkat gösterme

Bilinçli farkındalık düzeyinin arttırılması için ebeveynler tarafından günlük olarak yapılacak egzersizlerin özeti aşağıda verilmiştir (Oskay, 2022; Kabaoğlu, 2021).

- Günün herhangi bir anında, en azından çocuk bakımında kalan 1 dakikalık bir zaman zarfında, sabit bir yerde olarak zihni sessiz moda almak.
- Rahat hissedilen herhangi bir yerde sadece oturup etrafı izlemek. Etraf izlenirken görülen renklere, renklerin boyadığı objelere odaklanılmalı ve resim daha da detaylandırılmalıdır.
- Çocukla oynanılan herhangi bir oyunu bilinçli farkındalıklı bir deneyimle oynamak. Örneğin oynanan oyuncakla ilk kez oynanıyormuş gibi farkındalıkla oynamak ve çocuğunuza da bunu anlatarak oynamak örnek olarak gösterilebilir.
- Günün herhangi bir anında otomatik pilotta alıp verilen nefesi fark etmek.
- Her gün yenilen bir şeyi mesela çocuğunuzdan kalan bir çikolatayı bilinçli farkındalıkla yemek. Bunu farkındalıkla yapabilmek için çikolatayı sanki ilk kez yiyormuş gibi yavaş yavaş çiğnemek farkındalıkla yemenin en güzel örneği olabilmektedir.
- Sesleri bilinçli farkındalıkla dinlemek. Bulunulan yerde çocuğunuz uyurken ya da ona mama hazırlarken kulağınıza gelen en uzak sese odaklanılarak, ses fark edilir.
- Bilinçli farkındalıkla yürümeyi deneyimlemek.
- Bilinçli farkındalıkla kahve ya da çay içmek.

EBEVEYNLİKTE MÜKEMMELLİK BEKLENTİSİNİ KIRMAK

Mükemmel ebeveyn ya da yeterli ebeveyn olmak net bir tanım olarak karşımıza çıkmasa da, bu kavram "çocuğuna karşı duyarlı ve empatik yaklaşıp, fiziksel ve duygusal olarak ulaşılabilir olmak, çocuğuna güvenli ve destekleyici yaklaşım sergileyen, maddi ve manevi bütün ihtiyaçlarına karşılık verebilen ebeveyn" olarak tanımlanabilmektedir (Leigh, 2016). Bu konuda Dr. Winnicott "yeterince iyi ebeveynlik''hakkında araştırmalar yapmıştır. Buna göre ebeveynlerin bebeklerinin ihtiyaçlarına yüzde yüz tutarlılık ve doğrulukta yanıtlar vermesi her zaman gerekli değildir. Ebeveynler çocuklarının ihtiyaçlarına %30 oranında doğru yanıt verdikleri durumlarda bile, bebeklerin yeterince iyi ilgi gördüğü ve güvenli bağlanma sağlandığı söylenebilmektedir. Güvenli bağlanma, çocukların çevrelerini keşfederken ebeveynlerine geri dönme ve ebeveynlerini bulabilme güvenini taşımalarını ifade eder.

FULL TEXTS BOOK

Yeterince iyi ilgi gören çocukların, güvenli bağlanmış ve mutlu bireyler olarak büyüdükleri bilinmektedir. Ebeveynlerin mükemmel yanıtlar vermektense, yeterince iyi bir ilgi ve destek sunmalarının çocuklarının sağlıklı gelişimi için yeterli olduğu bilinmektedir (Balis, C., 2021). Dr. Winnicott'un "yeterince iyi" kavramı, ebeveynlerin olabildiğince iyi ve dengeli bir bakım sunmalarını ve zaman zaman hata yapabileceklerini ifade eder. Bu yaklaşım, mükemmellik arayışından uzaklaşıp, gerçekçi ve destekleyici bir ebeveynlik anlayışını teşvik eder. Bu kavram doğrultusunda, çocuklar daha özgüvenli ve dışa dönük olarak büyüyebilirler. Ayrıca, ebeveynlerin hataları çocuğun dış gerçeklikleri anlamasına ve hazırlıklı olmasına katkıda bulunur. Winnicott, mükemmel bir ortamın sağlanmasının mümkün olmadığını ve çocukların gerçek dünya ile uyumlu şekilde gelişmesi için yeterince iyi bir ortamın yeterli olduğunu belirtmiştir. Bruno Bettelheim, Winnicott'un "yeterince iyi annelik" kavramını genişleterek "yeterince iyi ebeveynlik" olarak yeniden düzenlemiş ve babaları da bu kavrama dahil etmiştir (Gray, 2015). Bettelheim, ebeveynlerin ve çocukların mükemmel olmalarını beklememek gerektiğini vurgulamıştır; önemli olan iyi insan ilişkileri oluşturmaktır. Woodhouse, yıllar sonra bu kavramı genişleterek, ebeveynlerin bebeklerinin ihtiyaçlarına yanıt verme seviyesini yüzde elli olarak hesaplamıştır. Bu, ebeveynlerin yeterli düzeyde yanıt vermelerinin çocuk gelişimi için yeterli olabileceğini öne sürer. Bu kavramlar, ebeveynlikte mükemmeliyet arayışından ziyade, yeterince iyi olmanın ve gerçekçi beklentilerin çocukların sağlıklı gelişimi için önemli olduğunu vurgular (Woodhouse ve ark., 2019).

BİLİNÇLİ FARKINDALIKLA İLGİLİ YAPILAN ÇALIŞMALAR

Yurt dışında ebeveynlerin bilinçli farkındalık düzeyini konu alan araştırmalardan örnekler ve sonuçları aşağıda verilmiştir:

2020'de yapılan bir çalışma da ergenlerin yaşam doyumu ile ebeveynlerin bilinçli farkındalıkları arasındaki ilişkide, başa çıkma öz yeterliliğinin aracılık rolünü incelemeyi amaçlamıştır. Araştırmaya 479 ergen ve 42 ebeveyn katılmıştır. Ebeveynlerin bilinçli farkındalıklarının, ergenlerin yaşam doyumu ile ilişkili olduğu bulunmuştur. Bu ilişkide, başa çıkma öz yeterliliği önemli bir aracılık rolü üstlenmiştir. Ebeveynlerin bilinçli farkındalıkları, ergenlerin başa çıkma öz yeterliliklerini artırarak yaşam doyumlarını olumlu yönde etkilemiştir. Ebeveynlerin bilinçli farkındalıkları, ergenlerin hemen her duygu durumuyla başa çıkma yeteneklerini önemli ölçüde destekleyerek yaşam doyumlarını artırmaktadır. Bu sonuçlar, ebeveynlerin bilinçli farkındalığının, ergenlerin başa çıkma becerilerini ve yaşam doyumlarını geliştirmede önemli bir faktör olduğunu göstermektedir (Lui ve ark., 2020).

2021' de Portekiz'de yapılan bir çalışmada COVID-19 salgını sırasında Portekizli annelerin bilinçli farkındalık, ruh sağlığı ve anne-bebek bağı üzerindeki etkilerini incelenmiştir. Çalışma, salgın öncesi ve sırasında doğum yapan, 0-12 ay arası bebeğe sahip toplam 567 annenin kaygı, depresyon, stres, bilinçli farkındalık ve doğum sonrası bağlanma düzeylerini değerlendiren ölçeklerle yapılmıştır. Anne-bebek arasında yaşanan bağlanma bozukluğunun, ebeveynlerde bilinçli farkındalığın tüm alt boyutlarıyla pozitif yönde ilişkili olduğu bulunmuştur. Yani, bilinçli farkındalık, bağlanma sorunlarını azaltma yönünde olumlu etkiler göstermiştir. COVID-19 sırasında doğum yapan annelerin bilinçli farkındalık düzeylerinin, salgın öncesi doğum yapan annelere göre daha düşük olduğu gözlemlenmiştir. COVID-19 salgınının, annelerin bilinçli farkındalık seviyelerini olumsuz yönde etkilediği ve bu durumun anne-bebek bağlanmasını etkileyebileceği sonucuna ulaşılmıştır. Bu bulgular, pandemi döneminin annelerin ruh sağlığı ve ebeveynlik uygulamaları üzerindeki etkilerini anlamak ve destekleyici stratejiler geliştirmek için önemlidir (Fernandes ve ark., 2021)

2022 yılında Çin'de yapılan bir çalışmada ,COVID-19 sırasında Çinli annelerin stres düzeyleri ile çocuklarının uyum davranışları arasındaki ilişkide, ebeveynlikte bilinçli farkındalığın rolünü inceleyen bir çalışma yapılmıştır. Araştırma, 172 Çinli anne ve okul öncesi çağdaki çocuklarıyla gerçekleştirilmiştir. Annelerin bilinçli farkındalık düzeylerinin, stres seviyeleri ile olumsuz yönde ve çocukların içsel ve dışsal davranış sorunları ile de olumsuz yönde ilişkili olduğu bulunmuştur. Bu,

FULL TEXTS BOOK

bilinçli farkındalığın stres ve davranış sorunlarını artırabileceğini göstermektedir. Annelerin bilinçli farkındalık düzeylerinin, çocuklarının prososyal davranışlarını olumlu yönde etkilediği gözlemlenmiştir. Yani, yüksek bilinçli farkındalıklı olan ebeveynin, çocuklarının yardımseverlik ve iş birliği gibi olumlu davranışlarını artırmıştır. Ebeveynlikte bilinçli farkındalığın, stres ve çocukların uyum davranışlarının tüm alt boyutları ile ilişkide aracı bir rol oynadığı bulunmuştur. Bu, bilinçli farkındalığın, annelerin stres ve çocukların uyum davranışları arasındaki ilişkiyi etkileyen bir faktör olduğunu göstermektedir. Bu bulgular, ebeveynlikte bilinçli farkındalığın, stres yönetimi ve çocuk davranışları üzerindeki etkilerini anlamak için önemlidir ve ebeveyn destek programlarının bu unsurları göz önünde bulundurması gerektiğini vurgulamaktadır (Cheung ve Wang, 2022).

Türkiye ebeveynlerin bilinçli farkındalık düzeyini konu alan araştırmalardan örnekler ve sonuçları aşağıda verilmiştir:

3-18 yaş arasında olan Yaygın Gelişimsel Bozukluk tansına sahip çocukların ebeveynlerinin aile uyumlarını ve duygularının sosyalleştirme tepkilerini ikili ABCX Stres Modeli kapsamında incelenmiştir. Çalışma, YGB tanısı almış çocukların ebeveynlerinin aile uyumlarını ve duygusal sosyalleştirme tepkilerini ikili ABCX Stres Modeli çerçevesinde incelemeyi hedeflemiştir. Çalışmada 140 ebeveyn yer almıştır. Ebeveynlikte bilinçli farkındalık, ailenin uyum kaynaklarından biri olarak ele alınmıştır. Bu, ebeveynlerin duygusal durumlarını ve tepkilerini yönetmelerine yardımcı olan bir faktör olarak değerlendirilmiştir. Ebeveynlerin destekleyici ve önleyici tepkilerinin bilinçli farkındalık ile ilişkili olduğu bulunmuştur. Yani, bilinçli farkındalığa sahip ebeveynler, çocuklarının duygusal ihtiyaçlarına daha destekleyici ve önleyici yanıtlar verme eğilimindedir. Damgalanma algısı ile duygu sosyalleştirme tepkileri arasındaki ilişkide, bilinçli farkındalıklı ebeveynliğin aracı rol oynadığı sonucuna ulaşılmıştır. Bu, bilinçli farkındalığın, ebeveynlerin damgalanma algısını ve dolayısıyla çocuklarına verdikleri duygusal tepkileri etkileyebileceğini gösterir. Bilinçli farkındalıklı ebeveynliğin, ebeveynlerin duygu sosyalleştirme tepkilerini olumlu yönde etkilediği ve damgalanma algısının bu ilişkiyi etkileyen bir faktör olduğu sonucuna varılmıştır. Bu bulgular, bilinçli farkındalığın ebeveynlerin stres yönetimi ve çocuklarına yönelik duygusal tepkiler üzerindeki etkilerini anlamak açısından önemlidir. Ayrıca, aile içindeki uyum ve ebeveyn-çocuk ilişkilerini destekleyen stratejilerin geliştirilmesine katkıda bulunabilir (Türsel ,2019).

12-17 yaş arasında çocuğu olan annelerin ebeveynlikte bilinçli farkındalık düzeyleri ve dijital ebeveynlik tutumları ile çocuklarının internet bağımlılığı arasındaki ilişkiyi incelenmiştir. Çalışma, annelerin ebeveynlikte bilinçli farkındalık düzeyleri ve dijital ebeveynlik tutumlarının, çocuklarının internet bağımlılığı üzerindeki etkilerini ölçmeyi hedef edinmiştir. Annelerin ebeveynlikte bilinçli farkındalık düzeyleri ile dijital ebeveynlik tutumları arasında istatistiksel olarak anlamlı bir ilişki bulunamamıştır. Bu, bilinçli farkındalık ile dijital ebeveynlik tutumlarının birbirinden bağımsız olabileceğini veya etkilenmediğini gösterebilir. Annelerin ebeveynlikte bilinçli farkındalık düzeyleri ile çocuklarının internet bağımlılığı düzeyleri arasında ters yönlü ve zayıf bir ilişki saptanmıştır. Bu, daha yüksek bilinçli farkındalık seviyelerine sahip annelerin çocuklarının internet bağımlılığı riskinin daha düşük olabileceğini gösterir, ancak bu ilişkinin zayıf olduğunu belirtir. Çalışmada dijital ebeveynlik tutumlarının çocukların internet bağımlılığı üzerindeki etkisi konusunda net bir ilişki bulunmamıştır. Bu, dijital ebeveynlik tutumlarının çocukların internet bağımlılığı üzerinde belirgin bir etkisi olmadığını veya başka faktörlerin etkili olabileceğini düşündürmektedir. Bilinçli farkındalık ve dijital ebeveynlik tutumlarının çocukların internet bağımlılığı üzerinde önemli etkiler yaratmadığı sonucuna varılmıştır. Ancak, bilinçli farkındalığın çocukların internet bağımlılığı ile zayıf bir ters ilişkiye sahip olması, daha geniş bir bağlamda bu ilişkinin değerlendirilmesi gerektiğini bize göstermektedir. Bu bulgular, ebeveynlerin bilinçli farkındalık düzeylerinin ve dijital ebeveynlik yaklaşımlarının çocukların internet kullanım alışkanlıkları üzerindeki etkilerini daha detaylı incelemek için ek araştırmalar yapılması gerektiğini işaret edebilir (Günaydın,2021).

FULL TEXTS BOOK

2021'de yapılan bir çalışmada bilinçli farkındalığa dayalı aile eğitim programlarının ebeveynler ve çocuklar üzerindeki etkilerinin incelenmesi amaçlanmıştır. Çalışmada 4-6 yaş aralığında çocuğu olan ebeveynlere yönelik 11 hafta süren bir eğitim programı uygulanmış ve programın sonuçları araştırılmıştır. Araştırmanın bulguları şu şekildedir: Program, ebeveynlerin bilinçli farkındalık seviyelerinde anlamlı bir artış sağlamıştır. Bu, ebeveynlerin çocuklarıyla olan etkileşimlerinde daha dikkatli ve duyarlı olmalarını desteklemiştir. Ebeveynlerin ebeveynlik becerilerine yönelik algıları ve kendilerine olan güvenleri de artmıştır. Ebeveynler, çocuklarını daha etkili bir şekilde yönlendirme ve destekleme yeteneklerinde bir gelişim görmüşlerdir. Ebeveynler arasında iletişim düzeylerinde bir iyileşme sağlanmıştır. Bu, aile içi iletişimde daha açık, anlayışlı ve destekleyici bir ortam oluşturmuştur. Çocukların davranış problemlerinde gözle görülür bir azalma gözlemlenmiştir. Ebeveynlerin geliştirdiği bilinçli farkındalık ve iletişim becerileri, çocukların davranışsal sorunlarına olumlu yönde etki yapmıştır. (Işık ve Demircioğlu, 2021).

2022'de yapılan 150 katılımcı baba ile baba-çocuk ilişkisi, ebeveynlikte bilinçli farkındalık ve çocuklarının psikolojik sağlamlığı arasındaki ilişkileri araştıran bir çalışma yapılmıştır. Çalışmanın bulguları şu şekildedir: Baba-çocuk ilişkisi ile ebeveynlikte bilinçli farkındalık alt boyutları ve toplam puanları arasında pozitif yönde, ancak zayıf düzeyde bir ilişki bulunmuştur. Bu, baba-çocuk ilişkisinin ebeveynlikte bilinçli farkındalığı biraz artırabileceğini, ancak bu etkinin çok güçlü olmadığını göstermektedir. Babaların öğrenim durumu ile ebeveynlikte bilinçli farkındalık alt boyutu olan "çocukla anda olma" arasında pozitif yönde, zayıf bir ilişki bulunmuştur. Bu, daha yüksek öğrenim durumuna sahip babaların çocuklarıyla daha iyi anda olma becerisine sahip olabileceğini ancak etkisinin sınırlı olduğunu göstermektedir. Çocuğun yaşı ile ebeveynlikte bilinçli farkındalık alt boyutları ve toplam puanı arasında ters yönde ve zayıf düzeyde bir ilişki bulunmuştur. Bu bulgu, yaş arttıkça babaların bilinçli farkındalık düzeylerinde bir azalma olabileceğini, ancak bu etkinin zayıf olduğunu göstermektedir. Hafta sonu çalışma durumu açısından babaların ebeveynlikte bilinçli farkındalık düzeylerinde anlamlı farklılıklar gözlemlenmiştir. Hafta sonu çalışan babaların, çalışmayan babalara göre "ebeveyn öz yeterliliği" alt boyutu ve toplam puanları daha düşük bulunmuştur. Bu, hafta sonu çalışan babaların, bilinçli farkındalık ve ebeveynlik becerileri açısından daha düşük performans sergilediğini göstermektedir. Genel olarak, çalışma, baba-çocuk ilişkisi ve ebeveynlikte bilinçli farkındalık arasındaki ilişkinin zayıf olduğunu, babaların öğrenim durumu ve çocuk yaşının da bu ilişkiye sınırlı etkilerde bulunduğunu göstermektedir. Ayrıca, hafta sonu çalışma durumu, bilinçli farkındalık düzeylerini etkileyen önemli bir faktör olduğunu da ortaya koymuştur (Sezgin,2022).

2022'de otizm spektrum bozukluğu (OSB) olan çocukların davranış problemleri ile ebeveynlerinin duygu düzenleme zorluğu arasındaki ilişkide ebeveynlikte bilinçli farkındalığın aracı rolünü incelemek isteyen ve 273 ebeveynin katıldığı çalışmanın bulguları şu şekildedir: Ebeveynlikte bilinçli farkındalık ile ebeveynlerin duygu düzenleme güçlüğü arasında negatif yönde anlamlı bir ilişki bulunmuştur. Yani, ebeveynlerin bilinçli farkındalık düzeyi arttıkça, duygu düzenleme güçlüğü yaşama olasılıkları azalmaktadır. Ebeveynlikte bilinçli farkındalık ile çocukların davranış problemleri arasında da negatif yönde anlamlı bir ilişki gözlemlenmiştir. Bu, ebeveynlerin bilinçli farkındalık düzeylerinin artmasının çocuklarının davranış problemlerini azaltma yönünde etkili olduğunu göstermektedir. Ebeveynlerin duygu düzenleme güçlüğü ile çocuklarının davranış problemleri arasında pozitif yönde bir ilişki bulunmuştur. Ebeveynlerin duygu düzenleme zorlukları, çocukların davranış problemleri ile daha fazla ilişkilidir. Ebeveynlikte bilinçli farkındalık, ebeveynlerin duygu düzenleme güçlüğü ile çocuklarının davranış problemleri arasındaki ilişkiye kısıtlı miktarda aracılık etmektedir. Bu, bilinçli farkındalığın duygu düzenleme zorlukları ve çocukların davranış problemleri arasındaki ilişkiyi belirli bir ölçüde etkileyebileceğini, ancak bu etkileşimin sınırlı olduğunu gösterir. Sonuç olarak, yapılan bu çalışma, ebeveynlikte bilinçli farkındalığın, ebeveynlerin duygu düzenleme güçlüğü ve çocukların davranış problemleri üzerindeki etkisini anlamada önemli bir rol oynadığını ortaya koymaktadır. Bilinçli farkındalığın, ebeveynlerin duygu düzenleme becerilerini iyileştirebileceği ve dolayısıyla çocukların

FULL TEXTS BOOK

davranış problemlerini azaltabileceği ancak aracılık etkisinin sınırlı olduğunu tespit eden bir çalışma olmuştur (Aydın, 2022)

SONUÇ

Ebeveynlerde bilinçli farkındalıkla ilgili olarak yapılan çalışmalar, ebeveynlikte bilinçli farkındalık düzeyinin ebeveyn ve çocuk arasındaki iletişimi güçlendirdiği belirlenmiştir. Literatürde bilinçli farkındalık düzeyinin ebeveynlerin stres düzeyini azalttığını gösteren çalışmalar mevcuttur. Ebeveynlerde bilinçli farkındalık, toplum sağlığı içinde oldukça önemli bir kavramdır. Bilinçli farkındalık düzeyi yüksek ebeveynlerin yetiştirdiği çocukların daha pozitif, dışa dönük, özgüvenli ve mutlu olduğu saptanmıştır.

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FULL TEXTS BOOK

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THE HISTORICAL DEVELOPMENT OF PROBATION SERVICE: CHALLENGES AND FUTURE PERSPECTIVES

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ABSTRACT
The development of probation service has gone through different stages whereas each of them has reflected the context of that time, challenges and the evolving needs of the society. In various countries probation service is well established, while in others like Albania, the probation service is recently developed and the justice system is still undergoing reforms. Countries with a long tradition in probation service usually have served as mentors providing valuable insights and best practices for countries less experienced. Reflecting on the development of probation service and its future challenges not only helps in informing the currents practices, but also in improving outcomes in service delivery and addressing possible gaps in the country context. This article aims to provide a comprehensive framework of the evolving role of the probation service while thinking proactively for the new challenges and perspectives. A literature review was conducted using online platforms. Several research articles focused on the probation history and the new developments were part of the review. The study highlighted issues regarding the new contemporary challenges including improved IT infrastructure and logistic; maximizing human resource capacity and the need for more integrated services. Implications for the future of probation service in Albania are also discussed.
Keywords: Probation service, history, development, challenges, future.

INTRODUCTION
The Probation service history dates back over a century and have continually evolved adapting to the changing needs of the society and criminal justice system. The early etymology of the probation comes from the Latin word *probare* which means "being tested" or "proving" (House of Commons Justice Committee, 2012). Probation is an alternative to incarceration, allowing offenders to be supervised in community instead of prisoning while fulfilling certain obligations imposed from the court. Its valuable role in rehabilitating and reintegrating offenders makes probation an essential part of the criminal justice system.

In the 19-th century the society started to review its approach toward punishment and incarceration, feeling that there is a need to work more individually with the offender in order to rehabilitate him rather than placing the focus only in the effect the prisoning will have in protecting the society (Webster, 1952). During the middle ages, punishments for even minor crimes were harsh and the death penalty was among the most widespread. Till the late of 18-th century in America child offender were treated same as adult and children from seven years could be sentences even with death if found guilty (Angell, 2004; Office of Juvenile Justice and Delinquency Prevention, 1999). Despite the severity this punishments did not really lead to the reduction of crime and discussion of that time prompt for other alternatives. These changes in the philosophy of thinking preceded the development of the probation service.

Early roots of probation service
The first pioneer of the probation service was John Augustus, a Boston shoemaker who founded the probation service in 1841. Augustus, "the father of probation service", convinced a Boston judge to release a drunken man instead of imprisoning, promising that he will assist the man by helping him in rehabilitation and reintegration into the society (Mackey & Levan, 2012). Augustus assisted mostly

FULL TEXTS BOOK

alcohol abusers and minor offenders that were unable to pay their fines (Taxman, 2012). The first rehabilitate initiatives where family-centric approaches. In 1878, Massachusetts introduced the first probation law, enabling courts to appoint official probation officers. The development of probation service in America was similar with the development of probation service in other countries. The pioneer of the development of the probation service in England was Britain's Matthew Davenport Hill in 1840s. However, in case of England the beginnings of the probation service were influenced mostly by religion. During that time the England church was concern about the amount of crimes associated with alcohol abuse, and the missionaries offered the court the option to rehabilitate them (Bird & Ward, 2021). This differences in the origin of the development of the probation service in America and England, also leads in using different approaches in treating the offenders, whereas in England the supervising and training where religious in character and in America it was followed a more secular approach (Phillips, 2010). Similarly with England, also in other the European countries the early foundation of the probation initiatives were laid by charitable and religious organizations. Despite America and England considered as the first countries that laid the foundations of the probation service, the late 19 century would mark the beginning of the probation service also for other countries like Sweden, Germany, France, Netherland etc.

Expansion and formalization of probation service

The practice of probation service spread across the United States, during the period of 1912- 1933 and the number of probation service offices grew from 200 to 4000 (Rothman, 1979). However, according to Webster (1952) the probation developed gradually and the progress was not very fast, especially in sates with a rural nature. The Federal Probation Act of 1925 will be the one that will create a unified practice of probation service in America by establishing probation service for federal courts and allowing judges to consider alternative sentences like suspension of execution of sentence of imprisonment to the convicts and placing them under supervision. While in UK, the passing of the Probation of Offenders Act 1907 formalized the probation service, marking so the most important date in terms of probation development (Annison, 2013). The court were allowed to place the offender in probation rather than sentencing taking into consideration characteristic like age, health, mental conditions and other aspects etc. Also in other European countries the 20th century would mark major changes in the evolution of the probation service. The transition to a more individualized approach in the rehabilitation of convicts would lead to the development of some alternatives to imprisonment such as conditional and suspended sentence, parole, house arrest, bail, conditional release etc. (Kalmthout & Durnescu, 2018), and for many countries, these changes in the sanctions influenced the improvement and further development of the probation service.

Important developments were especially in the field of juvenile justice. An important achievement was the creation for the first time of juvenile courts in 1899, in Illinois, and then their wide spread in different states of the USA in the first half of the 20th century (Rothman, 1979). While in England, in 1969 the amendment of the Children and Young Persons Act 1933 gave an even greater priority to placing the child's well-being at the center of the criminal process (Pratt, 1989). In other countries in Europe like Poland and Hungary the first initiatives of probation service were only dedicated to juvenile offenders (Kalmthout & Durnescu, 2018).

Efforts to improve juvenile justice reinforced the value of the probation service. For example, in America the American system, during that time, young offenders 16-18 could be treated or not as a young offender depending on the recommendation of the Grand Jury and on the own motion of the judge Addressing the importance of improving youth correction discussions in the literature of that time by Webster (1952) highlighted that before deciding not to treat a young person as a juvenile offender, it would be useful to require a probation report, because that report would help decision-makers making reasonable decision regarding the youth's future. In other words, Probation Service report would help

FULL TEXTS BOOK

judges make more informed decisions. Nowadays, the preparation of pre-sentence reports is one of the main duties of the probation service.

Till 1960 the main reform program applied in America was the same with that designed in the 1910-1920 considering problems related with the strengthening juvenile system, probation reforming, and improving outpatient care (Rothman, 1979). After 1960 there was a need to learn from these reforms, in what has function and what not and what they should have done better. These reflections included several countries, and were not limited only in America or England. Probation caseloads were analyzed and were categorized considering the level of risk and the level of supervision required. Also Classification criteria were created to make it easier to identify and accomplish goals related to socialization, career training, and education (May, 1995). During that time, Probation was increasingly tasked with managing cases involving drug offenders and people with addiction problems. According to Sparrow (2014) in the cases of drug addicts, they relied heavily on psychiatric services to help them rehabilitate.

Probation as social work and the decline of the rehabilitative ideal

For a long time, probation service was seen as an activity closely related to social work (Canton, 2024; House of Commons Justice Committee, 2012). It should be widely accepted that social work and probation service share a series of common principles such as: improving the well-being of individuals, integrating them in social life. providing support, embracing values such as non-discrimination, integrity, respect for human dignity etc. However, the pessimism that underpinned the discourse of the time regarding the role of probation in the rehabilitation of persons and the reduction of crime, also targeted social work, seeing its influence as ineffective (Smith, 2005). According to Raynor & Vanstone (2016) changes in research base of probation, organization, and training influenced the continuous separation between social work and probation service. The effectiveness of the role of probation service workers began to be discussed, and probation officers were seen as they were not doing nothing more than social service worker (Svensson, 2003). This was also influenced by the fact that there were also an increased number of the welfare agencies that worked with different vulnerable groups, including offenders (Raynor, 2010). At that time, the discussions of the literature advanced further when Neils (1995) claimed that now new values such as restorative justice, community safety and anti- custodialism would be more suitable in the context of probation service. In the meantime the probation service was accused as it was losing its role as an alternative of punishment and was only focusing on social aspects. This earlier ideology sometimes referred to as a "medical model", saw the causes of criminal behavior in psychological, biological and social deficiencies, assuming that through treatment the deviant behavior could be corrigible (Cullen, 2017). The importance that aspects of social work had on probation service began to fall due to the influence of the doctrine "nothing work". High crimes rates and recidivism placed more questions in rehabilitation. In 1970-1980 the doctrine “nothing work” by Robert Martinson's (1974) viewed rehabilitation efforts as ineffective. Consequently, the focus on rehabilitating and integrating people in the society started to diminish and there was a shift toward punitive measure.

Evidence based practice, from “nothing work” to “what work”

The "nothing works" theory had some early effects, but eventually it prompted a more thorough evaluation of the types of rehabilitation programs that really worked. This eventually led to the improvement and reaffirmation of the use of social work ideas by the probation service. Since then, evidence-based techniques that have been shown to reduce recidivism rates, such as cognitive-behavioral therapy and other treatments and have been incorporated into probation services, consistent with social work objectives. In fact, the previous studies were criticized for the methodology and the results being not so true (Raynor, 2018). The “black box of community supervision” by Bonta et al, (2008) would open a new chapter in the approach to the treatment of convicts in the probation service.

FULL TEXTS BOOK

From the ideollogy “nothing work” it changed to “what work”. According to research in diferent fields from psychology, the sociology of criminal justice etcc. interventions that incorporate the principles of rehabilitation, prevention, procedural justice, and cooperation have been shown to be effective in reducing recidivism rates (Raynor, 2018). By addressing factors such as risk-need- responsivity factores and promoting justice and cooperation, these interventions have the potential to have a significant impact on preventing reoffending. It is important for policymakers and practitioners to consider these findings when designing programs aimed at reducing recidivism and promoting positive outcomes for individuals involved in the criminal justice system. Now the focus is on the training of probation officers based on evidence-based practice (Bonta, 2006)

Probation service in Albania

The Probation Service has a brief history in the Republic of Albania**.** Law No. 10 023, dated 27.11.2008, "On some additions and changes to Law No. 7895, dated 27.1.1995 of the Criminal Code of the Republic of Albania, as amended," laid the foundations of the probation service in Albania. Albania undertook continuous reforms in the framework of alignment with the European legislation. These amendments on the criminal code The Law nr. 78/2020 “On the Organization and Functioning of the Probation Service”. Created the necessary legal spaces for the establishment of the probation service institution charged with the supervision of the offenders. Thus, in 2009 Probation Service was established. For a long time probation service has developed its activity based on the Decision of the Council of Ministers no. 302 date. 25.03.2009 “On the Approval of the Regulation ‘On the Organization and Function of the Probation Service and on the Definition of Standards and Procedures of the Supervision of the Execution of the Alternative Sanctions”, being not in accordance with the recommendation of the committee of the Council of Ministers of Europe, where it was recommended that the regulation of such institutions must be done by law. It was not until 2020, when probation service has its law, law no 78/2020 “On the Organization and Function of the Probation Service”.

The Probation Service in Albania has undergone many improvements. Initially, it grew from 4 local offices to 22 offices currently located near the Courts of First Instance, and from 50 employees now it has around 147 employees (Xhangolli, 2021). The mission of the Probation Service in Albania is to protect the community, prevent recidivism and provide guidance and support to those under supervision so that they can successfully reintegrate and socialize into the community by overcoming obstacles and making positive changes.

After the entry into force of the Juvenile Justice Code in 2018, the Albanian Probation Service adopted a new methodology of working with juvenile offenders mentored by the Swedish Probation Service, in the framework of the Albanian-Swedish juvenile justice program (2017-2022). The adaptation of the new instruments was accompanied with training, mentoring and workshop with the staff that addressed the juvenile cases. The methodology of work was based in the leading model of the Risk-Need-Responsivity factors (Lovkrona & Ymeri, 2022).

Challenges and perspectives

The development of the Probation Service has been accompanied by various challenges. In the Albanian context, many of the challenges facing are similar to those in other countries, while others are more specific to the country context. High caseload and workload pressure places probation workers in a difficult position to manage cases and to work individually with offenders who may need support and guidance (Rachal, 2020). Hoxha & Rama (2024) found that probation specialist in Albania face difficulty in applying cognitive behavioral technique due to cases overload.

Another challenge is related to IT infrastructure and adaptation to technology. In the framework of the digital strategy, Probation Service has raised an electronic system for digitizing the Probation Service system, which has been in place since 2015. This would enable the digitalization of the files of convicts.

FULL TEXTS BOOK

However, datas from Audit Report (2022) has showed problems with entering the data on time, and problems with the use of the system have also led to inefficient use of public funds. Another challenges is related to the electronic monitoring which has been suspended since 2017 also highlighted in the European progress report (2023). This make difficult excecuting alternative sentences like home confinement.

The supervision of offender requires a qualified and trained staff. According to Law no. 78/2020 "For Organization and Functioning of Probation Service", article 15/2 probation service specialist must follow two programs of training: primary and ongoing training. In order to maximize human resource capacity, probation service specialist have received training regarding juvenile treatment and lately training regarding radicalization and violent extremism. However, there is a need to receive ongoing training following an evidence based practice (Hoxha & Rama, 2024). Certain groups like those with mental health problems, sex offenders and drug abuser may have more complex needs and may be more challenging regarding their rehabilitation. Further training programs should take into consideration this issues.

In addition, there is a need for more integrated services that would facilitate rehabilitation of individuals with multiple needs such as coordination among agencies including social services, employment centers, mental health service, substance abuse treatment, education programs, housing ECT. Service in Albania are mostly fragmented and limited human and financial resource can hinder the implementation of such services. Hoxha & Rama (2024) found that probation service in Albania has limited cooperation with other agencies in treating offenders.

Concluding remarks

In order to overcome the challenges faced by probation systems it is important to address limitations through strategic planning, engaging stakeholders, building capacity and conducting ongoing evaluations. By taking these steps we can work towards improving outcomes for individuals under supervision. Through careful planning and collaboration with all parties involved we can create a more effective and efficient probation system that ultimately benefits both the individuals being supervised and society as a whole.

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FULL TEXTS BOOK

FOSTERING E-LEARNING IN TEACHING-LEARNING: TRANSFORMING FUTURE EDUCATION IN MODERN ERA

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ABSTRACT
The current study fosters e-learning in teaching-learning and transforms future education in the modern era. E-learning holds excellent promise to preserve knowledge and experiences for the next generation, and the value of youth education is being acknowledged more in contemporary society. A more significant number of people can now get degrees because of online curricula. Because of this, students can get an excellent education regardless of where they live. Students can study at their own pace and in their own time with e-learning. With that being said, in a distributed, open, and ever-changing e-learning setting, it might be challenging to provide a suitable means of spreading different information. Amidst the ongoing discussion over the validity of online learning, concerns regarding the benefits and drawbacks of E-learning and its role in professional development for educators and learners are growing. E-learning is here for several reasons, including shorter product development cycles, fiercer global competition, a need for more qualified workers, and the shift from an industrial to a knowledge-based economy. E-learning in teaching-learning is playing an increasingly important role in traditional classrooms. The importance of knowledge, the advantages of lifelong learning, mobility, and globalization are all factors that contribute to this. Even with meticulous preparation and implementation, there is no assurance that an E-learning program will succeed. E-learning that isn't well-organized and managed has a far higher chance of falling short of teachers' and students' expectations and goals. Learning could shake up established industries and schools because it gives students more flexibility in when and where they get their education. E-learning will change the way people get degrees in the future. E-learning platforms offer a wealth of information regarding students' accomplishments and development. E-learning has the potential to be more economical than more conventional classroom settings. It is easier to expand to meet the needs of more students if we do not rely on costly physical infrastructure like classrooms and textbooks. The ability to effectively communicate and use digital tools is more important than ever for thriving in the modern world. The fundamentals of the technology that modern companies rely on can be taught to students through online courses. Promoting e-learning in the classroom is essential to equip students better for the opportunities and challenges ahead. By incorporating digital technologies into the design of interactive, relevant, and hands-on classes, educators may better equip their students for the modern era.
Keywords: Fostering, E-Learning, Teaching-Learning, Transformation, Future, Education, and Modern Era

Introduction

Learning new things through reading and listening to discussions on various online platforms is one way "e-learning" is defined. Several other names describe this method of teaching. Due to the wide variety of online learning settings, the terms dispersed learning, virtual learning, and online learning have merged into one. Students need unique abilities to succeed in e-learning since they enter a different kind of classroom (Romiszowski, 2004). Virtual, online, web-based, dispersed, "e-learning," and online learning are many words that describe distant education. Coming from the root word "electronic," the term "e-learning" can refer to any student-driven learning that utilises computers, regardless of whether

FULL TEXTS BOOK

it occurs in a formal educational setting or not. Due to the deluge of information students face nowadays, the ability to analyse, research, and evaluate material is more important than ever (New Media Consortium, 2007). No student who is serious about raising their grade point average should ever skip a lesson. Studying for your degree online is a great way to practise making wise decisions, sharpen your analytical abilities, and broaden your horizons. It is not appropriate for children to rely on their teachers. They didn't dally around at the beginning. Learning can occur at the student's pace and environment with the correct tools. Our favourite students are the ones who consistently show up to class prepared to learn. Any number of students can sign up for free once it's ready. Teachers can use their class time more efficiently by dividing extensive courses into smaller, more manageable ones. No matter the time of day, we promise to process your transaction quickly. By providing children with skills that are relevant to today's world, educators may help students thrive in this modern era.

Additionally, online students are often more independent than their in-person peers. Huynh et al. (2003) found that students showed more engagement and dedication to studying when they actively participated in class debates. Although online students outperform their in-class counterparts on average, they are likelier to skip class or not turn in their work (Zhang, Zhou and Briggs, 2006). In education, "e-learning" describes a method that blends internet resources with traditional classroom methods to create an atmosphere where students collaborate to solve real-world issues. One of the initial goals of online education, often known as computer-assisted learning, was to provide course materials digitally. An increasing number of individuals are considering the benefits of e-learning. Any instructional methods using electronic devices are collectively called "e-learning" here. Regardless of its network connectivity, technology can nonetheless facilitate learning and transform future education in the Modern Era.

Notion of E-Learning

Each individual has their own set of learning preferences based on their own set of habits, interests, and degrees of involvement. Many things are putting a lot of pressure on our country's educational system, including changes in population, rising corporate demands, and an influx of young, ambitious people who want to go to college to better their professions. The traditional model of education is fast losing its relevance. The abundance of information available online has made self-education easier than ever before. There is an overwhelming variety of creative degree programs offered by universities worldwide. We must be innovative if we want technology to meet their unique needs. To build a knowledge society that embraces diversity and inclusion, it is vital to create accessible online learning environments. Any education heavily relying on the Internet is called "e-learning" here. This study investigates how educational institutions adjust to accommodate students' demands in light of the difficulties inherent in online learning. Acronym for "electrical learning," "e-learning" denotes instruction that does not occur in a conventional classroom context. Electronic learning, or e-learning, relies heavily on online resources such as databases, video and audio files, search engines, and libraries. This kind of education is equally effective in traditional classroom settings as e-learning transforms future education in the modern era.

School websites increasingly provide the option to enrol in online courses these days. In an online classroom, students can access various tools, such as course materials, and several ways to communicate with their instructors and peers, such as private and public networks, email, and message boards. Most people imagine students accessing course materials through digital methods like the Internet, CDs, satellites, or multimedia software when they hear "e-learning" or "electronic learning." However, this is only sometimes the case. Students work together using various tools to accomplish common goals (Gul, S. B. A, 2015). The growth of e-learning platforms and Web 2.0 technology has brought new challenges to both teachers and students. When used in the classroom, these devices transform entirely children's learning. Due to the unique characteristics of online learning, both students and teachers may encounter new challenges. The first step in improving online education is acknowledging the numerous issues with

FULL TEXTS BOOK

this new sort of virtual classroom. Students may be better prepared for the demands of an online course if they have a solid understanding of what e-learning means. In 2011, Clark and Mayer coined e-learning to describe the instruction process using any medium that leverages the Internet. Both teachers and students may face additional challenges as a result of the many ways in which online learning varies from traditional classrooms. Due to the plethora of materials technology enhances, traditional classrooms are being replaced by online and hybrid learning settings. Our ability to swiftly detect and address problems is essential when we want our students to thrive in e-learning and influence the future of education in the modern era.

Types of E-Learning

The e-learning field is currently deciding on a common name, similar to other rapidly evolving academic fields. Various scholars define the phrase differently and may even disagree on what it means. Despite this, the meanings are usually interchangeable. Since there are a variety of beneficial e-learning formats, students can choose the one that suits them best. For the most thorough and valuable learning experiences, various approaches are advised. A key component of modernizing education is incorporating online learning resources into classroom training. Due to the increased flexibility it provides students in terms of time and location, online education can radically alter how people learn in conventional classrooms. Here are a few pros and cons of online learning that you can encounter in a traditional classroom setting: As its goals, content, and technology have evolved, e-learning has also undergone substantial methodological and stylistic shifts. Some of the most common kinds of e-learning include these:

Asynchronous Learning

Asynchronous learning and teaching have been the favoured e-learning strategy up until this point due to their versatility (Hrastinski, 2008). Asynchronous learning gives students access to everything they need for a course, including live and recorded lectures, readings, presentations, and more. Asynchronous learning allows students more freedom to work at their own speed, unlike conventional classroom settings, which require students to finish assignments in real-time. Thanks to the method's flexibility and ease of use, students may complete assignments, participate in class discussions, and access course materials whenever it's most convenient. Learning at one's own pace is a fundamental human right. They take it easy while things are going well but shine when faced with adversity. Students are not required to finish all the materials found on the internet immediately. This includes books, articles, spreadsheets, presentations, WhatsApp groups, YouTube videos, and more. Synchronous learning allowed students to participate in two-way conversations, finish group projects, and receive responses instantly. Rather than engaging in real-time conversation and engagement, a crucial component of asynchronous learning is providing feedback after the class has ended. They greatly aided the children in both groups as they practised problem-solving collaboration (Hizriani, N., Nor, H., & Saadillah, S, 2022). The lack of rigid class timetables gives students greater flexibility to juggle academic and extracurricular commitments. A learning management system or online platform usually keeps a course's text, multimedia, and supplementary materials. The practice of allowing students to access recorded classes whenever it is convenient for them is relatively standard. It is up to each student to figure out how much time is optimal for reviewing the material. Teachers and students can collaborate in real-time through online message boards and forums where they can share ideas and ask questions. As long as they stay within the time constraints imposed by their instructors, students are granted considerable leeway to complete the various assessments at their own pace. Online learning gives students more academic and personal freedom because they can access course materials and finish tasks whenever convenient. Allows pupils to breeze through more accessible classes while they devote more time to studying for harder ones. If students are in a rush or in a different time zone, they should have the option to not participate in real-

FULL TEXTS BOOK

time if it is too much trouble. There is more leeway for students to reflect on the material and their understanding of the material before they are required to submit their answers or projects. Timely assignment completion still requires students to have internal desire and self-control, even with the availability of rapid feedback. Students might learn less if they had to wait for responses to their questions and assignments instead of receiving them instantly. Without many opportunities for face-to-face communication between teachers and students, children may experience feelings of unwanted isolation. Asynchronous e-learning has recently become popular as students' go-to for online education (Parsad and Lewis, 2008). The expectations of being adept with a broad range of online tools and having a constant internet connection may be too much for some students to manage. Students enrolled in online courses can study at their own pace. There is a plethora of specific materials that can be utilized in the educational setting. Asynchronous learning platforms such as Canvas, Blackboard, and Moodle allow students to pose questions and participate in discussions. The possibility of asynchronous online learning enhancing students' knowledge was discovered by Lin, Hong, and Lawrenz (2012). As an adjunct to more conventional classroom methods, asynchronous learning could be helpful for students who thrive when given extensive leeway in determining when and how they study.

Synchronous Learning

In a synchronous learning virtual classroom, students work together in real time to solve classroom problems as they arise. Part of this strategy is using pre-arranged online lectures or meetings. Online video conferencing has made it possible for everyone to take part in these classes electronically. Virtual classrooms, online discussion forums, etc., promote student engagement in the creation of course standards. The traditional classroom has seen numerous changes due to the rapid expansion of e-learning. One way to tell whether an online program is primarily synchronous or asynchronous is by looking at the degree of synchronization. However, outcomes have been conflicting; there is some indication that these two types of e-learning can potentially improve students' average grade point averages (Zeng, H., & Luo, J, 2023). Students can complete assignments and participate in class discussions in real time using digital tools. This allows people to get their questions answered quickly. Participants are expected to be punctual for all activities and classes. Sort things out and get everyone on the same page by using live video conferences, chats, or phone calls. In this type of class, the instructor may observe the progress of each student as well as the results of their group projects. Teachers can deliver live lectures to their classes using a variety of online video conferencing platforms, such as Zoom, Google Meet, and Microsoft Teams.

In e-learning, a broad range of synchronous, asynchronous, and hybrid approaches are employed. Synchronous learning allows students to collaborate in real time to solve problems that arise after a lecture (Salmon, 2013). Alternatively, students in asynchronous classes can work on their online assignments at their own pace and in their own time. In hybrid virtual worlds, users can accomplish active and passive tasks in real-time sessions. Hybrid lesson ideas merge the advantages of both online and conventional classrooms. Experts in a certain subject hold live online presentations called webinars, which include Q&A sessions. Instructional programs that put students' knowledge to practice through group projects or independent experimentation with the assistance of a teacher. This is when the lesson is guided by an educated teacher who breaks down ideas and gives pupils opportunities to put what they've learned into practice. Depending on their preference, workshop participants can work in smaller groups, on larger projects, or even solo. Students retain more information when they are able to ask questions and receive prompt responses. The widespread availability of real-time communication has greatly increased student engagement in class. Students who put in the effort to prepare before class can make the most of their time there and avoid interruptions. To make students more accountable and motivated, try implementing planned sessions and having them communicate in real time. One way to

FULL TEXTS BOOK

make a classroom more interesting is to add more interactive activities, debates, and conversations that happen in real time. Due to scheduling conflicts, students in various time zones can miss out on live sessions.

We may be less capable of learning when problems with infrastructure, like slow internet connections, affect the technology we rely on. It seems like some students simply lack the self-control or self-discipline to arrive on time for class every day. Instantaneous online meetings are more likely to have interruptions and derailments. It may be too much for some kids to handle being online all the time and having to participate at certain times. Microsoft Teams, Zoom, and Google Meet are just a few of the many available real-time conferencing options. Platforms that integrate video conferencing providers make features like polls, breakout rooms, and real-time chat available. Services such as Twitch and YouTube Live have made it possible to webcast live seminars and lectures. Teachers and students can work together in real time using Google Docs and Miro. Through the strategic application of concurrent learning, one can enhance critical thinking, discourse, and engagement. While asynchronous components might be useful for students taking a lot of classes, they truly shine when immediate feedback is needed. Outcomes from a study conducted by Asoodar, Atai, Vaezi, and Marandi (2014) and Teng, Chen, Kinshuk, and Leo (2012) indicate that synchronous group learning helps students develop stronger peer ties. The ability to work together in real-time is a crucial feature of synchronous online courses.

Blended Learning

Blended learning, which combines traditional classroom teaching methods with modern online resources, relies heavily on online education. Even after over two decades, it hasn't become as famous as its makers had intended. Courses that include e-learning modules are becoming more accessible through a proliferation of online resources (Nagaraj C. et al., 2021). Blended learning is an innovative strategy combining online resources with conventional classroom methods. This approach combines online learning with more traditional classroom methods to create an environment that is more adaptable, productive, and tailored to the needs of individual students. Looks at potential physical and digital solutions. Students can now take advantage of online and hands-on learning in the same class with the help of technological tools like labs and workshops. Students greatly benefit from online education since they can quickly move through the content. Plus, kids get to do more engaging things like work on group projects, solve problems, and participate in activities that have real-world relevance. Students can complete online tests and group projects and work on individual assignments at one of many stations. Most online courses need students to collaborate in smaller groups, either virtually or in an actual classroom. Students who pursue their education online benefit from more time freedom and more opportunities for hands-on experience. As part of this, they will work together on projects, share ideas for solutions, and draw on their collective knowledge. Even though most course materials are available online, students are still urged to contact their instructors whenever needed. Not all courses necessitate students' physical presence; some classes are only offered online. Attendance is required for a portion of the in-person activities in blended learning courses, such as labs, exams, and group projects, but not all of them.

Blended learning combines online and conventional classroom teaching, giving students more study flexibility. When training is needed, people can learn online or in a more traditional classroom setting. This mixed-mode technique combines online and in-person training to meet the specific needs of each learner. Blended learning, which mixes online and in-person instruction, appears more popular among students than in traditional classroom settings. Why? The reason behind this is that it facilitates the establishment of student-centred programs that cater to each student's unique requirements. Students can choose how they wish to engage in class, whether in person, online, or another format. In contrast to more conventional classroom settings, research by Vo et al. (2017) and Smith and Hill (2019) shows

FULL TEXTS BOOK

that students in blended learning contexts have more control over their education. Students can study whenever it suits them best because this classroom technique is not reliant on location or schedule. Encouraging students to personalize their learning to meet their requirements is a great way to get them invested in their education. Time and priority management skills are taught to students in both traditional and online classrooms. Integrating digital resources with more conventional teaching strategies can help students become more active in their education. Blended learning, which combines personalized instruction with many delivery modalities, may help children succeed in school. Access to a wealth of materials that might be inaccessible in a more conventional classroom is made possible for pupils. Students with access to online and in-person course materials are more likely to work together and pay attention in class.

Microlearning

The premise of microlearning is that information could be better retained if presented in smaller, more manageable portions. Designed to facilitate regular, targeted study, this layout is excellent for just-in-time learning and concept reinforcement. They streamlined video guides that either introduce new material or review old material. Infographics simplify complex subjects by drawing attention to critical points. Teachers offer detailed feedback on students' work after they finish brief tests to gauge their understanding of the content. They use simple flashcards, often available online, to increase their knowledge base. Literature that is either overly wordy or fails to address the topic adequately. As a whole, microlearning aims to improve comprehension and memorization. Placing students in more minor, manageable groups can improve their subject recall and make progress tracking easier. Microlearning has a few flaws, such as its incompleteness when handling complex or challenging subjects and its dependence on previously learned material. The wide variety of human learning styles allows us to do many things. A few students can persist in their confusion no matter how often you review the material. Educators are responsible for curriculum creation as part of their professional duties. Class preparation is a challenge for many educators. Microlearning strategies are flexible enough to be adjusted to different contexts, even when there is a significant difference in the preferred technologies of teachers and pupils—completing all the course materials (Fitria, T. N, 2022). A discussion, analysis, or summary is audio-recorded and focused on a topic. Students may hone their abilities and learn to make better decisions by participating in brief, interactive situations or simulations.

Microlearning sessions are created to help students better absorb large amounts of content. Session lengths could be anything from a few seconds to nearly fifteen minutes. Every microlearning module is designed to cater to specific skills or learning objectives, allowing for more focused study and faster understanding. This data is often updated and accessible from various devices, including smartphones, tablets, and desktop computers. Games, simulations, and quizzes are standard interactive components of microlearning that help students stay interested and enhance their memorization. Study materials are available 24/7, so students may choose when it is most convenient. Children learn best when exposed to new concepts in smaller, more focused doses rather than all at once. Multimedia and interactive elements make courses more engaging and fun to use. Aids pupils in overcoming challenges and reaching their full potential by making relevant information easily accessible to them. Shorter, more focused learning modules may be more effective than lengthier, more traditional course materials. A life skill that children will gain substantially from is the capacity to concentrate for short periods. Microlearning isn't well suited for advanced topics due to its simplistic nature. Students risk falling behind or not understanding important ideas since microlearning modules do not offer a consistent method of instruction and do not form a cohesive whole. Assessing the efficacy of individual microlearning modules in meeting their learning goals is a crucial but challenging undertaking. All the subtleties and vital details can be lost in a simplified version.

FULL TEXTS BOOK

Microlearning takes advantage of this fad in training and education by highlighting the significance of concentrated, brief sessions to improve learning and memorization. Students who have trouble responding quickly or are anxious about being late might find this strategy helpful. Microlearning sessions can eventually aid in word-of-mouth and address individual needs. Try adding multimedia, interactive elements, and real-life examples to make the training more engaging and applicable. Not making things too easy and continually checking content for accuracy and relevance is the only way to ensure enough high-quality information. Students should be able to deepen their understanding using these scenario-based microlearning courses. A microlearning program's success or failure can be revealed through key performance indicators and student feedback. New hire orientation is a breeze when we talk about strategy compliance. Assists in learning via doing, reflecting, and applying. This allows experts to make effective use of their ever-expanding corpus of knowledge.

Adaptive Learning

Adaptive learning technology enables students to become self-directed learners and take responsibility for their education, according to Yazon et al. (2002). (Jonsdottir, 2015; Truong, 2016) Adaptive learning technology can change lessons depending on students' answers to questions. Students can better grasp abstract systems through interest-based Adaptive learning technology, which helps them learn more rapidly and retain more information (Walkington, 2013). Adaptive learning technology has allowed educators to personalize course content based on students' interests, strengths, and prior knowledge. Adaptive learning systems use data and algorithms to adjust the speed, content, and teaching methods to assist students in achieving their maximum academic potential. Adaptive learning systems consider the unique abilities and areas of improvement of each learner to enhance the relevance and efficiency of learning. The message it provides is that the subject is both challenging and relevant. So that their progress can be monitored in real time, the system adapts the difficulty level, subject order, and exercise types based on how well the learners are doing. Information scrutiny allows teachers to monitor student development, spot trends, and understand the results of their choices. With its many examples, explanations, and exercises, this lesson plan will be easy for students of all levels to follow. The system records student interactions, including response times, task lengths, and activity participation levels. By utilizing algorithms on the gathered data, we can ascertain each learner's level of understanding and progress. It is possible to meet the specific requirements of every student by employing this method of goal-oriented requirements engineering. Douglas et al. (2019) propose utilizing an Adaptive learning technology to guarantee that each student gets individualized course materials. According to Dhakshinamoorthy (2019), student academic performance improves when adaptive learning technologies are tailored to their cognitive learning methods. The technology then adjusts the difficulty level of the material to make it easier or harder to understand when the test is over. Provides students with timely, personalized feedback on their work, including suggestions for how to improve. Meeting students' needs and reducing uncertainty leads to more investment and better outcomes. Adaptive learning can improve performance, understanding, and memory by tailoring support and adjusting content levels.

Gamified Learning

The goal of gamified learning is to increase participation and recall of course material by integrating game design elements into more conventional classroom settings. The gamification of education approach aims to increase student engagement and retention of course content by using game mechanics and concepts in the classroom (Dicheva & Dicheva, 2017). Traditional classroom instruction is enhanced in gamified learning by incorporating game mechanics like leader boards, challenges, points, and badges. Including elements of play makes learning more engaging. Levels, challenges, leader boards, badges, and points are all a part of this. Earning prizes and completing milestones as the course

FULL TEXTS BOOK

progresses motivates students to study more. It uses resources like games, quizzes, and role-playing settings to make learning more exciting for pupils. Similar to a game's objectives and scoring system, this gives pupils instantaneous feedback on their progress. Game enthusiasts comprise most of the intended demographic (Fardo, 2014). The application of gamification in these settings has been backed by studies conducted by Borges et al. (2013), Dichev and Dicheva (2017), Krause et al. (2015), and Knutas et al. (2014). Students can earn medals, badges, and points as they progress through the levels and accomplish the objectives. It reminds pupils of their accomplishments and encourages them to strive for more significant achievements in class. To unlock incentives or advance to the next level, students must finish most activities within the allotted time.

Students can put their new knowledge into practice in a risk-free environment, much like in a game or role-playing activity. As they move through the stages, pupils gain confidence and competence through the game's more difficult content or exercises. There is a risk that incentives and competitiveness may overshadow the importance of students' intrinsic motivation and the primary goals of education. Involvement, goal-setting, skill-improvement, sociability, and learning maximization are all important outcomes. Scientists are eager to examine the effects of gamification on classrooms because studies have demonstrated that some elements of games can improve engagement, retention, comprehension, and collaboration (Hakulinen & Auvinen, 2014; Tvarozek & Brza, 2014). In a separate study, Christy and Fox (2014) discovered that gamification has unexpected significance. Building engaging, gamified learning spaces that improve students' knowledge acquisition is no easy feat. The rules and content of the game need to align with the learning objectives so that there is no wasted effort leading to bogus information acquisition. Incorporating gamification into the classroom and more traditional methods can enhance students' ability to retain course information.

Social Learning

In social learning courses, students collaborate on projects and participate in class discussions to develop their skills. Students learn more when they work together, whether in smaller groups, bigger ones, or even just with their instructors. Collaborating with others to discover solutions is a part of it. Encourages students to think critically and articulate their understanding, aiding their personal development. Social learning is quickly becoming the industry standard, according to multiple studies. This is in contrast to traditional NRM techniques. Typical instances of this type of publication include Dodds et al., Keen et al. 2005a, and Parson and Clark (1995). Students can find information about individuals who share their interests through online groups and social media. As an alternative to sitting in a stuffy classroom, today's children would instead engage in online activities such as group projects, discussion forums, and social media. Promotes teamwork and exchanging ideas using internet platforms such as social media and discussion boards. Managers increasingly rely on adaptive management and stakeholder participation strategies to deal with complicated and uncertain situations, as stated by Holling and Walters (1978) and Walters and Holling (1990). Exploration suggests that managers of social-ecological systems may benefit from increased knowledge and flexibility when participating in decision-making (Folke et al., 2005; Fazey et al., 2007).

Social learning theory states that an individual's authority will be unaffected by internal pressures. It places a premium on self-regulation, symbolic and vicarious processes, and others like them (Bandura, 1971). Establishing communities of practice, or networks of people with similar goals and interests, can enhance current educational practices. At an increasing rate, natural resource administrators and policymakers consider social learning ideal. Even after all this time, no one has reached a theoretical agreement on where it came from or what it means. The words "social learning" and "participation" are sometimes used interchangeably due to the lack of clarity surrounding individual and group learning. Many assertions regarding social learning are unsubstantiated, and its notion is often confused with its possible advantages. At this time, we do not have enough information to say whether or not social

FULL TEXTS BOOK

learning has occurred, how much it has, when it happened, who was involved, or what kind of learning it was (Reed, M. S., et al., 2010). This idea states that one's social environment and past experiences significantly impact one's preferred learning method. The requirement of mentoring connections is emphasized in this method so that students can benefit from one other's experiences, both good and bad. This may be most natural in less stuffy settings like study groups or collaborative projects. No matter how different our lives are, we can all learn from each other's experiences. Many different online communities exist, each serving a unique purpose in making connections, commerce, and disseminating information. Among many others are social media, internet forums, and business networks. Setting up meetings and transactions may foster cooperation and information sharing. Help create an environment where students feel safe expressing themselves. As a group, people learn more efficiently, enthusiastically, and autonomously than they would alone. Honest dialogue and teamwork are vital in today's linked world.

Interactive Learning

An interactive learning method encourages a three-way conversation between the teacher, the students, and the course content. Improving comprehension, memorization, and application of knowledge are the aims of immersive, participatory, and interactive learning. Participatory learning is promoted rather than passive learning, in which students merely take part in the process. The course material includes exercises that require students to work in groups, solve problems, and participate in discussions. Projects, simulations, role-playing, and experimentation can achieve active learning and more student engagement. The significance of learning methodologies is recognized and prioritized. Instantaneous responses, user-friendliness, and minimal effort on the part of the buyer characterize the ideal product in today's technology landscape. Educational researchers have mainly used the term interactive in two contexts: pedagogy and investigating how new technologies could augment more conventional forms of teaching. When new, more effective ways of teaching a subject emerge, traditional approaches become outmoded. The term interactive perfectly captures the features of a productive and efficient learning environment compared to the conventional method of instruction, which benefits both the teacher and the pupils (Pradono S. et al., 2013). Interactive learning encourages students to work in groups to accomplish common goals, such as finishing an assignment, making art, or solving an issue. On-time and with substance, gives pupils comments on their work. We aim for the kids to work in more intimate groups where they can freely express themselves and ask questions. Whether students collaborate on a group project, present their research, or work independently, they should always support one another. Using game design concepts creates interactive learning spaces that highlight the need for critical thinking and creative problem-solving.

The goal of interactive learning is to foster student engagement and interpersonal skills via the use of various technological tools. Researchers have found a way to solve this issue by combining digitally self-directed learning with interactive studying. There are multiple advantages to using interactive learning strategies in the classroom. This article employs a systematic review of hundreds of articles published in peer-reviewed international journals to explore the many kinds of interactive learning, its multidisciplinary applications, and its educational benefits (Lukita, H. et al., 2017). Active participation and the usage of interactive tactics improve students' learning experiences. Learning exercises that strengthen students' ability to understand and remember new information can help all students. It helps with understanding the content and finding real-world uses for it. Everyone should be highly concerned with a person's communication skills, teamwork abilities, critical thinking, and problem-solving creativity. In an online class with a professional moderator, students pay more attention, contribute more thoughtfully, and get more valuable comments. Managing technology and interactive components efficiently is essential to achieve the intended learning outcomes. Including interactive activities in your class plan helps captivate students and enhance their learning experience. What a difference it would

FULL TEXTS BOOK

make if teachers and parents taught children that group projects are more successful when everyone pitches in, and everyone listens. Interactive learning unlocks a treasure trove of exciting and helpful information by combining group work, participation, and real-world application. Teachers can engage students' attention and foster learning through various interactive strategies.

Mobile Learning

The world is evolving at a dizzying rate, and new information is appearing even faster. Due to the ever-changing modern world, books have become outmoded as a source of information due to the expansion of websites, applications, videos, live chats, etc. The impact of technology on people's lives and futures is growing. Regardless of their position, most individuals in today's culture would support technologically enabled educational reforms. The proliferation of educational institutions using technology is just one of the several factors contributing to its growing significance in education. The positive effects of technological advancements on education far exceed any negative ones; these innovations have altered the nature of education. Education and technology are powerful tools that may achieve excellent outcomes when appropriately applied.

Mobile learning generally refers to expanding educational opportunities enabled by portable electronic devices. To present a comprehensive overview of mobile learning, this chapter will analyse its characteristics, advantages, and problems with long-term retention. Plus, it works with a ton of various apps for mobile devices. Software developed with mobile devices in mind is often smaller and lighter than its desktop and laptop counterparts, making it ideal for portability (Kumar, P., & Raja, V.,2019). The benefits of mobile learning are only now being realized by members of Generation Z and Millennials. The positive cycle begins from mobile learning, improving students' critical thinking skills, to deep learning, which generates new, valuable data. Mobile learning has numerous advantages, including additional classroom training, which can be supplemented with mobile learning and is constantly accessible on any wireless device. Students with various mobile learning options to access course content are more engaged and work harder to succeed. Using mobile learning, which uses portable digital devices, is one way to boost enrolment at four-year universities. Students now have constant access to course materials and assignments because of the portability and convenience of mobile devices. Students have more flexibility in their study schedules and locations when they have access to course materials online. The mobility it offers regarding access to course materials is one of the many benefits of mobile learning. They improved mobile multimedia learning experiences by integrating text, images, video, and interactive elements. Assists users in coordinating online conversations and projects through chat rooms and message boards. Teachers can track students' progress using mobile learning apps and cater to their unique needs. Various educational resources, including courses, tutorials, quizzes, and more, are accessible through mobile apps. Apps such as Duolingo and Khan Academy have made learning a new language relatively easy.

Distance Learning

Some educational approaches are referred to as online learning, though they are known by more terms than just distance learning. On this platform, there are abundant web-based tools that teachers and students can use to work together digitally. This method ensures that students can keep up with their education even if they are physically unable to attend class. More and more universities are moving their courses online, which means that students from all over the world may soon be able to take lessons without wasting time and money travelling. Both students and teachers rely on video conferencing, learning management systems, and other digital communication tools. When students cannot physically attend a traditional classroom, distance learning can assist them in receiving the individualized attention they need through different technological resources. This idea is what Honeyman and Miller (1993) describe as the process of designing and delivering educational experiences in which the learner and the

FULL TEXTS BOOK

information provider are geographically or temporally separated. It was in the 1840s that Isaac Pitman introduced the concept of distance learning to the British people through mail networks to teach shorthand (Moore & Kearsley, 2005). It allows students to study when it is most convenient for them by offering both scheduled and unstructured learning. This includes both synchronous (in which students engage in real-time activities) and asynchronous (in which they can access course materials and complete tasks at their own speed) learning styles. It uses a variety of media, including books, films, quizzes, and online forums, to accommodate various learning styles and interests.

Distance education students have more flexible schedules since they can conveniently access and participate in course materials. When people cannot attend traditional schools due to geography, financial, or time constraints, we help. When you include transportation, books, and tuition, attending an online school can cost less than a conventional, in-person school. Since students design their personalized study plans according to their interests and goals, they can go through the material at their speed while still touching on earlier courses. An optimal learning environment is created when knowledgeable teachers collaborate with various digital resources and fresh viewpoints. Despite its obvious importance, many kids will go without regular internet access. Distance learning aims to broaden participation in formal education and training by reducing or eliminating physical and temporal obstacles. Because of its adaptability, it works well both in and out of the classroom. There is no other field of study that is seeing the same rate of growth as this one. The development of web-based technologies has shed light on the possible implications of distant learning for education. Teachers define it as using information and communication technologies in various settings (Webster & Hackley, 1997). Online course participants must be highly motivated and self-controlled to succeed without a teacher and a flexible class schedule. Less face-to-face interaction between students, teachers, and classmates means fewer opportunities for students to learn from their teachers and classmates. Issues with the program or the network could prevent people from participating and learning. Involving diverse student groups and providing them with high-quality digital tools can be a real problem. Technology advancements have made online learning more accessible and adaptable for students. Regardless of the challenges, great learning experiences are the result of meticulous preparation and execution.

E-Learning Transforms Future Education

The future of education is being rapidly transformed by the introduction of innovative approaches, resources, and models that promote engagement, customization, and accessibility. Significant progress is being made during this time of change. The introduction of e-learning has been the driving force behind this massive transformation in the educational landscape. Thanks to the rise of online education, which does away with geographical barriers, students worldwide can now have access to first-rate teaching tools and resources. As a result, individuals from different parts of the globe can expand their knowledge. In turn, this democratizes educational chances since more people can afford to get an education. Students can accommodate various schedules and personal activities because instructional content is accessible 24/7. This is going to be helpful for the kids. AI and other complex algorithms have made it feasible to personalize instruction and assessment based on each student's strengths, weaknesses, interests, and past performance. This capacity is coming to fruition as these systems evolve. The learning and teaching processes are substantially improved When students collaborate to understand complex ideas, evaluate alternative perspectives, and participate in question-and-answer sessions. Educators who create an environment that recognizes and commends pupils for their analytical thinking and academic success may pave the way for such opportunities. Part of this is getting pupils to think creatively, critically, and about the future. The usage of online classrooms for the international propagation of these new ideas has risen in the past few years. More and more institutions are embracing e-learning approaches, combining online and traditional classroom training. According to figures collected by the Form Research Centre, most four-year colleges and universities offered some form of

FULL TEXTS BOOK

online course in 2010 and 2011. A hybrid, online, or distant learning technique would have been more beneficial, according to Parker, Lenhart, and Moore (2011). A third of undergraduates participated in programs offered only online in 2013, as Allen and Seaman (2013) reported. The outcome is that every student will get a personalized education based on their desires and needs. Incorporating additional hands-on activities and allowing students greater freedom to examine material at their own pace, this course is well-suited to help students prepare for life in the modern era.

E-learning covers many diverse topics in a somewhat subjective time frame. Utilizing computers to enhance education stands out the most. There is an endless variety of configurations for an online classroom, and some might not work with one another. Even thinking about it makes me nervous. Since it has so many different qualities, describing it and understanding how its functions is challenging. Among the many potential business uses is improving educational settings (Shoppers, P. A. C., 2018). Incorporating multimedia elements such as movies, simulations, and interactive exercises into e-learning platforms has the potential to elevate and optimize the learning process. It is possible to incorporate various aspects of gaming into educational activities. Features such as leader boards, challenges, and badges are a part of this. As we lead students through their learning journey, we aim to enthral and excite them. Teachers can provide their students with internet access to lesson plans through e-learning, allowing for instructional content distribution. This time savings will allow teachers to concentrate on presenting students with a more robust curriculum while students can participate in more meaningful conversations and hands-on activities. A more adaptable and comprehensive method of education can be developed by combining online and in-person instruction. This approach takes advantage of and improves upon the numerous strengths of both approaches to teaching-learning and transforms education in the modern era.

E-learning platforms collect data, such as student interactions and grades, that can provide teachers with valuable insights into their students' strengths and areas for improvement. By analysing data, we can predict how well children will do and catch problems before they escalate so we can help them when they genuinely need it. Businesses and institutions can save money by providing e-learning instead of constructing expensive new facilities to accommodate additional students. The potential for online education to drastically lower the cost of conventional schooling is high because it does away with the necessity for textbooks, computers, and teachers. Anyone can improve their education and career prospects using the information available online. We devoted the first year to studying e-learning and its possible uses in creating models. It appears that this instructional design class agrees that e-learning has numerous benefits. We considered online and traditional classroom settings when developing our Edmodo e-learning methodologies. The present work was finished after evaluation, following the analysis, design, development, execution, and completion (Siagian, S., Sinambela, P. N. J. M., & Wau, Y, 2020). Learners can rapidly acquire specialized knowledge or skills using condensed, concise learning modules to promote continual progress and adaptability to changing job demands. Students from around the globe can freely exchange and discuss information in online classes. There is an improvement in peer support and learning quality when people work together on projects and participate in online discussion groups. Nowadays, we have access to various evaluation tools, including quizzes, interactive simulations, and peer-reviewed assignments. Quick comments on tests help students see where they excel and where they need more work to transform education in the modern era.

Students can supplement their traditional classroom instruction with digital materials or spend all day in a virtual environment using these tools. Artificial intelligence allows us to automate administrative processes, create personalized learning paths, and provide virtual instruction or support. Low-income and rural residents do not have equal access to technology and the Internet, making this an enormous issue. Online learning must be regularly updated with new course materials and delivery techniques to ensure its success and reliability. It takes careful planning and execution to create strategies that engage kids in a digital setting. In profound ways, e-learning is altering the educational landscape by allowing

FULL TEXTS BOOK

for innovations in learning that were previously unimaginable. One promising avenue for the future of international knowledge development and innovation is e-learning, made possible by the dizzying rate of technical advancement to transform education in the modern era.

Conclusion

Finally, e-learning is an ever-evolving field that adapts to the needs of today's students by capitalizing on the various digitally-enabled learning opportunities that are accessible, personalized, and adaptive. As computer and communication technologies improve, the benefits of distance learning will only increase. To help students see the world outside the four walls of a typical classroom, it employs various teaching strategies that use online resources. Even the busiest people can use online learning's convenience to further their careers and develop their skill sets at their own speed. Many game-changing innovations have occurred in education since the advent of the internet. Because of their familiarity with cell phones, messaging apps, and the internet, modern students have no trouble participating in or managing an online course. The significance of online education is anticipated to grow as time passes and technology advances. The rapid development of technologies such as adaptive learning, virtual reality, and artificial intelligence could drastically alter the future of education. We sincerely wish to build an educational system that is innovative, accessible, and successful, and we must address the existing problems and accept new technologies. With the right e-learning resources, education is now within reach of almost anybody, thanks to the proliferation of affordable e-learning platforms that transform education in the modern era.

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FULL TEXTS BOOK

SOLID WASTE SERVICES IN CITIES IN THE CONTEXT OF MIGRATION AND ENVIRONMENTAL ISSUES: GAZİANTEP METROPOLITAN MUNICIPALITY

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ABSTRACT
Environmental problems, which are already difficult and costly to solve by their qualifications, are becoming bigger problems in the cities with increasing population, industrializing, and migrating. The population growth, industrialization and even regular migration occur at a certain pace. This may provide some time for public administrations to take some measures and prepare the infrastructure of services for increasing needs. However, the wave of global migration, which started with the Syrian War, took place very quickly and captured the urban and state administrations unprepared.
Meet the vital needs (such as health, safety, shelter, and nourishment) of Syrian refugees who took refuge in Turkey, are more priority services fulfilled by central government and local governments. As these intensive refugee flows increased the number of people living in urban areas, even in the implementation of basic municipal services there emerged major difficulties. It has taken some time to adapt to this rapid change in services that require significant plans, projects, and high costs, such as solid waste services. However, in the following periods, it has been observed that the services required for the solution of the environmental and infrastructure problems have also started to be fulfilled.
This study focuses on intensive immigration cities, where those services for refugees are offered. In these cities, there are difficulties in the fulfilment of solid waste services, such as many basic local services. In the study, a conceptual framework will be presented primarily on migration and environmental issues. The administrative, political, financial, and social aspects of solid waste services will be examined, and their importance will be emphasized in terms of city and environment. Finally, the problems of solid waste in Gaziantep, which is the most affected by the Syrian crisis and hosts a large number of refugees, will be approached and the solid waste services of Gaziantep Metropolitan Municipality will be examined.
Keywords: Migration, Environment, City, Municipality, Solid Waste Services

INTRODUCTION

Human and economic activities such as agriculture and tourism, industrialization, urbanization, and rapid population growth are the main causes of environmental problems. With industrialization, population movements from rural areas to cities began to increase. While the population of cities is rising, urban services, infrastructure, superstructure, and housing stock in these settlement areas have not developed at the same pace. In addition to the negative consequences of the inadequate built environment, the natural environment and resources are rapidly consumed and polluted.
However, population growth, industrialization, and even regular migration occur at a certain pace. This may provide some time for city administrations to take some measures and prepare the infrastructure of services for increasing needs. On the other hand, the global migration wave that started with the Syrian War took place very quickly. It caught both central government institutions and local governments unprepared. As the population living in cities increases rapidly, there have been great difficulties in even providing basic municipal services. It took some time to solve the problems encountered especially in high-cost services that require long-term plans and projects, such as solid waste management.

1. ENVIRONMENTAL PROBLEMS IN IMMIGRANT-RECEIVING CITIES

Today, which is considered the information age, cities continue to receive immigration and the urban population is all the more increasing. However, this rapid population growth in urban areas brings with

FULL TEXTS BOOK

it many environmental problems. These environmental problems in migration-receiving cities can seriously affect the quality of life of local people and immigrants. Threats to the environment observed in cities that receive intense immigration are as follows:

- First of all, basic infrastructure deficiencies emerge in cities that receive intense immigration. Issues such as inadequacy of water and sewage systems and difficulties in waste management increase public and environmental health risks. Problems such as unplanned construction and slums cause uncontrolled deterioration of the urban environment.
- The second threat to the environment in immigrant-receiving cities is the problem of overconsumption of natural resources. The insufficiency of the built environment leads to rapid exploitation and pollution of the natural environment and resources. Pollution and excessive consumption of water resources, destruction of forests, and conversion of agricultural lands into residential areas damage biodiversity. The natural environment is important for a good urban environment. Damage to natural resources and ecosystems can endanger environmental sustainability.
- Finally, rapid population growth increases energy needs in cities. This increases the overuse of fossil fuels and therefore greenhouse gas emissions. In addition, heavy traffic and industrial activities cause air pollution.

In case of rapid and intense migration, city governments experience some difficulties in providing health, education, housing, social services, and infrastructure services (Güven, 2016). While newcomers to the city wait for many services to reach them, there may be poor quality and disruptions in the services of local people. There are traffic and transportation problems, a lack of green areas and parking spaces, electricity, drinking water, and sewage problems, and deficiencies in health and education. These lead to irregular and unplanned development of the city and some environmental problems (Ceritli, 1995):

- Disorganization of waste management and street cleaning services
- Deficiencies in water and sewage services
- Traffic problems and inadequacy in transportation services
- Spatial planning problems and unplanned use of land
- Illegal construction and slums (squatting)
- Exploitation and pollution of the natural environment and resources
- Deterioration of the social and cultural environment
- Destruction of forests, green areas, and agricultural areas

Irregular and unplanned urban development in cities that receive intense and rapid migration can lead to such environmental problems. There has been an intense and rapid influx of people to other countries since the civil war that started in Syria in 2011. Such a wave of migration, of course, affected the cities receiving immigrants more.

In Gaziantep, one of the cities where the highest number of refugees migrated from Syria, the problems listed above have been largely experienced. However, this study focuses on the difficulties experienced in solid waste management in Gaziantep and the services provided.

2. SOLID WASTE SERVICES IN CITIES THAT RECEIVE INTENSIVE MIGRATION: GAZİANTEP METROPOLITAN MUNICIPALITY

Providing solid waste services in cities that receive intense migration is one of the most important challenges for city administrations. It is possible to collect these difficulties under four headings:

- First, the amount of waste produced is increasing. Rapid population growth rapidly increases solid waste generation (the amount of waste generated per person per day) and challenges the current waste management system.

FULL TEXTS BOOK

- Solid waste management infrastructure remains inadequate. The current waste collection, transportation, processing, and storage infrastructure is falling short of meeting the rapidly growing amount of waste. Waste management projects are based on very costly and time-consuming practices.
- Inadequacy in solid waste services poses dangers to the environment and public health. It can lead to serious health and environmental problems such as depletion and pollution of natural resources, and soil, water, and air pollution.
- Legal and administrative inadequacies may cause solid waste services to be disrupted. If the legal frameworks, administrative decisions and policies regulating solid waste management are missing or weak, effective management cannot be achieved.

In addition to cities that normally already receive intense immigration, increasing global migration movements in recent years have become a significant challenge for city administrations. The wars and civil conflicts in Afghanistan, Iraq and most recently Syria have forced many people to relocate. Infrastructure services, especially solid waste management, emerge as a major problem in regions where immigrants and refugees densely live.

The number of refugees and asylum seekers is important to examine the effects of migration and refugee population on solid waste services in the city of Gaziantep, where this study focuses. Gaziantep hosts a significant refugee population after waves of immigration from Syria and other surrounding countries in recent years.

Table 1. Population of Gaziantep Province by Years

Year	Population
2009	1.653.670
2010	1.700.763
2011	1.753.596
2012	1.799.558
2013	1.844.438
2014	1.889.466
2015	1.931.836
2016	1.974.244
2017	2.005.515
2018	2.028.563
2019	2.069.364
2020	2.101.157
2021	2.130.432
2022	2.154.051
2023	2.164.134

Source: TÜİK, 2024

According to 2023 TÜİK data, the population of Gaziantep province is announced as approximately 2 million 164 thousand. As seen in Table 1, the population of Gaziantep, which is already becoming crowded every year, has increased by more than half a million in the last 15 years. After the civil war started in Syria in 2011, a large influx of refugees began to Gaziantep, one of the closest cities. In Table 1, asylum seekers accepted under "temporary protection" are not included in the figures. According to the data of the Ministry of Internal Affairs, Directorate of Immigration Management, dated July 11, 2024, the number of Syrians under temporary protection within the provincial borders of Gaziantep is around 430 thousand. In addition, more than 10 thousand foreigners in Turkey with a "residence permit" live in Gaziantep (Göç İdaresi Başkanlığı, 2024). All these data show that approximately 17 percent of the number of people living in Gaziantep are Syrian refugees and the population living in the city exceeds 2 million 600 thousand.

FULL TEXTS BOOK

In Gaziantep province, there are 9 district municipalities in addition to the metropolitan municipality. District municipalities are responsible for collecting waste within their borders and transporting it to facilities. The metropolitan municipality is responsible for the preparation of the solid waste management plan within the provincial borders and the management and coordination of the system. The metropolitan municipality has duties and powers, especially regarding solid waste facilities, that is, the separation, processing, recycling, and storage stages of solid waste management.

Table 2 shows the increase in solid waste collected in Gaziantep over the years. The amount of waste produced increases in direct proportion to the increase in population. However, the large increase, especially between 2010 and 2012, seems to be compatible with the period when the effects of the refugee influx were most visible.

Table 2. Amounts of Solid Waste Collected in Gaziantep Province by Years

Year	Ton
2001	263.327
2002	305.767
2003	344.140
2004	337.572
2006	443.512
2008	410.554
2010	413.233
2012	522.679
2014	584.017
2016	637.478
2018	650.984
2020	676.082
2022	682.796

Source: TÜİK, 2022

There are two solid waste regular storage areas in Gaziantep, one in the center and the other in the Nizip district (Table 3). At the same time, an average of 2 thousand tons of waste per day arrived in these landfills, where electrical energy is produced, in 2023. Since the storage life of these areas is about to expire, it is planned to build a new regular storage area in the Şehitkamil district (Dündarlı village). The waste coming to the Central Solid Waste Regular Landfill is taken to the "mechanical biological separation facility" and sorted. 100 thousand tons of urban waste is processed annually in this facility. The amount of packaging waste separated from domestic waste in 2023 is 1665.27 tons (Gaziantep Büyükşehir Belediyesi, 2024).

This modern waste separation facility fulfills an important function in solving the solid waste problem caused by overpopulation in the city due to the Syrian refugee crisis. The facility was built by the United Nations Development Program (UNDP) with financial support of 9.2 million euros from the European Union, in partnership with İlbank and Gaziantep Metropolitan Municipality. The facility, one of the largest in Europe in its class, exemplifies circular economy principles. When operational at full capacity, it is expected to produce biogas and recycled resources and provide additional income to the municipal budget (UNDP, 2021).

Table 3. Solid Waste Facilities in Gaziantep

Location	Facility	Start of Activity
Gaziantep Merkez	- Central Solid Waste Sanitary Landfill	2007
	- Electrical Energy Production Facility	2011
	- Mechanical Biological Waste Separation Facility	2022

FULL TEXTS BOOK

Nizip	- Nizip Solid Waste Sanitary Landfill - Electrical Energy Production Facility	2015 2022
Şehitkamil	- Şehitkamil Solid Waste Transfer Station	2021
İslahiye	- Fevzipaşa Solid Waste Transfer Station	2018
Araban	- Muratlı Solid Waste Transfer Station	2018

Source: Gaziantep Büyükşehir Belediyesi, 2024

Table 3 shows the solid waste facilities in Gaziantep. All but two of these facilities were built after 2011, when the refugee influx began. A regular landfill was established in Nizip in 2015, and other facilities were later built. New facilities are still being planned within the solid waste management system. To briefly summarize, in Gaziantep, in addition to 2 regular landfills, there are 2 landfill gas electricity generation facilities, 1 mechanical biological separation facility, and 3 solid waste transfer stations.

One of the waste transfer stations is in the Şehitkamil district, and the others are in Fevzipaşa and Muratlı villages. Approximately 1000 tons of domestic solid waste comes to the Şehitkamil waste transfer station daily. Waste is disposed of by transporting it to the central solid waste landfill via tractors and semi-trailers. The waste collected from the İslahiye and Nurdağı districts is brought to the Fevzipaşa waste transfer station, and the waste collected from the Araban and Yavuzeli districts is brought to the Muratlı waste transfer station. These two facilities receive approximately 120 tons and 60 tons of urban solid waste per day, respectively. Wastes are disposed of by being transported to the regular landfill in the center (Gaziantep Metropolitan Municipality, 2024).

CONCLUSION

The rapid increase in population in Gaziantep province due to intense migration and refugee influx, naturally, negatively affects the effectiveness of solid waste management services. While city governments in Gaziantep worked to meet the urgent and vital needs of refugees, they also made efforts for long-term services such as solid waste management. Since their budgets were not sufficient for these long-term and high-cost services, they cooperated with national organizations such as the GAP (Southeastern Anatolia Project) Regional Development Administration, and İlbank and international organizations such as the European Union, United Nations Development Program, and Japan International Cooperation Agency (JICA). They also partnered and cooperated with private sector organizations to provide some services and establish facilities (Gaziantep Büyükşehir Belediyesi, 2017; 2024; UNDP, 2024; GAP, 2024; Gökşin, 2018).

The Gaziantep example provides some useful information for local governments to provide effective, efficient, and economical solid waste services in cities that receive intense and rapid migration:

- First of all, the urban infrastructure as well as the infrastructure related to the solid waste management system should be strengthened. Solid waste services must be carried out strictly in accordance with an integrated and sustainable solid waste system.
- Integrated and sustainable solid waste management plans should comply with the waste hierarchy accepted in the sector and literature. In other words, waste reduction should be the priority and zero waste should be targeted.
- In addition to long-term policies and strategies, short-term plans should not be ignored.
- Technological innovations such as smart waste collection systems, waste separation, and recycling facilities should be utilized.
- Strengthening cooperation between the public sector and the private sector will provide advantages in improving the waste management infrastructure.
- Local, national, regional, and international cooperation opportunities should be explored in costly projects required for the solid waste management system.

FULL TEXTS BOOK

- Education and information activities that are inclusive of urban citizens, immigrants, and refugees and encourage social participation should be carried out.
- Participation and information activities regarding solid waste should be carried out with a multicultural understanding.

Solid waste management problems encountered in cities that receive intense and rapid migration are of great importance not only in terms of environment and public health but also in terms of urban life quality and sustainability. Integrated approaches, technological innovations, social participation, and effective governance are issues that should not be neglected to solve these problems.

For sure, it is not an easy task to quickly respond to a large wave of immigration, population growth, and the increase in the amount of solid waste with solid waste services. Solid waste management is one of the leading urban services that require great cost and time. It is based on planning and coordination, large investments, projects, and facilities. In addition, it is closely tied to public participation and good governance elements. This process is also challenging for Gaziantep in terms of time and cost, management, and planning. Nevertheless, there have been significant developments in the field of solid waste.

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FULL TEXTS BOOK

FOOD INDUSTRY IN AFGHANISTAN

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ABSTRACT
Afghanistan is a landlocked country located at the crossroads of Central Asia and South Asia. Occupying 652 230 km^2 of land, the country is predominantly mountainous with plains in the north and the southwest, which are separated by the Hindu Kush mountain range. It is an agricultural country where approximately 80% of the population is engaged in agriculture and animal husbandry. The agricultural and livestock sectors play a crucial role in improving the livelihoods of rural communities and meeting the needs of urban areas. However, agricultural productivity is low due to high insufficiencies. Food storage and processing are essential for improving the availability of diverse foods throughout the year. Despite the significant scale of agricultural production, the lack of technical facilities and machinery hampers full processing, resulting in most products being exported as raw materials. Agricultural products produced in Afghanistan mainly include food products such as fruits, vegetables, grains, and legumes. Simple techniques like drying fruits and vegetables and making pickles are common, but there is potential to enhance these practices to improve food quality and security. Traditional food processing involves post-harvest handling, sorting, washing, packaging, and storage, often done manually. Establishing processing and packaging centers enhances the potential for local and export markets. This study examines the food production of Afghanistan and provides insights into the significance of traditional food products in the country's food sector.
Keywords: Afghanistan, Agriculture, Livestock, Traditional Food Products, Food Processing

INTRODUCTION
Afghanistan is located in Central Asia with Iran to the west, with Turkmenistan, Uzbekistan, and Tajikistan to the north, with Tajikistan and China to the east and with Pakistan to the south. The country covers an area of 652,860 km^2 and has Kabul as its capital (Bashiri, 2002). In 2023, the total Afghan population was estimated to be 43 million, with approximately 85 percent living in rural areas. However, these numbers can vary significantly due to the ongoing impacts of conflict and instability in the country. The major ethnic groups include Pashtun, Tajik, Hazara, and Uzbek (Bashiri, 2002).
Afghanistan is an agricultural country with approximately 80% of the population engaged in agriculture and animal husbandry. Agriculture and livestock products not only improve the villages' lives but also meet the cities' needs. These two sectors play a crucial role in improving the livelihoods of rural communities and meeting the needs of urban areas.
Agricultural products that Afghanistan is known for can be listed as wheat, fruits (Kandahar pomegranates, grapes, apricots etc.), nuts (almonds and pistachios), vegetables (i.e. potatoes, onions), and saffron. Livestock farming, including sheep, goats, and cattle, is also plays a vital role in the agricultural sector, providing meat, milk, and wool. The country was once self-sufficient in livestock products. However, agricultural productivity is low due to high insufficiencies (practical, allocative, and economics). The lack of technical facilities and machinery hampers full processing, resulting in most

FULL TEXTS BOOK

products being exported as raw materials. Also challenges such as lack of resources, water scarcity, inadequate agronomic methods, lack of crop storage facilities, low-quality seeds, inadequate infrastructure, high input cost, security issues, climate change, outdated farming techniques, market access, financial constraints, education and training collectively hinder the growth and efficiency of agricultural sector of the country (Samim & Zhiquan, 2020). Consequently, most products are exported as raw materials and are then processed and marketed abroad.

Afghanistan's key exports consist of vegetable saps, fresh and dried grapes, carpets and other textile floor coverings, as well as fresh and dried fruits. The country's primary imports include wheat and meslin flour, textile braids, animal or vegetable fats and oils, petroleum gas, machinery, and surgical instruments. The main importers of Afghan products are Pakistan, India, Iran, Türkiye, and Iraq, while the leading sources of Afghan imports are Iran, Pakistan, China, Kazakhstan, and Uzbekistan (Mazhar, 2020).

Despite Afghanistan's rich agricultural output, including fruits and vegetables, many families still lack diverse food, especially in remote areas during winter. The country has intense and prolonged winters, especially in the Central Highlands, Northern Plains, and the Hindu Kush range. The cold and snow restrict the local availability of fresh foods and hinder the transport of the different types of food from other regions. As a result, many families face significant food insecurity and malnutrition for several months each year. This limited diet contributes to widespread micronutrient deficiencies, particularly affecting mothers and children. However, the country is slowly regaining crop production, with positive developments such as the spread of improved seeds and increased use of fertilizers contributing to food production recovery.

The amount of agricultural production in Afghanistan is not consistently monitored or reported by government agencies. This lack of comprehensive data makes it difficult to assess the true scale and trends in the food industry.

Food Processing and Storage

Many Afghan families currently employ basic food storage and processing methods, such as drying fruits and vegetables or producing pickles. However, there is potential to enhance these processed foods' quality and diversify the techniques utilized. Introducing advanced food processing in regions where it is not yet common-such as Bamyan, Badakhshan, Ghor, and Daikundi, which are typically food-insecure, could positively impact household food security, nutrition, and income. Due to limited awareness and knowledge about simple post-harvest food processing techniques, food losses are generally high in Afghanistan.

Traditional food processing techniques that have been used for generations to preserve and enhance the products are given below:

Sun-drying is a common method used for preserving fruits such as grapes (for raisins), apricots, and vegetables. This technique involves spreading the produce in the sun to remove moisture, preventing spoilage and extending shelf life.

Salting and drying are traditional methods for preserving meat. The meat is first salted to draw out moisture and then dried.

Fermentation is used to produce a variety of dairy products such as yogurt and kurut. This technique not only preserves milk but also enhances its nutritional value and flavor.

Pickling is a popular method for preserving vegetables. Cucumbers, carrots, and other vegetables are immersed in a solution of vinegar, salt, and spices, creating flavorful pickles that can be stored for long periods.

Drying herbs and spices: Herbs like mint and coriander, as well as spices like saffron, are traditionally dried to preserve their flavor and potency. These dried herbs and spices are essential ingredients in Afghan cuisine.

FULL TEXTS BOOK

Grinding and Milling (Flour Production): Traditional stone mills are often used to grind grains such as wheat into flour. This method retains more nutrients compared to modern milling techniques and is still practiced in many rural areas.

Jams and Preserves: Making jams and fruit preserves is a traditional technique for extending the shelf life of fruits.

In some areas of Afghanistan, simple coolers are used for storage. These coolers are effective in maintaining lower temperatures and preserving products. Additionally, underground storage pits and caves are utilized for storing vegetables like potatoes and root crops. These traditional methods help extend the shelf life of produce in regions where modern storage facilities may be lacking.

Industrial Food Processing

Afghanistan's food industry plays a pivotal role in both the domestic and regional economies. The combination of traditional and modern processing techniques is crucial for enhancing the quality and sustainability of agricultural products.

Afghanistan remains an agrarian country with most analyses holding food production and processing as key to recovery. Increasing food processing capacity throughout Afghanistan has become a central focus of the central government of Afghanistan, development organizations, and private investors. Recently, the establishment of food processing companies in order to better exploit Afghanistan's products has attracted more attention from the public and private sectors. Practical steps have been taken to establish new food processing companies, and a large number of companies have started their activities in various sectors. However, their work is in the early stages and can be improved according to the relevant departments (Tavva et al., 2019).

A list of food production and processing factories has been prepared by the Ministry of Agriculture; however, this list is not completed, and many factories are not included in it (Table 1).

Table 1. Food Production and Processing Companies in Afghanistan (Noori, 2020)

No	Name of Factory	Activity	Location
1	Afghan Rice Processing and Packaging Company	Rice production / processing	Nangarhar
2	Afghan Women Fruits/Vegetables Processing Company	Food production	Kabil
3	Arab Rice Production and Processing Company	Rice production / processing	Laghman
4	Armin Agricultural Company	Food production	Balkh
5	Aryan Agricultural Company	Food production	Kabil
6	Baghlan Rice Production and Processing Company	Rice production / processing	Baghlan
7	Bahar Biscuit Production Company	Food production	Kabil
8	Bamyan Company	Food production	Kabil
9	Chiefs Nan Pazi	Food production	Kabil
10	Dil Pesand Company	Food production	Kabil
11	Dinar Khel Company	Food production	Kabil
12	Easy Food	Food production	Kabil
13	Etehad Jawedan Company	Food production	Balkh
14	Faqiri Food Production Company	Food production	Kabil
15	Farhangesh Company	Food production	Balkh
16	Firooz Nouri Food Production Company	Food production	Balkh

FULL TEXTS BOOK

17	Gholam Jan Industries	Food production	Balkh
18	Golsar Agricultural Company	Food production	Herat
19	Gul M Akhtarzadeh Agricultural Company	Food production	Kabil
20	Helmand Saybin Production and Processing Company	Food production	Helmand
21	Hery Dunya Company	Food production	Kabil
22	Hivad Doost Group Agricultural Company	Food production	Kabil
23	Ispar Aria Company	Food production	Kabil
24	Kabul Super Company	Food production	Kabil
25	Kabul Zubair Beyk	Food production	Kabil
26	Maiwand Asia Company	Lentils processing	Kabil
27	Muzaffar Ebadi Food Production Company	Food production	Balkh
28	Nan Khoshmaza Production Company	Food production	Kabil
29	Nawin Afghan Company	Food production	Kabil
30	Noor Safi Limited Company	Food production	Herat
31	Sami Ebrahim Rice Processing and Packaging Company	Rice production / processing	Nangarhar
32	Shad Mir Food Production Company	Food production	Balkh
33	Shoaib Faisal Company	Food production	Kunduz
34	Suharab Company	Food production	Kabil
35	Super Rayhan Company	Food production	Kandahar
36	Yaksad Agricalcural Company	Food production	Kabil
37	Zahed production, processing and packaging company	Rice production / processing	Kabil
38	Zer Dast Company	Food production	Kunduz

12 fruit processing and packaging centers were established in five provinces of Afghanistan. Each center has a processing capacity of 7 tons of fruit per day, which includes washing, grading, and packaging. At present, Afghan fruits are mostly sold in the markets in the traditional way. Fruit processing companies are not yet operating in the country, and the fruits are transferred to the markets through plastic bags. Improper transportation and packaging of Afghan fruits cause even these fruits to rot and lose their quality until they reach local markets.

Afghanistan’s expanding food and beverage processing sector reflects the country’s core strengths in dried fruits and nuts, as well as new products typically supplied as imports, such as bottled water, soft drinks, and vegetable oil. Raisins dominate this sector, as the largest economic horticultural crop in Afghanistan, and its primary export commodity and the legacy of a traditional Afghan industry once accounted for 60% of the world raisin market.

These exports play a crucial role in the country's economy by generating revenue and supporting livelihoods. The production and export of the goods create job opportunities for many Afghans, supporting local communities and promoting economic development. While exporting these products brings economic benefits, there are challenges such as market access, quality control, unreliable data, limited modern storage facilities, and logistical issues. Addressing these challenges and exploring new markets can further boost the impact of these exports. In addition, by focusing on improving production efficiency, expanding market access, and embracing both traditional and modern practices, Afghanistan can enhance its food security, increase its regional integration, and boost economic growth. Moving forward, continued investment in infrastructure, technology, and training will be essential to support these goals and ensure a prosperous and sustainable future for Afghanistan's food industry.

FULL TEXTS BOOK

According to the data reported by spokesman for the Ministry of Industry and Commerce, Afghanistan has exported 255 tons of fresh fruit so far this year to India, Europe and some Arab nations, making 30 percent increase compared to the same period in 2018 (Jahanmal, 2021).

According to the Afghanistan Chamber of Trade and Investment, the list of the latest food products exports is listed in Table 2. The list also includes countries to which food products have been exported with the amount of ingredients and the total price of each item.

Table 2. List of food products exported from Afghanistan in 2019 (Popal, 2020)

No	Product	Product quantity (kg)	Price ($)	Country to which product was exported
1	Red raisins	14 640 000	43 920 400	Turkey, Pakistan, Russia, Kazakhstan, Iran, Australia, Saudi Arabia, Netherlands, China, India, Germany, Spain + 20
2	Green raisins	525 549 300	3 678 845 000	India, Dubai, Germany, Canada, USA, Australia, Iran, UK, Sweden, Saudi Arabia, Pakistan, New Zealand, Turkey + 18
3	Black raisins	822 856 200	5 759 993 500	India, Dubai, Iran, Kuwait, Kazakhstan, Germany, Canada, Turkey + 20
4	Abjosh raisins	1 244 410 700	6 222 053 540	India, Dubai, USA, Canada, Turkey, China
5	Pistachio	135 315 900	1 930 725 900	India, Lebanon, Turkey, Dubai, USA, Germany, Canada, France, Japan, UK, Sweden, Kazakhstan, Uzbekistan, China, Malaysia, Norway + 14
6	Almond	5 237 100	40 039 000	Turkey, Dubai, Germany, India, Saudi Arabia, Iran, Australia, Iraq, Pakistan, USA, Kuwait, UK + 10
7	Chilgoza	18 700	617 150	India, Dubai, UK, USA, Australia, Pakistan, Sweden, Turkey, New Zealand, France + 7
8	Walnuts	2 138 000	4 413 800	India, Dubai, Pakistan, UK, Belgium, Germany, Sweden, Japan, USA, Turkey + 7
9	Dried fig	10 395 700	75 888 700	India, Dubai, Germany, USA, Canada, UK, Pakistan, Kuwait, Qatar, Australia + 9
10	Saffron	32 000	27 428 700	India, Saudi Arabia, Dubai, USA, Spain, Germany,

Investors in the food and beverage processing sector can capitalize on large, adjacent consumer markets, and Afghanistan's growing domestic population. The fact that most processed food and beverage items are currently imported into Afghanistan to meet local demand shows clear potential for production in the country. In terms of exports, Afghanistan now provides only 2% of the US$2.2 billion, 1.3 million-

FULL TEXTS BOOK

ton world market for raisins, pistachios, almonds and walnuts. India and Pakistan-two of the world's most populous countries-are proximate, natural buyer markets for Afghan products. In fact, Afghanistan's traditional fruit products, especially raisins, already are a recognized quality brand and common cooking ingredient among India's one billion consumers. In addition, the reduced import duties of several preferential trade agreements provide a strong incentive for exporters in Afghanistan. A recent agreement with India covers many dried and fresh fruits and nuts, including Afghan green, black, golden and red raisins.

CONCLUSION AND DISCUSSION

Afghanistan's food industry plays a pivotal role in both the domestic and regional economies. The combination of traditional and modern processing techniques is crucial for enhancing the quality and sustainability of agricultural products. The country's key exports, such as raisins, pistachio, and saffron, not only contribute significantly to its trade balance but also bolster employment and economic development. However, challenges such as unreliable data, limited modern storage facilities, and market access issues must be addressed to fully realize the potential of Afghanistan's food sector. By focusing on improving production efficiency, expanding market access, and embracing both traditional and modern practices, Afghanistan can enhance its food security, increase its regional integration, and boost economic growth. Moving forward, continued investment in infrastructure, technology, and training will be essential to support these goals and ensure a prosperous and sustainable future for Afghanistan's food industry

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FULL TEXTS BOOK

AFGANİSTAN'IN SÜT ÜRETİMİ VE GELENEKSEL SÜT ÜRÜNLERİ

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ÖZET
Afganistan, Çin ve Hindistan'ı birbirine bağlayan enerji koridoru üzerinde bulunan stratejik konumda bir ülkedir. Ülke ekonomisi ağırlıklı olarak tarım ve hayvancılığa dayalı olup süt ve süt ürünleri en önemli tarım ürünlerindendir. Hayvancılık, ülkedeki çiftçiler ve aileler için en önemli gelir kaynaklarının başında gelmektedir. Ancak, Afganistan uzun süren çatışmalar, altyapı eksiklikleri ve sınırlı teknolojik ilerlemeler gibi birçok negatif durumla karşı karşıyadır. İklim krizi, kuraklık, sezonluk ürün dalgalanmaları, yetersiz soğuk zincir altyapısı ve sınırlı pazar erişimi de gıda sektörünün gelişmesini yavaşlatan temel etmenler arasındadır. Tüm bu zorluklara rağmen, Afganistan süt endüstrisi dikkate değer bir dayanıklılık ve büyüme potansiyeli göstermektedir. Ülkede üretilen süt ürünleri genellikle inek sütünden yapılmaktadır. İnek sütünün yanı sıra keçi, koyun, manda ve deve sütlerinden de geleneksel olarak yapılan süt ürünleri bulunmaktadır. Genellikle geleneksel süt ürünleri küçük çaplı işletme ve ev işletmelerinde yapılıp satışa sunulmaktadır. Üretilen süt ve süt ürünleri; taze süt, kaymak, yoğurt, süzme yoğurt (chaka), ayran (doogh), peynir, kurut, tereyağı ve krema olarak sıralanabilmektedir. Bu ürünlerin çoğu hem geleneksel olarak hem de endüstriyel boyutta üretilmektedir. Bunun yanı sıra süt kullanılarak yapılan çeşitli içecek, yemek ve tatlılar bulunmaktadır. Bu çalışmada Afganistan'ın süt üretimi incelenerek geleneksel süt ve süt ürünlerinin üretimi ile ilgili bilgiler verilmiştir.
Anahtar Kelimeler: Afganistan, Süt Üretimi, Geleneksel Süt Ürünleri, Süt Endüstrisi

GİRİŞ
Afganistan, 652 230 km^2 alan ile Asya'da denize sınırı olmayan 1919 yılından itibaren bağımsız bir devlettir. Ülkenin kuzeyinde Türkmenistan, Özbekistan ve Tacikistan, doğusunda Tacikistan ve Çin, güneyinde Pakistan ve batısında İran bulunmaktadır (Bashiri, 2002). Afganistan, Çin ve Hindistan'ı birbirine bağlayan enerji koridoru üzerinde bulunan stratejik konumda bir ülkedir.

Afganistan'ın ekonomisi, topraklarının sadece %15'i ekilebilir olmasına rağmen, ağırlıklı olarak tarım ve hayvancılığa dayanmaktadır. Ülkede tarım ve hayvancılığın, özellikle de koyun ve keçi yetiştiriciliğinin önemi büyüktür (T.C. Ticaret Bakanlığı, 2020). Sanayi üretimi ise ağırlıklı olarak küçük çapta tekstil, sabun, mobilya, ayakkabı, gübre, çimento, el yapımı halılar, doğal gaz, yağ, kömür, bakır, mermer işletmelerine dayanmaktadır (T.C. Ticaret Bakanlığı, 2020).

Afganistan'ın ekonomik görünümü 2001 yılından beri, uluslararası yardım akışı ve dört yıllık bir kuraklığın ardından, artan yağışlarla tarımsal üretimde gözlenen çarpıcı artış sayesinde önemli ölçüde iyileşmiş olmakla birlikte, ülke halen dünyanın en fakir ülkelerinden biridir. Diğer taraftan, ülke ekonomisi 2005-2017 yılları arasında yıllık ortalama yaklaşık %8.3 oranında artarken, 2018 yılında %3 oranında artışın olduğu bildirilmiştir. Bu düşüşte olumsuz hava koşulları büyük rol oynamıştır (T.C. Ticaret Bakanlığı, 2020).

FULL TEXTS BOOK

Süt ve süt ürünleri en önemli tarım ürünlerindendir. Hayvancılık, ülkedeki çiftçiler ve aileler için en önemli gelir kaynaklarının başında gelmektedir. Ancak, Afganistan uzun süren çatışmalar, altyapı eksiklikleri ve sınırlı teknolojik ilerlemeler gibi birçok negatif durumla karşı karşıyadır. İklim krizi, kuraklık, sezonluk ürün dalgalanmaları, yetersiz soğuk zincir altyapısı ve sınırlı pazar erişimi de gıda sektörünün gelişmesini yavaşlatan temel etmenler arasındadır (Samim ve Zhiquan, 2020). Tüm bu zorluklara rağmen, Afganistan süt endüstrisi dikkate değer bir dayanıklılık ve büyüme potansiyeli göstermektedir. Hayvan yetiştiriciliğinde modern yöntemler kullanılmamasına rağmen hayvancılık, ülkedeki çiftçiler ve aileler için en önemli gelir kaynaklarının başında gelmektedir.
Son yıllarda ülkede süt sektöründe belirgin gelişmeler görülmektedir. Çizelge 1.'de 2019 yılında kaydedilen 26 süt ürünleri işletmelerinin listesi verilmiştir.

Çizelge 1. Afganistan'da faaliyet gösteren süt ve süt ürünleri işletmeleri (2019)

No	İşletme Adı	Üretilen Ürünler	Kullanılan Hammadde	Yer	İşletmenin Kuruluş Yılı
1	Afghan Maldar Fabrikası	Süt, krema, ayran ve tereyağı	İnek sütü ve süt tozu	Kandahar	-
2	Baghlan Süt Ürünleri Fabrikası	Yoğurt, peynir ve ayran	İnek sütü	Baghlan	2010
3	Balkh Süt Ürünleri Birliği	Pastörize süt, yoğurt, tereyağı, krema, peynir, chaka, shirpera	İnek sütü	Mezâr-ı Şerîf	2005
4	Chopan Herat Süt Ürünleri Fabrikası	Yoğurt, krema ve ayran	İnek sütü	Herat	2015
5	Dehqan Roz Mushtari Süt Fabrikası	Yoğurt, ayran, chaka ve krema	İnek sütü ve süt tozu	Kabil	2010
6	Family Süt Ürünleri Fabrikası	Yoğurt, süt, yağsız süt, chaka	İnek sütü ve süt tozu	Kabil	2016
7	Gulistan Arghawan Fabrikası	Peynir, ayran, krema ve yoğurt	İnek Sütü	Herat	2017
8	Habib Gulzar	Süt tozu	Süt tozu	Kabil	2019
9	Herat Ice Krema	Yoğurt, ayran, dondurma	İnek sütü ve süt tozu	Herat	2009
10	Herat Süt Ürünleri Birliği	Pastörize süt, yoğurt, tereyağı, krema, peynir, chaka	İnek sütü	Herat	2012
11	Hüseyni Şirketi	Yoğurt, ayran, chaka ve tereyağı	İnek sütü	Kabil	2017
12	Kabil Süt Ürünleri Birliği	Pastörize süt, yoğurt, tereyağı, krema, peynir, chaka	İnek sütü	Kabil	2005
13	Kamil Süt Ürünleri	Kurut, yoğurt ve ayran	İnek sütü ve süt tozu	Herat	2016
14	Khateez Süt Ürünleri Birliği	Pastörize süt, yoğurt, tereyağı, krema, peynir, chaka	İnek sütü	Celalabad	2015

FULL TEXTS BOOK

15	Kunduz Süt Ürünleri Birliği	Pastörize süt, yoğurt, tereyağı, krema, peynir, chaka	İnek sütü	Kunduz	2006
16	Mashaal (Bahare sabz)	Yoğurt ve ayran	İnek sütü ve süt tozu	Kabil	2011
17	Medo Süt Ürünleri	Yoğurt	İnek sütü ve süt tozu	Kabil	2017
18	Milko Süt Ürünleri Şirketi	Yoğurt, peynir, ayran, süt ve krema	İnek sütü ve süt tozu	Kandahar	2017
19	Mushtari Süt Fabrikası	Yoğurt ve ayran	İnek sütü ve süt tozu	Kabil	2015
20	Nishat Süt Ürünler	Süt, yoğurt, ayran ve krema	İnek sütü	Kabil	2019
21	Omid Bahar Milk Plus	Süt	Süt tozu	Kabil	-
22	Pakiza Süt Ürünleri	Yoğurt, ayran ve tereyağı	İnek sütü ve süt tozu	Mezâr-ı Şerîf	2015
23	Sada Süt Ürünleri	Yoğurt, chaka, peynir ve tereyağı	İnek sütü	Logar	2013
24	Shirgah Süt Ürünleri Sanayi Şirketi	Yoğurt, tereyağı, kurut, ayran ve krema	İnek Sütü	Herat	2017
25	Takhar Süt Ürünler	Süt, yoğurt, ayran ve chaka	İnek sütü	Takhar	2016
26	Tala Süt Ürünleri Fabrikası	Süt, yoğurt ve ayran	İnek sütü ve süt tozu	Kabil	2012

Çizelge 1.'de verilen işletmeler arasında en eski işletme olan Kabil Süt Ürünleri Birliği günümüzde de halen faaliyet göstermektedir. İşletmede pastörize süt, krema, tereyağı, sarı yağ, chaka, peynir, yoğurt ve ayran üretimleri gerçekleştirilmektedir. Ürünler, geleneksel yöntemlerle genellikle katkı maddeler kullanılmadan üretilip satışa sunulmaktadır. Ancak, yoğurdun üretiminde mikrobiyal transglutaminazın kullanıldığı görülmektedir.

Afganistan'da üretilen süt ürünleri genellikle inek sütü kullanılarak yapılmaktadır. İnek sütünün yanı sıra keçi, koyun, manda ve deve sütlerinden de geleneksel olarak yapılan süt ürünleri bulunmaktadır. Genellikle geleneksel süt ürünleri küçük çaplı işletme ve ev işletmelerinde yapılıp satışa sunulmaktadır. Üretilen süt ve süt ürünleri; taze süt, kaymak, yoğurt, süzme yoğurt (chaka), ayran (doogh), peynir, kurut, tereyağı ve krema olarak sıralanabilmektedir. Bu ürünlerin çoğu hem geleneksel olarak hem de endüstriyel boyutta üretilmektedir. Bunun yanı sıra süt kullanılarak yapılan çeşitli içecek, yemek ve tatlılar bulunmaktadır. Çalışmanın sonraki bölümlerinde Afganistan'da geleneksel olarak ve endüstriyel boyutta üretilen süt ve süt ürünleri hakkında bilgiler verilmiştir.

AFGANİSTAN'DA ÜRETİLEN SÜT VE SÜT ÜRÜNLERİ

Yoğurt

Yoğurt, diğer ülkelerde olduğu gibi Afganistan'da da yaygın olarak üretilen bir fermente süt ürünüdür. Ülkede sade yoğurt olarak adlandırılan bir çeşit yoğurt üretilmektedir. Geleneksel yoğurt üretiminde maya olarak önceden yapılmış yoğurt kullanılmaktadır.

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Ayran (Doogh)

Doogh olarak bilinen ayran önceden hazırlanmış yoğurttan yapılmaktadır. Yoğurt deri tuluma, pişmiş topraktan yapılan kap veya bakır tas içerisine alındıktan sonra kabın ağzı kapatılıp yaklaşık bir saat boyunca çalkalanmaktadır. Çalkalanma sırasında yoğurdun yağı ayrılmakta ve bir araya toplanmaktadır. Arta kalan su ise doogh olarak isimlendirilmektedir. Doogh genellikle salatalık, tuz ve nane ile karıştırılarak yaz aylarında yemeklerle birlikte tüketilmektedir. Günümüzde doogh endüstriyel boyutta da üretilmektedir.

Süzme Yoğurt (Chaka)

Ülkede yağlı ve yağsız olmak üzere iki çeşit süzme yoğurdu üretilmektedir. Halk arasında süzme yoğurt chaka olarak adlandırılmaktadır. Yağlı chaka doğrudan yoğurdun bezlerden süzdürülmesi ile elde edilirken, yağsız chaka doogh'un bezlerden süzdürülerek (Şekil 1) suyundan ayrılması ile elde edilmektedir.



Şekil 1. Chaka

Peynir Çeşitleri

Afganistan'da çok fazla peynir çeşidi bulunmamaktadır. En yaygın peynir çeşitleri; taze peynir, Kulça peynir, Ashawa peynir ve Kurut olarak verilebilir.

Taze peynir: Bu peynirin üretim yönteminde bölgeden bölgeye farklılıklar görmek mümkündür. En ayırt edici farklılıklardan biri kullanılan pıhtılaştırıcı türüdür. Bazı yörelerde bitkisel maya (*Withania coagulans*) kullanılırken, bazılarında şirdenden yapılan maya kullanılmaktadır. Bitkisel maya kullanılan yöntemde; ısıtılmış süt içerisine önceden temizlenerek kurutulan ve toz haline getirilen W*ithania coagulans*'ın bir bez içerisinde süte daldırılmakta ve süt mayalandıktan sonra bir bezden süzdürülerek peyniraltı suyundan ayrılmaktadır. Bu peynirin nem miktarının yüksek olmasından dolayı peynirin raf ömrü kısadır. Bu nedenle kısa sürede tüketilmesi önerilmektedir. Taze peynirin bez içerisinde süzdürülerek iyice peyniraltı suyundan ayrıldıktan sonra salamura içerisinde 4-6 saat bekletilmesi ile tuzlu taze peynir (Şekil 2) de elde edilebilmektedir.

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Şekil 2. Tuzlu peynir

Kulça peyniri: sütün bir tencerede ısıtıldıktan sonra içerisine birkaç damla limon suyu veya sirke eklenerek mayalanması sağlanmaktadır. Kısık ateşte süt karıştırılarak ısıtılmaya devam edilmektedir. Teleme ve peyniraltı suyu iki ayrı faz şeklinde ayrıldığında karıştırma ve ısıtma işlemine son verilmekte ve telemenin peyniraltı suyu içerisinde beş dakika boyunca çökmesi beklenmektedir. Daha sonra teleme iki katlı bez içerisine aktarılarak peyniraltı suyunun ayrılması sağlanmaktadır. El yardımıyla bez içerisindeki teleme suyundan ayrılmaktadır. Ayrıca süzdürme işlemi sırasında içerisinde teleme bulunan bezin üzerinden soğuk su geçirilmektedir. Bez içerisinde peynir kendi halinde birkaç saat bekletilmektedir. Daha sonra bezler açılmakta ve taze olarak tüketilmektedir. Kulça peyniri halk arasında genellikle kuru üzümle birlikte servis edilmektedir. Bu nedenle bazı bölgelerde kuru üzümlü peynir anlamına gelen "kishmish paneer" olarak da isimlendirilmektedir. Kulça peynirinin önceden kaynatılmış ılıtılmış tuzlu su içerisinde (salamura) birkaç saat bekletilmesi ile "Ashawa peynir" olarak bilinen diğer peynir çeşidi elde edilmektedir.

Kurut

Kurut, yoğurt ve chaka'dan elde edilen Afganistan'ın en popüler süt ürünlerinden biridir. Afganistan'ın yanı sıra kurut Orta Asya ülkelerinde de yaygın şekilde üretilmektedir. Kurut yapımı için öncelikle yoğurt hazırlanmakta, daha sonra yoğurt suyunun hemen hemen tamamının ayrılması için yoğurt keten torbalar içerisinde birkaç gün süzdürülmektedir. Elde edile chaka daha sonra bezlerden çıkartılarak tuzlanmakta ve el ile şekil verilerek güneş almayan temiz bir ortamda kurutulmaktadır. Bu şekilde üretilen süt ürününe kurut ismi verilmektedir (Şekil 3). Kurut uzun süre bozulmadan kuru ortamda muhafaza edilebilmektedir.



Şekil 3. Kurut

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Kaymak

Afganistan'da kaymak olarak bilinen süt ürünü süt üzerinde oluşan yağa verilen bir addır. Süt kaymağı ve yoğurt kaymağı olmak üzere ülkede iki çeşit kaymak yapılmaktadır. Süt kaymağının yapılması için, kaynatılmış süt bir süre açık havada soğumaya bırakılmakta, ardından sütün üzerinde ince bir tabaka şeklinde oluşan yağ toplanmaktadır. Yoğurt kaymağın yapılması için ise taze hazırlanmış yoğurt soğutulduktan sonra açık havada bir süre bekletilmektedir. Yoğurt üzerinde oluşan yağ tabakası yoğurdun pıhtısı kırılmadan yavaşça alınmaktadır (Şekil 4). Yoğurt kaymağı, yoğurt tadına sahip olduğu için ve süt kaymağına göre oluşan yağ tabakasının kalınlığı daha fazla olduğu için halk tarafından daha çok tercih edilmektedir.



Şekil 4. Gazne kaymağı

Tereyağı

Tereyağı, esas olarak inek veya koyun sütünden üretilen yoğurdun çalkalanması ve ortaya çıkan yayık suyunun ayrılması ile elde edilmektedir. Çalkalama işlemi keçi derisi içinde yapılmakta ve çalkalama sırasında yağ ve su olmak üzere iki süt ürünü elde edilmektedir. Yağ kısmı tereyağı olarak isimlendirilirken (Şekil 5), arta kalan su ayran (doogh) olarak adlandırılmaktadır. Köylerde soğuk hava depolarının ve/veya buzdolaplarının bulunmamasından dolayı tereyağı soğuk su içinde muhafaza edilmektedir. Bunun yanı sıra elde edilen tereyağdan hoş koku ve koyu sarı renge sahip olan ve sarıyağ olarak adlandırılan bir süt ürünü de yapılabilmektedir. Sarıyağı, yoğurdun kısık ateşte uzun süre kaynatılmasıyla elde edilmektedir. Buradaki amaç, tereyağda bulunan tüm suyun buharlaşmasıdır. Bu şekilde üretilen sarıyağ uzun süre bozulmadan muhafaza edilebilmekte ve genellikle çeşitli yemeklerin yapımında kullanılmaktadır.



Şekil 5. Taze tereyağı

Krema

Halk arasında krema iki şekilde elde edilmektedir. Birinci yöntem, çiğ sütün bekletilerek üzerinde oluşan yağın yavaş yavaş toplanmasını ifade ederken, ikinci yöntem sütün kaynatıldıktan sonra bir gece buzdolabında bekletilerek ardından üzerinde oluşan yağın toplanmasını ifade etmektedir.

Dondurma (Sheer Yakh)

Bu ürünün yapımı çok zahmetli olmasına rağmen ülkenin hemen hemen tüm illerinde üretilip tüketilmektedir. Yapımında kullanılan malzemeler; taze süt, kakule, gül suyu, şeker, kaymak, fıstık ve badem olarak sıralanmaktadır.

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Dondurma üretimi: Bir litre süt kısık ateşte kaynatıldıktan sonra içerisine bir yemek kaşığı mısır nişastası eklenip iyice karıştırılmaktadır. Daha sonra ayrı bir tencerede şeker, kakule ve gül suyu şerbet kıvamına getirildikten sonra süt karışımına ilave edilip kaynatma işlemine devam edilmektedir. Karışım buzdolabında soğutulduktan sonra 2/3'si bir tencereye alınıp kalan kısım buzdolabında soğumaya devam edilmektedir. Daha sonra soğumuş miksin bulunduğu tencere buz parçaları bulunan daha büyük bir tencerenin içerisine konulmakta ve hızlı şekilde karıştırma işlemi yapılmaktadır. Karışımın sürekli olarak tencerenin duvarlarına yayılarak donması sağlanmaktadır. Bu şekilde elde edilen dondurma kaymak, ufalanmış fıstık ve badem ile süslenerek servis edilmektedir.

Süt Tozu

Afganistan'da süt tozu üretimi yapılmayıp çoğunlukla ambalajsız şekilde diğer ülkelerden ithal edilmektedir. Bu süt tozu, genellikle süt işleme şirketleri tarafından taze inek sütü ve diğer süt ürünleri olarak etiketlenmeden içme sütü şeklinde hazırlanmakta ve satışa sunulmaktadır. Bu durum, etiketleme ve tüketiciyi yanıltma açısından sahtekarlık olarak değerlendirilmektedir. Bu durum, halk arasında süt işleme şirketlerine karşı güvensizlik oluşturmuş ve tüketicilerin birçok şirketten süt ve süt ürünlerinin satın almasını engellemiştir.

GELENEKSEL SÜTLÜ İÇECEKLER

Afganistan'da taze süt çok popüler olup çoğunlukla kahvaltıda çay ile tüketilmektedir. Bölgeden bölgeye taze sütten farklı içecekler hazırlanmaktadır. Bunlardan en yaygın olanları aşağıda özetlenmiştir.

Sütlü Kakule Çayı (Sheer Chai)

Sheer chai sütlü çay anlamına gelmektedir. Sütlü kakule çayı Afganistan'da çok sevilen bir içecek olup en çok ülkenin başkenti olan Kabil'de yapılıp tüketilmektedir. Aslen Keşmir'den gelen bu nefis içecek, Keşmir Çayı olarak da bilinmektedir. Gerçek Keşmir çayı yapımında yalnızca Keşmir'de bulunan özel çay yaprakları kullanılırken, Afgan Sheer Chai için herhangi bir siyah veya yeşil çay yaprağı kullanılabilmektedir. Sheer Chai yapımında siyah çay ve taze süt (inek veya koyun sütü) yanı sıra şeker ve kakule kullanılmaktadır. Siyah çay hazırlandıktan sonra içerisine süt, kakule ve şeker ilave edilerek iyice karıştırılıp birkaç dakika boyunca kaynatılmaktadır.

Tuzlu Sütlü Çay (Shor Chai)

Ülkenin güney bölgesinde, özellikle Badakhshan ilinde yaygın olarak yapılan bir içecektir. Shor chai için gereken malzemeler; taze süt (inek, keçi veya koyun sütü), siyah çay, çeviz hamuru, kaymak ve tuz şeklindedir. Yapımında öncelikle çay hazırlanılmakta, daha sonra içerisine süt, tuz, çekilmiş ve hamur haline getirilmiş ceviz ilave edilerek karıştırılmaktadır. Karışım birkaç dakika kaynatıldıktan sonra bardaklara dökülerek üzerine kaymak konulup servis edilmektedir.

Kaymak Çay

Bu içeceğin hazırlanması için başta yeşil çay olmak üzere, süt, kabartma tozu, kaymak, şeker, kakule ve ufalanmış fıstık gerekmektedir. Öncelik olarak yeşil çay 20 dakika boyunca yüksek ateşte pişirilmektedir. Genellikle 2 litre su içerisine bir fincan yeşil çay eklenmektedir. Daha sonra içine yarım yemek kaşığı kabartma tozu ilave edilip çay yavaşça karıştırılmaktadır. Oluşan köpüğün rengi nar rengini alıncaya kadar çay kaynatılmaya devam etmektedir. Bu süre genellikle 10 dakika sürmektedir. Ardından karışım süzgeçten geçirilerek üzerine soğuk su ilave edilip tekrar kaynamaya alınmaktadır. Elde edilen karışım içerisine yarısı kadar taze süt, damak zevkine göre şeker ve kakule ilave edilmekte ve karıştırılarak kaynatmaya devam edilmektedir. Servis edilmesi için bardak içerisine alınan çayın içerisine kaymak eklenerek ufalanmış fıstıkla süslenmektedir.

FULL TEXTS BOOK

Yumurtalı Süt

Bu içeceğin yapımında süt, şeker ve çiğ yumurta sarısı kullanılmaktadır. Bir yumurta sarısı iyice çırpıldıktan sonra üzerine kaynatılmış şekerli süt eklenmekte ve karıştırıldıktan hemen sonra tüketilmektedir.

Sütlü Meyve Suyu

Muz, hurma ve mango gibi meyvelerin blenderden geçirildikten sonra süt ile karıştırılması ile elde edilen çeşitli sütlü meyve suları halk tarafından sevilerek tüketilmektedir. Bu çeşit sütlü içecekler küçük çaplı meyve suyu satış noktalarında bol miktarlarda üretilirken, endüstri boyutta üretimi henüz yapılamamaktadır.

SÜTLÜ TATLILAR

Shirpera

Afganistan'ın geleneksel sütlü tatlılardan biri olan Shirpera tatlısının yapımı için sut tozu (2 su bardağı), badem (1/2 su bardağı), ceviz (1/2 su bardağı), kakule (1 çay kaşığı), şeker (1 su bardağı), gül suyu (1 çay kaşığı), su (1 su bardağı) ve fıstık (2 yemek kaşığı) gerekmektedir. Öncelikle süt tozu, ufalanmış ceviz ile badem ve kakule bir kap içerisinde karıştırılmaktadır. Daha sonra şeker ve su orta ateşte sürekli karıştırılarak şerbet haline getirilmektedir. Hazır hale gelen şerbetin içerisine kuru malzemeler eklenerek karıştırma işlemine devam edilmektedir. Bu şekilde homojen bir karışım elde edilmektedir. Ardından karışım bir tepsiye yayılmakta ve üzeri ufalanmış fıstıkla süslenmektedir. Soğuduktan sonra tatlı dilimlenip servis edilebilmektedir (Şekil 6).



Şekil 6. Shirpera

Firni

Firni tatlısı süt, mısır nişastası, şeker, kakule, gül suyu ve ufalanmış fıstık kullanılarak yapılmaktadır. Bir bardak süt için bir buçuk yemek kaşığı mısır nişastası gerekmektedir. Öncelikli olarak süt ve şekerin karıştırılarak kaynaması sağlanmaktadır. Daha sonra sütün bulunduğu tencereye yarım bardak su içerisinde erimiş mısır nişastası eklenmekte ve karışım kısık ateşte sürekli karıştırılarak 5 dakika boyunca pişirilmektedir. Elde edilen tatlı tencereden başka bir tabağa aktarılarak soğumaya bırakılmakta ve soğutulduktan sonra ufalanmış fıstık ile süslenerek tüketilmektedir (Şekil 7).



Şekil 7. Firni tatlısı

FULL TEXTS BOOK

Sütlaç

Sütlaç yapımı için pirinç, tam yağlı inek sütü, şeker ve kakule gerekmektedir. Pirinç bir gece boyunca ılık suda bekletildikten sonra suyundan ayrılması için bir bezden süzdürülmektedir. Süt içerisine pirinç, şeker ve kakule eklenmekte ve tüm karışım kısık ateşte pişirilmektedir. Bu şekilde Afgan halkı tarafından çok sevilen bir sütlü tatlı elde edilmektedir.

SONUÇLAR

Afganistan'ın tarım ve hayvancılık sektörü, uzun yıllar süren savaşlar nedeniyle ciddi zararlar görmüştür. Ülke, geniş mera alanlarına sahip olmasına rağmen, geçim kaynaklarının yetersizliği nedeniyle hayvancılık yeterince gelişmemiştir. Son yıllarda hayvancılık çiftliklerinin kurulması ve süt üretimindeki fabrikalarda bazı ilerlemeler yaşanmış olsa da, sektör hala emekleme aşamasındadır. Süt şirketleri farklı bölgelerde faaliyet göstermekte, ancak doğal ürünlere olan talep nedeniyle fabrika ürünleri pazarda yeterince ilgi görmemektedir. Ayrıca, depolama tesislerinin eksikliği nedeniyle doğal ürünlerin bir kısmı pazara ulaşmadan kaybolmaktadır.

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FULL TEXTS BOOK

LATERAL-TORSIONAL BUCKLING BEHAVIOUR OF WEB-TAPERED MONO-SYMMETRIC I-SECTION CANTILEVERS

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ABSTRACT
Lateral-torsional buckling (LTB) is the primary failure mode where slender cantilevers experience nonuniform twisting and buckling about their weak axes. Many studies are related to the elastic LTB load of simply supported beams, and modern codes present simple formulations. However, the studies focused on the elastic LTB load of cantilevers are rare, most of which are numerical since the LTB failure mode of cantilevers is much more complicated. Furthermore, no comprehensive study has examined the LTB of web-tapered cantilevers with mono-symmetric I-sections subjected to various load types and load positions. Thus, the present study intends to establish an analytical procedure for evaluating the elastic LTB load of web tapered mono-symmetric I-section cantilever, which is aesthetic and structurally efficient. The analytical method developed considers first-order bending distribution, load height level, monosymmetry property of the section, and web tapering. A parametric study has also investigated the effect of slenderness, tapering angles, load types, and load positions on the LTB of symmetric and mono-symmetric web tapered I-section cantilevers. The analytical solutions were verified with finite element analysis (FEA). It was found that analytical solutions are pretty compatible with FEA, and the proposed analytical treatment could be safely used to calculate the elastic LTB of the web-tapered I-section cantilevers. Besides, the present study has, for the first time, characterized and interpreted the LTB behavior of the web-tapered cantilevers with mono-symmetric I-sections in detail based on the presented analytical treatment.
Key Words: Lateral-Torsional Buckling, Cantilevers, Web-Tapered I-Section, FEA.

INTRODUCTION
Stability research has gained importance nowadays since technological and economic advancements necessitate constructing steel and composite structures that are ever lighter and stronger. Ever-stronger and lighter structures are becoming more common because of advancements in manufacturing and computer-aided design (CAD) software, cost considerations, and efficiency in construction. These ongoing advancements altered conventional building and design techniques and made it crucial to use materials efficiently in various industries, including offshore buildings, the automotive sector, and aerospace. The local and overall stability must be considered to assess the behavior of these structures precisely during the construction of structures with greater strength and reduced weight (Mohri, Damil & Potier-Ferry, 2013). The doubly symmetric and mono-symmetric I-sections are widely used in modern construction thanks to their structural efficiency. Besides, cantilevers with I-sections widely take place in steel structures. They are assembled so that they are subjected to bending about their major axis with the greatest flexural rigidity to use structural material economically. However, lateral-torsional buckling (LTB) is a global stability loss for cantilevers, where a cantilever that is bent about its strong axis may buckle out of a plane by deflecting laterally and twisting as the values of the applied loads reach a limit value called the elastic LTB load. Along with stress and deformation analysis, the LTB failure mode should be considered in design since it may take place long before the bending stress, which occurs at the extreme fiber of the section, reaches the yield point.
The differential equilibrium equations obtained for calculating the elastic LTB load of beams, beam-columns, and cantilevers under uniform bending can be solved and presented in the closed form.

FULL TEXTS BOOK

However, for cases where the moment gradient changes along the length of the beam and/or support conditions differ from simple support, the analytical solution becomes highly complex or includes infinite series (Yilmaz, 2023). Thus, numerical approaches including finite difference, finite integral, finite element, finite strip, and boundary element methods (Yilmaz, 2023; Ozbasaran 2013, 2014; Ozbasaran, Aydin & Dogan, 2015; Anderson & Trahair, 1972; Bui, 2009, 2012; Adany & Schafer, 2014; Naderian & Ronagh, 2015; Sapountzakis & Dourakopoulos, 2009) were developed for the calculation of the LTB load.

Another convenient tool to solve the LTB problem is the energy method, which is based on the equality between the additional strain energy stored during LTB and the extra work done by the applied forces. This method calculates the LTB load by substituting an approximate buckled shape in the energy equation. The approximate buckled shape should be compatible with the actual mode shape and satisfy the kinematic boundary conditions (Yilmaz, 2023). There are many studies focused on the LTB behavior of the beams, beams with mono-symmetric I section, C, Z, and box sections, the beam-columns, the castellated beam, and cantilevers using the energy method (Mohri, Bouzerira & Potier-Ferry, 2008; Torkamani & Roberts, 2009; Yilmaz, Kirac & Kilic, 2017; Ozbasaran, 2019; Saoula et al., 2021; Bresser, Ravenshorst & Hoogenboom, 2020; Belaid, Ammari & Adman, 2018; Mohri, Damil & Potier-Ferry, 2013; Yilmaz & Kirac, 2017; Yilmaz, Kirac & Anil, 2019; Aydin, Gunaydin & Kirac, 2015; Mohri, Brouki & Roth, 2003; Camotim, Andrade & Basaglia, 2012; Mohammadi, Hosseini & Rohanimanesh, 2016; Cheng, Kim & Li, 2013; Soula et al., 2016; Zhang & Tong, 2016; Kim, Li & Edmonds, 2016; Wang & Kitipornchai, 1986; Ozbasaran, Aydın & Dogan, 2015; Andrade, Camotim & Providência e Costa, 2007; Aydin et al., 2013; Zhang & Tong, 2008; Zhang et al., 2016; Yilmaz 2023). Steel web-tapered beams with I-sections are very popular in structural practices thanks to their aesthetic features and lightweight. These beams are mainly used as cantilevers and provide the advantage of low weight-to-strength ratios. Their structural efficiency is owing to their web can be tapered through the beam length according to the variation of bending moment. For the cantilever optimization, while beam height is maximum at fixed support where the bending moment is maximum, beam height gradually decreases towards the free end as the bending moment decreases. Trahair and Kitipornchai analytically and experimentally investigated doubly symmetric beams with tapered webs or flanges and mono-symmetric beams with tapered flanges (Kitipornchai & Trahair, 1972, 1975). In these researches, the flange bending during lateral buckling was analyzed and utilized to establish the governing differential equilibrium equations for bending and torsion. Trahair (2017) also utilized the energy method to develop a finite element method that can be used to evaluate the LTB of tapered beam-columns in case of various loading and boundary conditions. Benyamina et al. (2013) proposed a formula for calculating elastic LTB of doubly symmetric web-tapered I-beams. Asgarian, Soltani, and Mohri (2013) investigated the LTB of tapered thin-walled beams with arbitrary cross-sections. The LTB of the beams whose flanges and web are simultaneously tapered was examined by Kus (2015). Osmani and Meftah (2018) investigated the lateral buckling of doubly-symmetric beams subjected to combined bending and axial force effects by considering shear deformations. Authors have encountered only two comprehensive analytical studies focused on the LTB of web-tapered mono-symmetric I-section cantilevers in the literature. In these studies presented by Andrade, Camotim, and Dinis (2007) and Andrade and Camotim (2005), the elastic LTB load of web-tapered monosymmetric I-section cantilevers and simply supported beams subjected to free end and mid-span point loads, respectively, have been investigated via energy method considering the pre-buckling deflections. Studies have demonstrated that LTB loads of simply supported beams decreased while LTB loads of cantilevers increased, compared with those of un-tapered ones. Another significant contribution of the study by Andrade Camotim and Dinis (2007) is the presented detailed comparison of the LTB solutions of prismatic and web-tapered beams and cantilevers obtained by the one-dimensional analytical model based on the energy method and two-dimensional shell finite element modeling. The study unveils that for short cantilevers, in contrast to the shell model,

FULL TEXTS BOOK

the 1D frame element assumption could not capture remarkable web and/or flange distortion or a localized web buckling phenomenon near the application point of load. The LTB behavior of web-tapered tee-section cantilevers is different from web-tapered I-section cantilevers since the lack of the bottom flange leads to the lower part of the web being subjected to compression, which increases buckling instability. The study by Yuan, Kim and Chen (2013) found that web tapering may lead to an increase or decrease in the LTB load according to flange width. The optimum design of tapered I-beams, considering the LTB, deformation, and stress constraints, was studied by Ozbasaran and Yilmaz (2018). A closed-form solution for tapered cantilever strip beam-columns loaded with point loads at the free end has been presented by Challamel et al. (2010).

The literature review unveils that there is no comprehensive study in which the LTB of cantilevers with mono-symmetric I-sections subjected to various load types and load positions has been investigated, and the general behavior of these cantilevers is interpreted. The primary motivation of the present study is to establish an analytical treatment based on the energy method for calculating the LTB of cantilevers with mono-symmetric I-sections under different load types and positions. The present analytical model considers the moment distribution that occurred due to transverse loads along the cantilever, the position of load along the cross-section, and the monosymmetry property of the section. The analytical procedure has been verified with finite element analysis (FEA). A parametric study using the verified analytical procedure has examined the effect of slenderness, tapering angles, load types, and load positions on the LTB of symmetric and mono-symmetric web tapered I-section cantilevers. The results were interpreted in detail to understand the general LTB behavior of web-tapered cantilevers.

ANALYTICAL MODEL

The LTB of the web-tapered cantilever with mono-symmetric I-section occurs in two stages. First, the cantilever bends about its major axis with the greatest flexural rigidity under transverse loads, and then the cantilever buckles by deflecting laterally and twisting when the magnitude of the loads acting on the cantilever reaches the elastic critical LTB load. **Fig. 1** shows the LTB of a web-tapered cantilever with a mono-symmetric I-section subjected to a point load at the end. In **Fig. 1(a)**, α and L are the tapering angle and the cantilever length, respectively. **Fig. 1(b)** illustrates the a-a section of the web-tapered cantilever. In **Fig. 1**, while the S and C denote the shear center and the center of gravity, the lateral and vertical displacements and the torsional rotation of the shear center were given with u, v, and φ, respectively. The y_0 indicates the distance between the shear center and the center of gravity. Furthermore, **Fig. 2** depicts the cross-section dimensions of a web-tapered cantilever with the mono-symmetric I-section. In **Fig. 2**, while the top and bottom flange width is shown with b_{f1} and b_{f2}, the t_{f1} and t_{f2} denote the top and bottom flanges' thickness.

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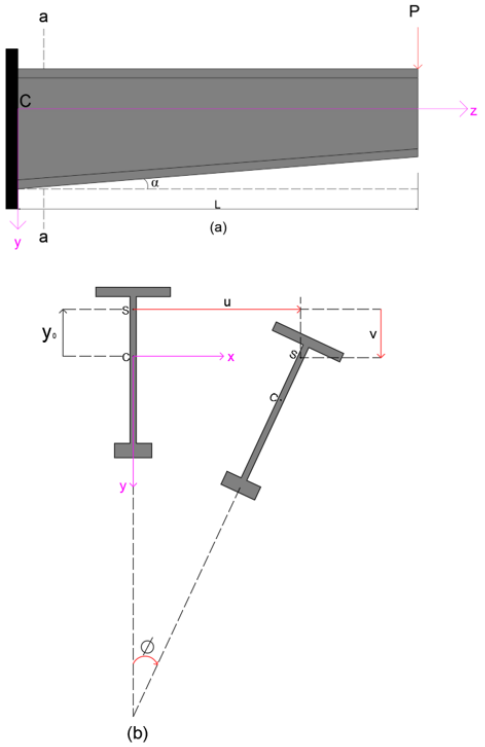


Fig. 1. The LTB of the web-tapered cantilever with mono-symmetric I-section (a) side view, (b) a-a section

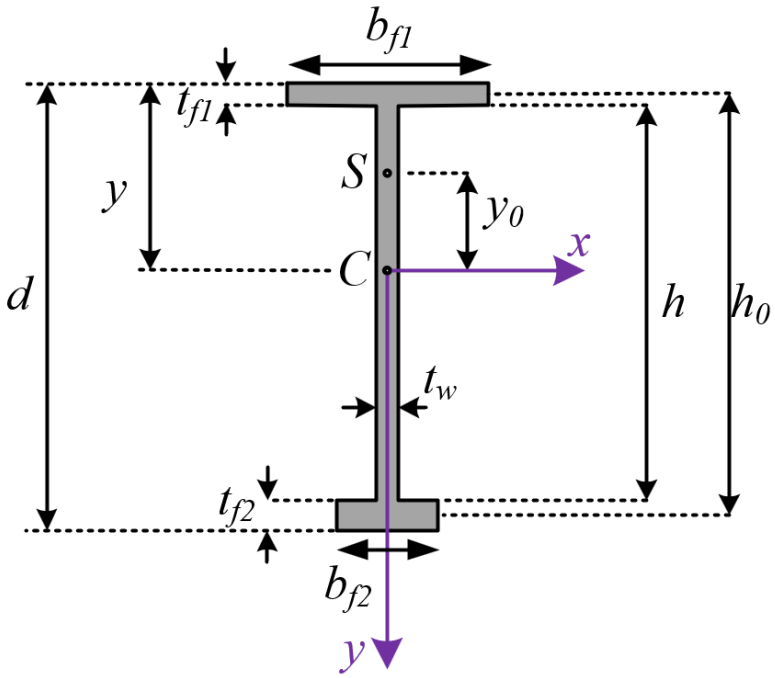


Fig. 2. The cross-section dimensions of a web-tapered cantilever

The *d* and *h* are heights of cross-section and web, respectively. These two dimensions are dependent on the distance to the fixed end in the z-axis since *h* decreases with tapering according to Eq. (1):

$$h(z) = h_i - z * \tan(\alpha) \quad (1)$$

Where h_i refers to the height of the web at a fixed end. Therefore *d* becomes:

$$d(z) = h(z) + t_{f1} + t_{f2} \quad (2)$$

The *y(z)* is the distance of the gravity center to the top of the section and is given as follows:

FULL TEXTS BOOK

$$y(z) = \frac{1}{A(z)}\left[\frac{A_{f1}t_{f1}}{2} + A_w(z)\left[t_{f1} + \frac{h(z)}{2}\right] + A_{f2}\left[d(z) - \frac{t_{f2}}{2}\right]\right] \quad (3)$$

A_{f1}, A_{f2}, *and* $A_w(z)$ are areas of the top flange, bottom flange, and web, respectively. The $A(z)$ implies the summation of these areas. The warping constant $C_w(z)$, torsional constant $J(z)$, and the moment of inertia belonging to the weak axis $I_y(z)$ are the main parameters that are effective on the LTB. For a web-tapered cantilever in **Fig. 1,** $C_w(z)$, $J(z)$, and $I_y(z)$ can be expressed as follows:

$$C_w(z) = \frac{h_0^2(z)b_{f1}^3t_{f1}s}{12} \quad (4)$$

$$J(z) = \frac{b_{f1}t_{f1}^3 + b_{f2}t_{f2}^3 + h_0(z)t_w^3}{3} \quad (5)$$

$$I_y(z) = \frac{b_{f1}^3t_{f1} + b_{f2}^3t_{f2} + h(z)t_w^3}{12} \quad (6)$$

Where $\bar{y}(z)$ denotes the distance from the gravity center to center of the top flange. The $h_0(z)$ is the distance between flange centers. The $\bar{y}(z)$, $h_0(z)$, and $y_0(z)$ can be calculated as follows:

$$\bar{y}(z) = y(z) - \frac{t_{f1}}{2} \quad (7)$$

$$h_0(z) = d(z) - \frac{t_{f1} + t_{f2}}{2} \quad (8)$$

$$s = \frac{1}{1 + \left[\frac{b_{f1}}{b_{f2}}\right]^3\left[\frac{t_{f1}}{t_{f2}}\right]} \quad (9)$$

$$y_0(z) = sh_0(z) - \bar{y}(z) \quad (10)$$

The strain energy stored in the cantilever due to lateral bending, warping, and torsion, respectively, can be written as follows (Yilmaz, Kirac & Anil, 2019; Yilmaz, 2023):

$$U = \frac{1}{2}\int_0^L EI_y(z)\left[\frac{d^2u(z)}{dz^2}\right]^2 dz + \frac{1}{2}\int_0^L EC_w(z)\left[\frac{d^2\phi(z)}{dz^2}\right]^2 dz + \frac{1}{2}\int_0^L GJ(z)\left[\frac{d\phi(z)}{dz}\right]^2 dz \quad (11)$$

E and G refer to Young's and shear modulus, respectively. The work done by the external transverse forces can be expressed in Eq. 12 (Yilmaz, Kirac & Anil, 2019; Yilmaz, 2023):

$$V = \frac{1}{2}\int_0^L M_x(z)\left[2\phi(z)\left[\frac{d^2u(z)}{dz^2}\right] + \beta_x(z)\left[\frac{d\phi(z)}{dz}\right]^2\right]dz + \frac{1}{2}\sum PH_p\phi_p^2 + \frac{1}{2}\int_0^L qH_q\phi(z)^2dz + M\phi_L\left[\frac{du_L}{dz}\right] \quad (12)$$

Where $M_x(z)$ denotes the bending moment about the major axis, the second and third terms in Eq. (12) refer to works done by concentrated load (P) and distributed load (q), respectively, which are transverse loads acting outside of the shear center on the cross-section. These works occur because the distance between the shear centers and the points where loads are applied changes when the cross-section rotates. In Eq. (12), the vertical distances of the points where the concentrated and uniformly distributed loads have been applied to the shear center are given as H_p and H_q. It should be noted here that the load height levels (H_p and H_q) become positive when the loads are applied below the shear center. Φ_p denotes torsional rotation at the application point of the concentrated load. Besides, an external moment acting on the shear centre at the end of the cantilever causes additional work existing in the last term of Eq. (12). When the end moment M is represented with an equivalent force couple, these opposite direction forces displace relatively in longitudinal directions and cause additional work as the cross-section rotates. Additional work V_M can be calculated by multiplying the magnitude of forces with their displacement in the longitudinal direction as follows:

FULL TEXTS BOOK

$$V_M = 2\left[\frac{M}{d_f}\right]\left[d_f\,\frac{\emptyset_L}{2}\,\frac{du_L}{dz}\right] = M\phi_L\left[\frac{du_L}{dz}\right] \tag{13}$$

While Φ_L refers to free-end rotation, d_f denotes the distance of the force couple. The end moment M should be considered positive in Eq. (12) when clockwise (Yilmaz, 2023). The LTB behavior of mono-symmetric I-sections is more complex than those of symmetric I-sections. Different from the symmetric I-sections, there is additional torque because of the monosymmetry of the section, arising from the pre-buckling longitudinal bending stresses as the beam twists during the buckling. This extra torque substantially affects the torsional stiffness of the beam. Torsional stiffness should be modified considering the major axis bending moment and mono-symmetry parameter of the beam for proper evaluation of the LTB (Wang & Kitipornchai, 1986). Wanger's coefficient (β_x) represents the mono-symmetry property of the cross-section and is defined by Eq. (14) (Yilmaz, 2023). In Eq. (14), x and y are Cartesian coordinates of the infinitesimal area (dA). I_x denotes the moment of inertia belonging to the major axis and can be presented for web-tapered cantilevers depending on the distance in the z-axis as in Eq. (15). The y_0 must be considered positive for the sections whose shear center is located under the gravity center.

$$\beta_x = \frac{1}{I_x}\int_A y(x^2+y^2)dA - 2y_0 \tag{14}$$

$$I_x(z) = \frac{b_{f1}t_{f1}^3 + h(z)^3 t_w + b_{f2}t_{f2}^3}{12} + A_{f1}\left[y(z) - \frac{t_{f1}}{2}\right]^2 + A_w(z)\left[t_{f1} + \frac{h(z)}{2} - y(z)\right]^2 + A_{f2}\left[d(z) - \frac{t_{f2}}{2} - y(z)\right]^2 \tag{15}$$

$\beta_x\,(z)$ can be expressed for web-tapered cantilevers in **Fig. 1** as follows:

$$\beta_x(z) = \frac{1}{I_x}\left[\begin{array}{l}[h_0(z) - \bar{y}(z)]\left[\frac{b_{f2}^3\,t_{f2}}{12} + b_{f2}t_{f2}\,[h_0(z) - \bar{y}(z)]^2 + \frac{t_w[h_0(z) - \bar{y}(z)]^3}{4}\right] \\ \quad -\bar{y}(z)\left[\frac{b_{f1}^3\,t_{f1}}{12} + b_{f1}t_{f1}\bar{y}^{\,2}(z) + \frac{t_w\bar{y}^{\,3}(z)}{4}\right]\end{array}\right] - 2y_0 \tag{16}$$

Therefore, the total potential energy ($\Pi=U+V$) of the cantilever can be expressed as in Eq. (17) by considering Vlassov's model, which assumes that the cross-section has been rigid in its plane and the shear deformation of the section's mean surface can be neglected (Yilmaz, 2023).

$$\Pi = \frac{1}{2}\int_0^L EI_y(z)\left[\frac{d^2u(z)}{dz^2}\right]^2 dz + \frac{1}{2}\int_0^L EC_w(z)\left[\frac{d^2\phi(z)}{dz^2}\right]^2 dz + \frac{1}{2}\int_0^L GJ(z)\left[\frac{d\phi(z)}{dz}\right]^2 dz + \frac{1}{2}\int_0^L M_x(z)\left[2\phi(z)\left[\frac{d^2u(z)}{dz^2}\right] + \beta_x(z)\left[\frac{d\phi(z)}{dz}\right]^2\right]dz + \frac{1}{2}\sum PH_p\phi_p^2 + \frac{1}{2}\int_0^L qH_q\phi(z)^2 dz + M\phi_L\left[\frac{du_L}{dz}\right] \tag{17}$$

The energy method is based on the equality between the additional strain energy stored during lateral buckling and the extra work done by the applied forces. The energy method requires a buckled shape assumption, which satisfies kinematic boundary conditions and represents the actual buckled shape. Thus, the LTB load is calculated by substituting the buckled shape in the total potential equation. The kinematic boundary conditions are geometrical constraints preventing one or more deflections or rotations at the support of the structural member. When a cantilever is considered, since clamped end restraints the whole deflections and rotations, it has been explicit that u, ϕ, du/dz, $d\phi/dz$ are equal to zero at fixed support ($z=0$). However, u, ϕ, du/dz, $d\phi/dz$ are unrestrained at the free end ($z=L$). The buckled shape of the cantilever can be expressed by the lateral deflection of the cantilever at the shear center (u)

FULL TEXTS BOOK

and the rotation angle of the cross-section (Φ). Considering the kinematic boundary conditions of the cantilever, buckled shape functions can be defined as in Eq. (18). A_i and B_i are amplitudes of buckled shape functions.

$$u(z) = \sum_{i=1}^{n} A_i \left(\frac{z}{L}\right)^{i+1}$$
$$\phi(z) = \sum_{i=1}^{n} B_i \left(\frac{z}{L}\right)^{i+1} \quad (18)$$

When buckled shape functions are substituted in Eq (17), the total potential energy becomes the following form:

$$\Pi = U + V = f(A_1, A_2, A_3 \dots, A_n, B_1, B_2, B_3 \dots, B_n) \quad (19)$$

Where f is a quadratic function in 2n variables. The variables are A_i and B_i terms. When the LTB occurs, the total energy function reaches a stationary condition, which requires:

$$\frac{\partial \Pi}{\partial A_i} = 0 \;\; for\; i = 1,2 \dots n$$
$$\frac{\partial \Pi}{\partial B_i} = 0 \;\; for\; i = 1,2 \dots n \quad (20)$$

Eq. (20) generates a system of 2n homogeneous linear equations, and the set of algebraic equations can be written in matrix form:

$$[K]_{2nx2n} \{d\}_{2nx1} = \{0\}_{2nx1} \quad (21)$$

Where K is a coefficient matrix and $\{d\} = \{A_1, A_2, A_3 \dots, A_n, B_1, B_2, B_3 \dots, B_n\}^T$. Eq. (21) has been satisfied when the determinant of the K coefficient matrix equals zero.

$$det\,[K]_{2nx2n} = 0 \quad (22)$$

Eq. (22) generates a power series of order 2n, of which the smallest feasible root gives the elastic LTB load or moment. The present analytical treatment can solve the elastic LTB load of the web-tapered cantilever with mono-symmetric I-section like in **Fig. 1**, subjected to the various load cases by considering the load height levels such as top flange, bottom flange, and shear center loading. The present analytical approach can be easily applied using mathematical programming software such as Matlab, Mathematica, Python, etc.

NUMERICAL ANALYSIS

In the numerical analysis part of the present study, using the proposed analytical model, the elastic LTB loads of web-tapered cantilevers with both doubly symmetric and mono-symmetric I-section subjected to six different load cases presented in **Fig. 3.** have been calculated for three loading positions along the cross-section, which are top flange, bottom flange, and shear centre loadings. Since it is also aimed that the effects of the tapering and the slenderness on elastic LTB loads of the web-tapered cantilevers have been investigated, the lengths and tapering angles of the cantilevers were taken as variables. **Table 1** shows the properties of the cantilevers investigated in the scope of numerical analysis. In **Table 1**, DS and MS mean doubly symmetric and mono-symmetric; d_e is the section height at the free end. All elastic buckling loads calculated via the presented analytical method have been verified with the 1D finite element analysis (1D-FEA) using LTBeamN software (Centre Technique Industriel de la Construction Metallique; 2015).

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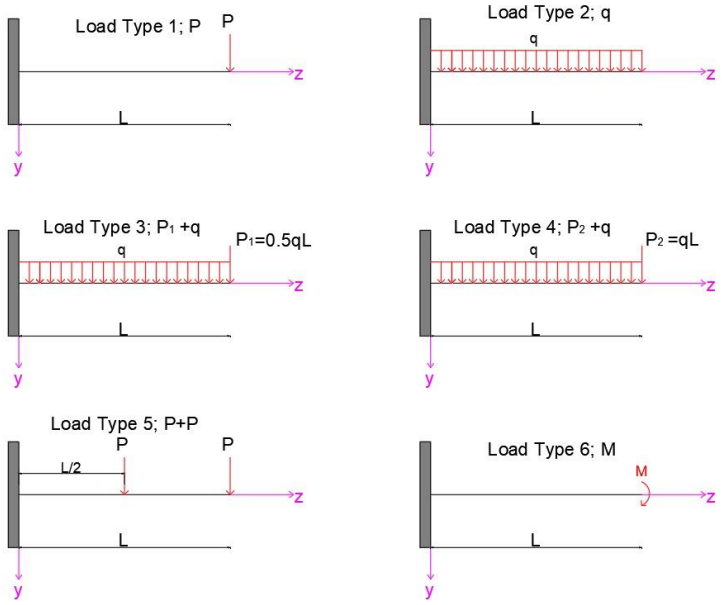


Fig. 3. The considered load cases in the numerical analysis

Table 1. The section properties of web tapered cantilevers in the numerical analysis

Variables	Sections		α	L	d	d_e	b_{f1}	b_{f2}	t_{f1}, t_{f2}	t_w
Tapering angles	C1	DS	0	2	200	200	90	90	11.3	7.5
	C2	DS	1.432	2	200	150	90	90	11.3	7.5
	C3	DS	2.862	2	200	100	90	90	11.3	7.5
	C4	MS	0	2	200	200	90	45	11.3	7.5
	C5	MS	1.432	2	200	150	90	45	11.3	7.5
	C6	MS	2.862	2	200	100	90	45	11.3	7.5
Slenderness	C7	DS	1.909	2	200	133.34	90	90	11.3	7.5
	C8	DS	1.909	2.5	200	116.67	90	90	11.3	7.5
	C9	DS	1.909	3	200	100	90	90	11.3	7.5
	C10	MS	1.909	2	200	133.34	90	45	11.3	7.5
	C11	MS	1.909	2.5	200	116.67	90	45	11.3	7.5
	C12	MS	1.909	3	200	100	90	45	11.3	7.5

LTBeamN software has been commonly used in the literature to solve elastic LTB problems. The software calculates the elastic LTB load analysis utilizing the beam elements that consider warping, and it yields accurate results with 3D finite element analysis (3D-FEA) (Yilmaz & Kirac, 2017; Yilmaz, Kirac & Anil, 2019; Yilmaz, 2023). In the scope of the numerical analysis, for example, the elastic LTB loads of the cantilever beam C6 subjected to concentrated load have been calculated with the 3D-FEA in which shell elements are used in addition to the 1D-FEA to compare different analysis techniques' results. The 3D FEA analysis was carried out with Abaqus software (Dassault systèmes; 2022). The S8R5 shell element with five degrees of freedom at each node was used for modeling cantilever beam C6. It is reported in previous studies that the S8R5 shell element provides correct results in LTB problems (Yilmaz & Kirac, 2017; Yilmaz, Kirac & Anil, 2019; Yilmaz, 2023; Mohri, Bouzerira & Potier-Ferry, 2008; Aydin, Gunaydin & Kirac, 2015). The mesh examination was performed. It has been determined that element mesh sizes of sixty, ten, and four were sufficient for the cantilever length, the web's height, and the flanges' widths, respectively, for proper evaluation of buckling loads. Besides, it was found that more refinement has not been effective in achieving results despite increased computational time. **Fig. 4.** illustrates the buckled shape of the shell finite element model belonging to

FULL TEXTS BOOK

the cantilever C6 under concentrated load acting on the shear center. **Table 2** shows the LTB load comparisons of C6 obtained from the 1D-FEA and the 3D-FEA. In **Table 2**, TF, SC, and BF refer to top flange, shear center, and bottom flange loadings, respectively. AB and LT denote ABAQUS and LT-BeamN, respectively. When buckling loads are compared, it is determined that there is only a %2 average difference between results obtained from 1D-FEA and the 3D-FEA. Besides, the maximum difference is only %5. Results demonstrate that 1D-FEA, in other words, beam element including warping, can be used safely to evaluate LTB of tapered cantilevers with mono-symmetric I-section.

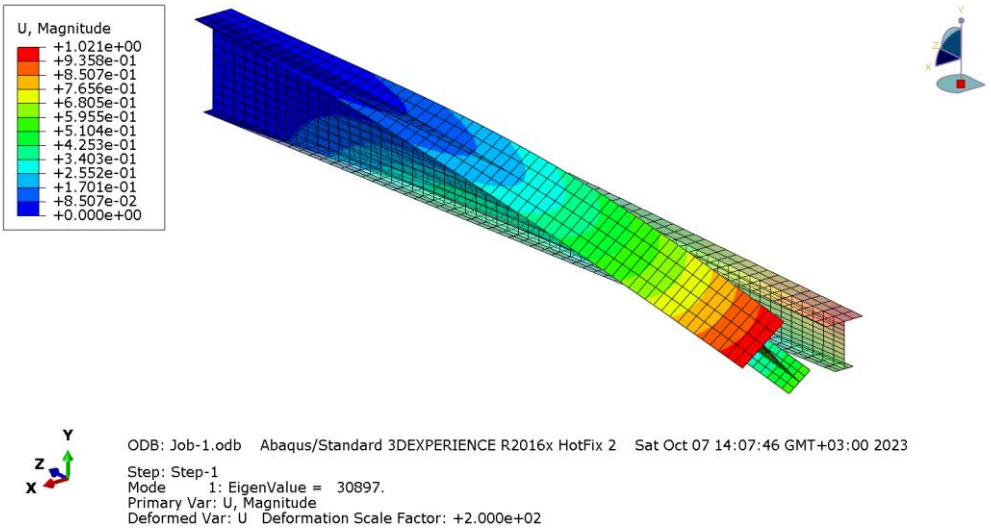


Fig. 4. The buckled shape of the shell finite element model belonging to the cantilever the cantilever C6

Table 2. The LTB loads of the C6 under load type 1 obtained by ABAQUS and LTBeamN

Cantilever C6	LT	AB	AB/LT
TF	27.74	27.8	1.00
SC	29.14	30.8	1.05
BF	34.37	34.0	0.99

For each considered six load cases and three loading positions, the LTB loads of all cantilevers, calculated via the present analytical model and 1D-FEA, are presented in **Tables 3-8**. AN and LT refer to the LTB loads obtained by the present analytical model and 1D-FEA in these tables, respectively. When results presented in Tables 3-8 were examined, it can be seen there is excellent agreement between analytical and numerical LTB loads. The average difference is only 2%, and the maximum difference can only reach up to 5%. The present analytical model has perfectly captured the effects of tapering, slenderness, load types, and load positions on the LTB loads. Thus, it is found that the present analytical treatment can be safely used to evaluate the LTB of web-tapered cantilevers.

Table 3. The analytical and numerical LTB loads for load case 1

Load case 1, P_{cr} (kN)									
Cantilever	TF			SC			BF		
	AN	LT	LT/AN	AN	LT	LT/AN	AN	LT	LT/AN
C1	46.6	45.08	0.97	85.66	84.52	0.99	110.58	109.74	0.99
C2	53.15	50.73	0.95	83.49	82.44	0.99	102.8	101.85	0.99
C3	61.15	59.6	0.97	81.22	80.87	1.00	94.65	94.15	0.99
C4	26.93	26.28	0.98	29.35	28.83	0.98	38.13	37.65	0.99
C5	27.48	26.95	0.98	29.36	28.92	0.99	36.5	36.06	0.99

FULL TEXTS BOOK

C6	28.05	27.74	0.99	29.4	29.14	0.99	34.62	34.37	0.99
C7	55.67	53.31	0.96	82.75	81.88	0.99	100.13	99.23	0.99
C8	37.34	36.37	0.97	47.83	47.3	0.99	54.94	54.38	0.99
C9	26.34	25.84	0.98	30.87	30.49	0.99	34.19	33.81	0.99
C10	27.67	27.19	0.98	29.37	28.98	0.99	35.91	35.52	0.99
C11	18.17	17.83	0.98	18.92	18.61	0.98	21.97	21.66	0.99
C12	12.86	12.98	1.01	13.23	12.98	0.98	14.8	14.56	0.98

Table 4. The analytical and numerical LTB loads for load case 2

Load case 2, q_{cr} (kN/m)									
Cantilever	TF			SC			BF		
	AN	LT	LT/AN	AN	LT	LT/AN	AN	LT	LT/AN
C1	80.92	78.79	0.97	165.24	163.21	0.99	246.12	243.95	0.99
C2	88.95	82.65	0.93	161.36	159.41	0.99	231.09	229.93	0.99
C3	98.51	88.69	0.90	157.34	156.46	0.99	215.12	216.41	1.01
C4	41.48	40.58	0.98	46.97	46.27	0.99	78.37	77.49	0.99
C5	42.21	41.27	0.98	47	46.46	0.99	74.78	73.78	0.99
C6	43.01	42.18	0.98	47.07	46.8	0.99	70.78	70.44	1.00
C7	91.96	84.4	0.92	160.03	158.39	0.99	225.89	225.21	1.00
C8	48.2	44.51	0.92	72.5	71.66	0.99	95.86	95.87	1.00
C9	28.2	26.17	0.93	38.36	37.87	0.99	48.16	48.26	1.00
C10	42.47	41.55	0.98	47.02	46.55	0.99	73.5	72.71	0.99
C11	22.26	21.75	0.98	24.03	23.7	0.99	34.1	33.8	0.99
C12	13.13	12.82	0.98	13.93	13.71	0.98	18.47	18.34	0.99

Table 5. The analytical and numerical LTB loads for load case 3

Load case 3, $q_{cr}+0.5q_{cr}L$ (kN/m)									
Cantilever	TF			SC			BF		
	AN	LT	LT/AN	AN	LT	LT/AN	AN	LT	LT/AN
C1	30.16	29.24	0.97	57.36	56.61	0.99	79.27	78.68	0.99
C2	33.96	32.09	0.94	55.95	55.28	0.99	73.87	73.54	1.00
C3	38.49	36.42	0.95	54.47	54.23	1.00	68.16	68.62	1.01
C4	16.55	16.17	0.98	18.3	18	0.98	26.88	26.57	0.99
C5	16.86	16.52	0.98	18.31	18.06	0.99	25.61	25.43	0.99
C6	17.2	16.95	0.99	18.33	18.2	0.99	24.17	24.28	1.00
C7	35.4	33.36	0.94	55.46	54.9	0.99	72	71.89	1.00
C8	18.79	17.94	0.95	25.46	25.18	0.99	31.14	31.1	1.00
C9	11.01	10.57	0.96	13.61	13.45	0.99	15.93	15.91	1.00
C10	16.97	16.65	0.98	18.31	18.1	0.99	25.15	25.05	1.00
C11	8.91	8.728	0.98	9.41	9.268	0.98	12.01	11.94	0.99
C12	5.26	5.141	0.98	5.48	5.381	0.98	6.63	6.588	0.99

Table 6. The analytical and numerical LTB loads for load case 4

Load case 4, $q_{cr}+q_{cr}L$ (kN/m)			
Cantilever	TF	SC	BF

FULL TEXTS BOOK

	AN	LT	LT/AN	AN	LT	LT/AN	AN	LT	LT/AN
C1	18.36	17.78	0.97	34.43	33.97	0.99	46.42	46.06	0.99
C2	20.78	19.71	0.95	33.57	33.16	0.99	43.2	42.95	0.99
C3	23.69	22.67	0.96	32.67	32.53	1.00	39.82	39.94	1.00
C4	10.27	10.03	0.98	11.29	11.1	0.98	15.88	15.69	0.99
C5	10.47	10.26	0.98	11.3	11.4	1.01	15.15	15.03	0.99
C6	10.68	10.54	0.99	11.31	11.23	0.99	14.31	14.34	1.00
C7	21.7	20.58	0.95	33.27	32.93	0.99	42.09	41.93	1.00
C8	11.56	11.13	0.96	15.32	15.15	0.99	18.31	18.23	1.00
C9	6.78	6.566	0.97	8.21	8.112	0.99	9.41	9.373	1.00
C10	10.54	10.35	0.98	11.3	11.16	0.99	14.88	14.8	0.99
C11	5.54	5.426	0.98	5.81	5.724	0.99	7.17	7.116	0.99
C12	3.26	3.195	0.98	3.39	3.325	0.98	3.948	3.948	1.00

Table 7. The analytical and numerical LTB loads for load case 5

Load case 5, P_{cr}+P_{cr} (kN)									
Cantilever	TF			SC			BF		
	AN	LT	LT/AN	AN	LT	LT/AN	AN	LT	LT/AN
C1	40.64	39.35	0.97	78.19	77.11	0.99	111.04	110.05	0.99
C2	45.82	43.97	0.96	76.3	75.33	0.99	103.46	102.38	0.99
C3	51.96	50.9	0.98	74.33	73.97	1.00	95.41	94.71	0.99
C4	22.23	21.71	0.98	24.69	24.27	0.98	37.94	37.36	0.98
C5	22.65	22.22	0.98	24.7	24.34	0.99	36.15	35.61	0.99
C6	23.09	22.83	0.99	24.74	24.53	0.99	34.09	33.73	0.99
C7	47.77	46.03	0.96	75.65	74.79	0.99	100.83	99.8	0.99
C8	31.66	30.91	0.98	43.43	42.91	0.99	54.35	53.74	0.99
C9	22.23	21.81	0.98	27.87	27.51	0.99	33.26	32.86	0.99
C10	22.79	22.41	0.98	24.71	24.4	0.99	35.5	35.01	0.99
C11	14.96	14.68	0.98	15.87	15.61	0.98	20.93	20.6	0.98
C12	10.59	10.38	0.98	11.08	10.88	0.98	13.74	13.51	0.98

Table 8. The analytical and numerical LTB loads for load case 6

Load case 6, M_{cr} (kNm)			
Cantilevers	SC		
	AN	LT	LT/AN
C1	41.67	40.74	0.98
C2	40.38	38.37	0.95
C3	39.03	36.77	0.94
C4	20.72	20.08	0.97
C5	20.85	20.11	0.96
C6	21.02	20.36	0.97
C7	39.93	37.73	0.94
C8	30.89	29.44	0.95
C9	25.18	24.15	0.96
C10	20.91	20.11	0.96
C11	17.26	16.65	0.96

FULL TEXTS BOOK

C12	14.67	14.17	0.97

Results in **Tables 3-8** unveiled that the elastic LTB loads increase for top flange loading with the increase of tapering. This unexpected result can be explained by two opposite effects that occurred by tapering. The first effect is a decrease in stiffness with tapering, which has reduced the LTB loads. The second effect, which stems from the reduction of the distance between the load application point and shear center with the effect of tapering, has increased the LTB loads. Since the second effect is more dominant, the LTB loads have increased with the tapering increase for top flange loadings. However, for bottom flange loadings, it is explicit that both these effects occurred due to tapering tend to decrease buckling loads. These trends were reflected in the results, and the LTB loads decreased.

When results in **Tables 3-8** are examined, it can be observed that an increase in the tapering can reduce or increase LTB loads for shear center loading. The rise in tapering brings about two opposite effects for shear center loading. The first effect of tapering increase is the decrease in stiffness, which reduces LTB loads. The second effect of the tapering increase is that the shear center and the center of gravity become closer, which reduces the absolute value of the mono-symmetry parameter of the cross-section (β_x). The decrease in the β_x has an effect leading to an increase in the LTB loads. For shear center loading, the dominant one of these two effects of the tapering increase directs the LTB behavior of mono-symmetric web-tapered cantilevers. To better understand this complex behavior in shear center loading, a more detailed examination where different cross-sections are used has also been performed utilizing the present verified analytical model. The dimensions of the cantilevers and the calculated LTB loads are presented in **Table 9**. The mono-symmetry was generated by varying top and bottom flange widths, whereas other cross-section dimensions were kept the same.

Table 9. The LTB loads of different mono-symmetric I-sections under shear center loading

Cantilever	b_{f1}	b_{f2}	t_{f1}= t_{f2}	t_w	d	α	P_{cr} (L=1000)	P_{cr} (L=2000)
CB1	90	30	11.3	7.5	200	0	71.03	21.07
						1.4312	71.54	21.24
						2.8624	72.07	21.42
						4.2936	72.65	21.64
						5.7248	73.26	21.87
CB2	90	60	11.3	7.5	200	0	189.88	41.95
						1.4312	190.70	41.59
						2.8624	191.36	41.24
						4.2936	191.82	40.91
						5.7248	192.02	40.66
CB3	90	90	11.3	7.5	200	0	494.91	85.66
						1.4312	488.65	83.49
						2.8624	482.09	81.22
						4.2936	475.13	78.88
						5.7248	467.67	76.59
CB4	90	120	11.3	7.5	200	0	1093.80	162.39
						1.4312	1067.06	156.13
						2.8624	1039.74	149.66
						4.2936	1011.72	142.99

FULL TEXTS BOOK

						5.7248	982.83	136.23
CB5	90	150	11.3	7.5	200	0	2021.32	279.67
						1.4312	1964.80	266.80
						2.8624	1906.97	253.51
						4.2936	1847.55	239.70
						5.7248	1786.18	225.40

When the LTB loads are examined in **Table 9**, it is found that for doubly symmetric cantilevers and cantilevers whose shear center is below the gravity of center, the first effect has been more dominant. Thus, tapering increases have decreased the LTB loads. The LTB loads of specimens *CB3*, *CB4*, and *CB5*, whose b_{f1} is less than or equal to b_{f2} have reduced with the increase of tapering level independent of the cantilever length. However, the second effect has been dominant for the behavior of Specimens *CB1* and *CB2*, of which shear center is above their center of gravity; in other words, b_{f1} is larger than b_{f2}. Thus, LTB loads increased with the tapering increase. When the LTB loads of *CB1* and *CB2* for cantilever lengths of 1.0 m and 2.0 m were examined, the tapering increase caused the increase in LTB loads of *CB1* and CB2 cantilevers with lengths of 1.0 m, but the decrease in LTB loads of *CB1* and *CB2* cantilevers with length of 2.0 m. As cantilevers become more slender with increased cantilever lengths, the tendency reverses, and the first effect becomes more effective. Therefore, the LTB loads decrease with the tapering increase. It is an explicit demonstration that slenderness affects the influence of tapering increase on LTB loads of web-tapered mono-symmetric cantilevers, of which the shear center is above their center of gravity when cantilevers are loaded from their shear center. In brief, for shear center loading, while the tapering increase leads to a decrease in the LTB loads for web-tapered cantilevers with doubly symmetric or monosymmetric I-section whose shear center is below the center of gravity, however, the LTB loads may increase or decrease with the tapering increase for the web-tapered cantilevers with monosymmetric I-section whose shear center is above the center of gravity depending on the cantilever length.

CONCLUSION

The present study has introduced an analytical procedure based on the energy method to evaluate the lateral-torsional buckling behavior of web-tapered cantilevers with mono-symmetric I-sections. The current treatment was verified with 1D finite element analysis. In the scope of the study, the effects of load types, tapering level, mono-symmetry, and load height level parameters on LTB loads of web-tapered cantilevers with mono-symmetric I-sections were investigated. The findings can summarized as follows:

- It has been determined that the present analytical approach can yield pretty accordant results with 1D finite element analysis by excellently capturing the effects of tapering, slenderness, load types, and load positions on the LTB loads. The average difference was only 2%, and the maximum difference could only reach up to 5%.
- The increase in tapering caused an increase in the LTB loads of web-tapered cantilevers for top flange loading, whereas it decreased the LTB loads for bottom flange loading. For top flange loading, this unexpected behavior, which is the increase of the LTB loads despite the decrease in stiffness with the tapering increase, stems from two opposite effects due to the tapering increase. The first effect is a decrease in stiffness with tapering, which has reduced the LTB loads. The second effect, which results from the reduction of the distance between the load application point and the shear center with the effect of tapering increase, has increased the LTB loads. The second effect is more dominant in behavior; thus, the LTB loads of web-tapered cantilevers increased with the increase of tapering. However, both these

FULL TEXTS BOOK

effects tend to decrease LTB loads when web-tapered cantilevers are loaded from their bottom flange. Therefore, the tapering increase led to a decrease in the LTB loads for the bottom flange loadings.

- Results unveiled that an increase in the tapering can reduce or increase LTB loads for shear center loading. In this case, two contrary effects manage the LTB behavior of web-tapered cantilevers. Similar to flange loadings, the first effect of the increase in tapering is the decrease in stiffness, which reduces LTB loads. The second effect of the tapering increase is that the shear center and the center of gravity become closer, which decreases the absolute value of the mono-symmetry parameter of the cross-section. The decrease in the mono-symmetry parameter has an increasing effect on the LTB loads. Therefore, results demonstrate that the tapering increase caused a reduction in the LTB loads for web-tapered cantilevers with doubly symmetric or monosymmetric I-sections whose shear center is below the center of gravity. Nevertheless, it is found that the LTB loads may increase or decrease with the tapering increase for the web-tapered cantilevers with monosymmetric I-sections whose shear center is above the center of gravity, depending on the cantilever length.

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FULL TEXTS BOOK

INTERRELATIONSHIPS AMONG ONLINE TEACHING SELF-EFFICACY, ATTITUDES, KNOWLEDGE, AND CONFIDENCE IN TRANSITIONING FOR CHEMISTRY TEACHERS IN UNIVERSITY OF CAPE COAST AFFILIATE COLLEGES OF EDUCATION

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ABSTRACT
Understanding the online teaching self-efficacy of chemistry tutors, particularly their attitudes and confidence during the transition to online teaching, is limited. This study aimed to explore the relationships between Online Teaching Self-Efficacy, Attitudes, Knowledge, and Confidence in transitioning to teaching Chemistry Teachers in University of Cape Coast (UCC) Affiliate Colleges of Education (CoEs). Using a cross-sectional survey, the research examined how online teaching self-efficacy among chemistry teachers at UCC affiliate CoEs is influenced by their technological pedagogical knowledge, attitude towards online chemistry teaching, and confidence in managing related challenges. Data were gathered from twenty-four randomly selected chemistry teachers across sixteen purposively chosen UCC affiliate CoEs. The instrument was adapted from the Michigan Nurse Educators' Sense of Efficacy for Online Teaching (MNESEOT), Online Teaching Self-Efficacy Inventory (OTSEI), and an anonymous online survey. Data were analyzed using descriptive and inferential statistics, including the independent sample t-test, ANOVA, Pearson correlation, and regression. The results indicated that online teaching self-efficacy and the chemistry teachers' confidence in handling transition-related challenges was relatively high and strongly correlated. Therefore, professional development training should focus on enhancing the technological pedagogical knowledge of teachers with extensive experience in conventional chemistry.
Keywords: Attitudes, Chemistry teachers, Knowledge, Online teaching, Self-efficacy.

INTRODUCTION

The rapid shift to online teaching, propelled by increasing student enrolment, the COVID-19 pandemic, and inadequate infrastructure, has forced tertiary institutions worldwide to adopt online teaching methods (Marschall & Watson, 2022). This sudden transition poses significant challenges, especially for chemistry teachers, who must adapt their content, resources, and pedagogical approaches to an online format, with little to no prior training in digital pedagogy. Consequently, many educators experience decreased motivation, negative emotions, and low self-efficacy (Santi et al., 2020). These issues underscore the need for strong self-efficacy, positive attitudes towards online teaching, and confidence in handling the complexities of this transition.

Chemistry teachers transitioning to online teaching are confronted with a host of challenges. A significant challenge is online teaching self-efficacy. Technology in education enhances critical thinking, problem-solving skills, lifelong learning, and access to education for underserved populations (Schooner et al., 2017; Uçar et al., 2014a). The COVID-19 pandemic has accelerated the adoption of various e-learning models, necessitating adaptations in teaching practices to meet educational standards and student expectations (Carrillo & Flores, 2020; Murphy, 2020).

Teaching has evolved with technological advancements, requiring educators to blend content and pedagogical and technological knowledge to create engaging and effective online learning environments (Blonder & Rap, 2017; Hampton et al., 2020). Despite increased infrastructure and training, barriers such as a lack of self-confidence, competence, and resistance to change persist (Buabeng-Andoh, 2012). Addressing these challenges is crucial for improving online chemistry education in Colleges of Education (CoEs), where chemistry is often viewed as a practical and abstract subject (Delgado, 2020).

FULL TEXTS BOOK

This study explored the interrelationships between online teaching self-efficacy, attitudes towards online teaching, technological pedagogical knowledge, and confidence in transitioning among chemistry teachers at the University of Cape Coast affiliate Colleges of Education. This study aims to identify the factors that impact online teaching effectiveness and provide insights into supporting chemistry educators in their transition to online teaching.

LITERATURE REVIEW

Effective, learner-friendly teaching and learning can take place anywhere and at any time; however, regarding online teaching and learning, the procedure requires a different set of skills, strategies, and tools (Giri & Dutta, 2020; Jeffery & Bauer, 2020; Tigaa & Sonawane, 2020). It is also reported in the literature that, with the use of technology over time, teachers often change their classroom practices and ultimately adopt more student-centred beliefs (Tondeur et al., 2016). Most teachers tend to have low self-efficacy for online teaching because of the difference between conventional and online teaching and the steep nature of the learning curve involved. Teachers in a higher educational institution with prior experience of teaching in an online environment, according to (Horvitz et al., 2015; McLennan et al., 2017), have high self-efficacy, are highly motivated, and are more inclined to teach in an online environment.

On the contrary, as cited by (Ma, Chutiyami, Zhang, & Nicoll, 2021b), those without prior online teaching experience have low self-efficacy when they transition to online teaching. Kao and Tsai (2009) and Kao et al. (2014) also noted that the lack of opportunity to establish connections with students in an online environment, as in the conventional classroom, makes teachers feel less efficacious in interacting with and providing feedback to students. Dolighan and Owen (2021) claimed that previous experience with online learning in the form of additional certification or online professional development courses will help teachers acquire stronger self-efficacy when they move to online teaching. They also found that higher online teaching efficacy scores were correlated with having taken additional qualifications or online professional development courses.

Previous studies by (Celik & Yesilyurt, 2013; Smarkola, 2008; Uçar et al., 2014b) revealed a relationship between self-efficacy and attitudes towards the use of computers as well as the use of the Internet. This position was supported by (Cullen & Greene, 2011; Smarkola, 2008; Smarkola, 2011) with attitudes towards the use of computers positively correlated with their computer self-efficacy, and learners with greater self-efficacy for Internet use had a positive attitude towards the Internet.

Confidence, as reported by (Ertmer & Ottenbreit-Leftwich, 2010) constitutes one of the two greatest predictors of teachers' technology use in achieving instructional goals. He further suggested the need to devote time and effort to increasing teachers' confidence in using technology to achieve students' learning outcomes. Teachers are required to develop positive experiences with the use of computers in the classroom in the context of instructional tools. The confidence and self-efficacy in online teaching and its influence on teachers' pedagogical beliefs play a central role in the technological practices of teachers. Confidence in teaching in a conventional environment leads to misconceptions of students' perceptions of their skills and knowledge in online teaching. Pedagogies known to be effective in conventional teaching environments may not be suitable in online environments. Technological pedagogical knowledge (TPK), one of the seven components of the TPACK Model, focuses on pedagogies related to the use of technological tools and resources, in both online and conventional environments. The need to leverage technological resources as pedagogical tools for effective teaching cannot be overemphasized (Abdulai et al., 2022).

A key factor in transitioning to online chemistry teaching is the shift in pedagogical beliefs, attitudes, and ideologies (Ottenbreit-Leftwich et al., 2018). Teachers need ongoing professional development to build confidence and self-efficacy in their use of evolving technological tools (Ottenbreit-Leftwich et

FULL TEXTS BOOK

al., 2018). Technological knowledge alone is insufficient and confidence in using these tools is essential for effective teaching and learning. Confidence and the perceived value of using technology can enhance self-efficacy in online teaching. Technological pedagogical knowledge significantly affects students' scientific attitudes and literacy (Adebusuyi, Bamidele, & Adebusuyi, 2020). Effective teaching in the 21st century requires leveraging ICT tools as pedagogical resources and necessitating changes in teachers' knowledge, beliefs, and culture (Santos & Castro, 2021).

RESULTS AND DISCUSSION

Table 1: Summary Statistics for Attitude towards teaching (TAT) online, Technological pedagogical knowledge (TPK), Confidence in handling challenges (CiHc) and Online teaching self-efficacy (OTSE)

Variables (n= 24)	*M*	*SD*	Min	Max	Description
Technological pedagogical knowledge	3.95	0.39	3.37	4.95	High level
Attitude towards teaching online	3.51	0.38	2.78	4.11	High level
Confidence in handling challenges	15.11	2.30	10.55	19.25	High level
Online teaching self-efficacy	14.45	2.97	8.11	19.92	High level

Source: *Field data, May 2021*

Table 1 presents the mean and standard deviations of online teaching self-efficacy, attitudes towards online teaching, technological pedagogical knowledge, and confidence in handling challenges. From Table 1 above, teacher attitude towards teaching online had a mean of 3.51 (SD = 0.38, SEM = 0.08, Mode = 3.72, Mdn = 3.58, Min = 2.78, Max = 4.11) whereas that of technological pedagogical knowledge was 3.95 (SD = 0.39, SEM = 0.08, Mode = 3.95, Mdn = 3.95, Min = 3.37, Max = 4.95). The mean score for online teaching self-efficacy was 14.45 (SD = 2.97, SEM = 0.61, mode = 15.17, Mdn = 14.66, min = 8.11, max = 19.92). The confidence in handling challenges had a mean of 15.11 (SD = 2.30, SEM = 0.47, Mode = 10.55, Mdn = 15.14, Min = 10.55, Max = 19.25).

Table 2: Descriptive Statistics and Correlation coefficient of OTSE, CiHc, TPK and TAT

Variables	*M*	*SD*	1	2	3	4
1.Online teaching Self-efficacy	14.45	2.97	-			
2. Confidence in handling Challenges	15.11	2.30	0.64*	-		
3. Technological Pedagogical Knowledge	3.95	0.39	0.66*	0.61*	-	
4. Teacher attitude in Teaching online	3.51	0.38	0.12	0.43*	0.12	-

Note: *p < 0.05 level (2-tailed) N=24. ***Source****: Field data, May 2021*

Table 2 shows that there was a strong significant positive relationship between online teaching self-efficacy and confidence in handling challenges in an online environment, r (22) = 0.64, p = <.001, and technological pedagogical knowledge, r (22) = 0.66, p = <.001. It further indicated that there was a strong significant positive relationship between confidence in handling challenges in an online environment and technological pedagogical knowledge (r (22) = 0.61, p =.001) and teachers' attitude in teaching chemistry online (r (22) = 0.43, p =.018).

FULL TEXTS BOOK

Discussion

Online teaching self-efficacy was the dependent variable, with technological pedagogical knowledge, confidence in handling challenges, and teachers' attitude towards teaching chemistry online as independent variables. The objective was to determine the nature of the relationships between these variables.

Self-efficacy, a construct borne out of Bandura 's (1997) social cognitive theory, is one of the most studied constructs in both academia and business. Teaching self-efficacy has also received equal attention with respect to teaching in a conventional setting, alongside variables such as technological pedagogical knowledge, attitudes towards online teaching, and educational qualifications. Numerous studies in the literature have been confined to conventional classrooms with pre-service teachers and students (Ajayi et al., 2020; Arrington, 2023; Belardo et al., 2017). Few studies have targeted online teaching in tertiary landscapes among teacher educators. This survey sought to determine whether the relationship between the most researched variables in a conventional setting exists in an online environment.

A Pearson Product Moment correlation showed teachers online teaching self-efficacy was positively related with, confidence in handling challenges inherent with the transitioning to teach chemistry online r (23) =.64, p=.001 and technological pedagogical knowledge, r (23) =.61, p=.002; with the confidence in handling challenges .66 points higher (M=15.11, SD= 2.3) on average than the online teaching self-efficacy (M= 14.45, SD =2.29). Technological pedagogical knowledge was also .44 points higher (M=3.96, SD = .39) than attitudes towards teaching chemistry online (M= 3.51, SD= .39). The results of the study indicate that the confidence of chemistry teachers in UCC affiliate CoEs in handling challenges was strongly related to their technological pedagogical knowledge, attitude towards teaching chemistry online, and online teaching self-efficacy. On the other hand, online teaching self-efficacy was also found to be positively correlated with technological pedagogical knowledge, r (23) =.66, p < .001. Previous studies by Abbitt (2011) and Kul et al. (2019) found a similar relationship between technological pedagogical knowledge and self-efficacy beliefs of pre-service teachers.

Abbitt (2011) further posited that these multiple domains of self-efficacy beliefs account for teachers' thoughts and actions regarding the use of technology for teaching and learning. However, Hickson (2016) found no significant relationship between self-efficacy and the use of technology in pedagogical practice. This difference could be accounted for by the context, nature of the population, and prevailing conditions at the time of the research. The state of technological infrastructure and the availability of Wi-Fi Internet in CoEs cannot be compared to those in advanced countries; hence, the difference is not surprising.

Teachers' confidence in handling challenges inherent in transitioning to teaching chemistry online was operationalized in this study as the belief that a teacher has in looking beyond all obstacles and persisting to carry out activities such as the selection of technological resources, engaging students, and migrating and aligning course content and outcomes to national standards while teaching chemistry in an online environment. Prior et al. (2016) found a strong, positive, and significant relationship between online teaching self-efficacy and attitudes. This runs counter to the current non-significant relationship (r (23) =.12, p =.58). This difference can be attributed to the context and prevailing conditions in which the two studies were conducted. The nature of support received by chemistry teachers in the two settings might not be the same. The relationship between online teaching self-efficacy and technological pedagogical knowledge confirms Dolighan and Owen (2021), who found a similar relationship between online teaching self-efficacy and technological pedagogical knowledge.

The strong positive and significant relationship between teachers' confidence in handling challenges and the transition to teaching chemistry online with technological pedagogical knowledge and attitude underscores the fact that confidence plays a focal role in the development of self-efficacy when it comes to teaching chemistry in an online environment. Previous studies have identified attitudes as a

FULL TEXTS BOOK

determinant of teacher self-efficacy (Kuragayala, 2020). However, teachers' attitudes towards teaching chemistry and any other course in an online setting vary from their conventional teaching experiences. The current research shows that the relationship between attitudes towards teaching chemistry online and online teaching self-efficacy is positive, but the correlation coefficient was too low to make a significant difference.

CONCLUSION AND RECOMMENDATION

Conclusion: Chemistry teachers in UCC-affiliated CoEs reported a high level of satisfaction with various online teaching tasks, indicating a positive reception towards the transition to online teaching. The online teaching self-efficacy of these teachers was found to be positively and significantly related to their confidence in handling challenges during this transition, highlighting that teachers who feel capable of teaching online are also more confident in managing the associated difficulties. Despite this strong relationship, there was no statistically significant difference between online teaching self-efficacy and confidence in handling the challenges. Additionally, technological pedagogical knowledge was identified as a perfect predictor of online teaching self-efficacy among chemistry teachers, suggesting that their ability to integrate technology with pedagogy plays a crucial role in their self-efficacy in online teaching. Overall, chemistry teachers' online teaching self-efficacy in UCC-affiliated CoEs was strongly influenced by their technological pedagogical knowledge.

Recommendations: Since the Covid 19 pandemic has exposed shortfalls in online teaching practices, there is a need to provide support to teachers in colleges of education to develop and improve their online teaching self-efficacy. Stakeholders in the teacher education landscape should work towards finding the right technology-pedagogy mix to develop the right self-efficacy of teachers to function effectively and efficiently in an online environment.

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FULL TEXTS BOOK

APPLYING PYTHON TO DESIGN VISUAL AIDS FOR THE TOPIC "PERPENDICULAR RELATIONSHIPS IN SPACE" IN TEACHING AND LEARNING MATHEMATICS AT HIGH SCHOOLS

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ABSTRACT
According to the 2018 General Education Program of Vietnam, visual aids for teaching and learning mathematics are still limited and unequal across topics. Python is a free high-level programming language that is extremely flexible and adaptable, with the ability to combine artificial intelligence development skills. This research presents a Python technique for creating visual aids for teaching mathematics, specifically focusing on the topic "Perpendicular relationships in space." A quantitative analysis was also carried out to assess the efficiency of using Python to teach mathematics, with the goal of improving and advancing research.
Keywords: Visual aid, Python, Mathematics Education, high school.

1. Introduction

Today, the Fourth Industrial Revolution has influenced many aspects of life, especially the future of education (Elayyan, 2021). In this process, teaching and learning mathematics also follows the general trend of applying new technologies (Ayanwale et al., 2022). Although there are many software and platforms supporting math teaching and learning, Python, a free and versatile high-level programming language, is increasingly popular and widely used worldwide (Saha, 2015).

According to Tuan et al. (2022), visual aids are objects, phenomena, symbols, etc., directly used by teachers and students in the teaching process to acquire new knowledge and develop intellectual capacities. Visual aids have evolved, not only in quantity but also in quality, ranging from simple, rudimentary items to modern tools (Alshatri et al., 2019). Visual aids play a crucial role in teaching various subjects such as foreign languages (Pateşan et al., 2018), mathematics (Brewer, 2016), and sciences (Ho & Intai, 2017). Numerous studies have explored the use of Python in designing visual aids for educational purposes (Solem, 2012; Li et al., 2020). The application of Python in mathematical education has been adopted in several countries, including Korea (Park et al., 2019), the United States (Jackson et al., 2019), and Italy (Frassia et al., 2018).

This paper proposes a Python approach to designing visual aids for the topic "Perpendicular relationships in space" to facilitate mathematics teaching in high schools. A statistical study was also conducted to evaluate the effectiveness of this approach.

2. Literature Review

2.1. Definition of Visual Aids

Giardino (2010) describes visual aids as tools that provide learners with information to help them learn and accumulate experience, thus enabling them to understand general concepts through visual images and form new knowledge. According to Hyerle (2008), visual aids are non-verbal symbol systems used by learners, teachers, and leaders to link mental and emotional associations through images, creating and communicating rich thought patterns. Visual aids are categorized into three types: (1) Brainstorming Webs to promote creativity and intellectual exploration, (2) Graphic Organizers to enhance content analysis and specific learning processes, and (3) Conceptual Maps to foster cognitive development and critical thinking. Visual aids are essentially symbols, objects, drawings, phenomena, or familiar images used strategically in teaching to build knowledge content.

FULL TEXTS BOOK

Hamdani (2011) defines visual aids as a combination of sound and images. The presence of visual aids makes the teaching material more accessible and comprehensive for learners. Visual aids can also take on the role of the teacher in presenting content. Additionally, visual aids are materials and equipment that stimulate and support sound and images in teaching, facilitating learning by activating multiple sensory channels (Madhuri, 2013).

2.2. Python Software with Open-Source Library Manim

Manim is an open-source library written in Python designed to create visually appealing and dynamic educational videos about mathematics. This software allows users to create animations, graphs, charts, and mathematical simulations with high precision. Manim combines Python's programming capabilities with the need to present complex mathematical concepts visually, making it an ideal teaching tool for educators and students. Besides being an educational tool, Manim promotes creativity and research in mathematics. Its ability to simulate and visually represent mathematical concepts helps researchers and teachers develop new teaching methods and assists students in understanding complex mathematical ideas.

Key Features of Manim

(1) High-Quality Graphics: Manim provides tools to create sharp 2D and 3D images, from simple to complex.

(2) Python Integration: As a Python library, Manim allows users to utilize the full range of libraries and tools available in the Python environment to extend video capabilities.

(3) Flexible Customization: Users can create complex scenarios, adjusting every detail from color and transparency to motion, ensuring the videos meet their educational objectives.

(4) Strong Support for Mathematical Concepts: Manim is designed to solve mathematical problems and represent mathematical algorithms, making it an ideal tool for teaching and learning mathematics.

3. Research Results

3.1. Research Method

Step 1: Study the lesson content to select suitable visual aids.

Step 2: Use Python to design visual aids, then incorporate them into the lesson plan.

Step 3: Implement the lesson plan in actual teaching

Step 4: Collect feedback for improvement. If the feedback is positive, proceed to **Step 5**.

Step 5: Save the lesson plan with the designed visual aids for future teaching use. If the feedback is not positive, return to **Step 2**.

3.2. Visual Aids Designed

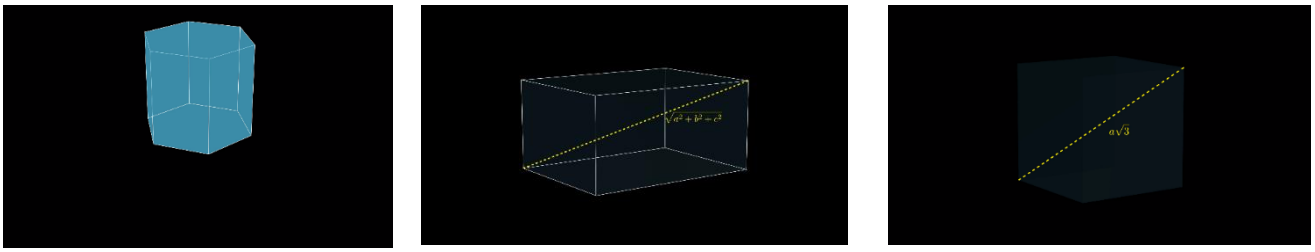


Figure 1. Illustrations of regular prisms, rectangular boxes, and cubes using Python

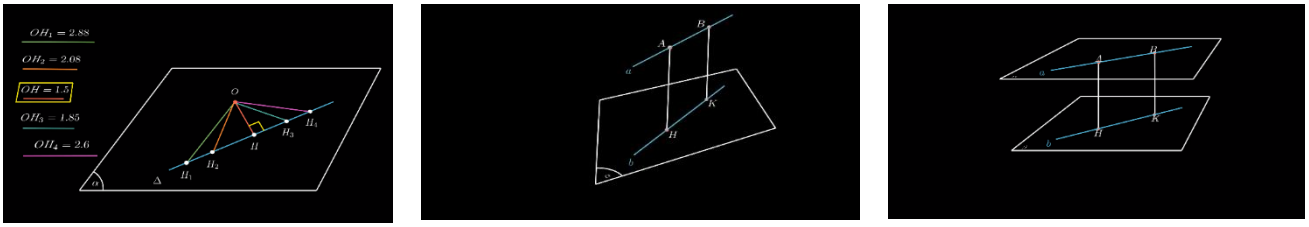


Figure 2. Illustrations of spatial distances using Python

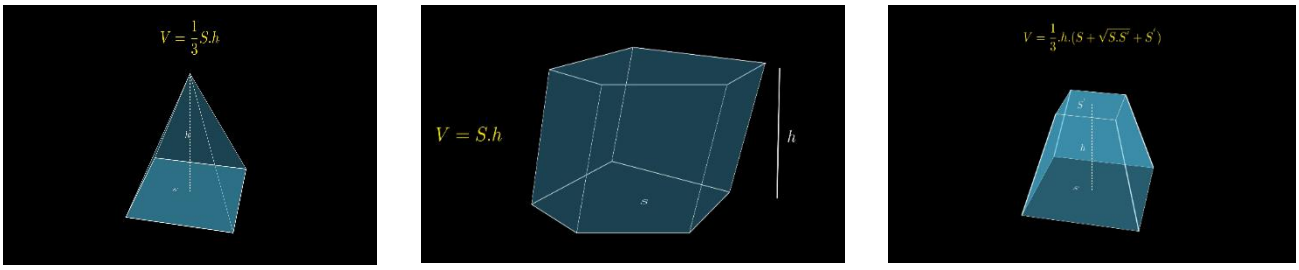


Figure 3. Illustrations of volumes of pyramids, prisms, and truncated pyramids using Python

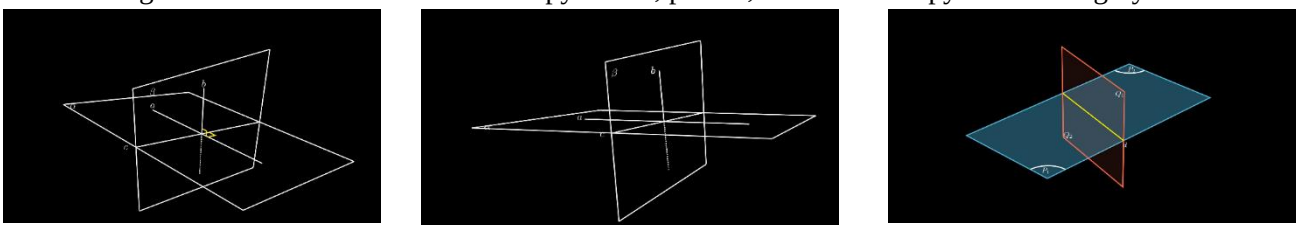


Figure 4. Illustrations of the angle between two planes and dihedral angles using Python

3.3. Survey Questionnaire

Table 1. Survey Questionnaire

Encode	Observed Variable
Q1. Compared to traditional teaching, learning math with visual aids through digital software has the following benefits:	
Q1A	Easy to access
Q1B	Increases interest in learning
Q1C	Can study at any time
Q1D	Can study anywhere
Q1E	Saves time and cost
Q1F	Easy to use
Q2. The content of knowledge when teaching with visual aids has the following characteristics:	
Q2A	Conveys information visually and understandably
Q2B	Increases interaction and curiosity
Q2C	Helps visualize and generalize knowledge
Q2D	Promotes thinking and creativity
Q2E	Improves learning experience
Q3. Arranging lessons with visual aids has the following characteristics:	
Q3A	Uses logical structure
Q3B	Balances theory and practice
Q3C	Meets the learning needs of students
Q4. Compared to traditional teaching, I think	
Q4A	Helps to imagine and understand the lesson better
Q4B	Promotes more interaction and positivity
Q4C	Enhances problem-solving skills
Q4D	Diversifies teaching methods
Q5. In your opinion about using visual aids in teaching mathematics	
Q5A	What are the advantages?
Q5B	What are the disadvantages?
Q6. On a scale of 1 to 10, how would you rate the visual teaching method?	

Questions **Q1**, **Q2**, **Q3**, **Q4** are designed on a 5-point Likert scale to evaluate the quantitative results of the answers. The questions are coded as follows: 1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Neutral*, 4

FULL TEXTS BOOK

= *Agree*, 5 = *Strongly agree*. Question **Q5** is an open-ended question to analyze qualitatively. Question **Q6** has a scale from 1 to 10 to evaluate quantitatively.

3.4. Analysis Results

Statistical Data Collection: A total of 259 questionnaires were distributed, and all 259 were returned, achieving a response rate of 100%.

3.4.1. Reliability Analysis

Students' feedback on reliability was analyzed using IBM SPSS 26 software, presented in Tables 2, 3, 4, and 5.

Table 2. Analysis of Student Feedback for Q1 Group Questions

Reliability Statistics

Cronbach's Alpha	N of Items
0.684	6

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q1A	19.2201	7.351	0.405	0.646
Q1B	19.0734	7.386	0.456	0.629
Q1C	19.1583	7.436	0.401	0.647
Q1D	19.1815	7.289	0.415	0.643
Q1E	19.1158	7.645	0.412	0.644
Q1F	19.0965	7.638	0.392	0.650

Table 3. Analysis of Student Feedback for Q2 Group Questions

Reliability Statistics

Cronbach's Alpha	N of Items
0.749	5

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q2A	15.6873	5.208	0.541	0.695
Q2B	15.6448	5.385	0.477	0.719
Q2C	15.7181	5.451	0.467	0.722
Q2D	15.6795	5.234	0.572	0.685
Q2E	15.6178	5.198	0.517	0.704

Table 4. Analysis of Student Feedback for Q3 Group Questions

Reliability Statistics

Cronbach's Alpha	N of Items
0.613	3

Item-Total Statistics

FULL TEXTS BOOK

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q3A	8.8687	0.835	0.461	0.465
Q3B	8.7954	1.039	0.516	0.395
Q3C	8.6757	1.212	0.316	0.650

Table 5. Analysis of Student Feedback for Q4 Group Questions

Reliability Statistics

Cronbach's Alpha	N of Items
0.694	4

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q4A	13.3012	2.397	0.510	0.608
Q4B	13.2510	2.600	0.533	0.601
Q4C	13.2510	2.592	0.441	0.652
Q4D	13.3282	2.477	0.438	0.657

The above tables show that the observed variables have a suitable total variance correlation coefficient (all greater than 0.3). The Cronbach's Alpha coefficients for **Q1**, **Q2**, **Q3**, **Q4** groups are 0.684, 0.749, 0.613, and 0.694 respectively, all greater than 0.6, indicating reliability and appropriateness of the survey questions.

3.4.2. Descriptive Statistics of Variables

The 5-point Likert scale with 1 being the lowest (Minimum), 5 being the highest (Maximum), and 3 being Neutral. The mean values have specific meanings in the following ranges:

1.00 – 1.99: Strongly Disagree
2.00 – 2.99: Disagree
3.00 – 3.99: Neutral
4.00 – 4.99: Agree
5.00: Strongly Agree

Table 6. Descriptive Statistics of Variables

Encode	N	Mean	Std.Deviation
Q1A	259	3.7490	0.89071
Q1B	259	3.8958	0.82167
Q1C	259	3.8108	0.87100
Q1D	259	3.7876	0.89642
Q1E	259	3.8533	0.79831
Q1F	259	3.8726	0.82310
Q2A	259	3.8996	0.79091
Q2B	259	3.9421	0.79760
Q2C	259	3.8687	0.78636
Q2D	259	3.9073	0.75682
Q2E	259	3.9691	0.81591
Q3A	259	4.3012	0.71123
Q3B	259	4.3745	0.55918
Q3C	259	4.4942	0.57311
Q4A	259	4.4093	0.72234
Q4B	259	4.4595	0.62358

FULL TEXTS BOOK

Q4C	259	4.4595	0.69417
Q4D	259	4.3822	0.74490
Valid N (listwise)		259	

3.4.3. Analysis of Q1 Group Questions

Table 7. Selection Ratio of Q1 Group Questions

Question		Q1A	Q1B	Q1C	Q1D	Q1E	Q1F
Strongly Disagree	Frequency	4	0	0	4	0	0
	Percentage (%)	1.5	0	0	1.5	0	0
Disagree	Frequency	14	13	17	12	15	9
	Percentage (%)	5.4	5.0	6.6	4.6	5.8	3.5
Neutral	Frequency	77	63	76	77	59	79
	Percentage (%)	29.7	24.3	29.3	29.7	22.8	30.5
Agree	Frequency	112	121	105	108	134	107
	Percentage (%)	43.2	46.7	40.5	41.7	51.7	41.3
Strongly Agree	Frequency	52	62	61	58	51	64
	Percentage (%)	20.1	23.9	23.6	22.4	19.7	24.7
Total *Agree* and *Strongly Agree*	**Frequency**	**164**	**183**	**166**	**166**	**185**	**171**
	Percentage (%)	**63.6**	**70.6**	**64.1**	**64.1**	**71.4**	**66.0**

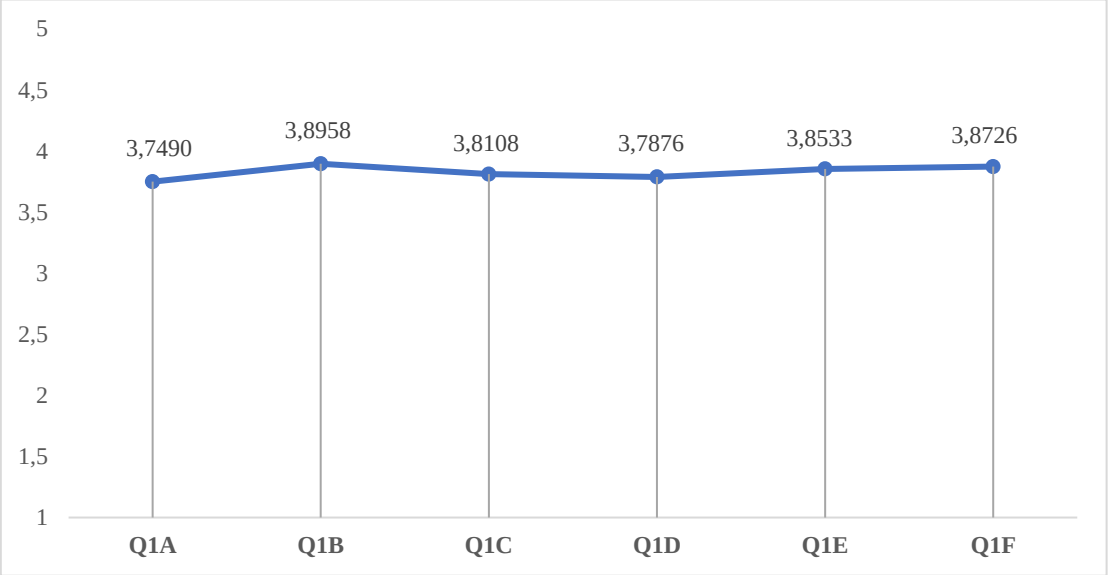


Chart 1. Average Value of Q1 Group Questions

Based on the above table, the total percentage of students selecting Agree and Strongly Agree is quite high, all above 50%, indicating that students tend to agree with the opinions. This shows that most

FULL TEXTS BOOK

students recognize the benefits of using visual teaching aids in teaching mathematics compared to traditional teaching methods.

3.4.4. Analysis of Q2 Group Questions

Table 8. Selection Ratio of Q2 Group Questions

Question		Q2A	Q2B	Q2C	Q2D	Q2E
Strongly Disagree	Frequency Percentage (%)	0 0.0	1 0.4	1 0.4	0 0	0 0
Disagree	Frequency Percentage (%)	10 3.5	7 2.7	9 3.5	7 2.7	8 3.1
Neutral	Frequency Percentage (%)	65 25.1	63 24.3	66 25.5	66 25.5	66 25.5
Agree	Frequency Percentage (%)	125 48.3	123 47.5	130 50.2	130 50.2	111 42.9
Strongly Agree	Frequency Percentage (%)	59 22,8	65 25.1	53 20.5	56 21.6	74 28.6
Total *Agree* and *Strongly Agree*	**Frequency Percentage (%)**	**184 71.1**	**188 72.6**	**183 70.7**	**186 71.8**	**185 71.5**

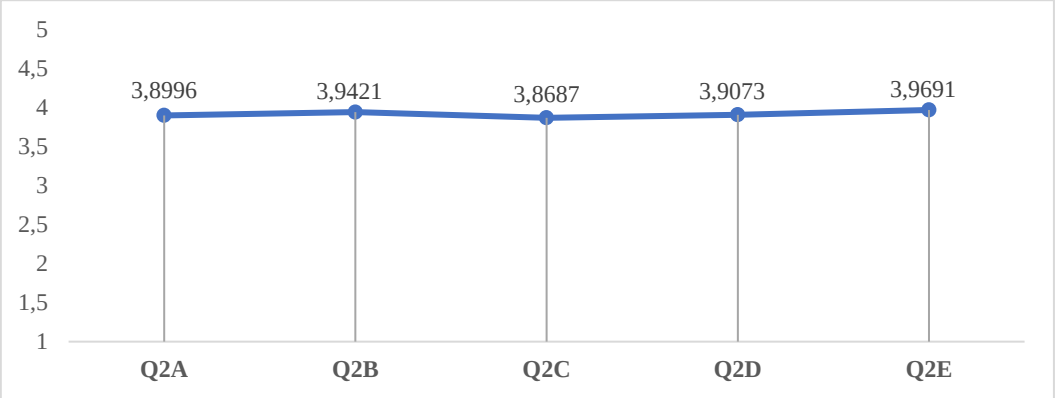


Chart 2: Average Value of Q2 Group Questions

From the table above, it can be seen that Q2A, Q2B, Q2C, and Q2E all have a relatively high rate of agreement and strong agreement above 50%, indicating that most students agree with the contents. This shows that when teaching with visual aids, it still provides the necessary knowledge and the content is suitable for students, making the presentation of knowledge content understandable.

FULL TEXTS BOOK

3.4.5. Analysis of Q3 Group Questions

Table 9: Selection Ratio of Q3 Group Questions

Question		Q3A	Q3B	Q3C
Strongly Disagree	Frequency	0	0	0
	Percentage (%)	0	0	0
Disagree	Frequency	0	0	0
	Percentage (%)	0	0	0
Neutral	Frequency	38	10	10
	Percentage (%)	13.3	3.9	3.9
Agree	Frequency	105	142	111
	Percentage (%)	36.7	54.8	42.9
Strongly Agree	Frequency	116	107	138
	Percentage (%)	40.6	41.3	53.3
Total *Agree* and *Strongly Agree*	**Frequency**	**221**	**249**	**249**
	Percentage (%)	**77.3**	**96.1**	**96.1**

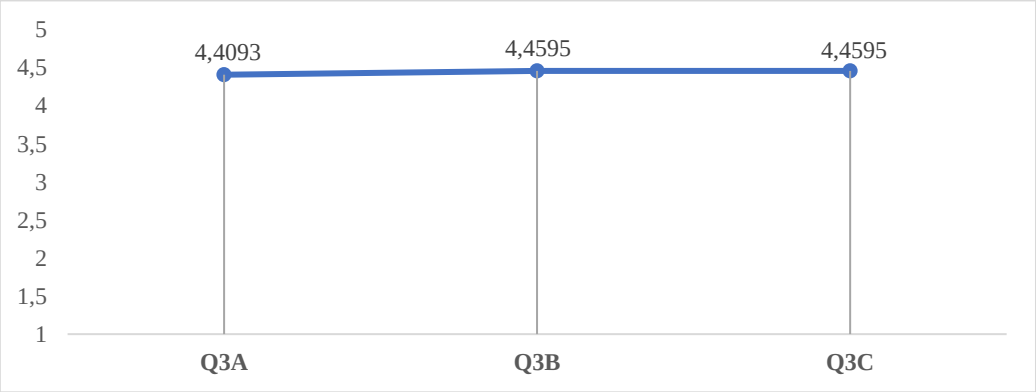


Chart 3: Average Value of Q3 Group Questions

The high rates of agreement and strong agreement for Q3A, Q3B, and Q3C, with no selection of strongly disagree or disagree, indicate that students generally agree with the contents. This demonstrates that the arrangement of visual aids lessons meets students' learning needs.

3.4.6. Analysis of Q4 Group Questions

Table 10: Selection Ratio of Q4 Group Questions

Question		Q4A	Q4B	Q4C	Q4D
Strongly Disagree	Frequency	0	0	0	0
	Percentage (%)	0	0	0	0
Disagree	Frequency	2	0	1	1
	Percentage (%)	0.8	0	0.4	0.4
Neutral	Frequency	30	18	27	38
	Percentage (%)	11.6	6.9	10.4	14.7
Agree	Frequency	87	104	83	81

FULL TEXTS BOOK

Question		Q4A	Q4B	Q4C	Q4D
	Percentage (%)	33.6	40.2	32.0	31.3
Strongly Agree	Frequency	140	137	148	139
	Percentage (%)	54.1	52.9	57.1	53.7
Total *Agree* and	**Frequency**	**227**	**241**	**231**	**220**
Strongly Agree	**Percentage (%)**	**87.7**	**93.1**	**89.1**	**85**

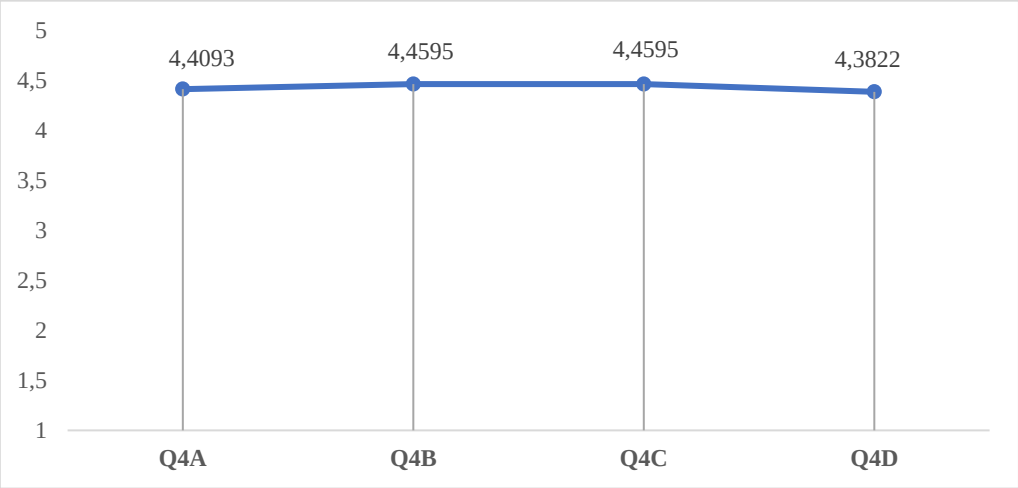


Chart 4: Average Value of Q4 Group Questions

The high rates of agreement and strong agreement for Q4A, Q4B, Q4C, and Q4D, all above 50%, indicate that the majority of students believe that compared to traditional teaching methods, using visual aids in teaching brings more benefits, such as enhancing interaction between teachers and students, promoting problem-solving skills, and better understanding of lessons.

3.4.7. Analysis of Q5 Group Questions

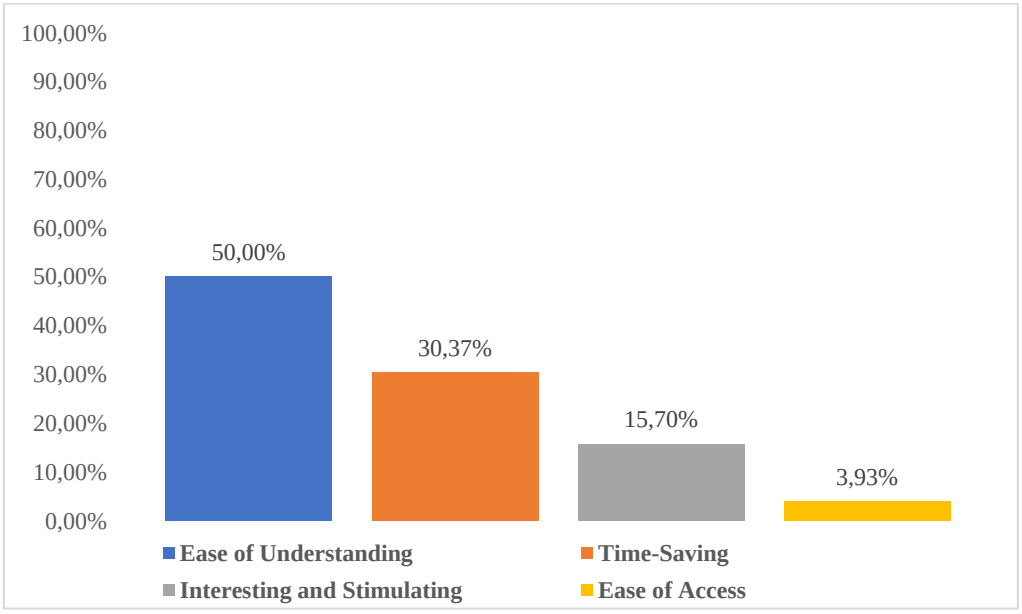


Chart 5: Advantages of Visual Teaching Methods

The results of the survey question Q5 show the advantages of teaching methods using visual aids as follows:

Ease of Understanding: 50% of survey respondents believe that the use of visual teaching aids in math teaching is easy to understand.

Time-Saving: 30.37% find it time-saving.

FULL TEXTS BOOK

Interesting and Stimulating: 15.70% find it interesting and stimulating.
Ease of Access: Only 3.93% believe it is easy to access, showing that some students are still not fully adapted to this teaching method.

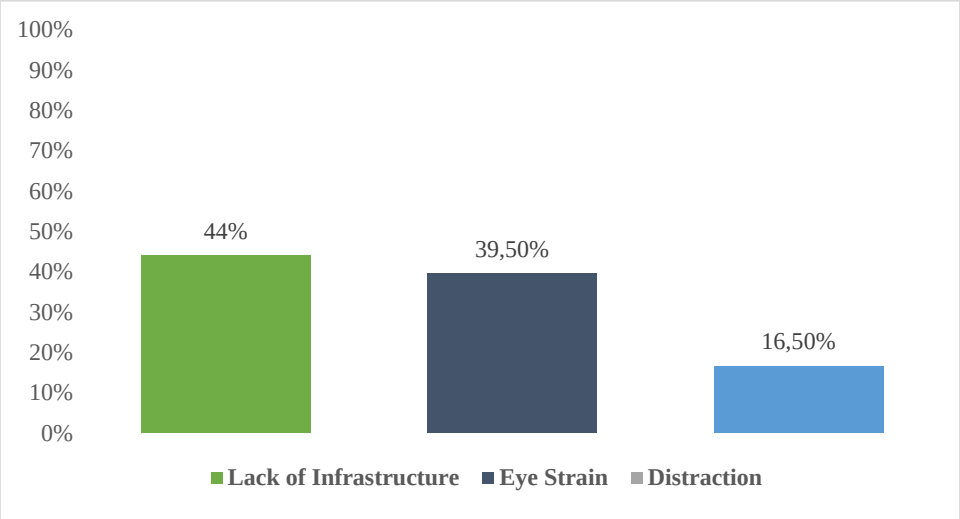


Chart 6: Disadvantages of Visual Teaching Methods

The results of the survey question Q6 show the disadvantages of teaching methods using visual aids as follows:

Lack of Infrastructure: 44% cited lack of infrastructure (wifi, electronic devices, etc.) as amajor disadvantage.

Eye Strain: 39.5% believe that visual teaching methods may affect vision due to prolonged exposure.

Distraction: 16.5% believe that for complex and difficult lessons, the use of visual materials can easily cause distraction.

3.4.8. Analysis of Q6 Group Questions

Table 11. Descriptive Statistics of Scores

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Q6	259	4.00	10.00	8.0502	1.01605
Valid N (listwise)	259				

Table 12: Scoring Rate for Visual Teaching Methods

Valid	Frequency	Percent
4.00	2	0.8
5.00	5	1.9
6.00	4	1.5
7.00	45	17.4
8.00	134	51.7
9.00	49	18.9
10.00	20	7.7
Total	259	100.0

FULL TEXTS BOOK

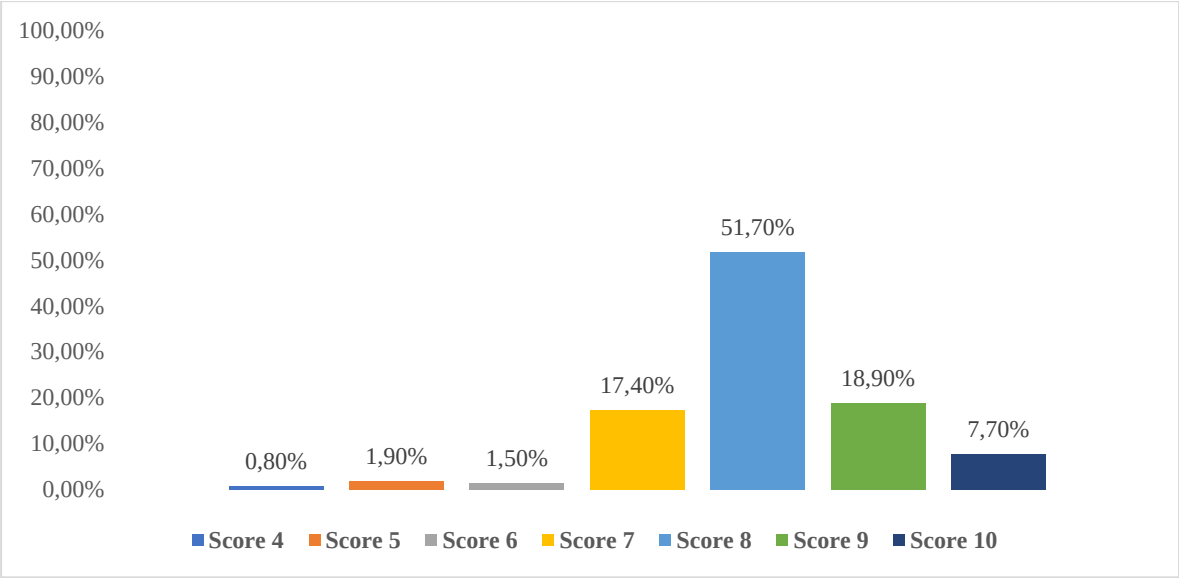


Chart 7: Score Range for Visual Teaching Methods

The average score of 8.0502 indicates that students are quite interested in the visual teaching method and recognize its effectiveness. The experimental results show that the purpose of the experiment has been achieved. Applying visual teaching methods in math education is a new trend in Education 4.0 today. The experiment shows that visual teaching methods in math are generally well received by students, although some limitations need to be addressed for further improvement.

4. Conclusion

Visual aids in teaching play a vital role in creating a positive learning environment, enhancing students' curiosity, and encouraging their eagerness to learn. These aids are in line with modern educational trends, aiming to develop students' overall competencies and effectively meet the current educational demands. However, attention must be paid to issues related to sound when using these aids. Some solutions to improve the learning experience include adjusting the volume to suit the classroom environment and providing features that allow teachers to increase or decrease the volume as needed. Background music, if used, should be instrumental or have a light tempo to avoid distracting students. Additionally, allowing teachers to mute the sound during important sections requiring high concentration is a good idea. Finally, regularly collecting feedback from students on the effectiveness of visual aids, including sound, will support adjustments and improvements in their use in future lessons. These adjustments will help enhance the effectiveness of visual aids, contributing to improving educational quality and the learning environment for students.

The study shows that the application of Python and the Manim open-source library has significant benefits in designing visual aids in mathematics, particularly for the topic “Perpendicular relationships in space” for the 11th-grade mathematics curriculum. Using technology in teaching not only helps make complex mathematical concepts more understandable and engaging but also encourages student interaction and active participation, thereby enhancing educational effectiveness. Integrating technology aligns with modern educational trends, better preparing students for an increasingly digital world. Future research should focus on expanding the application scope to various age groups and curricula, increasing interaction, and improving assessment tools to optimize the teaching and learning process.

In the future, besides Python, artificial intelligence tools such as ChatGPT, DALL-E, HeyGen, Cleanup, etc., can be used to design visual aids. Visual aids also need to develop new formats to be applicable to other subjects or mathematics at the primary and secondary school levels. Readers can refer to related articles on this research topic, such as Artificial Intelligence in Mathematics Education (Thanh & Tuan, 2021) and Augmented Reality Technology (Tuan & Ngan, 2021).

FULL TEXTS BOOK

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FULL TEXTS BOOK

WATER EXPOSURE PERIOD EFFECTS ON THE MOISTURE SUSCEPTIBILITY OF ASPHALT MIXTURES HAVING DIFFERENT AGGREGATE GRADATIONS

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ABSTRACT
Moisture affects asphalt mixtures' characteristics adversely, reducing the performance of roadway pavement and may even cause the service life to end earlier than projected. In this study, it was aimed both to evaluate the effects of different aggregate gradations on the moisture susceptibility of dense-graded hot mix asphalt (HMA) via Retained Marshall Stability (RMS) method and to examine the effectiveness of RMS over time by applying longer water exposure periods to the HMA test samples. Three different aggregate gradations as middle (M), coarser (C) and finer (F) based on the Type 1 gradation envelope defined in Turkey's Highway Technical Specification for use in the wearing course of flexible roadway pavements, and two different water exposure periods as 2-days and 12-days were included in the study for this aim. All HMAs with M, C and F gradations were determined to have successful moisture resistances according to their RMS results fluctuating on the level of 85%. Moreover, the effectiveness of RMS was not detected to be changed significantly over time, since RMS values were found to be decreased no more than 3% in all gradations as the water exposure period was increased from 2 days to 12 days. So, it was concluded that extending the 2-days of water exposure period further was not necessary to evaluate the moisture susceptibility of dense-graded HMAs with RMS method.
Keywords: Water exposure period, Aggregate gradation, Retained Marshall Stability, Moisture susceptibility, Hot mix asphalt.

INTRODUCTION
Water causes loss of adhesive bond at the asphalt-aggregate interface, known as stripping, and lowers strength of hot mix asphalt (HMA) against roadway flexible pavement distresses like deformations, crackings and mechanical weathering-based failures. This phenomenon is commonly defined as susceptibility of a HMA to moisture damage. HMA with high moisture susceptibility is not desirable for the roadway pavement to maintain successful performance throughout its service life, since poor moisture resistance of HMA will possibly lead to a shortened life-span of roadway pavement, which in turn creates additional economic burden on transportation agencies and therefore on communities.
For higher durability and better performance of a pavement in its service life, efforts are being made to make HMA more resistant against moisture. Some factors like modification of HMAs with several additives, mineralogical composition-morphological properties and gradation characteristics of aggregate have rather influencing effect on the moisture susceptibility of HMAs. Modification of HMAs either with wet process or with dry process has been found to provide improvements in moisture resistance. About 1% addition of hydrated lime, which is a well-known modifier used to modify asphalt mixtures with dry process (mixture modification), almost eliminated stripping in asphalt mixtures [1].

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FULL TEXTS BOOK

Hydrated lime could also increase moisture resistance of mixtures when it was used in wet process (asphalt modification) which was reported to raise tensile strength ratio (TSR), the most commonly test used to measure moisture sensitivity of compacted asphalt mixtures and higher TSR means better water resistance, from 64.3% to 78.6% [2]. Moreover, the damaging effects of water on asphalt mixtures were determined to be reduced by many additives, the most known of which were Styrene-Butadiene-Styrene (SBS), Ethylene Vinyl Acetate (EVA), Crumb Rubber (CR) and Polyethylene Terephthalate (PET) [3-8]. Asphalt mixtures composed of hydrophobic aggregates were found to have more potential to resist water [9] showing the effect of mineralogical composition on the moisture susceptibility. Shape of aggregates, a significant morphological property, may also affect moisture susceptibility of HMAs. The moisture resistance of asphalt mixtures with angular, flat, elongated and round aggregates were compared and performance of each of the mixture were determined to differ from each other either significantly or negligible [10]. In another study, it was found that higher flat-elongated particles and inferior sphericity of the aggregate weakened moisture resistance of HMA [11]. The effects of aggregate gradation on the moisture resistance of HMAs were evaluated by examining asphalt mixtures prepared with finer and coarser or upper-middle-lower limit aggregate gradations as per local codes. The literature contains conflicting findings on this issue. It has been stated in some papers that finer aggregate gradation (or upper limit) provides more resistance to moisture [9, 12-17], while in some papers it has been stated that coarser aggregate gradation (or lower limit) provides more resistance to moisture [18, 19]. Moreover, there are also studies showing that aggregate gradation is ineffective on moisture resistance of asphalt mixtures which have the same type of grading characteristics i.e., dense-graded mixtures [20, 21]. Although it is difficult to explain the reasons for the confusion here, there are many effective parameters in this regard as briefly mentioned above. Asphalt properties used in the mixture, fabrication properties of the samples and whether they are fabricated identically or not, compaction effort and the technique used, air void contents and whether or not these air voids are interconnected, unit weights of the samples, asphalt film thickness, testing methods used in the moisture susceptibility comparisons, etc. can be added to the above-mentioned parameters.

The effects of aggregate gradation variations on the moisture susceptibility of the asphalt mixtures were aimed to be evaluated by Retained Marshall Stability (RMS) in this study. For this aim, three different aggregate gradations were determined based on the Type 1 gradation envelope defined in Turkey's Highway Technical Specification for use in the wearing course of flexible roadway pavements: middle gradation (M), coarser gradation (C) and finer gradation (F). M contains the values passing through the middle of that defined envelope. C was obtained by shifting the lower limit of the gradation envelope downwards by 7%, while F was obtained by shifting the upper limit upwards by 7%. Moreover, 2 days and 12 days of water exposure periods were included in the study, unlike other studies, in order to examine the effectiveness of RMS over time.

MATERIALS AND METHODOLOGY

50/70 penetration grade asphalt binder and crushed limestone aggregate were used in the study. The basic characteristics of the asphalt binder and specific gravity values of the aggregate were presented in Table 1 and Table 2.

Table 1. Characteristics of the 50/70 penetration grade asphalt binder.

Applied test	Test result	Standard
Penetration at 25℃, dmm	55.3	ASTM D5
Softening point, ℃	51.8	ASTM D36
Flash point, ℃	283	BS EN 22592
Specific gravity at 25℃	1.01	ASTM D70
Viscosity at 135℃, Pa.s	0.295	ASTM D4402

FULL TEXTS BOOK

Viscosity at 150°C, Pa.s	0.184	ASTM D4402

Table 2. Specific gravity values of the crushed limestone aggregate.

	Bulk Specific Gravity	Apparent Specific Gravity
Coarse aggregate	2.759	2.781
Fine aggregate	2.727	2.760
Filler	-	2.764

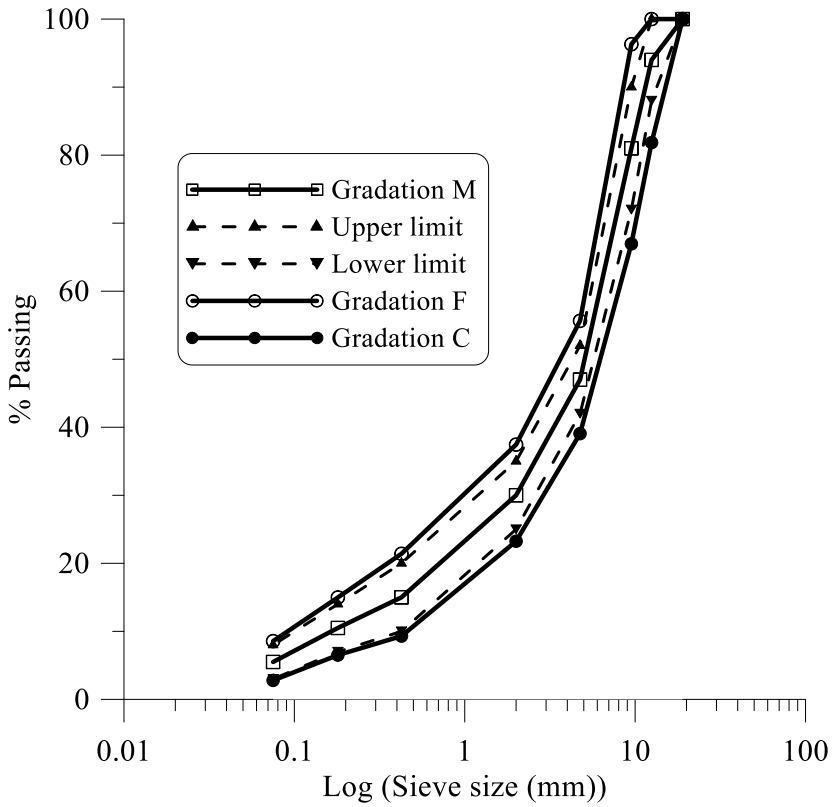


Figure 1. Aggregate gradations used in the Marshall briquettes.

M, C and F aggregate gradations shown in Figure 1 were used in Marshall briquettes. They were determined based on the Type 1 gradation envelope defined in Turkey's Highway Technical Specification [22]. M was the middle of that envelope while C and F were obtained by shifting the lower and upper limits of the gradation envelope downwards and upwards by 7%, respectively. That is, C is a coarser gradation than the lower limit, and F is a finer gradation than the upper limit of Type 1 gradation envelope. Optimum asphalt contents for each of the aggregate gradations were determined in accordance with Marshall method by us in our former study [23] as 4.68% for M, 4.64% for C, 4.96% for F and were used in that study. Marshall briquettes were fabricated at 150±5°C by compacting 75 blows to each face with Marshall hammer. Each briquette was produced with the optimum asphalt content according to the aggregate gradation. The effects of aggregate gradations on the moisture susceptibility of HMAs were detected by Retained Marshall Stability (RMS) method. The produced Marshall briquettes were divided into 3 groups, with two samples in each group. The reference group was unconditioned (dry), while one group was exposed to water at 60°C for 2 days (2 days-wet), and one group was exposed to water at 60°C for 12 days (12 days-wet). Briquettes were exposed to water for different periods of time in order to detect the change of effectiveness of the RMS over time. Stability measurements of all samples were carried out at 60°C and average values were calculated for each group. The effects of aggregate gradation on the moisture susceptibility of HMAs and the effectiveness of RMS over time were determined according to the Eq.1 given below.

FULL TEXTS BOOK

$$\text{RMS}, \% = \frac{\text{Average Marshall Stability of wet samples (2 days−wet or 12 days−wet)}}{\text{Average Marshall Stability of dry samples}} \text{x}100 \quad \text{(Eq.1)}$$

RESULTS AND DISCUSSION

The average mechanical properties of the test samples for each aggregate gradation were shown in Table 3.

Table 3. Mechanical properties of the test samples.

Gradation	Gmb	Va, %	VMA, %	Vfa, %
F	2.447	4.00	15.06	73.78
M	2.437	4.82	15.22	68.40
C	2.396	6.54	16.67	60.85

As expected, the bulk specific gravity (Gmb) and voids filled with asphalt ratio (Vfa) were decreased, while air void ratio (Va) and voids in mineral aggregate ratio (VMA) were increased when aggregate gradation gets coarser.

The average of Marshall Stability results for dry, 2 days-wet and 12 days-wet samples in each gradation type were presented in Figure 2. When Figure 2 was examined, it could be seen first of all that, dry or wet in all conditions, higher stability values were obtained as the gradation gets finer. Similar findings with finer gradation in dense-graded HMAs were seen in the literature [9, 23-27]. So, the results of the study can be said to be compatible with literature in this regard. When the differentiations in stability results were evaluated together with the data in Table 3, less void ratio and denser sample structure may have provided this outcome.

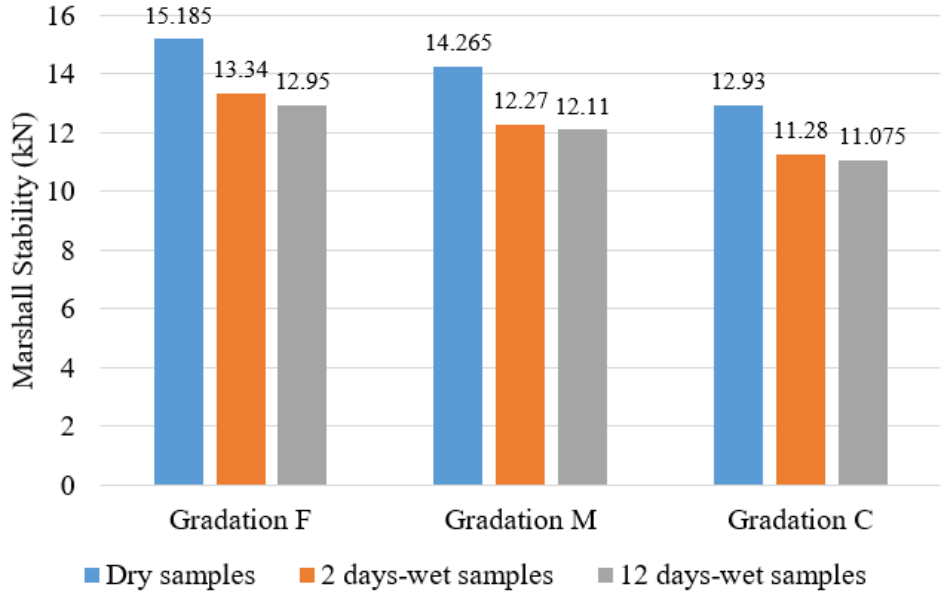


Figure 2. Marshall Stability results.

The RMS values were calculated according to the Eq. 1 in order to evaluate the effects of both the aggregate grading and the water exposure periods on the moisture susceptibility of HMAs. They were given in Figure 3.

FULL TEXTS BOOK

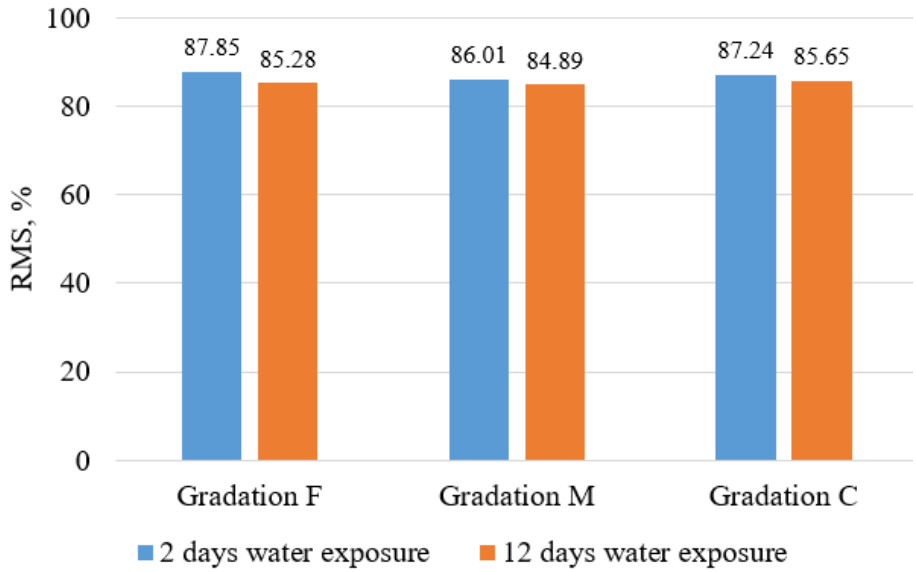


Figure 3. RMS results for aggregate gradings and water exposure periods.

All RMS values were found to be over 80% meaning that HMAs with all aggregate gradings perform well against detrimental effects of water and have successful moisture resistance. The highest RMS was in F grading as 87.85% (with 2 days of water exposure period), while the lowest was in M grading as 84.89% (with 12 days of water exposure period). According to the data in Figure 3, aggregate gradation characteristics were found to be ineffective on the moisture resistance of dense-graded HMAs, since all RMS values fluctuated on the level of 85%. Some literature studies also reflect this finding [20, 21].

RMS approach was stated to have low sensitivity in measuring moisture susceptibility of HMAs with respect to the other performance tests related on this issue [15]. Therefore, the effectiveness of RMS was examined by extending the water exposure period from 2 days to 12 days. RMS values were found to be decreased in all gradations as the water exposure period was increased from 2 days to 12 days. But, no significant decrements were detected. Even in the F grading, where the largest decrease was observed from 87.85% to 85.28%, this decrement was found to be less than 3%. It could be concluded that the effect of extending the water exposure period from 2 days to 12 days on RMS results is quite limited. Thus, when measuring the moisture sensitivity of dense-graded HMAs with the RMS approach, it was determined that 2 days of water exposure period would be sufficient and it was not necessary to extend this period further.

CONCLUSIONS

In this study, the effects of aggregate gradation on the moisture susceptibility of the HMAs and the effectiveness of RMS over time were evaluated. Three different aggregate gradations as M, C and F based on the Type 1 gradation envelope defined in Turkey's Highway Technical Specification and two different water exposure periods as 2 days and 12 days were included in the study. The following outcomes were achieved;

- In all conditions (dry, 2 days-wet and 12 days-wet), higher stability values were obtained as the gradation gets finer.
- All RMS values were fluctuated on the level of 85% for all gradations. The highest RMS was in F grading as 87.85% (with 2 days of water exposure period). The lowest RMS was in M grading as 84.89% (with 12 days of water exposure period).
- As the water exposure period was increased from 2 days to 12 days, RMS values were found to be decreased no more than 3% in all gradations.

Consequently, all HMAs with M, C or F gradations were determined to have successful moisture resistances according to their high RMS results. Moreover, 2-days of water exposure period would be

FULL TEXTS BOOK

sufficient to evaluate the moisture susceptibility of dense-graded HMAs with RMS approach and it was not necessary to extend this period further, since the effectiveness of RMS did not change much over time.

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FULL TEXTS BOOK

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FULL TEXTS BOOK

NAVIGATING MISUNDERSTANDINGS AND CONFLICTS IN MULTICULTURAL CLASSROOMS: A COMPREHENSIVE LITERATURE REVIEW

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ABSTRACT
This paper, which is a literature review examines misunderstandings and conflicts in multicultural classrooms, focusing on interactions between students and professors. The aim of the study is to identify the root causes of these conflicts, understand their dynamics, and explore effective strategies for resolution. Drawing on a range of scholarly sources, including Banks (2015), Gorski (2016), and Deardorff (2019), the review highlights how language barriers, cultural assumptions, and differing educational expectations contribute to communication breakdowns and cultural clashes. Methodologically, this paper, being a literature review synthesizes qualitative and quantitative research findings on intercultural communication and educational conflict, providing a comprehensive overview of current academic discourse.
Key contributions of this review include a detailed analysis of the role of cultural competence in mitigating conflicts and fostering a more inclusive and understanding learning environment. The paper also discusses practical strategies for educators to enhance their teaching practices, such as promoting empathy, open communication, and cultural awareness etc. By offering insights and recommendations for improving interactions in diverse classrooms, this review aims to contribute to the ongoing conversation on intercultural education and provide valuable guidance for educators facing the challenges of teaching in increasingly multicultural settings.
Ultimately, this study underscores the importance of addressing cultural misunderstandings proactively to build harmonious and effective educational environments.
Keywords: Intercultural Communication; Multicultural Classrooms; Educational Conflicts and Misunderstandings; Cultural Competence; Inclusive Education

INTRODUCTION

Intercultural education, a relatively new field within educational studies, has evolved in response to social and historical transformations throughout the twentieth century, influenced by local conditions leading to diverse paradigms and issues. The onset of globalization, increased migration, political changes, democratization, and the acknowledgment of human rights have prompted a significant reevaluation of theoretical frameworks and their practical applications. This evolution has introduced new goals and research areas focused on global society issues, cultural hybridization, trans-nationalism, borderland cultural interactions, intercultural conflicts, and the role of educational systems in fostering peaceful coexistence, integration, and social capital development in multicultural societies. These trends have spurred innovative thinking and the reconstruction of fundamental principles in intercultural education.
Intercultural education (IE) intersects with other educational fields such as global, international, comparative, European, civic, and peace education, though these relationships are complex and sometimes ambiguous. Both intercultural and global education address global processes, cultural globalization, migration, and intercultural cooperation and conflicts, aiming to raise awareness of global interconnectedness and foster a sense of responsibility and solidarity (Melosik, 1998). IE focuses specifically on socio-cultural phenomena and local subject matter.

FULL TEXTS BOOK

The relationship between IE and international education (IEd) is less clear-cut, as IEd is a newer concept, primarily linked to formal education abroad. IEd and CE may eventually converge, enhancing international cooperation in culture, education, and social development. Peace education, rooted in the works of Dewey, Montessori, Freire, and Galtung, aims to prevent war and conflict through mutual understanding and tolerance, with UNESCO and UNICEF promoting these programs. IE and peace education overlap in promoting human rights, tolerance, and combating discrimination, especially in post-conflict multiethnic communities.

IE also connects with civic education in addressing human rights, combating social exclusion, and supporting human capital development. The increasing cultural diversity and migration in modern societies necessitate frameworks for integrating ethnic groups into a transcultural civic community, emphasizing individual responsibility and cooperation across cultures. European education, promoted by the European Commission, supports European integration, encourages cooperation among Europeans, and fosters a European identity. The overlap with IE appears in programs that promote cultural heritage, local languages, and the ability to function within the EU.

In today's increasingly globalized world, multicultural classrooms have become the norm rather than the exception. These environments, characterized by a diverse student body with varying cultural backgrounds, offer both unique opportunities and significant challenges. The richness of cultural diversity can enhance learning experiences and foster a more inclusive educational atmosphere. However, it also presents a complex landscape where misunderstandings and conflicts can arise due to cultural differences. Understanding these dynamics is crucial for teachers and professors aiming to create harmonious and effective learning environments.

Research indicates that cultural misunderstandings in classrooms can stem from a variety of sources, including differing communication styles, cultural norms, and values (Banks, 2015; Gay, 2018). For instance, what might be considered assertive communication in one culture may be perceived as aggressive or disrespectful in another. Such differences can lead to misinterpretations and conflicts among students and between students and teachers. These conflicts, if not addressed properly, can hinder the educational process and affect the overall classroom climate.

Moreover, the way conflicts are managed in multicultural classrooms significantly impacts the learning experience. Effective conflict resolution strategies that consider cultural sensitivities can transform potential conflicts into learning opportunities (Hofstede, 2011). Conversely, a lack of cultural awareness can exacerbate tensions and lead to prolonged disputes, further disrupting the educational process (Gorski, 2016).

This paper aims to provide a comprehensive literature review on the sources of misunderstandings and conflicts in multicultural classrooms and the strategies employed to navigate these challenges. By examining existing research, this review seeks to identify best practices for teachers to foster a more inclusive and understanding classroom environment. Through this exploration, the paper will contribute to the ongoing discourse on multicultural education and highlight the importance of cultural competence in contemporary educational settings. Also this paper will delve into the various factors contributing to misunderstandings and conflicts, explore the impact of these issues on the educational experience, and review effective strategies for conflict resolution and fostering understanding in multicultural classrooms.

1. LITERATURE REVIEW / DIFFERENT CATEGORIES OF CONFLICTS

In today's pluralistic society, diversity presents both opportunities for growth and potential for conflict, particularly in educational settings where immigrant and native students coexist. This coexistence naturally leads to contrasts and disputes, which necessitate effective conflict resolution strategies to maintain a positive educational environment. As Europe becomes increasingly ethnically diverse, new sociocultural dynamics emerge, influencing educational contexts. Experts in Intercultural Education,

FULL TEXTS BOOK

such as Aguado, Ortega, Essomba, Santos, and Soriano, emphasize that conflicts in multicultural school settings can be constructive if resolved with respect, dialogue, and mutual understanding. Traditionally, conflicts in such contexts have stemmed from differing communication styles, unshared disciplinary norms, and varying classroom atmospheres. Jordan's (2007) framework of dialoguing and participation promotes student-led conflict resolution, enhancing school climate. Additionally, the socio-cultural concept of a "Third Space," as discussed by Gutierrez, Rogoff, Larson, and Bhabha, serves as a hypothetical arena where diverse worldviews and learning strategies converge to foster negotiation and mutual respect without cultural assimilation. This space supports the creation of new relational frameworks and respectful learning strategies, helping teachers mitigate discord. The "Third Space" encourages expanded learning, personal knowledge referencing, and cultural hybridity. In their research, the "Third Space" concept is utilized to analyze conflicts as negotiation opportunities that improve interethnic classroom relations, broaden perspectives, and foster effective adaptation, listening, and self-expression strategies for students.

Disagreements in educational settings do not always escalate to conflicts, as highlighted by Cascón (2000), who classifies conflicts into three categories: pseudo conflicts, latent conflicts, and actual conflicts. Pseudo conflicts occur when there is no real antagonism between the interests and needs of the parties involved; misunderstandings or communication issues are usually at play, and reestablishing dialogue often resolves these issues. Latent (or hidden) conflicts, though lacking open confrontation, are prevalent due to perceived clashes of interests or values, or the parties' inability to address the conflict due to lack of awareness or strength. These conflicts can be as damaging as actual conflicts (the third category), causing significant emotional harm and requiring complex interventions. Schools often avoid addressing latent conflicts to prevent crises, but proactive conflict management, viewing diversity as an asset, and employing techniques like the Transcend Method (Galtung, 2003) can improve coexistence. This method emphasizes empathy, creativity, and non-violence, seeing conflict as an opportunity for growth. Addressing pseudo conflicts early, through dialogue, fosters positive intercultural coexistence and helps prevent escalation to violence (Galtung, 1988). Additionally, understanding and considering the perspectives of all parties involved—teachers, students, and families—are crucial. Research (Alvarez Garcia et al., 2007) shows that students often perceive the most common violence as stemming from teachers, which negatively affects student reactions and the classroom climate. This study investigates how pseudo conflicts impact the atmosphere in intercultural secondary education classrooms from both teachers' and students' viewpoints. The goal is to identify key conflicts and train teachers to use this knowledge to enhance classroom relationships, hypothesizing that alignment between teachers' and students' assessments of pseudo conflicts will foster resolution and improve the learning environment.

While scholars in intercultural communication have traditionally emphasized the role of cultural differences in causing miscommunication and misunderstanding, research on English as a lingua franca (ELF) challenges this view. Studies on intercultural communication in ELF contexts reveal that misunderstandings are less common than previously believed, and those that do occur are not necessarily due to cultural differences (House 1999; Mauranen 2006). This suggests that the lingua franca context influences interactions among diverse cultural groups. To further explore this, detailed analyses of naturally occurring ELF interactions are necessary.

The key distinction lies in the recipient's awareness of the communication problem. In cases of non-understanding, the recipient recognizes their failure to comprehend and can either signal this to the speaker or ignore it (Firth 1996). For example, Mauranen (2006) illustrates a scenario where the recipient first signals minimal incomprehension and then directly requests clarification. Conversely, in instances of misunderstanding, the recipient is unaware of the misinterpretation, which may become evident in subsequent turns through incoherent responses (Bremer et al. 1996).

FULL TEXTS BOOK

Explicitly differentiating misunderstanding from non-understanding is complex, as the distinction is neither absolute nor clear-cut. Understanding problems can stem from partial or non-understanding of a prior statement, and assessing the recipient's awareness of their misinterpretation can be challenging. For instance, a confirmation request might reveal a misinterpretation while also indicating some awareness of potential inaccuracy in understanding.

While awareness may be present, such cases cannot be classified as non-understanding because some level of understanding, albeit incorrect, has been achieved. Determining whether a check for accuracy is due to an awareness of a problem or a preemptive measure is challenging (Mauranen 2006, Kaur 2009). Therefore, confirmation requests revealing misinterpretation will be categorized as misunderstandings, aligning with Bazzanella and Damiano's view of misunderstanding as a continuum and Dascal's multi-level concept of misunderstanding (Bazzanella & Damiano, 1999; Dascal, 1999). The analysis provides insights into sources of misunderstanding in intercultural communication, specifically in ELF contexts (House, 2003; Mauranen, 2006). By considering the local context, participant orientations, and subsequent repair moves, a clearer picture of misunderstanding in these interactions emerges (Seidlhofer, 2011). Misunderstandings often stem from factors like ambiguity, mishearing, and lack of world knowledge, common in both intercultural and intracultural interactions (Gumperz, 1982; Roberts, 2000). While linguistic diversity and varying proficiency levels in ELF interactions contribute to misunderstandings, participants often collaboratively use strategies to prevent them (Kaur, 2009). Although language problems are not the primary cause, they can exacerbate issues like ambiguity and mishearing (Jenkins, 2000).

Additionally, the study highlights the role of cultural differences in intercultural misunderstandings (Wierzbicka, 1991). Research from various perspectives—cultural-anthropological, interactional-sociolinguistic, and cross-cultural pragmatic—often attributes misunderstandings to participants' differing cultural backgrounds (Scollon & Scollon, 2001; Tannen, 1984). These differences in assumptions, beliefs, discourse strategies, and communicative styles can make intercultural communication challenging (Hofstede, 1991)

1.1 Strategies to resolve conflicts based on literature review

Resolving conflicts in multilingual and multicultural classrooms is a complex endeavor that requires understanding the dynamics of cultural diversity, language differences, and educational settings (Garcia & Wei, 2014; Cummins, 2001). Recent studies highlight various approaches and strategies aimed at fostering harmonious interactions and effective conflict resolution among students from diverse linguistic and cultural backgrounds (Banks, 2015; Gay, 2018).

One prominent approach involves promoting cultural competence among teachers. Cultural competence encompasses awareness, knowledge, and skills necessary to understand and effectively interact with people from different cultural backgrounds (Sue et al., 2019). Teachers who are culturally competent can recognize cultural differences in communication styles, norms, and values, thereby mitigating potential misunderstandings and conflicts (Gay, 2018).

Effective communication strategies are crucial for resolving conflicts in multilingual classrooms. Open communication channels facilitate dialogue and understanding among students and between students and teachers (Samovar et al., 2012). This includes encouraging students to express their thoughts and feelings freely and promoting active listening to ensure that all perspectives are heard (Ting-Toomey, 2017).

Implementing inclusive teaching practices is another key approach. These practices accommodate diverse learning styles and linguistic abilities, ensuring that all students feel valued and included (Cummins, 2019). For instance, using multilingual resources, providing language support, and adapting instructional materials to students' proficiency levels can enhance comprehension and reduce language-related tensions (Hall, 2018).

FULL TEXTS BOOK

Conflict resolution skills training is increasingly recognized as essential in multicultural education contexts. Teaching negotiation, mediation, and problem-solving techniques empowers them to address conflicts constructively and collaboratively (Johnson & Johnson, 2019). These skills not only resolve immediate disputes but also promote long-term peacebuilding and mutual respect among students (Biggs, 2018).

Furthermore, promoting intercultural dialogue and understanding through structured activities and programs fosters positive interactions and reduces stereotypes and biases (Banks, 2018). Cultural exchange programs, peer mentoring initiatives, and collaborative projects allow students to learn from each other's cultural backgrounds and perspectives (Melby-Lervåg et al., 2020).

Recent studies emphasize the importance of professional development for teachers in multicultural settings. Ongoing training and workshops help teachers stay informed about best practices and new research in multicultural education and conflict resolution (García et al., 2021). This continuous learning enables teachers to adapt their teaching strategies and interventions to meet the evolving needs of diverse student populations.

1.2 Case studies of misunderstandings and conflicts in multicultural classrooms

In order to create a better vision and perspective of situations in which these misunderstandings and conflicts took place, I am referring to some known cases. Let's mention an example that underscores the complex interplay between language, culture, and education in multicultural classrooms, highlighting the need for continued research and practical interventions to navigate these challenges effectively. According to a recent study (published in European Journal of Psychology of Education) conducted in Norway, there has been a compelling case for examining misunderstandings and conflicts in multicultural classrooms. This research, published in 2023, explores the dynamics of inclusion and exclusion in Norwegian schools, particularly focusing on newly arrived minority language students. The study highlights the challenges these students face, including language barriers, cultural misunderstandings, and social integration issues. One specific example from the study involves the experiences of minority language students in introductory classes designed for newly arrived immigrants. These students often find themselves isolated due to their limited proficiency in Norwegian and their distinct cultural backgrounds. Teachers reported that these language barriers often led to misunderstandings and conflicts, as students struggled to communicate effectively with their peers and teachers (Hilt, 2023). The study also revealed that teachers' attitudes and preparedness to handle cultural diversity significantly impacted the classroom environment. In many cases, teachers who lacked training in multicultural education found it challenging to address the needs of these students adequately. This situation sometimes resulted in misinterpretations of students' behaviors and intentions, further exacerbating conflicts (Hilt, 2023; Fandrem, 2023). The study underscores the importance of culturally responsive teaching practices. For instance, teachers who employed inclusive strategies, such as incorporating students' native languages and cultural references into lessons, were more successful in fostering a supportive and harmonious classroom atmosphere. These practices not only helped in reducing misunderstandings but also promoted a sense of belonging among minority language students (Hilt, 2023; Emanuelsson, 2023). Overall, the research emphasizes the need for systematic changes in teacher training and educational policies to better support multicultural classrooms. By adopting inclusive practices and providing adequate resources, schools can mitigate conflicts and create a more inclusive learning environment for all students (Hilt, 2023; Fandrem, 2023).

Another case regarding Albanian reality is well described in a recent case study in Albania, which highlights the challenges and misunderstandings in multicultural classrooms. The research, published in 2023, focuses on the integration of minority students, particularly Roma children, into mainstream Albanian schools. Language barriers, cultural differences, and socioeconomic disparities contribute significantly to misunderstandings and conflicts between students and teachers. Teachers often

FULL TEXTS BOOK

misinterpret the behavior of Roma students, attributing it to lack of discipline rather than cultural differences. This misinterpretation leads to conflicts and hinders the students' integration and academic performance (Reach & Teach, 2023). The study also emphasizes the need for culturally responsive teaching methods. By incorporating Roma culture and language into the curriculum and employing inclusive teaching practices, teachers can reduce misunderstandings and foster a more inclusive and supportive learning environment. This approach not only helps in bridging the cultural gap but also promotes a sense of belonging and respect among all students (Reach & Teach, 2023).

Several recent cases in Albania and neighboring countries illustrate challenges in multicultural classrooms. In Kosovo, a study highlights the difficulties faced by Serbian minority students integrating into Albanian-majority schools, emphasizing issues of language and cultural identity (Bajrami, 2022). In North Macedonia, conflicts arise due to ethnic tensions between Macedonian and Albanian students, affecting classroom dynamics and peer relationships (Manevska, 2023). Additionally, a study in Montenegro reveals challenges for Bosniak students in predominantly Montenegrin schools, focusing on language barriers and cultural misunderstandings (Karabegović, 2021). These examples underscore the complex nature of multicultural education in the Balkans.

In addition to the cases mentioned, recent studies highlight several other instances of multicultural classroom challenges in Albania and neighboring countries. In Bulgaria, Turkish minority students face integration issues due to linguistic and cultural differences (Petrova, 2024). In Greece, classrooms with diverse ethnic backgrounds, including Albanian immigrants, encounter frequent misunderstandings and conflicts (Vassilakis, 2023). Similarly, in Serbia, Hungarian minority students experience difficulties adjusting to Serbian-majority schools, leading to tensions and conflicts (Toth, 2022). These cases collectively emphasize the ongoing need for culturally responsive teaching practices and inclusive educational policies in the region (Jovanović, 2024).

2. METHODOLOGY

The methodology for conducting a literature review on "Navigating Misunderstandings and Conflicts in Multicultural Classrooms" involves a systematic approach to gathering and analyzing scholarly sources from various academic databases, journals, books, and relevant institutional reports published mostly from 2018 onwards (but not only). The review focuses on identifying and synthesizing key themes, theories, empirical findings, and best practices related to conflict resolution and the management of misunderstandings in educational settings characterized by cultural and linguistic diversity. To begin, a comprehensive search strategy was employed using keywords such as "multicultural education," "conflict resolution," "intercultural communication," "language barriers," "cultural competence," and related terms. Academic databases will be utilized to access peer-reviewed articles, theoretical frameworks, case studies, and meta-analyses that address the topic.

The inclusion criteria prioritize recent publications in order to ensure that the review reflects current perspectives and practices in multicultural education. Articles should contribute significant insights into the causes, manifestations, and implications of misunderstandings and conflicts in diverse classrooms, as well as effective strategies for resolution and prevention.

Data extraction involves careful reading and analysis of each selected article to extract relevant information, including theoretical perspectives, methodologies used, key findings, and practical implications for teachers. Special attention will be paid to identifying common types of conflicts (e.g., communication styles, cultural norms, language barriers), factors influencing conflict escalation, and evidence-based strategies for fostering positive intercultural interactions and managing conflicts constructively.

Synthesizing the findings involves organizing the literature according to thematic categories and critically evaluating the strengths and limitations of existing research. The review aims to provide a clear understanding of the complexities involved in navigating multicultural classrooms, offering insights into

FULL TEXTS BOOK

how educators can promote inclusive learning environments and enhance student outcomes through effective conflict management strategies.

Ultimately, the literature review will contribute to the field by consolidating current knowledge, identifying gaps in research, and offering recommendations for future studies and practical applications in multicultural education settings.

3. DISCUSSION AND ANALYSIS OF FINDINGS

The various cases and scientific studies on multicultural classrooms highlight several critical conclusions about the interplay of language, culture, and education. These conclusions emphasize the systemic and pedagogical issues that need to be addressed for effective multicultural education.

Firstly, language barriers are a significant challenge in multicultural classrooms, often leading to misunderstandings and conflicts. The studies from Norway and Albania reveal that minority language students frequently experience isolation and communication difficulties. This isolation is exacerbated by a lack of proficiency in the majority language, which hinders their ability to participate fully in classroom activities and social interactions. Therefore, educational systems must prioritize language support programs to help these students bridge the language gap and integrate more effectively.

Secondly, the cultural misunderstandings between students and teachers are a recurrent theme. Teachers often misinterpret students' behaviors due to a lack of cultural awareness and training. This misinterpretation can lead to disciplinary actions that are perceived as unfair by the students, further deepening the divide. The research mentioned underscore the need for teachers to receive training in cultural competence to understand and appropriately respond to the diverse cultural backgrounds of their students. This training can help in creating a more inclusive and respectful classroom environment.

Thirdly, the importance of culturally responsive teaching practices is a recurring conclusion. Studies show that when teachers incorporate students' native languages and cultural references into their lessons, it fosters a more supportive and harmonious classroom atmosphere. These inclusive strategies not only reduce misunderstandings but also promote a sense of belonging among minority language students. Therefore, educational policies should encourage and support the implementation of culturally responsive teaching methods.

Additionally, the impact of socioeconomic disparities cannot be ignored. In the Albanian case study, socioeconomic factors contribute significantly to the challenges faced by Roma children in mainstream schools. These disparities often result in a lack of resources and support for minority students, further hindering their academic performance and integration. Addressing these disparities requires comprehensive policy changes that ensure equitable access to educational resources for all students, regardless of their socioeconomic background.

Moreover, the studies highlight the broader regional context, particularly in the Balkans, where ethnic tensions and historical conflicts continue to influence classroom dynamics. The cases from Kosovo, North Macedonia, and Montenegro illustrate how deeply entrenched ethnic identities can exacerbate conflicts in educational settings. This regional perspective suggests that resolving these issues requires not only educational reforms but also broader societal efforts to address ethnic tensions and promote reconciliation.

In conclusion, these research point to several critical areas for intervention: enhancing language support programs, providing cultural competence training for teachers, implementing culturally responsive teaching practices, addressing socioeconomic disparities, and tackling broader ethnic tensions. By focusing on these areas, educational systems can create more inclusive and supportive environments that better meet the needs of all students in multicultural classrooms.

FULL TEXTS BOOK

4. CONCLUSIONS

From what has been discussed until now, we can conclude that in multicultural classrooms, misunderstandings and conflicts can stem from various sources, each tied to cultural differences. First of all, language barriers present significant challenges in multicultural classrooms. Differences in language proficiency can lead to miscommunication and frustration. Non-native speakers might struggle to express themselves clearly or understand nuanced instructions, resulting in misunderstandings and feelings of exclusion. Additionally, idiomatic expressions and slang used by native speakers can confuse students unfamiliar with these terms, causing them to feel alienated or misunderstood. One significant area is communication styles. For instance, students from cultures that value direct communication may come across as blunt or even rude to those from cultures that prefer a more indirect approach.

Learning styles are another area where cultural differences can lead to misunderstandings. Some cultures emphasize collaborative learning and group success, while others focus on competition and individual achievement. This divergence can cause friction in classroom activities and assessments, as students might have contrasting approaches to learning and participating in class. Furthermore, the emphasis on memorization versus critical thinking varies across cultures. In cultures that value rote learning and memorization, students may struggle to adapt to environments that prioritize critical thinking and questioning, leading to misunderstandings with peers and teachers.

Implementing inclusive teaching strategies that accommodate diverse learning styles and cultural backgrounds is crucial. This includes using a variety of teaching methods, such as collaborative projects, individual assignments, and interactive discussions. Setting clear expectations and guidelines for classroom behavior and participation ensures that students understand the norms and rules, and explaining the rationale behind them fosters mutual respect. Practicing active listening and empathy in interactions with students shows genuine interest in their perspectives and experiences, and validates their feelings and concerns.

Teaching students conflict resolution skills, such as negotiation, mediation, and problem-solving, encourages them to address conflicts constructively and seek common ground. Providing language support for non-native speakers, including language classes, tutoring, and the use of visual aids and simplified language in instructions and materials, is essential. Organizing cultural exchange programs and activities that allow students to share their cultural backgrounds and learn from one another fosters mutual understanding and appreciation. Establishing peer mentoring programs where students from different cultural backgrounds can support and learn from each other helps build a sense of community and reduces feelings of isolation. Implementing regular feedback mechanisms to gather students' input on the classroom environment and teaching methods allows for necessary adjustments and improvements.

Resolving conflicts and misunderstandings in multicultural classrooms is essential for creating a positive and effective learning environment. By fostering cultural competence, encouraging open communication, and implementing inclusive teaching strategies, educators can help students navigate these challenges and promote mutual understanding and respect. These efforts not only improve the classroom dynamic but also prepare students to thrive in an increasingly diverse and interconnected world.

Obviously, resolving conflicts in multilingual and multicultural classrooms requires a comprehensive approach that integrates cultural competence, effective communication, inclusive teaching practices, conflict resolution skills training, and intercultural dialogue. By implementing these strategies, teachers can create inclusive learning environments where students from diverse backgrounds can thrive academically and socially.

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FULL TEXTS BOOK

BACTERIOLOGICAL ANALYSIS OF LOTIC AND LENTIC SURFACE WATERS IN GBOKO METROPOLIS.

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ABSTRACT
Background-Access to clean water in tropical regions of Africa has been a major challenge that has continued to ravage the health of average indigenes of such communities; hence, there is a need to investigate the Bacteriological quality of both lotic and lentic surface water in such regions.
Methods- A Multiple tube methods and relevant meters were employed in evaluating the physicochemical and coliform content of the water samples.
Results- The results shows a temperature mean values ranged from 27.21 to 27.40°C at lotic 1–3, while the mean value of temperature for lotic 1 was 27.45°C. The pH values range from 11.75–11.75 at lotic 1–3 and 12.32 at lentic 1. The dissolved oxygen had a value of 3.05–3.80 mg/L at lotic 1–3 and 3.75 at lentic 1. Biological oxygen demand (BOD) had a value of 0.00–0.05 mg/L at lotic 1-3 and 0.00 at lentic 1 and did not have their values within the standard set by WHO (2017).
Conclusion- The study revealed levels of coliform counts in the examined surface waters with values exceeding the standard set by WHO (2017). Coliform values were higher within the lotic environments. This work unrivaled an urgent need to sensitize the locals to the need to treat the water by boiling it prior to drinking.
Keywords: Water, lotic, lentic, biological oxygen demand, coliform, surface water.

Background of the Study

In Sustainable Development Goals (SDG)'s (2015), water is the 6th goal, namely: "Ensure availability and sustainable management of water and sanitation for all". It shows that clean water is one of human basic needs, and it is processed from raw water to clean water by using any treatment to reach the standard of living, water is necessary for humans.
Lotic water systems are bodies of water that is flowing continuously, ranging from torrential rapids to slow moving back waters. Surface water is the water running across or standing on the surface of the ground. These include bodies of water such as lakes, dams, streams, rivers and ponds which serve as major sources of drinking water and other domestic uses to most cities and rural communities (Ichor *et al.*, 2014).
Surface water (lotic and lentic) is particularly most likely to be exposed to man-made contamination both from the point sources and non-point sources such as run-offs from urban and suburban streets, agricultural lands, microorganisms from atmospheric water precipitation etc. Surface water contamination is polluted by many factors around us either by point or non-point source. Polluted water can harm and cause health effects to the public and the country (Shahabudin and Musa, 2018).
Bacteriological analysis of water is the isolation and count of indicator organism whose presence indicate that disease causing pollution has occurred in the water supply. These indicator organisms are called coliforms bacterial (Chukwurak, 2012). Coliform bacteria include a group enteric bacteria such as *Escherichia coli, klebsiella* sppand *Enterobacter* spp.
Few systematic studies have been undertaken in other countries to determine the prevalence of various bacteria pathogens in surface water. Epidemiological studies of waterborne outbreaks have indicated

FULL TEXTS BOOK

that the most important waterborne pathogens in Finland are the norovirus (Nvs) and Campylobacter; 11 of the 14 waterborne outbreak reported during 1998 and the 1999 were caused by these microbes (Norman and MacDonnell, 2004).

In Bauchi State, Nigeria, a study uncovers that *Schistosoma* sppis a contaminant of surface water sources. The parasite could be contracted through washing or bathing. (Ichor *et al.*, 2014). The human pathogens that contaminate water include: *Campylobacter, E. coli, Salmonella typhi, Shigella spp, Yersinia enterocolitica, Pseudomonas aeruginosa,* etc. Most of these pathogens account for the serious health risk associated with water predominantly obtained from human and animal enteric origins and causes diseases whenever it is present in any source of water supply (WHO, 2004).

In developing countries like Nigeria, where access to both clean water and sanitation are not the rule and waterborne infections are common that leads to increase in morbidity and mortality among people. Therefore, this study access the bacteria mean count of lotic and lentic surface water in Gboko metropolis

Statement of Problem

The major problem that could be associated with dealing with surface water contaminated by microorganisms is the infectious disease that could be contracted from them because the causative agents of these disease are present in the feces and urine of infected persons. These diseases include among others, bacillary dysentery, botulism, cholera, schistosomiasis, salmonellosis. The causative organism of these diseases are present in the feces and urine of infected persons and when discharged into water may gain entrance into anybody that may use the water for purpose of drinking and other domestic uses, (WHO, 2004).

Justification

Lotic and lentic surface waters are source of water for domestic, agricultural and industrial uses. Residents in the locality use this water for domestic purposes and for irrigational purposes for the cultivation of pepper, maize, tomatoes and vegetables (some of which are often eaten raw). The factory in the locality use this water source for various purposes (such as washing of equipment and cooling of machinery).

All these could pose serious health and environmental hazards to the community if not addressed. This study will benefit residents by creating awareness on the bacteriological, physicochemical qualities of lotic and lentic surface water with a view to having good quality water.

Aim of the Study

The aim of the study is to investigate the microbial quality of lotic and lentic surface water in Gboko metropolis.

Objectives of the Study

The objectives of this study is to:

- Isolate and identify the microbial quality of the water sample.
- Determine the bacteria load of the isolates.
- Determine the physicochemical parameter of the water samples under study (Temperature, PH, Dissolve Oxygen, Biological Oxygen Demand).

MATERIALS AND METHODS

Sample Collection

Sampling site were lentic 1, lotic 1,Lotic 2), Lotic 3. Manual sampling was employed. A total of 20 samples were collected at four different point using 400ml sterile bottles and were transported to Microbiological Laboratory Joseph Sarwuan Tarka University Makurdi for analysis.

FULL TEXTS BOOK

Sample Preparation

Nutrient Agar

Nutrient agar was prepare using the manufacturers instruction. 20g of nutrient agar powder was dissolved in1000ml distilled water and heated to boiling in other to harmonize it. It was them sterilize by autoclaving at 121°C for 15 minutes.

MacConkay Agar

MacConkay agar was prepared using the manufacturer's instructions. 28g of MacConkey Agar was measure and suspend in 1000 ml of distilled water, heat to boiling to dissolve the agar completely. The media was then sterilized by autoclaving at 121°C for 15 minutes

Enumeration of Heterotrophic Total Bacterial Count

Nutrient agar is the choice medium and pour plate method was used for enumeration for total bacteria count. Serial dilution was made using dilution factor of 10-3 which was used for inoculation. The dilution was made by introducing 1ml of sample in 9ml of distilled water as 10-1 tube. 1ml of dilution 10-1 was introduced into another 9ml of distilled water as dilution 10-2. For 10-3, 1ml was taken from each and introduced into molten nutrient agar and incubated 37oC for 24 – 48 hours.

Enumeration of Coliform Bacteria

Differential medium for the isolation of coliforms was MacConkey agar. Serial dilution was made using dilution factor of 10-3 which was used for inoculation. The dilution was made by introducing 1ml of sample in 9ml of distilled water as 10-1 tube. 1ml of dilution 10-1 was introduced into another 9ml of distilled water as dilution 10-2. For 10-3, 1ml was taken from each and introduced into molten macConkey agar and incubated 37oC for 24 hours.

Bacteria Identification

Gram Staining

A wire loop was sterilized in Bunsen burner and allowed to cool. A drop of normal saline was added on a clean microscope slide, and the wire loop was used to pick the isolates and smeared it on the drop of normal saline on the slide after which it was heat fixed by passing over a flame. The smear was flooded with Crystal violet as a primary stain for 1 minute, followed by Lugol's Iodine for 30 – 60 seconds and then washed off. It was decolorized by Acetone for 30 seconds and washed off with distilled water. The slide was counterstained with Safranin for 1 minute and then washed off. The slide was kept in a rack to air dry after wiping the back with cotton wool. The stained slide was then viewed with a microscope under oil immersion at x100 objective lens. Gram positive bacteria stains purple while Gram negative stains red.

Biochemical Tests

Biochemical tests were used to determine the biochemical reactions or characteristics of the isolated organisms from the water sample.

Catalase Test

Two 2ml of Hydrogen peroxide was poured into Petri dishes and using a sterile applicator stick, several colonies were immersed in the Hydrogen peroxide solution and carefully observed for immediate bubbling. The presence of bubbles indicates a positive result.

Citrate Test

Simmons citrate agar was used to prepare slants in test tubes according to the number of samples to be tested, using a sterile wire loop; the slants were streaked with the inoculum and then stabbed. It was allowed for 24 hours. A colour change from green to blue indicates a positive result.

Indole Test

Tryptophan broth was inoculated with emulsify isolated colony of the test organism in tryptophan broth and incubated at 37°C for 24-28 hours. 0.5 ml of Kovac's reagent was added to the broth culture down the side of the tube and observe color change. Development of brown-red to purple-red within 20 minutes indicates a positive result.

FULL TEXTS BOOK

Urease Test

This test was based on the organism's ability to split urea through the production of the enzyme urease. The entire surface of the urea slant was inoculated with the provided growth from the tryptic broth culture using the inoculating loop by streaking the surface of the agar in a zig zag manner. This was incubated at 37oC for 24-48 hours and a color change to pink indicate a positive result.

Temperature Measurement

Temperature was measured at the site of sample collection. It was measured by submerging the thermometer two-thirds below the surface of the water. The thermometer was allowed adjust to the water temperature for at least 1 minute before removing the thermometer from the water and taking the measurement.

pH Measurement

To carry out this test, a pH strip was dipped into the water sample and after a short while colour development occurred. The reaction time was specified by the manufacturer and this is important as the colour may continue to change after this period has elapsed. The concentration of analyte in the sample was determined by visual comparison with a printed reference chart showing a series of colours corresponding to specific concentrations.

Dissolved Oxygen

The water sample was collected in a special bottle that allows the water to be contained without coming into contact with air. Chemical reagents were then added to the water, including a titrant that is added until a reaction involving oxygen is complete (indicated by a color change).

Biological Oxygen Demand (BOD)

The BOD was measured by collecting water sample in BOD bottle and properly aerating the sample with oxygen. The oxygen level was determine using oxygen electrode. The water was incubated at 20°C for 5 days in the dark after which the oxygen level was redetermine.

Data Analysis.

The data analysis employed was ANOVA

RESULTS

Total Viable Counts and Coliform Counts of Samples

This table shows the Total Viable Counts and Total Coliform Counts with the highest count in lotic 2 $3.4\times10^{5} \pm 1.13 \times 10^{4a}$. it also has the highest number of total coliform count of $3.20\times10^{5} \pm 1.13 \times10^{4a}$ respectively. The lowest Viable count were reported in lentic 1 having TVC $1.41\times 10^{5} \pm 1.27\times 10^{4c}$ and a TCC $1.20 \times10^{5} \pm 0.00C$ respectively.

Sample location	TVC	TCC
Lotic 1	$2.79 \times 10^{5b} \pm 1.27 \times10^{4b}$	$2.32 \times 10^{5} \pm 3.39 \times 10^{4b}$
Lotic 2	$3.53 \times 10^{5} \pm 1.13 \times10^{4a}$	$3.20 \times 10^{5} \pm 1.13 \times10^{4a}$
Lotic 3	$3.48 \times 10^{5} \pm 5.66 \times 10^{4a}$	$3.16 \times 10^{5} \pm 5.66 \times10^{3a}$

FULL TEXTS BOOK

Lentic 1	$1.48 \times 10^5 \pm 1.27 \times 10^{4c}$	$1.20 \times 10^5 \pm 0.00^c$

Table 2: Cultural, morphological and biochemical characteristics of Bacteria isolates.
This table shows the cultural, morphological and biochemical characteristics of Bacteria isolates. The isolates include *Proteus* Spp, *E. Coli*, *Klebsiella* Spp and *Shigella* Spp.

S/N	CC	CS	GR	MOR	CAT	CIT	UR	IND	Probable org.
1	Pale	circular	_	Rod	+	+	+	+	*Proteus* spp
2	Pink	circular	_	Rod	+	_	_	+	*E. coli*
3	Mucoid pink	circular	_	Rod	+	_	+	+	*Klebsiella* spp
4	Pale	circular	_	Rod	+	_	+	+	*Shigella* spp

Table 3: Percentage Prevalence of Bacteria Isolates Across Locations
Table 3 shows the percentage prevalence of Bacteria isolates across locations with lotic 3 having the highest percentage prevalence of 31.82%, followed by lotic 2 with a percentage prevalence of 27.27%. Lotic 1 is third with a percentage prevalence of 22.73%. Lentic 1 has the lowest percentage prevalence of 18.18%.

Location	*Proteus* Spp	*E. Coli*	*Klebsiella* Spp	*Shigella* Spp	Total %
Lotic 1	1.(4.55)	4 (18.18)	0 (0.00)	(0.00)	5 (22.23)
Lotic 2	2 (9.09)	3 (13.64)	1 (4.55)	0 (0.00)	6 (27.27)
Lotic 3	1(4.55)	0 (0.00)	4 (18.18)	2 (9.09)	7 (31.82)
Lentic 1	1 (4.55)	0 (0.00)	3 (13.64)	0 (0.00)	4 (18.18)
Total	**5 (22.73)**	**7 (31.82)**	**8 (36.36)**	**2 (9.09)**	**22 (100.00)**

Table 4: physicochemical parameters
Table 4 shows the results of physicochemical parameters. pH, and Temperature were measured using Hanna multipara-meter tester model 98129.

Parameters	Lotic 1	Lotic 2	Lotic 3	Lentic 1
pH	11.75	11.75	11.72	12.32

FULL TEXTS BOOK

T°C	27.40	27.45	27.21	27.45
DO	3.05	3.75	3.8	3.75
BOD	0	0	0.05	0

DISCUSSION

To examine the bacteriological quality of lotic and lentic surface water, water quality testing was done. It obtained the test results for the physicochemical parameters: temperature, pH, DO, BOD. The measurement results in this present research shows that lentic1 had the highest pH of 12.8 and the lotic surface waters with a pH range of 11.62 -11.82 and both do not meet the standard of 6.5-8.5 given by Nigerian industrial standard (2007).Temperatures of all the samples investigated were within the WHO standards set by water regulatory agencies. DO of water samples shows the quality of water. The number of COD and BOD explains the number of Oxygen needed to decompose organic and inorganic compounds. The existence of Oxygen in water shows that the quality of water is good. The lotic and lentic surface water under study has a DO range of 2.9 – 3.8 and do not meets the standard of ≥6 mg/l by (WHO, 2017). It can be caused by the influx of domestic waste water. The concentration of DO in water should be increased, because the DO is needed by microorganisms to decompose pollutants in the water body.

The rate of contamination of each surface water was determined. The result showed that lentic 1 had the lowest total viable counts of 1.48 x 105± 1.27 × 10^{4c} and total coliform counts of 1.20 x 10^5 ± 0.00c. High total viable counts and total coliform counts were obtained in samples from the stream water which represent lotic surface waters. Lotic 2 has the highest number of total viable count of 3.53 x 10^5 ± 1.13 ×104a and a total coliform counts 3.20 x 10^5 ± 1.13 ×10^{4c}. The level of contamination between total viable counts and total coliform counts however differed significantly (df =2 P< 0.05), this result is in agreement with the results of Ichor et al. (2014). The total bacteria count for all the samples examined exceeded the limits of 1.0 x 10^2 Cfu/ml which is the limit for bacteria count for drinking water(WHO, 2017). High bacteria pollution recorded at lotic 2 may be linked to people's lifestyle of indiscriminate disposal of waste and poor sanitation system. Furthermore, free movement of domestic solid wastes disposed around the houses are likely sources of bacterial contamination of the streams in the other sample sites.

The presume coliform counts for all of the samples were higher than the limits set by WHO (2017) for coliform bacteria in drinking water which is zero total coliform/100ml of water. The count of E. Coli, *Shigella* spp, *Proteus* Spp, *Klebsiella* Spp, in all of the water samples is a clear deviation from the WHO standard for drinking water. The study revealed varying levels of coliform counts in the examined surface waters and were in agreement with results from an earlier study by Dirisu and Olomukoro (2015).

CONCLUSION

The bacteriological qualities of the evaluated surface waters were averagely poor, and are certainly not fit for human consumption as they are of low quality. The non-restriction of the unwholesome act of open defecation onto the top soils by individuals residing within the sampled sites should be discouraged. The bacteria gaining access to water is not only an indication of deterioration but also a warning sign of the presence of many water-borne pathogens, clean environment plays an important and vital role. As most of the isolated bacteria were able to produce toxins, it is recommended for strict

FULL TEXTS BOOK

monitoring and certification of the streams hoping to maintain quality of stream and ultimately to ensure good health.

RECOMMENDATION

The following recommendations are made

There is need for the state and local government to monitor the water source since they are very close to residential areas and outbreak of water borne disease in imminent as well as water inspection from the source should be consider very important. We

Sensitization of the communities residing within the area by relevant governmental and non-governmental bodies on the urgent need to treat the water by boiling prior to drinking should be conducted

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FULL TEXTS BOOK

INVESTIGATION OF THERMOLUM KINETIC PARAMETER OF SrB_6O_{10}:Dy PHOSPHOR SYNTHESIZED BY SOLUTION COMBUSTION SYNTHESIS

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ABSTRACT
Thermoluminescence (TL) is the process by which an insulating or semiconducting material that was earlier exposed to ionizing radiation produces light by heating it at a linear rate. The kinetic parameters, including the activation energy (E), frequency factor (s) and order of kinetics (b), of Dy doped SrB_6O_{10} phosphor synthesized by the SCS was determined by CGCD and initial rise. SrB_6O_{10}:$Dy_{0.5\%wt}$ phosphor were sintered at 750 ^oC for 4 h to obtain crystal form. TL glow curve of SrB_6O_{10}:$Dy_{0.5\%wt}$ phosphor exhibited two TL peak located at 110 ^oC, 230 ^oC when heating rate of 2 ^oC/s after 1 Gy beta dose. The phosphor exhibited good reusability of 10 experimental cycle with in experimental error of 3%. The kinetic parameters, including E, b, s was estimated two methods, i.e CGCD and initial rise. All measurements were obtained using the Risø TL/OSL DA-20 model device. Kinetic parameters were calculated by these methods and compared with each other.
Keywords: Thermoluminescence, Strontium borate, Dosimetry, kinetic parameter, activation energy

INTRODUCTION
Borates have garnered significant attention due to their numerous properties, such as a large band gap, thermal and chemical stability, high luminescence efficiency, and cost-effectiveness (Mutailipu, Poeppelmeier, & Pan, 2020). To develop Thermoluminescence dosimetry, various borate-based compounds including lithium borate, magnesium borate, and strontium borate have been doped with metal and/or lanthanide ions to enhance their dosimetric properties (González, Mendoza-Anaya, Ávila, & Escobar-Alarcón, 2023; Lim, Wagiran, Hussin, & Hashim, 2015; Liu et al., 2006; Ortega et al., 2006; A. Ozdemir, Guckan, Altunal, Kurt, & Yegingil, 2021; Santiago et al., 2011; Yukihara, Milliken, & Doull, 2014). Koskentalo et all studied the luminescence of Ce^{3+} and Tb^{3+} doped both for SrB_6O_{10} and for BaB_8O_{13} (Koskentalo, Niinistö, & Leskelä, 1985). Liyan et all studied Thermoluminescence properties of Tb doped SrB_6O_{10} phosphor (Liu et al., 2006). Traps responsible for the Thermoluminescence processes are characterized by specific parameters such as E, b, s. Understanding these parameters enhances our comprehension and interpretation of the luminescence mechanism and provides essential information for dosimeter applications. Many experimental methods are known for calculating TL trap parameters, including Computerized Glow Curve Deconvolution (CGCD), initial rise, various heating rates, Tm-Tstop, etc. Each method has its own advantages and disadvantages. For example, in the initial rise method the activation energy is independent of the kinetic order (b) of the TL peak any TL glow curves Many researchers have calculated the trap parameters of their materials using involving these methods (Andrade et al., 2022; Mostafa et al., 2023; Munoz, Yoshimura, Chithambo, Jacobsohn, & Trindade, 2022; A. Ozdemir, Altunal, Guckan, Kurt, & Yegingil, 2021). In this study, structural characterization analysis of 0.5%wt Dy doped to SrB_6O_{10} phosphor by SCS method was studied by XRD and SEM technique. TL glow curve of the phosphor was recorded with the heating rate of 2 ^oC/s. Its reproducibility was studied up to ten experimental cycle under the same laboratory condition. The kinetic parameters of the TL curve of the phosphor were studied and compared by CGCD and initial rise method.

FULL TEXTS BOOK

MATERIALS AND METHOD

Dy doped strontium borate (SrB_6O_{10}) phosphor was synthesized by the solution combustion synthesis. The chemicals purchased from Sigma Aldrich, including high purity Strontium nitrate ($SrNO_3$,), boric acid (H_3BO_3), Urea as precursor, and Dysprosium nitrate ($DyNO_3$) as dopant were used. The concentration of Dy was taken at 0.5%wt. Details of this are presented in our previous work (Adnan Ozdemir, 2020; A. Ozdemir, Altunal, et al., 2021; A. Ozdemir, Guckan, et al., 2021). All chemicals were placed in a beaker and heated in 150 ml of distilled water with the help of fish. Amorphous structure obtained by evaporation of water from the structure at 750 ^oC for 4 h was sintered to crystalline form. The material was taken in porcelain crucibles and heated from room temperature to 750 ^oC with 5 ^oC increments per minute. At 750 ^oC for 4 hours, it was sintered in the ash furnace to crystallize. After this process, SrB_6O_{10}:Dy (0.5%) powder was prepared for TL measurement. Thermoluminescence (TL) measurements of the synthesized $SrB_6O_{10}:Dy_{0.5\%wt}$ phosphor were performed on a Risø TL/DA 20 device accompanied with a photomultiplier (PM) tube with a bialkali photocathode (Electron Tubes, 9235QA). For TL measurements, a Schott BG-39 filter with visible region transmittance in the front of Photo Multiple Tube (PMT) was used. X-ray diffraction (XRD) was utilized for identifying crystalline phases. Scanning was typically performed at angles ranging from 5° to 90°. Surface morphological analysis was taken by FE-SEM, TL measurements for undoped SrB_6O_{10}:Dy phosphor powders was 5 mg. Test dose was used as 1 Gy beta dose.

RESULTS AND DISCUSSION

Basic TL glow curve of SrB_6O_{10}:Dy phosphor

Fig. 1 shows the TL glow curve of $SrB_6O_{10}:Dy_{0.5\%wt}$ phosphor recorded at the heating rate of 2 $^oC/s$ from room temperature to 450 ^oC without preheating after 1 Gy dose. The TL curve of $SrB_6O_{10}:Dy_{0.5\%wt}$ consists of two TL peak located at approximately 110 ^oC, and, 225 ^oC, respectively. High temperature TL peak located at 225 ^oC was used for dosimetric investigation.

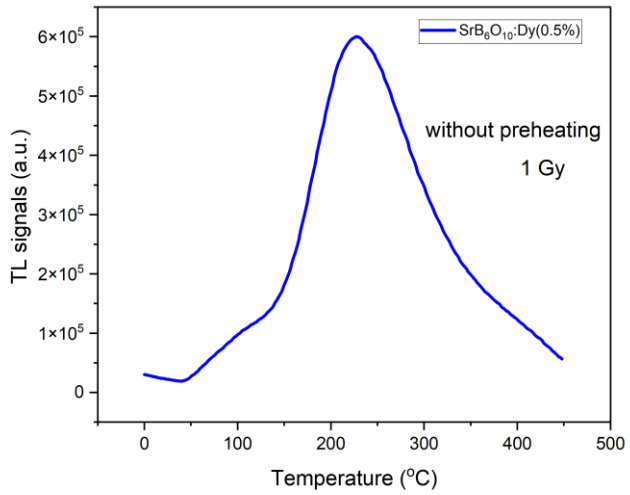


Figure 1. TL glow curve of $SrB_6O_{10}:Dy_{0.5\%wt}$ phosphor recorded with the heating rate of 2 $^oC/s$ after 1 Gy.

Preheat experiment

The preheating experiment is performed to minimize the effect of unstable TL traps on the main dosimetric TL peak. This experimental procedure involves preheating between predetermined preheating temperatures after a test dose and then recording the TL reading. In this study, for $SrB_6O_{10}:Dy_{0.5\%wt}$ phosphor, TL irradiance curves were recorded after each preheat for the

FULL TEXTS BOOK

$SrB_6O_{10}:Dy_{0.5\%wt}$ phosphor after preheating in 10/20 °C increments from 30 to 350 °C at a predetermined dose of 1 Gy. The phosphor is exposed to 1 Gy dose before each preheating. In the obtained TL curves, the preheating temperature graph was plotted against the TL signals between 215-240 °C and shown in Fig. 2. According to this graph, there is a flat position between 30 and 150 °C and a sharp decrease after 150 °C to 300 °C. The preheating temperature of this phosphor was taken as 120 °C.

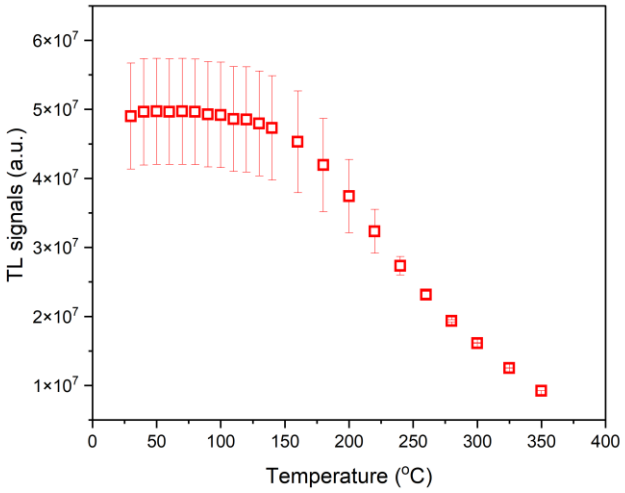


Figure 2. Integrated TL signal between between 215-240 °C vs preheating temperature

In Fig. 3, the TL curve of the same $SrB_6O_{10}:Dy_{0.5\%wt}$ phosphor recorded after 140 °C preheating is compared with the TL curves recorded without preheating at the same heating rate after 1 Gy dose. The low temperature TL peak was deleted after preheating at 140 °C. A new TL peak appeared, located at approximately 350 °C. The reason for the formation of this TL peak located at 350 °C is the charge transfer between the traps.

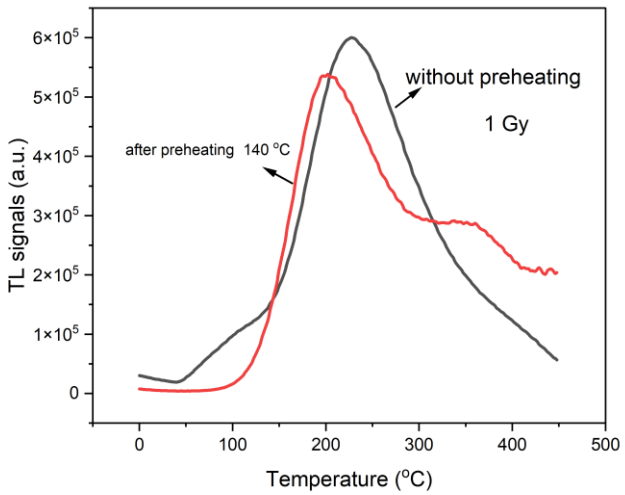


Figure 3. Comparation TL glow curve of $SrB_6O_{10}:Dy_{0.5\%wt}$ without preheating after preheating 140 °C.

The effect of heating rate on the TL glow curve in $SrB_6O_{10}:Dy_{0.5\%wt}$

TL glow curves of $SrB_6O_{10}:Dy_{0.5\%wt}$ phosphor after 1 Gy beta dose were recorded using predetermined heating rates of 0.5, 1, 2, 3, 4, and 5 °C/s. Fig.4 shows the TL glow curve of the phosphor recorded at

FULL TEXTS BOOK

the aforementioned heating rates. The TL glow peak maximum shifted to higher temperatures as the heating rate increased from 0.5 to 5 °C/s. Intensity TL signals was also decreased to higher temperatures as the heating rates.

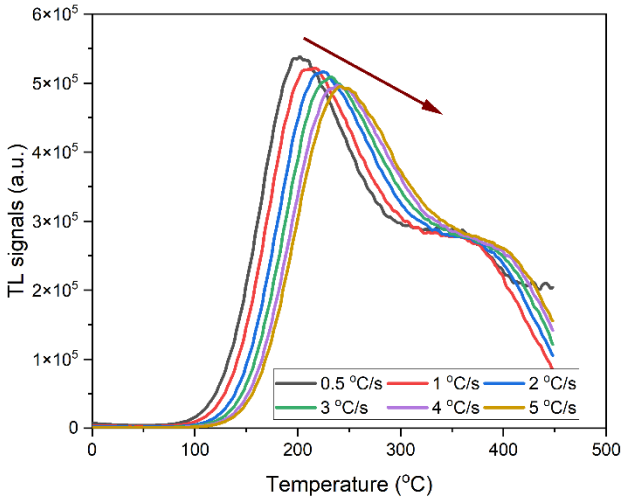


Figure 4. TL glow curve recorded in various heating rate of 0.5 to 5 °C/s after 1 Gy

Reusability

One of the most important features of TL dosimeters is that they can be used repeatedly. A good dosimeter should have a maximum standard deviation of 5% from the initial reading. Repeatability for $SrB_6O_{10}:Dy_{0.5\%wt}$ phosphor for TL readings were recorded after a 1 Gy dose followed by 120 °C preheating and this cycle was repeated 10 times, and shown in Fig. 5. The first reading was normalized and the deviation was determined to be ~3%. The phosphor has a good repeatability.

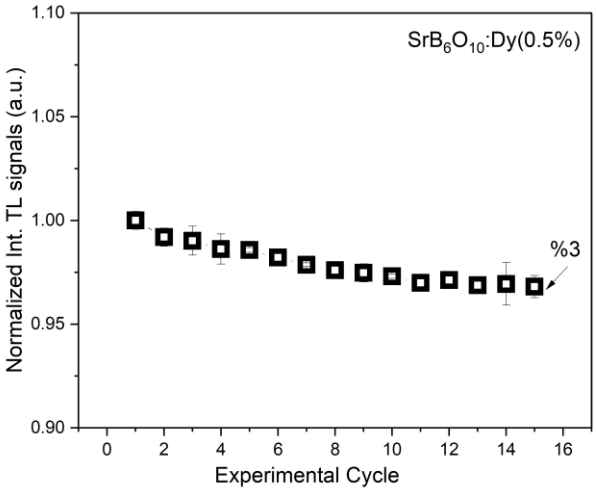


Figure 5. Normalized TL signals according to first TL readout vs experimental cycle

Kinetic parameters study

Computerized Glow Curve Deconvolution (CGCD)

FULL TEXTS BOOK

Computerized Glow Curve Deconvolution (CGCD) is a method to determine the activation energies E, frequency factors s and kinetic order b from any TL radiation curve. It has been used by many researchers to calculate kinetic parameters. In this study, the TL curve of $SrB_6O_{10}:Dy_{0.5\%wt}$ phosphor recorded at a heating rate of 2 °C/s after 1 Gy dose was fit according to the equation given in Equation 1.

$$I(T) = I_m b^{-(b+1)} . \exp(\frac{E.(T-T_m)}{kT.T_m}) x[(b-1)\frac{T^2}{T_m^2}\left(1-\frac{2kT}{E}\right)\exp\left(\frac{E.(T-T_m)}{kT.T_m}\right) + 1(b-1)\frac{2kT_m}{E}]^{\frac{-b}{b-1}} \quad (1)$$

Where Im is the maximum intensity of the TL radiation peak and Tm is the temperature corresponding to the position of maximum intensity.

The TL glow of the $SrB_6O_{10}:Dy_{0.5\%wt}$ phosphor given in Fig.6 was fitted to the Eq.1., Goodness of fit was tested Figure of Merit (FOM) given in Equation 2.

$$FOM = \left|\frac{Y_{exp}-Y_{Fit}}{A}\right| . 100 \quad (2)$$

Here Yexp is the TL glow curve of the phosphor, Yfit is the fitted TL glow curve and A is the area under the fitted TL glow curve. The indicator of a successful fit is a FOM value of 3% or less. The frequency factor (s) was calculated. To determine the kinetic parameters of the $SrB_6O_{10}:Dy_{0.5\%wt}$ phosphor, the fitted to the Eq. 1 was applied and the kinetic parameters were estimated. The TL peaks was as label: TL Peak 1 at 107°C, TL Peak 2 at 227°C, TL Peak 3 at 326°C, and TL Peak 4 at 412 °C. The activation energies for each TL peak are 0.35 eV, 0.61 eV, 0.95 eV, and 1.69 eV, respectively. The kinetic orders are 2, 2, 2, and 1.11, respectively. The frequency factors are 2.07 x 10^3 s^{-1}, 6.98 x 10^4 s^{-1}, 5.43 x 10^6 s^{-1}, and 2.21 x 10^{11} s^{-1}, respectively.

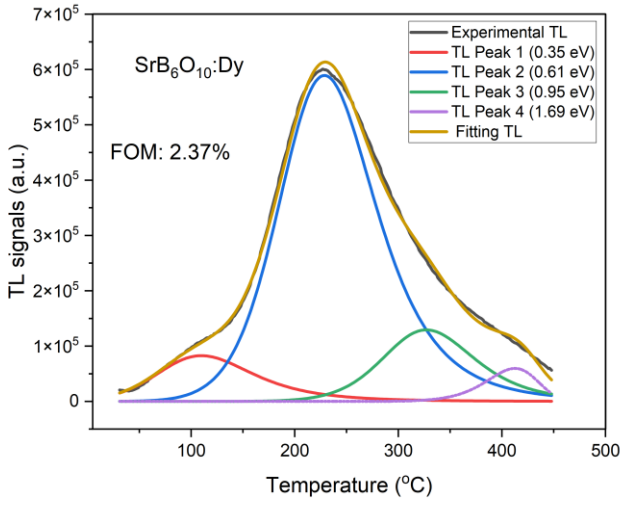


Figure 6. De-convulated TL glow curve of $SrB_6O_{10}:Dy_{0.5\%wt}$ via CGCG analysis

İnitial Rise method

The initial rise (IR) method is frequently used to determine the activation energy from any TL glow curve. This method does not require knowledge of the kinetic order (b). It functions effectively when applied to simple or well-isolated TL peaks.

TL glow curve of the $SrB_6O_{10}:Dy_{0.5\%wt}$ was recorded after preheating at 140°C from room temperature to 450°C, following 1 Gy dose. Activation energies was calculated from Eq. 3

$$I(T) = Aexp(-\frac{E}{kT}) \quad (3)$$

where; A is constant; E is activation energy; k is Boltzmann constant and T is temperature, is assumed approximately constant. The activation energy was calculated from the natural logarithm I(T) vs 1/kT given in Fig. 7. Its slope gives equal to -E. The activation energies of the TL Peak 2 at 227 °C was 0.71 eV, which is activation energy close to that obtained by the CGCD method.

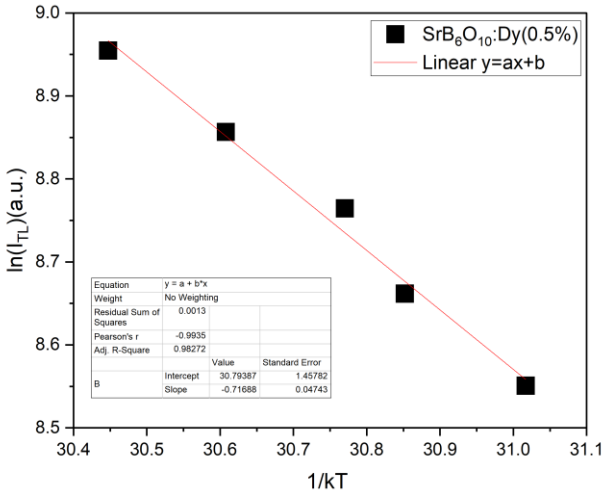


Figure 7. The natural logarithm I(T) vs 1/kt for TL Peak located at 227 °C.

CONCLUSION

Dy doped SrB_6O_{10} phosphor were synthesized by the SCS. Its structural characterization was done by SEM and XRD. TL glow curve of the $SrB_6O_{10}:Dy_{0.5\%wt}$ was composed of two TL peak located at approximately 110 °C, and, 225 °C when heating rate of 2 °C/s, respectively. Step annealing experimental was studied.Kinetic parameter parameters of TL glow curve SrB_6O_{10}:Dy was determined by CGCD and initial rise method. Activation energies by two methods are agreement.

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FULL TEXTS BOOK

MOLECULAR GENOTYPING OF ANOPHELES MOSQUITOES IN ILORIN, KWARA STATE, NIGERIA

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ABSTRACT
Gilles published a taxonomy key to identified Anopheles Mosquitoes morphologically as mosquitoes constitute a very important component in the determinants of insect-borne diseases of public health importance. This study aimed to investigate the molecular genotyping for mosquitoes Anopheles using species-diagnostic DNA polymerase chain reaction (PCR) in order to give clear assessment to different Anopheles species morphology, distribution, molecular diversity and genotype so as to identify the major malaria vector groups of Anopheles mosquitoes. Morphological keys were first used to identify the mosquitoes from five breeding site. Mosquitoes belonging to the *Anopheles gambiae* complex were further morphologically identified using standard keys. *Anopheles gambiae* genomic DNA extracted are subjected to standard PCR assays. A total of 2,295 of Mosquitoes identified morphologically were collected belonging to three species of mosquitoes, 1454 of these were identified as anopheles mosquitoes consisting of (*Anopheles coluzzi* and *Anopheles gambiae* complex and *Anopheles arabiensis*), *Culex quinquefasciatus* were 585 and a total of 256 for *Aedes aegypti*. PCR analysis was used to identify the specific-species in Anopheles species and only Anopheles gambiae was identified molecularly and it is most prevalent. Molecular genotyping identification of Anopheles Mosquitoes shows that they are most prevalent and this contributes to targeting of major malaria vectors by the government and malaria vector control programmes to curb malaria in the society.
Keywords: Anopheles, Identification, Nigeria, Molecular Genotyping, PCR

Introduction

Mosquitoes are nuisance species as well as potential transmitters of zoonotic and human diseases such as dengue fever, yellow fever and malaria and they also constitute a very important component in the determinants of insect-borne diseases of public health importance, especially in places where the availability of diverse water bodies support their breeding. The pathogens carried by mosquitoes mainly include the malaria parasite (Plasmodium), filaria (Wucheria and Brugia) and arboviruses. (Adebote *et al.*,2008) (Okorie, 2014).

Malaria is one of the most severe global public health problems worldwide, particularly in Africa, where Nigeria has the greatest number of malaria cases (World Health Organization, 2014). About half of the world's population is at risk of malaria; in 2015, there were roughly 212 million malaria cases and an estimated 429,000 malaria deaths (WHO, 2014). Nigeria suffers the world's greatest malaria burden, with approximately 51 million cases and 207,000 deaths reported annually while 97% of the total population is at risk of infection (WHO, 2014); yellow fever epidemics have also had devastating effects on human populations (Nasidi *et al.*, 1989).

FULL TEXTS BOOK

Mosquitoes are widely distributed throughout the world and they utilize different water bodies for their breeding. Over 3400 species of mosquitoes have been identified, with many species breeding in both natural and artificial containers such as pools, gutters, coconut shells, tree holes, bamboo stumps, leaf axils, septic tank, and so on (Okogun, 2005). Among all mosquito species that have been recorded, about 10% are regarded as vectors of infectious agents having a considerable effect on public health. The most important mosquito vectors belong mainly to three genera including Anopheles, Aedes, and Culex (Negev, 2015).

In Africa, particularly in Nigeria, Malaria is an infectious disease caused by female Anopheles mosquitoes of the over 400 Anopheles species, only 30 to 40 can transmit malaria with Anopheles gambiae being the principal vector (Mbogo *et al.*, 2003). Anopheles gambiae transmits malaria to man through the malaria parasite Plasmodium.

Previous mosquito variety research in Nigeria has mostly relied on morphology, with only a few studies using DNA analysis to identify the different mosquito species (Iyiola *et al.*, 2021) Mosquito Species are distinguished by morphological features such as the legs, antennae, wings, and abdomen location (Iyiola *et al.*, 2021). Scientists all over the world have used two major ways to validate the identification of biological specimens: species identification based on morphological features and standard molecular techniques using DNA sequencing. The capacity to identify specific species of the Anopheles complex allows researchers to look into other elements of biology that differ between the species, such as larval ecology, resting behavior, and insecticide resistance, all of which are important for malaria epidemiology and vector control. Based on these data, this study aims to use standard molecular techniques using molecular genotyping method to distinguish the Anopheles mosquitoes morphological features using PCR method.

Literature review

The *Anopheles gambiae* complex has eight morphologically indistinguishable species of mosquitoes in the genus Anopheles. The complex was recognized in the 1960s and includes the most important vectors of malaria in sub-Saharan Africa, particularly of the most dangerous malaria parasite, Plasmodium falciparum (Walter Reed Army Institute of Research, 2007). It is one of the most efficient malaria vectors known. The Anopheles gambiae complex consists of *Anopheles arabiensis, Anopheles bwambae, Anopheles melas, Anopheles merus, Anopheles quadriannulatus, Anopheles gambiae sensu stricto, Anopheles coluzzii* and *Anopheles samharicus* and among the complex, *Anopheles gambiae s.s., Anopheles arabiensis,* and *Anopheles coluzzii;* the primary vector of malaria parasites in Africa (Ndo *et al.*, 2016) are the closest sibling species.

Current methods of molecular genotyping include restriction fragment length polymorphism identification (RFLPI) of genomic DNA, random amplified polymorphic detection (RAPD) of genomic DNA, amplified fragment length polymorphism detection (AFLPD), polymerase chain reaction (PCR), DNA sequencing, allele specific oligonucleotide (ASO) probes, and hybridization to DNA microarrays or beads.

Various molecular methods have been used to distinguish sibling species of Mosquitoes which includes karyotype, isozymes, and most recently polymerase chain reaction (PCR) amplification of rDNA of Anopheles mosquitoes (Rafferty *et al.*, 2002). PCR-RFLP technique has also been used for identification of members of the Anopheles species. Similarly, DNA sequences of different gene regions of the nucleus and mitochondria have been amplified to deduce the evolutionary relationship among species because they show high rates of nucleotide substitution (Havill *et al.*, 2007). The use of RAPD marker for genetic analysis of *Aedes aegypti* mosquito populations collected from Dengue outbreaks in Pakistan was reported and the study concluded that *Aedes aegypti* populations are genetically more diverse as previously reported in Pakistan (Ashraf *et al.*, 2016).

FULL TEXTS BOOK

PCR diagnostics is the current "benchmark" for distinguishing closely related and visually similar specimens. Sequence amplification by PCR and deduction of evolutionary relationship have also been used to differentiate and characterize mosquito species (Iyiola *et al.*, 2020) and due to its reliability, reproducibility and ease of use, there has been more interest towards methods that utilize the polymerase chain reaction (PCR). The use of PCR only requires a small part of the morphological identified mosquitoes, DNA sample can be gotten from just a single leg for molecular identification, allowing the rest of the specimen to be used for other analyses such as parasite detection (Walton *et al.*,1999).

However, unless DNA sequence analysis is performed on each specimen, using PCR method requires morphological identification of the species complexes in order to select the appropriate primers and to correctly interpret the results. Primers for species identification have been developed for numerous species complexes (Rafferty *et al.*, 2002). Polymerase chain reaction (PCR) is a method widely used to rapidly make millions to several copies of a specific DNA sample, allowing researchers to take a very small sample of DNA and amplify it to a large enough amount to study in detail. PCR was invented in 1983 by the American biochemist Kary Mullis at Cetus Corporation and is the most common DNA amplification method in molecular biology (VanRansburg *et al.*, 1996).

The identification of Anopheles as the sole vector of malaria transmission in humans has sparked a lot of interest in researching this genus (Sum *et al.*, 2014). More than half of malaria vectors are found to be members of sibling species that are physically similar but differ in genetics, ecology, biology, vectorial capacity, host choice, blood feeding behavior, and geographical distribution (Collins and Paskewitz, 1996) and PCR diagnostics being the current "gold standard" for distinguishing closely related and visually similar specimens is widely used. There is a variation in the second internal transcribed spacer (ITS2) of the rDNA in Anopheles mosquito and this can be used as diagnostic markers (Muller*et al.*, 2013) and identify specific species in genus Anopheles.

Materials and Methodology

Study Area

The study was carried out in Ilorin, Kwara state. *Anopheles gambiae s.l.* Mosquito larvae and pupae were collected from Post Office area (Ilorin West) N08029.398' E0040336.621', Oyun (Ilorin East) N0802455.54, E403649.78 and Amoyo (Ifelodun) N0802430.82, E403732.38in Ilorin, Kwara State, Nigeria.

Ilorin is within the equatorial rainforest belt, which is a tropical zone that houses vegetation of green foliage of trees, shrubs and oil palm trees. Local climate is tropical, with dry seasons between November and March and wet seasons between April and October. The average temperature ranges from 21°C - 37°C providing an ideal climate for malaria transmission throughout the year. Based on their dense population 3 areas were selected for the study. These areas were from Ilorin West, Ilorin East, and Ifelodun local government areas which are not apart from each other. These areas are usually characterized by stagnant pools in the rainy season.

Mosquito Larval Collection and Rearing

Larval collection was done between 7am to 9am. The larvae were identified on the field using their resting orientation to the surface of the water. After the collection of the larvae, the pupae were separated from the larvae using a pipette and they were put in separate containers, the pipette were also used to remove unwanted organisms or predators and they were transported to the laboratory. The larval stages were raised in the laboratory until the adult stage on a grounded mixture of non-fatty cabin biscuit and yeast. As the larvae transformed to pupae, the pupae were collected into a holding cage for emergence. The emerging adults were maintained in the insectary on a 10% glucose solution.

FULL TEXTS BOOK

Identification of Anopheles Mosquitoes

The adult mosquitoes were identified under a microscope as *Anopheles gambiae s.l.* based on morphological features as guided by morphological keys by Gilles and DeMeillon (1987). The morphological features are; pale interruptions on the costa area of the wings, three bands on the palps and speckled hind leg.

Preservation of Anopheles Mosquitoes

Members of *Anopheles gambiae* complex that emerged were left unfed to die after which they are identified morphologically into sex and species groups using stereo microscope with the use of morphological keys (Coetzee, 2020).

After that, a few beads of silica gel were put in the container. The silica gel will remove the excess humidity and will stop growth of fungus and mold. This way mosquitoes can easily be preserved for 1-2 months or even longer duration without disturbing their morphological features.

Mosquitoes DNA extraction

DNA was extracted using Zymo Research Quick Insect mini prep kit for 50 preps. The procedure for the extraction is as stated below.

Lysis

Mosquito was put in bashing bead tubes and 750L of bashing bead buffer was added to it and vortexed at high speed for 20 minutes to break open the cell membrane so that the DNA can be released. The mixture was centrifuged at 13000 rpm × 1 minutes to separate the supernatant from the pellets. Nucleic acids are usually in the supernatant.

Binding

400µL of the supernatant from the bashing bead tube was added to a collection tube into which 1200µL of genomic binding buffer was added and mixed thoroughly to bind the DNA to the spin column. From the supernatant in the bashing bead tube, 150µL was collected and put in another collection tube and 450Ml of genomic binding buffer was mixed into it. 800µL of the mixture from step 4 was transferred into Zymo spin HF tubes and spun at 13,000 rpm × 1 minutes. This step is to precipitate the DNA in the tube while impurities like RNA and proteins flow through the spin column are discarded.

Washing

Into the spin columns, 200µL of DNA pre-wash buffer was added and centrifuged at 13,000 rpm × 1 min. The flow through was discarded and the collection tubes were bloated. The spin columns were reinserted. 500µL of gDNA wash buffer was added to each column to wash off excess alcohol in the precipitation stage and also wash off leftover impurities. They were again centrifuged at 10,000 rpm ×1 minute.

Elution

The spin columns were put in labeled 1.5ml microcentrifuge tubes and a 10µL elution buffer was added directly into the columns and incubated for 10 minutes. It was centrifuged at 13,000 rpm ×1 min and the flow through in the micro centrifuge

DNA Agarose Gel Electrophoresis

The concentration of the agarose gels used during this study were 1,1.8 and 2. The 1% agarose gels were prepared to confirm the presence of genomic DNA extracted while the 2% agarose confirmed the presence of PCR amplicons. To prepare 1% agarose gel. I mixed 1g of agarose powder with 100 ml of 1X TBE running buffer, and then heated it until the mixture was clear. To prepare 2% agarose gel, 2g of agarose powder was mixed with 100ml 1X TBE running buffer, then heated until it was clear. The TBE buffer is made of Tris Base, Boric acid and EDTA. 200 ml of 50X stock was prepared using;

- 108g of Tris Base

FULL TEXTS BOOK

- 40 ml of 0.5M EDTA (pH 8.0)
- 55g of Boric acid
- 160 ml of distilled water.

The mixture is mixed vigorously with a magnetic stirrer until it is a clear solution. 100ml of 1X TBE is prepared from 50X stock by adding 2 ml of the stock to 98 ml of distilled water.

Fresh 1X TAE buffer and 1.8% agarose gel with 1X TAE were prepared for the gel extraction. 1.8% agarose was prepared by dissolving 7.2g of agarose powder in 400mls of 1X TAE. 200ml 0f 50X TAE stock contained;

- 48.4g of Tris Base
- 20 ml of 0.5M EDTA (pH 8.0)
- 11.42ml of glacial acetic acid
- 168.58ml of distilled water.

Tris Base was dissolved into 168.58ml of water and stirred at high speed using a magnetic stirrer until the solution was clear. EDTA and glacial acetic acid were then added and stirred. 400ml of 1X TAE was prepared from 50X stock by adding 8mls of 50X TAE to 392mls of distilled water. Ethidium bromide which is an intercalating dye was added to the agarose to enable viewing of bands when exposed to the UV radiation.

PCR Amplification for Molecular Identification of Anopheles Mosquitoes (gambiae) Complex

Molecular identification of mosquito samples was carried out according to the method described by (Collins et al. 1987) for Anopheles gambiae, four primers including ME (TGACCAACCCACTCCCTTGA), AR (AAGTGTCCTTCTCCATCCTA), QD (CAGACCAAGAT), UN A (GTGTGCCCCTTCCTCGATGT), GA (CTGGTTTGGTCGGCACGTTT) were used, this was done to identify sibling species of Anopheles gambiae s.s. complex.

Results

Anopheles Mosquitoes Breeding Habitat areas

The larva habitat encountered in this study include Pools, Ponds, Concrete reservoirs and Swampy areas around living homes and they were characterized according to (Table 1). Breeding habitats in Ilorin west were found to contain 209(9.1%) mosquito larvae, in Ilorin east were found to contain 372(16.2%), in Ilorin South were found to contain 6613(26.7%), in Lafiagi were found to contain 200 (8.71%) mosquito's larvae and post office were found to contain 901(39.3%) mosquito's larvae.

There was also a predominance of Anopheles mosquito larvae caught in Post office 901 (39.3%) breeding sites compared to those caught in Ilorin West 209(9.1%) breeding sites.

Morphological Identification of Mosquitoes

A total of 2,295 mosquitoes were collected from five areas in Ilorin within the period of collection and were used for morphological identification and 1454 of these were identified as anopheles mosquitoes consisting of *Anopheles coluzzi* and *Anopheles gambiae* complex and *Anopheles arabiensis* with 126 in Ilorin West, 163 in Ilorin east, 546 in Ilorin South, 112 in Lafiagi and 513 in post office. *Culex quinquefasciatus* were 585 with 65 in Ilorin West, 117 in Ilorin east, 44 in Ilorin South ,59 in Lafiagi and 300 in the post office, Ilorin.

Aedes aegypti collected in Ilorin west were 24, 92 in Ilorin east, 23 in Ilorin South, 29 in Lafiagi and 88 in the post office. *Aedes aegypti* and *Culex quinquefasciatus* collected were excluded from the study because they are not malaria vectors. PCR analysis was used to identify the specific species within the *Anopheles gambiae* complex.

FULL TEXTS BOOK

Table 1: Prevalence of mosquitoes collected from different sites in Kwara state, North central Nigeria.

Location	Anopheles	Culex	Aedes	Total (100)
Ilorin West	126	65	24	209(9.1)
Ilorin East	163	117	92	372(16.2)
Ilorin South	546	44	23	613(26.7)
Lafiagia	112	59	29	200(8.71)
Post office	513	300	88	901(39.3)
Total	1454	585	256	2295(100.0)

Molecular Identification of *Anopheles gambiae*

Molecular identification of sibling species of *Anopheles gambiae s.l.* in this study showed that bands were produced from samples from Ilorin West, Ilorin east and post office, LGAs. Only one member of the Anopheles complex was identified molecularly; Anopheles gambiae s.s in all of the locations. Also, Anopheles 1454 mosquito's larvae were the predominant member followed by Culex mosquitoes (584) in all the three LGAs. Figure 1 shows the agarose gel pictures of some samples after genomic DNA extraction. The samples were loaded with 1% gel agarose to detect the genomic DNA.

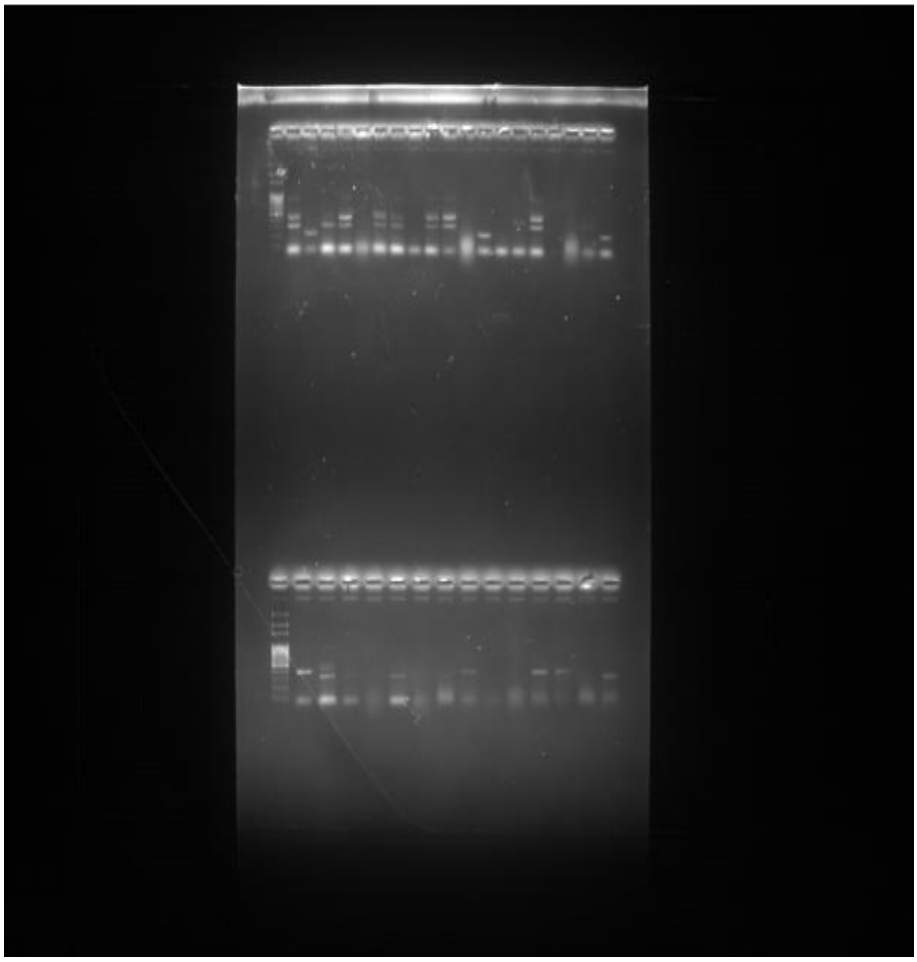


Figure 1: Using the previously shown primers (1 kb ladder), DNA Agarose Gel Electrophoresis of PCR amplification Results.

FULL TEXTS BOOK

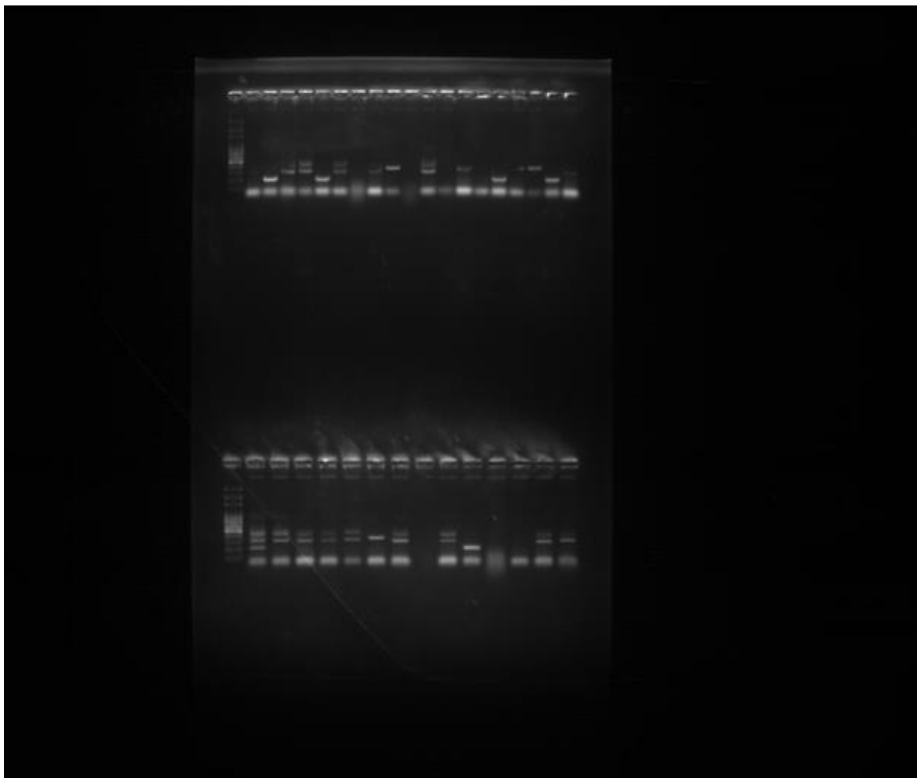


Figure 2: Using the previously shown primers (1 kb ladder), DNA Agarose Gel Electrophoresis of PCR amplification Results.

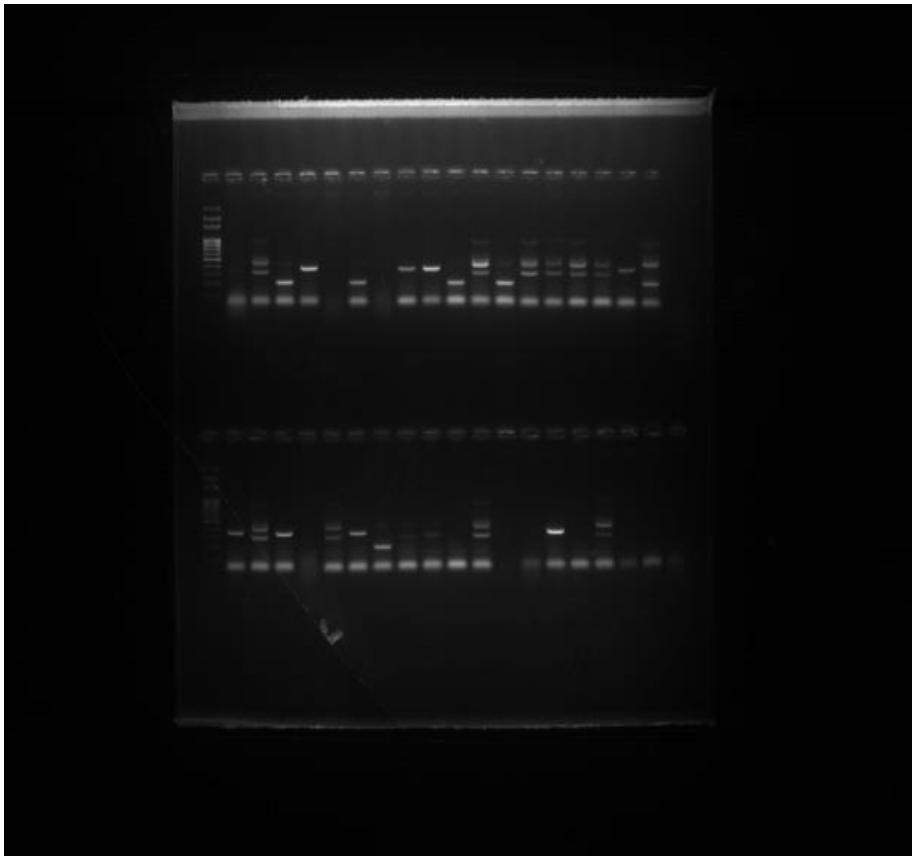


Figure 3: Using the previously shown primers (1 kb ladder), DNA Agarose Gel Electrophoresis of PCR amplification Results.

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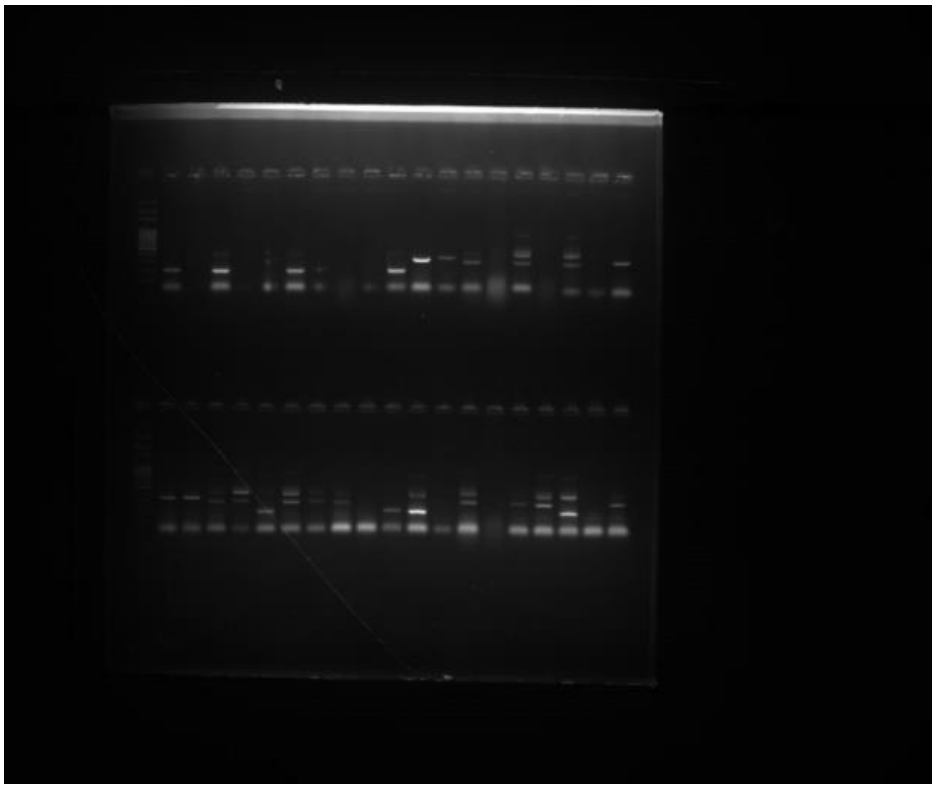


Figure 4: Using the previously shown primers (1 kb ladder), DNA Agarose Gel Electrophoresis of PCR amplification Results.

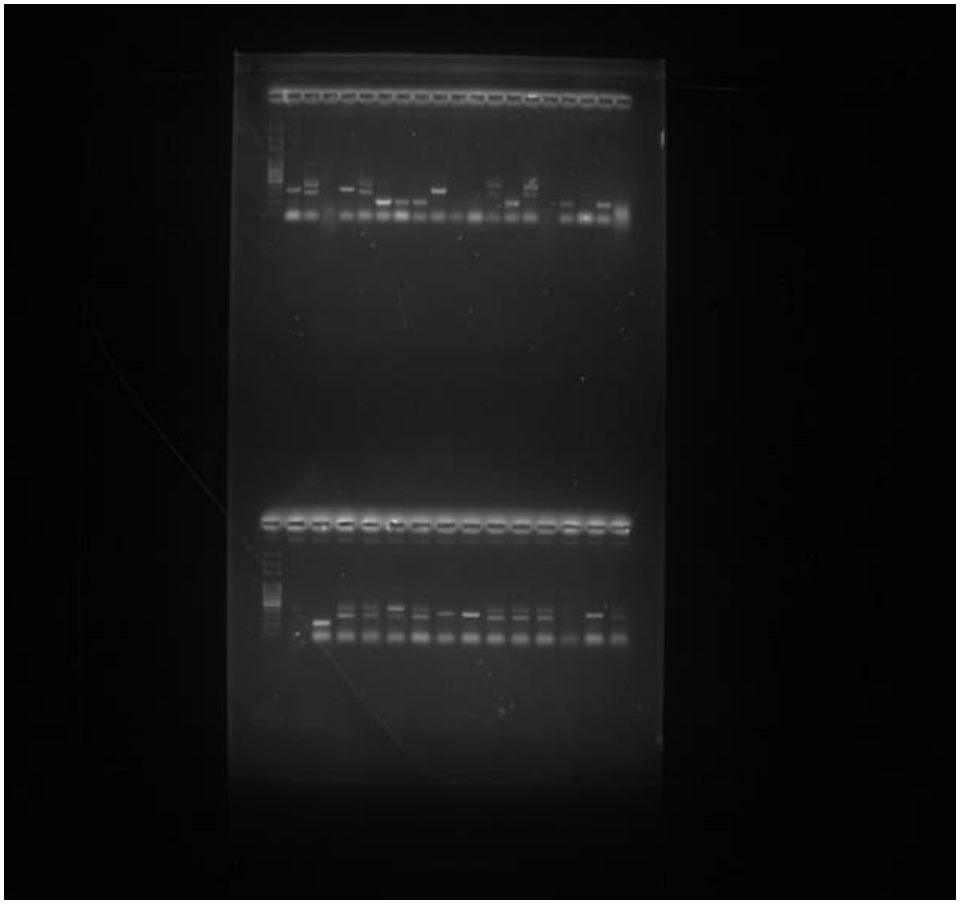


Figure 5: Using the previously shown primers (1 kb ladder), DNA Agarose Gel Electrophoresis of PCR amplification Results.

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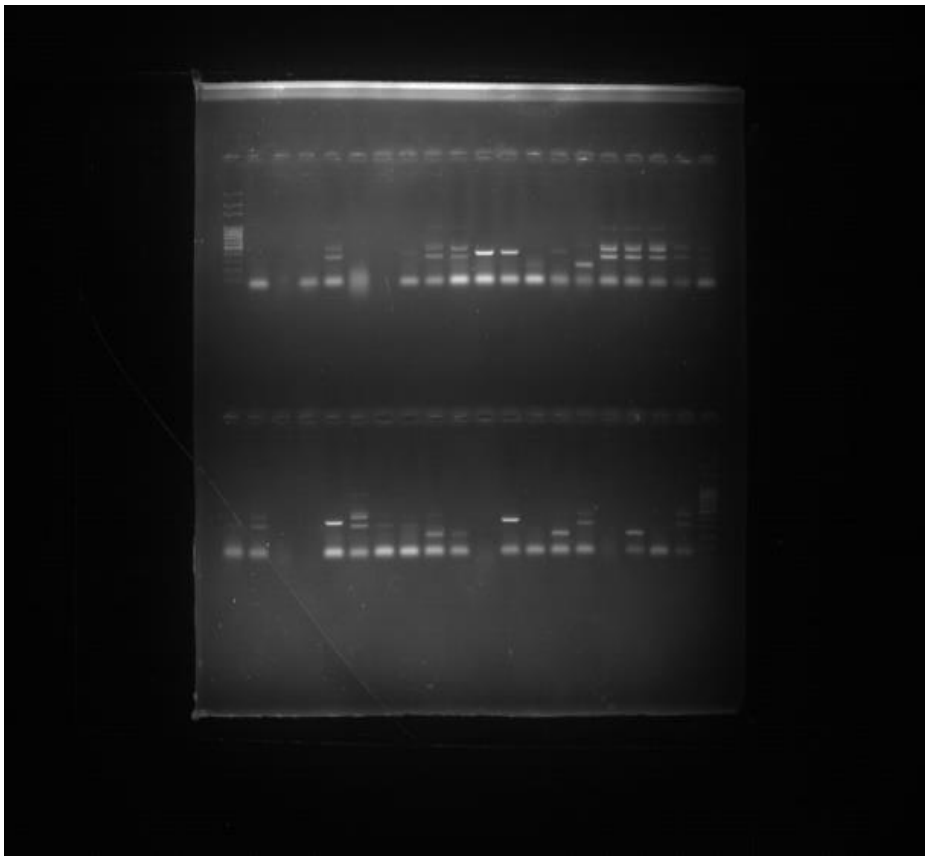


Figure 6: Using the previously shown primers (1 kb ladder), DNA Agarose Gel Electrophoresis of PCR amplification Results.

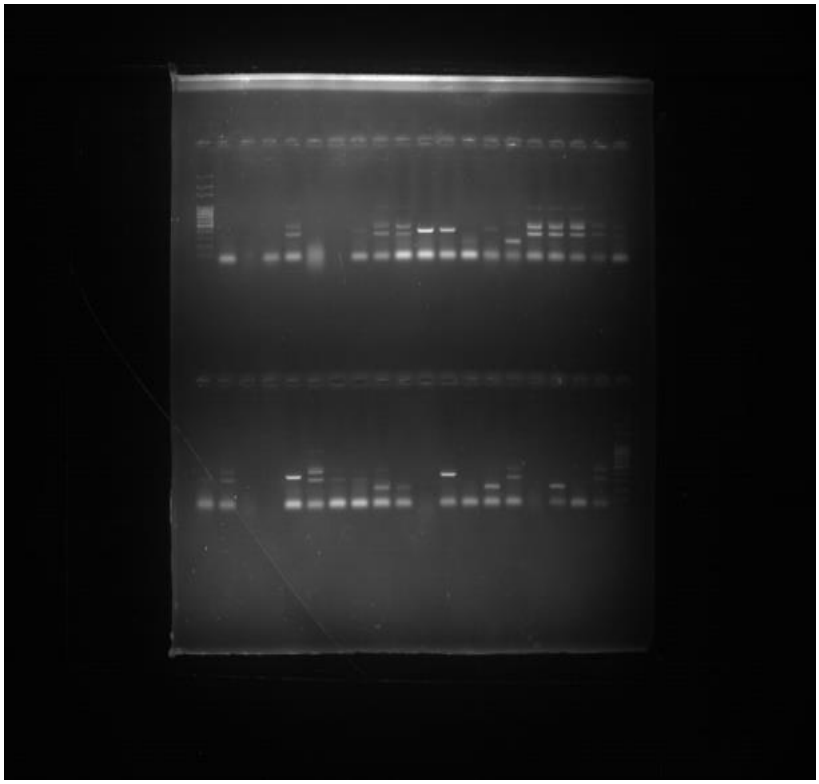


Figure 7: Using the previously shown primers (1 kb ladder), DNA Agarose Gel Electrophoresis of PCR amplification Results. The amplified PCR product are:
Anopheles gambiae 367bp
Anopheles arabiensis 315b

FULL TEXTS BOOK

Anopheles coluzzi 257bp

Discussion

This study showed the presence of Anopheles mosquitoes in the three studied LGAs reflecting the availability of suitable breeding sites (Table 1). All the larvae (100%) collected in this study were found breeding in stagnant water while none was found in flowing water. This agrees with already established knowledge that mosquitoes prefer to breed in all sorts of stagnant water but running streams and creeks with any water movement and ponds with predators such as fish, frogs, or dragonflies are not good breeding sites for mosquitoes (Farjana *et al.*, 2015).

There is significant difference between each compared group of habitat area (Balarabe *et al.*, 2015) hold the view that characterizing mosquito breeding sites in order to determine their influence on Anopheline and Culicine distribution and densities is very useful to understanding the variations observed in malaria transmission intensity and to plan more efficient vector control strategies. Considering the abundance of Anopheles breeding sites in this study, larval source management, environmental hygiene strategies and improved house design would be appropriate to effectively eliminate the various Anopheles mosquitoes breeding sites.

A total of 1454 Anopheles species belonging to three Anopheles species groups were identified morphologically from the studied LGAs. These include Anopheles gambiae s.l., Anopheles coluzzi and Anopheles arabiensis. These findings were similar with those identified morphologically in parts of Kano state (Ahmed and Ahmed, 2011). In this study, *Anopheles gambiae s.l.* had the highest occurrence, followed by *Anopheles arabiensis* and then *Anopheles coluzzi* was the least species group.

The presence of *Anopheles gambiae s.l.* and *Anopheles arabiensis* in this study could pose a major threat to the spread of malaria parasites as these species of mosquitoes have been implicated in various studies as the major malaria vector in Africa with the predominance of *Anopheles gambiae s.l.* over *Anopheles arabiensis* and *Anopheles colluzzi*. Studies done in various parts of Nigeria (Ahmed and Ahmed, 2011) reported this pattern while others recorded a similar trend from various parts of Africa (Antonio *et al.*, 2017).

Inaccurate identification of mosquito vector species has overtime lead to ineffective vector control strategies. This can now be avoided in these LGAs using the information here as baseline data for planning effective malaria vector control programmes.

Conclusion

The results from this study show that An. gambiae and Culex mosquitoes co-exist in Ilorin west, Ilorin East and post office, in Ilorin, Kwara State. *Anopheles gambiae* is the predominant species in this area. The breeding patterns of Anopheles and Culex mosquitoes vary in response to changes in environmental factors such as wind and rainfall.

The findings from this study contributes to the basic understanding of the distribution of Anopheles' mosquitoes with respect to species composition and heterogeneities that could serve as a base-line data for further entomological studies in the area and Malaria control since it shows that Anopheles is predominant here.

On the basis of the results, it was discovered that the *Anopheles gambiae* are the most prevalent and this calls the attention of the government to help to curb the mosquitoes to reduce the spread of malaria in this area of Ilorin.

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FULL TEXTS BOOK

BENEFİTS AND RİSKS OF GENERATİVE AI İN CONTENT MARKETİNG

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ABSTRACT
In a short period of time since it was launched, Generative AI has caused widespread interest in the content marketing landscape, with significant benefits and notable risks. Undoubtedly, this is the primary reason for marketers, managers, and experts to have a tool that generates unlimited content on any topic. This article examines generative AI in content marketing by providing a holistic view of its benefits and challenges. The benefits of generative AI involve efficiency in content creation, better personalization, cost savings, creativity, and further improvements. Nevertheless, there are risks related to these advantages, including quality of the content, ethical concerns, dependence on technology, the potential for spreading misinformation, and diminished content value. This article attempts to provide a balanced perspective by observing both sides. Furthermore, the article highlights some future trends and developments in generative AI, providing an understanding of its potential impact on content marketing.
Keywords: Digital Marketing, Generative AI, AI in Marketing, Ethical AI, Content Marketing, AI-Generated Content

INTRODUCTION

Particularly with the fast development of digital technologies and the rise of artificial intelligence (AI), the field of marketing has experienced major changes recently. The integration of Generative AI, which has fundamentally reshaped the limits of customer engagement and interaction, is essential to this transformation.

Generative AI, a branch of artificial intelligence, possesses the ability to independently generate content, leading to significant improvements in various fields, including content marketing. This technology applies sophisticated algorithms to create text, images, videos, and other types of media, allowing marketers to generate content on a large scale and quickly (Israfilzade & Sadili, 2024). The emergence of generative AI presents a viable solution to the escalating need for digital content, as businesses progressively embrace digital marketing tactics to efficiently connect with their target audiences.

Generative AI has a complex and wide impact on content marketing. On one side, it offers possibilities for improved productivity, creativity, and personalisation that were previously unachievable. However, the rapid integration of this technology brings forth various challenges, such as concerns about the quality of content, ethical implications and the possibility of over-dependence on automated systems. This paper aims to review the benefits as well as potential drawbacks of generative AI in content marketing, offering an in-depth view of its role and implications in the industry.

Benefits of Generative AI in Content Marketing

Generative artificial intelligence is a subfield of artificial intelligence whereby new data from an initial set of input data is produced using machine learning algorithms. Basically, it lets machines produce original and unique content as well as ones that match the training data. Training the AI models on large volumes helps them to learn and replicate the patterns, subtleties, and complexity of the data (Goodfellow et al., 2014; Houde et al., 2020; Dwivedi et al., 2023).

Whereas classical artificial intelligence relies on patterns, decision-making, analytics, and fraud detection, generative artificial intelligence generates new content, chat responses, designs, synthetic data, or deepfakes. While classical artificial intelligence uses new data to generate simple results,

FULL TEXTS BOOK

generative artificial intelligence begins with user input and explores content variants (Israfilzade & Sadili, 2024).

Efficiency in Content Creation. One of the most significant advantages of generative AI is its ability to streamline the content creation process. Traditional content production can be time-consuming and labour-intensive, requiring substantial human effort in brainstorming, drafting, and editing (Mbotake, 2024). Generative AI automates these processes, allowing marketers to generate vast amounts of content quickly and efficiently. This efficiency not only saves time but also enables marketers to maintain a consistent flow of content, which is crucial for keeping audiences engaged and optimizing search engine performance.

For instance, AI-powered tools like GPT, and Gemini can generate articles, blog posts, social media updates, and other forms of content within minutes (Nalini et al., 2021, Israfilzade, 2023). These tools can produce content on a wide range of topics, making them valuable assets for content marketing teams looking to scale their output without compromising quality. By automating repetitive and time-consuming tasks, generative AI allows marketers to focus on more strategic and creative aspects of their work.

Enhanced Personalization. Personalization is a key driver of effective content marketing. Consumers today expect personalized experiences that cater to their specific preferences and needs (Terho et al., 2022). Generative AI can analyse vast amounts of data to understand user behaviour and preferences, allowing marketers to create highly targeted content.

By leveraging AI, marketers can tailor content to individual users, enhancing the relevance and impact of their messaging. This level of personalization can significantly improve customer engagement and satisfaction, leading to higher conversion rates and stronger brand loyalty (Babayev & Israfilzade, 2023). For example, AI can customize email campaigns based on user interactions with previous emails, ensuring that each message resonates with the recipient.

Generative AI also enables dynamic content personalization, where the content changes in real-time based on user interactions. This capability allows marketers to deliver a more engaging and interactive experience, further boosting customer engagement and retention.

Cost Savings. Generative AI can lead to substantial cost savings for businesses (Kshetri et al., 2023). Traditionally, creating high-quality content requires a team of writers, editors, designers, and other professionals, which can be expensive. AI can reduce the need for large content creation teams by automating much of the process, thereby lowering production costs (Soni, 2023).

These savings can be reallocated to other strategic areas such as customer acquisition, product development, or advanced marketing initiatives. By optimizing their budgets, companies can achieve greater efficiency and competitiveness in the market. Moreover, the cost-effectiveness of AI-generated content allows smaller businesses to compete with larger enterprises by producing high-quality content without a significant financial burden.

Enhanced Creativity. AI has the potential to enhance creativity in content marketing by offering new ideas and perspectives. While AI-generated content can serve as a starting point, human creators can refine and build upon these ideas, leading to innovative and engaging content.

AI tools can generate diverse content formats, from written articles to visual designs, providing a rich source of inspiration for marketers (Ameen, 2022; Israfilzade, 2023). For instance, AI can create multiple variations of a marketing campaign, allowing marketers to test different approaches and select the most effective one. This collaborative approach between AI and human creativity can result in more dynamic and compelling marketing content.

FULL TEXTS BOOK

Generative artificial intelligence can also help with brainstorming by producing a large spectrum of ideas dependent on input parameters. This capacity will enable advertisers to go in novel directions for their campaigns and breakthrough creative limitations. Adding AI-generated ideas to human creativity will help marketers create more original and powerful content strategies.

Risks of Generative AI in Content Marketing

With marketing not excluded, artificial intelligence has fundamentally changed many fields. From data analysis and customer segmentation to content creation and personalized advertising, artificial intelligence technologies have influenced every aspect of marketing during the past ten years (Israfilzade, 2023). On the other hand, generative artificial intelligence, despite its many benefits, presents significant risks.

Quality Concerns. It is important to note that the quality of the content is one of the significant risks that are associated with generative artificial intelligence. AI-generated content may lack the depth, tone, and originality that human creators can provide. While AI can produce grammatically correct and coherent text, it often struggles with context, tone, and cultural relevance.

Human control is required in order to reduce the impact of these problems. Editors and content creators must review and refine AI-generated content to ensure it meets quality standards and aligns with the brand's story. Without this crucial stage, company faces the danger of releasing poor quality work that might damage the brand's reputation.

Moreover, AI-generated content may accidentally contain factual inaccuracies or outdated information. Ensuring the accuracy and reliability of the content is essential to maintain the trust and credibility of the audience. Strict quality control procedures and such as subject-matter experts in the content review process help to solve these problems.

Ethical Concerns. The use of AI in content marketing raises several ethical concerns. One major issue is bias in AI algorithms (Ntoutsi et al., 2020). AI systems are trained on large datasets that may contain inherent biases, which can be reflected in the generated content. This can lead to discriminatory or offensive content that could damage the brand's image and alienate audiences.

Privacy is another ethical concern. AI relies on vast amounts of data to function effectively, raising questions about how this data is collected, stored, and used (Manheim & Kaplan, 2019). Marketers must ensure that they comply with data protection regulations and respect user privacy to avoid legal repercussions and maintain consumer trust.

Transparency and accountability are crucial in addressing these ethical concerns. Companies should be transparent about their use of AI and the data it relies on. Implementing ethical guidelines and standards for AI-generated content can help ensure that the technology is used responsibly and ethically.

Dependence on Technology. Over-reliance on AI tools can lead to a decline in human creativity and critical thinking (George, Baskar & Srikaanth, 2024). While AI can automate many aspects of content creation, it cannot replace the unique insights and emotional intelligence that humans bring to the table. Marketers must strike a balance between leveraging AI for efficiency and maintaining human input for creativity and strategic thinking. This balance is crucial for producing content that resonates with audiences on a deeper level and maintains the authenticity of the brand.

Furthermore, the dependence on technology can create vulnerabilities. Technical issues, such as system failures or cybersecurity threats, can disrupt the content creation process. Developing contingency plans and ensuring the robustness of AI systems are essential to mitigate these risks.

FULL TEXTS BOOK

Potential for Misinformation. AI-generated content can accidentally spread misinformation if not properly monitored. AI systems generate content based on patterns and data, which may include inaccuracies or outdated information (Zhou et al., 2023). Without thorough fact-checking, there is a risk of disseminating false information that could mislead audiences and damage the brand's credibility.

To address this risk, companies must implement robust verification processes to ensure the accuracy of AI-generated content. This includes cross-referencing information with reliable sources and involving subject matter experts in the content review process.

Moreover, the potential for misuse of AI to deliberately create and spread misinformation is a significant concern. Ensuring the ethical use of AI and promoting digital literacy among consumers are critical steps in combating the spread of misinformation.

Diminishing Content Value Over Time. Another significant risk associated with generative AI in content marketing is the potential for diminishing content value over time (Reisenbichler et al., 2022; Chui et al., 2023). As more businesses adopt AI-generated content strategies, the market could become saturated with similar types of content. This saturation can lead to content fatigue among consumers, reducing the overall impact and effectiveness of marketing efforts.

Additionally, if AI-generated content is not regularly updated and refreshed, it can become repetitive and lose its appeal. Audiences may begin to recognize and disregard AI-generated content, perceiving it as less authentic and engaging compared to human-created content. This diminishing value can undermine the long-term success of content marketing strategies.

To respond to this risk, marketers must continuously innovate and ensure that AI-generated content remains fresh, relevant, and valuable to their audiences. Combining AI capabilities with human creativity and strategic planning can help maintain the uniqueness and impact of marketing content.

Future Trends and Developments

The future of generative AI in content marketing holds exciting possibilities. Advances in AI capabilities will enable even more sophisticated personalization and creativity. For example, AI could analyse real-time user data to generate hyper-personalized content that adapts to changing consumer preferences.

Integration with other technologies, such as augmented reality (AR) and virtual reality (VR), could further enhance the impact of AI-generated content. These immersive technologies can create engaging and interactive experiences that captivate audiences and drive brand engagement.

Additionally, ongoing research and development will focus on addressing the ethical and quality concerns associated with AI. Efforts to reduce bias in AI algorithms and improve the transparency and accountability of AI systems will be crucial for building trust and

CONCLUSION

Generative AI offers a transformative approach to content marketing, presenting a blend of substantial benefits and notable risks. The efficiency in content creation, enhanced personalization, cost savings, and creative inspiration that generative AI provides can significantly sustain marketing strategies, enabling businesses to produce high-quality content at scale. However, the integration of this technology also brings forth challenges that require careful consideration and management.

Quality concerns are predominant, as AI-generated content often lacks the nuanced understanding and contextual relevance that human creators inherently possess. Ethical issues, including biases in AI algorithms and data privacy, necessitate the implementation of healthy ethical guidelines and transparency measures. The over-reliance on technology can diminish human creativity and critical thinking, underscoring the need for a balanced approach that leverages both AI capabilities and human insights.

FULL TEXTS BOOK

The potential for misinformation and the risk of diminishing content value over time further complicates the landscape. Ensuring accurate, up-to-date information and maintaining the freshness and uniqueness of content is crucial to sustaining audience engagement and trust.

Future trends in generative AI point towards even more sophisticated personalization and integration with immersive technologies like AR and VR, promising to enhance the impact of AI-generated content. Continuous advancements in AI capabilities, coupled with ethical research and development, will be essential in addressing current challenges and building a more reliable and trustworthy framework for AI in content marketing.

In conclusion, while generative AI holds huge promise for revolutionizing content marketing, its successful and sustainable implementation hinges on a balanced approach that combines technological innovation with human oversight and ethical considerations. By navigating the benefits and risks carefully, marketers can employ the full potential of generative AI to create compelling, effective, and responsible content that resonates with their audiences.

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FULL TEXTS BOOK

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FULL TEXTS BOOK

GAGAUZ TÜRKÇESİNDE BAĞLAMA EDATI "YA" NIN SEMANTİK KATMANDAKİ İŞLEVSEL YANSIMASI
FUNCTIONAL REFLECTION OF THE BINDING PREPOSITION "YA" IN GAGAUZ TURKISH IN THE SEMANTIC LAYER

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ÖZET
Çalışma enleminde, Gagauz Türkçesindeki "*ya*" bağlacının işlevsel doğrultuda imgelenen semantik vurgusu dikkate sunulmuştur. Bağlam ve şartların görünüm ufkuyla betimlenen anlamsal boyut, metin bağlamında motivize edilen "*ya*" bağlayıcı unsurunu derin yapıdan yüzey yapıya aktararak söylem periyodunu varsıl bir yöne çekmiştir. Yorumsal analiz modeliyle tasarlanan semantik perspektif, işlev odaklı polisemik imajların senkronik yankısıyla dizayn edilmiştir. Gagauz yazınındaki gizil estetik fayları açığa çıkaran bu anlamsal dizilim doküman analizi faktörüyle çözümlenerek anlambilimsel bir tarzla incelenmiştir. Dolayısıyla "*ya*" bağlama edatının biçimsel yönlü derin yapı işaretleyicilerinin saptandığı, çokanlamlı dizgenin semantik iz düşümünün, söylem perdesine özgün bir kreasyonla yansıtıldığı belirmiştir. Daha doğrusu, anlam paletinden akseden işlev odaklı estetik renkler vasıtasıyla ifade tablosunun polisemik bir izlenim yarattığı belirgin kılınmıştır.
Araştırma evreninde, bağlayıcı dil birimi "*ya*" nın anlamsal sınırdan tek başına geçebildiği gibi, "*yada, ye, eki (< ya ki), yaki, yakida*" tarzındaki biçimlere de dönüşebildiği dikkati çekmiştir. Ayrıca biçimbirimsel bir reaksiyonla işlenen söz konusu bağımsız görev birimlerinin, yüzey yapıda üstlendikleri özgün imgelemin yanı sıra, "seçenek sunma, soru sorma, açıklama, pekiştirme…" gibi farklı anlamsal ilgilerle otantik bir görünüm sergiledikleri görülmüştür. Gagauz Türkçesinin gramatikal yörüngedeki dilsel motiflerini ve değişken karakterli anlatı desenlerini semantize eden bu işlevsel dizayn, gözlem meridyeninden yansıyan polisemik kurguyu sanatsal bir hazla yeniden dramatize etmiştir. Tespiti yapılan işlev katmanına ad verme işlemi ise tümcede baskın olan anlam profili aracılığıyla gerçekleştirilmiştir. Böylelikle Gagauz edebi ikliminde bağımsız bir "*ya*" profilinin var olduğu tespit edilmiş ve bu kinestetik önermenin varlığını pekiştiren çeşitli yazınsal portrelerden orijinal tasarımlar resmedilmiştir.
Anahtar kelimeler: Gagauz Türkçesi, Ya bağlacı, Semantik, İşlev, Analiz.

ABSTRACT
At the latitude of the study, the semantic emphasis of the conjunction "*ya*" in Gagauz Turkish, which is visualized in a functional direction, is brought to attention. The semantic dimension described by the horizon of context and conditions has moved the discourse period in a rich direction by transferring the connecting element "either" motivated in the context of the text from the deep structure to the surface structure. The semantic perspective, designed with the interpretive analysis model, is designed with the synchronic echo of function-oriented polysemic images. This semantic sequence, which reveals the hidden aesthetic faults in Gagauz literature, was analyzed with the document analysis factor and examined in a semantic manner. Therefore, it has been determined that the formal deep structure markers of the linking preposition "*ya*" have been determined, and the semantic projection of the polysemous system is reflected on the discourse screen with a unique creation. More precisely, it is made clear that the expression table creates a polysemic impression through the function-oriented aesthetic colors reflected from the meaning palette.
In the research universe, it has been noticed that the connective linguistic unit "*ya*" can pass the semantic border alone, as well as transform into forms such as "*yada, ye, (< ya ki), yaki, yakida*". In addition, it has been observed that these independent task units, which are processed with a morphosyntactic

FULL TEXTS BOOK

reaction, display an authentic appearance with different semantic interests such as "offering options, asking questions, explaining, reinforcing...", in addition to the original imagery they assume in the surface structure. This functional design, which semanticizes the linguistic motifs of Gagauz Turkish in the grammatical orbit and narrative patterns with variable characters, has re-dramatized the polysemic fiction reflected from the observation meridian with artistic pleasure. The process of naming the detected function layer was carried out through the dominant semantic profile in the sentence. Thus, it has been determined that there is an independent "*ya*" profile in the Gagauz literary climate, and original designs from various literary portraits that reinforce the existence of this kinesthetic proposition have been illustrated.
Keywords: Gagauz Turkish, Ya conjunction, Semantics, Function, Analysis.

GİRİŞ

Dil örgesinin işlevsel boyutunu desenleyen, gramatikal odaktan yansıyan görev birimlerini bağlayıcı bir üslupla betimleyen, ifade düzlemini belirgin bir hedef ve bağlam ile güçlendiren anlamsal yapı, "bağlaç" motifinin betim sınırını semantize eder. Bu bağlayıcı unsur; görevdeş veya birbiriyle ilgili sözceler, tümceler ya da sözcük grupları arasında biçim ve anlam yönünden estetiksel bir âhenk yaratarak derin yapıdaki saklı anlam birimlerini yüzey yapıya aktarır. Farklı önermeler arasındaki gizil bağlantı noktalarından biri olan "*ya*" ögesinin ise söylem grafiğinde işlevsel bir yön çizerek anlam sınırını polisemik bir ivmeyle yeniden dizayn ettiği belirir. Dolayısıyla Gagauz Türkçesindeki "*ya*" bağlayıcı unsurunun işlevsel katmanda bağımsız bir tasarımla senkronize edildiği ve çeşitli anlam ilgileriyle desenlendiği görülür.

Sözcükleri, sözcük öbeklerini, cümleleri, ögeleri birbirine bağlayan öncül, bağımsız, görevsel biçimbirimler olan bağlaçlar; görevsel işlevlerinin yanı sıra bağladıkları yapılara çeşitli anlamsal katkılar sunar (Karaşin, 2008: 216). Bağlaç, metnin küçük ölçekli yapısında ardışık sözceler arasındaki anlamsal ilişkilerin metnin alıcısı ya da dinleyicisi tarafından açık olarak algılanmasını sağlayan belirginleştirici ögedir (Akt. Deniz ve Emir, 2009: 905). Aynı zamanda farklı durumlar arasındaki anlamsal ilişkilerin taşıyıcısıdır. Sözcük, söz grubu ve cümleler arasına girerek onları gerek biçim gerekse anlam açısından birbirine bağlar. Duygu, düşünce, istek ve durum odaklı karmaşık yapılar arasındaki bağlantıların, anlam kaybı olmaksızın kurulması da bu bağlayıcı unsurlar vasıtasıyla gerçekleşir (Deniz ve Emir, 2009: 906). Gramer birliklerini birbirine bağlayan, anlam ilişkileri kuran unsurlar (Korkmaz, 2009: 191) olarak nitelenen bağlaçların cümledeki yerleri ile yüklendikleri işlevler ve bağladıkları ögeler arasında kurdukları çeşitli anlam ilişkilerinde birbirine geçişler, iç içe girişler veya yan yana buluşlar söz konusu olduğundan, bunları her zaman kesin sınırlarla birbirinden ayırmak mümkün değildir (Korkmaz, 2009: 932). Bu nedenle aynı sözcük, sözcedeki kullanım yerine göre farklı sözcük ulamında yer alabilmekte ve değişik işlevler üstlenebilmektedir (Akt. Karaşin, 2008: 216). Dolayısıyla dili oluşturan birimlerin tek başına kullanıma çıkmaları, iletişimi sağlayamayacağından sistem içindeki konumlarının, kullanıldıkları yerin, ilişki kurdukları kavramların onları yönlendirişi, bildirişme adına büyük önem taşır. Bu doğrultuda görev üstlenen dil birimlerinin diğerlerinden ayrılması için ayrı birer göstergeyle adlandırılması kaçınılmazdır (Karaşin, 2008: 216).

BULGULAR

Gagauz Türkçesinde bağlama edatı *ya*'nın semantik boyuttaki işlevsel yansıması şu şekildedir:

1.Seslenme işlevi

Avşamêrsın, amuca, avşamêrsın,
Yok vakıt uyumaa!
Bu avşam Svıntu Vasiliy avşamıydır.
Amuca kalkêr,

FULL TEXTS BOOK

Çırakları, çobannarı toplêêr,
Da onnara söleer,
Ani vakıt geldi sürmää.
Amuca gider,
Koşêr beygirleri hem öküzleri.
Ya çocuklar, kaldırınız bir ses:
Hey-hey!
(Akt. Zanet, 2010: 304)

Şiirsel katmanda, *ya* bağlama edatının nida eksenindeki coşkun sesletimi göze çarpmıştır. Hissel bir devinimle tasarlanan anlam tablosu, konuşucunun hitabet motifiyle birleşerek çağrışımsal bir etki yaratmıştır. İki anlamsal dizgeyi birbirine bağlayan *ya* bağlantı birimi, aynı zamanda özne konumundaki "*çocuklar*" ibaresini de işaretlemiş; söylem periyodunu estetiksel bir üslûpla yeniden dramatize etmiştir.

2. Hayıflanma işlevi

Ah, güllär, güllär,
Kırmızı güllär,
Mancurii (h)aldı ellär.
Herbir fidan silkti yapraanı,
Ne pek titsi kaldı.
Ya, bizim genç yärlerimiz
Eşsiz kaldı,
Genç analar oolsuz kaldı.
(Akt. Zanet, 2010: 324)

Şiirsel düzlemin anlam sığasından akseden hissel imgelem, konuşucunun yaşanmış bir olaya yönelik derin üzüntüsünü yansıtmaktadır. Sanatsal iz düşümün retorik boyutunu tasvirleyen anlamsal çağrışım, *ya* bağlayıcı unsurunun işlevsel dokusuyla güçlendirilmiştir. Hayıflanma işleviyle duygusal bir yoğunluk yaratan *ya* biçimbirimi, kendinden sonra gelen cümleye bağlanarak anlam evrenini estetiksel yönde genişletmiştir.

3. Öfke – kızgınlık işlevi

Gün kauşmaa deyni girdik küü içinä. Yorgunnuktan ayaklarımız artık tutmazdılar, ama nesoy-nesoy sardırdık kendi maalemizä, etiştik Simonnarın evinä.
Açan kapu önünä girdik, Nüklay batü (Simonun tätüsu) üfkeli bir seslän dedi:
-Mamusunu-nesini **ya**… bütün gün çamur çiinedik, ayak kopardık da şindi sade turşu mu iyecez? …
(Filioglu, 2019: 84)

Metnin anlam yelpazesinde; bütün gün çalışmaktan yorulan ve acıkan bir grup insanın, günün sonunda kendilerine sunulan yemeğe dair memnuniyetsizliği ve bu durumdan kaynaklı öfke ve kızgınlık izleği konu edilmiştir. Kendinden önce ve sonra gelen tümceleri estetiksel bir tarzla işleyen *ya* bağlantı noktası, söylem ritmini zenginleştirerek verilmek istenen temsel olguyu güçlendirmiştir.

4. Emir işlevi

İçerdän çıktı Milana: "Kim orda?"
Petri, soruşa cuvap vermeyip, baardı: "**Ya** çaar o kocanı, mari!"
- Petri batü, sän mi? Buyurun aula! – çaardı Milana.
(Zanet, 2014: 11)

Metinde, kuvvetli bir buyruğun öfke ve kızgınlık perspektifiyle harmonize edildiği görülmektedir. Burada *ya*, başta bulunduğu cümleyi güçlendirmekte, emrin derecesini yükseltgen bir yapıya

FULL TEXTS BOOK

dönüştürmektedir. Bu tasarımda bağlaçtan sonra gelen önermenin kuvvetli emir ufkunu işaretlemesi ve söylem atmosferinin estetiksel bir betim kazanması söz konusudur.

5. Hatırlatma işlevi

- Desinner, ne deyirseler, biz büyük dedelerimizin yaptıklarını hem nasaatlarını tamamnamaktayız! – deyirdi İstemi-kağan Özgün-babaylan fikirleşerek.
- Elbet, elbet, şanlı kağanım! "Oğuz-name" dastanımızda **söylener ye**, ani Büyük babamız Oğuz-han düş görmüştü, ki dünyayı kara fenalıklardan kurtarmağa lazımmış…

(Tanasoğlu, 2009: 31)

Açıklama işleviyle paralel doğrultuda olan hatırlatma dizgesi, geçmişte tasarlanmış bir olguya dikkat çekerek çağrışımsal bir etki yaratmaktadır. Dinleyicinin söz konusu olguyu hatırlaması esas gayeyi teşkil ederken; anımsatıcı bir yaklaşımla kurgulanan *ya* bağlantı birimi, ifade enlemine işlevsel bir zenginlik yüklemektedir. Metinde konuşucu, önce İstemi Kağan'ın bir deyişini anımsatmakta, daha sonra bu deyişi açıklar nitelikte olan "*söylener ye*" kalıp örgesini işe koşmaktadır.

6. İstek işlevi

Donadarkan sofrayı,
Danışêr bana karı:
-**Ya** uyan, metin kuşum,
Sofraya çıkar turşu.
(Filioglu, 2019: 296)

Şiirde; eşler arasında geçen samimi diyalogta, *ya* bağlacının istek işlevine estetiksel bir gönderme yapılmaktadır. Eşinin uyanmasını ve sofraya turşu koymasını isteyen konuşucu, *ya* bağlayıcı unsurunun anlam ikliminden esinlenmektedir. Dizenin başında konumlanan *ya* biçimbirimi, kendinden sonra gelen sözceleri birbirine bağlayarak şiirin betim düzleminde anlamsal bir bütünlük sağlamaktadır.

7. Pekiştirme işlevi

- Ne sän. Kuruoğ? – genä kuşkulandı Külen. – Bän ne zor çektim yalnız, böylä işlerä mi aklım gideceydi? O köpäyi… bir kerä kaynak suylan haşladım… o hep… başka kerä dä yımışak mayızlan o hayın gözlerini doldurdum… komşular hepisi bilerlär artık… tä sor! Bir kerä ama, doorusunu söyleyim, atlı gelip şu maskara, ansızdan tuttu ardımdan peliyimi, da…

-Ne "da"?...

- … ama bän öylä keskin çekettim baarmağa, ani çadırdan fırladı Babaoğ-ata kılıç elindä, bir kaç ta karı komşu çadırlardan… da beni o cenabet braktı… ama kılıç-kılıç düyüştä o yaraladı bizim zavalı babamızı… aman-aman, kahırım benim hem günahım da ihtiyarın zor çekmekleri için o zamandan beri,
- aalamağa çeketti Külen fıtasına titireyerak sesinnän.
- Ye, hadi, brak Külen, uslan… **dedim ye**, ani kemikleri biyaziyär pelinnik içindä…

(Tanasoğlu, 2009: 48)

Metnin anlam yelpazesinde, geçmişte maruz kaldığı talihsiz olay nedeniyle ruhsal çöküntü yaşayan Külen adlı karakterin durumu konu edilmektedir. Bağlayıcı unsur *ya*'nın işlevsel yansıması olan "*dedim ye*" kalıbı, anlam düzlemini pekiştirerek yüzey yapıda konumlanan iki tümceyi birbirine bağlamaktadır. Konuşucu, *ye*'den önce gelen birime dikkat çekmek ya da dil tekrarı yapmamak adına *ye*'den önceki birimi (*dedim*) örüntülemektedir. Dolayısıyla konuşucunun, "*ani kemikleri biyaziyär pelinnik içindä…*" ifadesini daha önce dile getirdiğini söylemek mümkündür. Burada tasvirlenen *ye*, sezgisel bir ivmeyle hem önce söylenen düşünceyi şu an söylenen aynı düşünceyle birleştirmekte hem de pekiştireç görevi üstlenmektedir.

FULL TEXTS BOOK

8. Dikkat çekme işlevi

Petidä bir sarı şişiriga, güneş gibi var, Doruda sa bir biyaz, yaz havasının rengindä şişiriga var. Toplanmış uşaklar çocukların şişirigalarını görmää.

Ya, bakın! Bölä büük hem yalabık şişiriga, nicä bendä, siz taa görmediniz! – dedi Peti.

- E, görmedik, gördük! – dedi uşakların biri. – Senin şişirigan diil okadar gözäl!

(Stoletneaia vd., 2018: 28)

Metinde; Peti adlı çocuğun, sarı renkli balonuyla övünerek bulunduğu ortamda ilgi odağı olma isteği konu edilmektedir. Peti, bu isteğini gerçekleştirmek adına, *ya* bağlacının anlam ekseninden ilham almaktadır. "*Ya, bakın!*" cümlesindeki coşkun devinim, *ya* bağlayıcı unsurunun dikkat çekme işlevini yansıtmaktadır.

9. Tehdit işlevi

Bir gün adam demiş aslana:

-Günä karşı bitlä benim başımı.

Aslan bitlemää başladıynan, o adam sorêr aslana:

-Nasıl, kardaşlık, benim başım islää mi?

Aslan da demiş:

-İslää, insan kafasına benzeer.

İki-üç gündän sora kefi gelmiş aslanın, da o vermiş başını adama bitletmää. Şindi adam bitlärkän, sormuş aslan adama:

-Benim kafam nasıl, islää mi?

-İslää, - demiş adam, - ama benzeer köpek kafasına.

Açan işitmiş bu lafları aslan, osaat kalkmış, başlamış tırnaklarınnan topraa fırlatmaa geeri – ölä üfkelenmiş, ölä aar gelmiş ona, ani adam benzetmiş onun kafasını köpek kafasına. Adam sa annamamış, nedän aslan üfkelendi, demiş kendi kendinä: "Şindiyädän yoktu bölä yaptı, neçin şindi bölä yapêr acaba?" Da sormuş adam aslana:

-Neçin bölä yapêrsın?

Aslan durmuş, almış erdän yarım putluk bir taş, vermiş o taşı adama da demiş:

-Ur bu taşlan benim kafama!

Çocuk urmamış. İkinci kerä aslan teklif etmiş:

-Ur benim başıma!

Adam genä urmamış. Üçüncü kerä aslan demiş:

-**Ya** ur, **ya da** parça-parça paralarım seni!

(Çebotar, 2021: 68)

Metinde; tehdit etme işlevinin *ya* bağlacıyla senkronize edilmesiyle tasarlanan özgün imgelem, özgün bir yaklaşımla resmedilmiştir. Karşı tarafa yönelik bir saldırı gerçekleştireceğini, güçlü bir söylemle dile getiren aslan, içinde bulunduğu öfke ikliminin de etkisiyle, tehlikeli bir durum yaratma eğilimi göstermiştir. "*Ya ur, ya da parça-parça paralarım seni!*" cümlesiyle muhataba gözdağı vermiş, *ya* bağlacının güç potansiyelinden esinlenmiştir.

10. Pişmanlık işlevi

Sultan gene yalnız.

-Ne yaptım, ne yaptım? (Aalar) ko o sevmedi, gözü görsün beni yoktu, ama buradaydı, benimnen, ben de her gün onunnan yaşardım! O, fikirsizliğim benim!

Bir de "masa üstünde" hancerciği bular.

-Ah, te hancercik te, kim getirdiyse, beni saplasın, öldürsün? O ama beni öldürmedi, acıdı, akıllıcağım benim! Taa iyidi, o beni öldürsün, diyil ben onu, öyle bir gülü falayım. O, Allah! O kendi namuzluğunu

FULL TEXTS BOOK

korudu. **Ye**, ne için ben onu cezaya koydum? O ana toprağını sevirdi hem senselesini… bizim senselemizi…
(Tanasoğlu, 2009: 215-216)
Metnin söylem odağında, yaptığı davranışın sonucunu gören konuşucunun yaşadığı derin üzüntü ve hayıflanma göze çarpmaktadır. Suçlu olduğunu kabul eden konuşucu, bu durum nedeniyle yoğun bir pişmanlık yaşamaktadır. "*Ye, ne için ben onu cezaya koydum?*" cümlesinde geçen *ya* bağlayıcı deseni, pişmanlık işlevinin anlamsal iz düşümünü görünür kılınmaktadır.

11. Uyarı – ikaz işlevi
- Küüyä dönelim lääzım, mamu. Köklerimiz orada. Kopmayalım köklerimizdän. Baka da herkerä geeri dönmää istärdi, ma…
- Ama dönämeyecek. – kesti onun lafını Milana. – Bu mezarlıkta kalacek, o da, Mariniylän Doçi da.
- Hepsi senselemizin mezarları küüdä, ma mamu. – dedi Ligor. – İzin alıp, onnarın da mezarlarını küüyä taşıyacam. Doykuylan Yananın da mezarlarını bulacam, ma mamu… **Ya** bak gün batıya kayêr artık. Ha kalk, mamu, evä gidelim. – Ligor kalktı skemnedän, sora yavaçıcık aldı anasını kolundan. – Hadi, ma! Şindi karannık çökecek.
(Zanet, 2014: 29)
Metinde; *ya* bağlama edatı vasıtasıyla sergilenen uyarımsal söylem dikkati çekmektedir. Bu işlevin anlam dağarcığından yansıyan en belirgin husus, uyarının devamında olumsuz bir eylemin kestirilebilir olması, daha doğrusu kötü bir durumun olacağı haberinin yer almasıdır. "*Ya bak gün batıya kayêr artık.*" cümlesinde güneşin batmaya başladığı uyarısı *ya* birimi aracılığıyla desenlenmekte, bu uyarının sonunda karanlığın çökeceği olgusu da yine ikaz kanalı ile gerçekleşmektedir.

12. Korku-endişe etme işlevi
... Da te, bir günü, bu erif genä atlamış aul içinä da, açan hızlanmış ne sa çalmaa, kuytudan önünä Tayfun fırlamış. "Hav!" deyip, iki ayaklarını da bu erifin omuzlarına koymuş. İkisi burnu burnuya gelmişlär. Köpek başka salmamış, salt bu erifi ayakta tutmuş hem erif kıpırdadıynan hırlarmış. Bir parça vakıttan sora erif annêêr, ani iş şaka diil. Baaramêêr da. Zerä, taa aazını açtıynan, köpek ta aazını açêr. Korkudan erif donnarına işemiş. Bölä gerää gibi vakıt geçmiş. Görersiniz burada taa birisi yaşamêêr, hiç yok kim imdat ta versin. Bilmeerim neylän bu iş vardı nicä bitsin: ya köpek onu paralayaceydı, ya erifin ödü patlayaceydı, ama erifin kısmetinä o günü burada bir işim çıktı. Açan geldim da gördüm ne olêr bilmärdim aalayım mı, güliim mi! yavaştan alıp, çektim Tayfunu bir tarafa. Erif sa kıpırdamêêr. Bän da korktum: **ya** ödü patladısaydı?!
(Zanet, 2023: 270)
Metinde, hırsızlık yapmak üzere avluya giren kişinin, köpeğe yakalanması ve köpek tarafından engellenmesi söz konusudur. Bu olay karşısında konuşucunun yaşadığı endişe ve korku, "*ya ödü patladısaydı?!*" perspektifiyle dramatize edilmiştir. Olay, her ne kadar en az zararla atlatılmış olsa da, konuşucu, olası senaryolarla durum değerlendirmesi yapmıştır. Dolayısıyla *ya*'nın anlam süzgecinden geçen korku ve endişe işlevi, ifade enlemini güçlendirerek polisemik bir izlenim yaratmıştır.

13. Soru sorma işlevi
Çağay-hanın konaklarında toy, şennik, gülüş, tamahlık, karezlik – bak çalınmışları pay ederlär.
- Üsek han, taa çok mal kapamadık, cezalama, başka kerä uurumuz taa uygun gidär, - şalvir iyileräk yaltıklı sırıttı Titsi-Göz, saklayarak aslısını.
- Ozaman da payını alırsın! **Ye** kızlar?
- Kız pek alamadık…saklıydılar bulunmaz erlerdä…aradık, vakıt ta yoktu…tä bir bölücäk…istärsän görmäğä, üsek hanım, -dedi bu ordubaşı da elinnän nişan yaptı getirsinnär kızları içyanına. –Tä o miskin oğuz kızları, han.

FULL TEXTS BOOK

(Tanasoğlu, 2009: 112)

Metinde, soru sorma işleviyle örüntülenen *ya*, biçimsel açıdan bağlama işlevini üstlenirken, kendinden sonra gelen söylem platformunu da güçlendirmektedir. "*Ye kızlar?*" cümlesinde *ya* bağlayıcı ögesi sorgulayıcı bir üslupla resmedilmiş, *ye* biçimbirimine dönüşerek aynı zamanda merak ve öfke tarzındaki duygusal bağıntıyı da göz önüne sermiştir.

14. Şaşkınlık işlevi

- Görerim, ani buldunuz onu. Hem bilersiniz mi neçin bilerim? O da güzün her avşam gidip, sabaalän bölä pıtıraklan dolu, yorgun hem şen, gelärdi evä. Bän da onu kazayacaklan kazıyardım hem paklardım. Göräydiniz ozaman onun kanaatlı bakışını!
- Onun bakışı şindi da şen hem kanaatlı – dedim bän. – Hem da onun gibi taa beş orada var.
- Beş mi!? – şaşarak sordu kumiṭa.
- Beş – bir köpek hem dört pali! – cuvap etti ona kumi.
- **Ya** bak sän! – şaştı kumiṭa.

(Zanet, 2018: 469)

Metinde; bir süredir gözlerden aniden kaybolan köpeğin, bulunduğu ve yavruladığı haberini alan konuşucunun, yaşadığı şaşkınlık duygusu tasvir edilmiştir. "*Ya bak sän*!" cümlesi konuşucunun beklemediği durum karşısındaki şaşkınlığını ve verdiği ani tepkiyi sembolize ederken, aynı zamanda *ya* bağlayıcı deseninin varlığıyla anlamsal bağıntıyı pekiştirmiştir.

15. Neden – sonuç işlevi

Etiştiynän erimizä, bana düştü yakmaa ateşi, koymaa fasüleyi ötää dooru kaynasın hem hepbir göz-kulak olmaa şu kalmasın susuz, **ya** yanmasın, **yada** taşmasın. Bu bana deyni diildi bir sırasız ük. Ateşi yollandırdıynan, suyuna kontrol yaptıynan, kapattım tencerenin kapaanı, da bizim çoktan beklenän mancamız yollandı kaynamaa…

(Filioglu, 2019: 104-105)

Metnin betim katmanında konuşlanan neden-sonuç işlevi, *ya* bağlantı biriminin anlam odağından geçerek gramatikal bir görünüm arz etmiştir. Metinde, fasulyenin yanmaması ve taşmaması için bekleme, göz kulak olma eylemi, neden-sonuç ilişkisi çerçevesinde iletilmektedir. Bu anlamsal yörüngeden yansıyan bağlantı kuşağının, *ya* motifi vasıtasıyla güçlendiği ve anlatı tepkimesinin estetiksel bir tasarımla işlendiği dikkati çekmektedir.

16. Merak işlevi

Bir günü öküz deer çocaa:

-Şindi tä ne var. Tii o bayırın tepesini görersin mi? oradan çıkacek bir öküz. Da gelecek bizä karşı. Al benim buynuzlarımı da git. Bunu aç, i ekmek. Olmayınca kendi aulun, öbür buynuzumu açma. Açan olacek kendi aulun, taa ozaman ikinci buynuzumu aç. Ama aç aul içindä.

Da gider çocuk ileri. Acıktıynan, iyer buynuzdan. Etişer bir derä boyuna. Büük bir deräymiş. Yıkanmış orada, imiş, dinnenmiş, uyumuş. Açan kalker, geler aklına o ikinci buynuz. Da çocuk düşüner: "Neçin o dedi bana açmayım bu buynuzu? **Ya** açayım da bakayım, ne o"…

(Çebotar, 2021: 47-48)

Metnin anlam atmosferinden yansıyan anlatı yelpazesi, bilme ve öğrenme merkezli davranış örgesini sembolize etmiştir. Merak işlevini estetik bir iz düşümle semantize eden *ya* bağlayıcı unsuru, cümlenin sonunda betimlenen soru sorma dizgesiyle birleşerek anlamsal yapıyı güçlendirmiştir. Metinde, konuşucunun boynuzun içinde ne olduğunu merak etmesi *ya* bağlacı vasıtasıyla sunulmuştur.

FULL TEXTS BOOK

17. Beğeni işlevi

Gani şansora artık büük çocuktu, edinci yaşa bastıydı, ama büüdükçä taa pek sorucu olurdu. Kimseycii raada brakmazdı, hep sorardı. Olur-olmaz işleri dä o istärdi bilsin… Ganinin evdä manisinä deyärdilär Sofi babu, mamusuna – Mercanka bulü, bobası da Çoban Yorcuydu. Ona ölä deyärdilär, neçinki çobancılık edärdi koyunnarda. Hem dä içerdä taa vardı Ganinin kardaşçıı Veli. Çoban Yorcu sevärdi çok Ganiyi da hiçbir kerä onu azarlamazdı, nekadar da çok işlär sorsa.

Tä büün dä çıktı bobasına karşı. O gelirdi tırladan eşektä atlı, ama eşään dä ardına gelirdi bir küçük eşecik. Ganinin üzü-gözü güldü. Taa bobası eşektän inmedään, şaplattı ellerini da sevinmeli sordu:

- Baka, neredän aldın bu küçük eşecii? **Ya** ne gözäl!

(Baboglu, 2006: 5)

Metinde, Gani adlı çocuğun sevinç ve coşku enlemindeki hissel betimi konu edilmiştir. Gani'nin isteğini gerçekleştiren sürpriz gelişme; onun eğlenmesini ve yapılan eylemden doyum almasını sağlamıştır. "*ya ne gözäl!*" cümlesiyle gün yüzüne çıkan beğeni işlevi, *ya* bağlayıcı dokusunun güçlü vurgusuyla sanatsal bir intiba bırakmıştır.

18. Azarlama işlevi

- Ne oldu, ba Gani batü, ne ölä o basından hiç ses çıkmêêr?

- Taa olmadı, ama olacek, alarsaydım daulcunun elindän te o üç kilalık tokmaa e!.. **Ya** kaldır o boş kafanı yukarı da bak o instrumentin içindä, neturlü käämil semiçkalar büüyer, birazı artık tabla kolvermiş.

(Filioglu, 2019: 65)

Metinde kırıcı ve sert bir üslupla dizayn edilen anlamsal reaksiyon, azarlama işlevinin *ya* bağlayıcı ögesiyle olan kararlı bileşimini yansıtmaktadır. Cümlede "*Ya kaldır o boş kafanı yukarı da bak…*" ifadesinde her ne kadar öfke ve kızgınlık imgesi sezilse de kırıcı ve sert söylemin varlığı azarlama işlevinin baskın olduğunu göstermektedir.

19. Seçenek sunma işlevi

Geldi sevda bana
Derin sıklet sardı
Kondu uz canıma
Raatlıcaamı aldı.
"**Ya** sev beni" – dedi,-
"**Ya** ver ömürünü!"
(Akt. Karanfil, 2015: 39)

Şiirsel tepkimede "*ya…ya*" bağlacı, karşı tarafa seçenek sunarken aynı zamanda bir zorunluluk işlevi de üstlenmiştir. Dinleyiciden, iki seçenekten birini seçmesini isteyen konuşucu, bu istemini "*Ya sev beni ya ver ömrünü*!" cümlesiyle dile getirmiştir. Bu bağlamdan hareketle, seçenek sunma eyleminin, *ya* bağlantı noktasında işlevsel bir boyut kazandığı tespit edilmiştir.

20. Açıklama işlevi

Hederlezin çiçää sürtmäz uzun zaman:
Ya gök altın gözü yakêr hem kör yapêr,
Ya aydınnı üzü saklêêr koyu boran,
Gök gürüldemesi tomruu tez koparêr.
(Bujilova, 2020: 150)

Şiirde, birinci mısranın sonunda açıklayıcı bir önermenin dizayn edileceğine dair gizil bir gönderme söz konusudur. "*ya…ya*" bağlacı, kendinden önce gelen dizeyle anlamsal bir köprü kurarak açıklayıcı perspektifin estetik sınırında sanatsal bir ivme kazanmıştır.

FULL TEXTS BOOK

SONUÇ

Çalışma deseninde, Gagauz edebi ikliminde betimlenen bağlayıcı birim "*ya*"nın semantik katmandaki yorumsal iz düşümüne vurgu yapılmıştır. Gagauz Türkçesinden akseden söz konusu işlevsel görüngü, gramatikal bir çağrışımla senkronize edilmiştir. Anlambilim meridyeninden geçen bağlayıcı unsurlar ise bütünsel bir perspektifle dizayn edilmiş, anlamlandırma işlemi bağlam ve koşullar ekseninde resmedilmiştir. Bağlama edatı "*ya*" nın cümleye yüklediği anlamsal ivmenin lirik ve estetik bir betim kazanması adına, işlev merkezli otantik imgeler ve birey odaklı birtakım ibareler aracılığıyla işlev alanına ulaşılmaya çalışılmıştır. Dolayısıyla polisemi ufkundan akseden anlamsal dizgenin, ekstrem bir tasarımla yeniden inşa edilmesine imkan sunulmuştur. Bağlayıcılık göreviyle öne çıkan bağımsız biçimbirimsel model "*ya*" nın sözcük ve sözcük öbeklerini, tümceleri birbirine kenetlediği; anlam şeridinden tek başına geçebildiği ve birtakım kalıp formlar ışığında estetiksel bir görünüm sergilediği belirmiştir. Ayrıca cümlede üstlendiği işlevsel donanım ve kalıp yapı oluşturduğu diğer ögeler, bu estetiksel motifin görev alanının tespitinde önemli rol oynamıştır.

Dilsel örgeleri yüzey yapıda biçimsel bir yaklaşımla birbirine bağlayan bağlaç edimi, aynı zamanda bazı anlamsal işlevler üstlenerek derin yapıda oluşturduğu bağlantı noktalarının varsıl bir anlam potansiyeline sahip olduğunu bildirmiştir. Tespit edilen veriler kapsamında "*ya*" bağlantı biriminden akseden işlevsel dizayn sırasıyla şu şekilde görünüm arz etmiştir:

Seslenme işlevi, hayıflanma işlevi, öfke-kızgınlık işlevi, emir işlevi, hatırlatma işlevi, istek işlevi, pekiştirme işlevi, dikkat çekme işlevi, tehdit etme işlevi, pişmanlık işlevi, uyarı-ikaz işlevi, korku-endişe işlevi, soru sorma işlevi, şaşkınlık işlevi, neden-sonuç işlevi, merak işlevi, beğeni işlevi, azarlama işlevi, seçenek sunma işlevi, açıklama işlevi.

Araştırma düzleminde, Gagauz edebi kuşağından yansıyan "*ya*" bağlayıcı formunun özgün bir tarzla resmedilerek edebi yörüngenin kinestetik bir yönelimle aktivize edildiği görülmüştür. Metin bağlamında kurgulanan "*ya*"nın anlam penceresini açabilmek gayesiyle semantik boyuttan ilham alınmıştır. Bu birleştirici örgenin konumlandığı sanatsal boyutta polisemik bir yankının etkin varlığına dair güçlü verilere ulaşılmıştır. Polisemik ivmeden kaynaklı anlam çeşitliliğini ve dilsel zenginliği keşfedebilmek adına işlev merkezli anlam evreni görünür kılınmıştır. Böylelikle Gagauz Türkçesine yönelik orijinal bir bağlantı biriminin varlığı ve bu birimin var oluş ritmini kanıtlar nitelikteki yazınsal önermelere dikkat çekilmiştir.

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FULL TEXTS BOOK

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GEBELİKTE KADIN RUH SAĞLIĞI VE BİLİNÇLİ FARKINDALIK

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ÖZET

Gebelik dönemi, doğum anı ve sonrası, ebeveyn olmak, kadının yaşam döngüsünde fiziksel ve psikososyal olarak birçok değişimin meydana geldiği önemli bir süreçtir (Teixeira ve Figueiredo, 2009). Bu süreçte annenin fiziksel görünümünde olduğu gibi hormonlarında da değişimler meydana gelmekte, tüm bunlar kadının strese karşı tepkilerini etkilemektedir. Gebelik kadın için annelik kimliği kazanma heyecanı, yeni bir bireyin dünyaya gelmesi, fiziksel görünümde değişikliklerin meydana gelmesi gibi mutluluk ve heyecan verici bir süreç olmakla birlikte aynı zamanda yönetilmesi gereken birçok psikososyal değişkeni de içinde barındırmaktadır. Bu dönemde stresin yönetilememesi fiziksel ve psikolojik olarak olumsuz sonuçların ortaya çıkmasına sebep olmaktadır. Kadın bu sürece adapte olmakta zorlandığında kendisini yetersiz hissedebilmektedir (Teixeira ve Figueiredo, 2009; Priya ve ark., 2018). Anne adayının gebelik döneminde yaşadığı ruhsal sorunların hem bebek hem de anne-bebek bağlanması üzerinde olumsuz etkilerinin olduğu; postpartum dönemde annenin kendisini savunmasız hissederek bakım verici rolüne zarar verdiği bilinmektedir (Özdamar ve ark., 2014). Diğer yandan bu sorunlara yönelik farmakolojik tedaviler yan etkileri dolasıyla gebelik döneminde endişe vermekte ve ilk etapta tercih edilmekten kaçınılmaktadır. Bu durumda gebelikte ruhsal iyilik halinin devamlılığının sağlanması, artması ve sorunlara yönelik çözüm üretilmesinde farklı profesyonel yaklaşımlara olan ilgi artmıştır. Bilinçli farkındalık temelli müdahaleler de bu nonfarmakolojik yöntemlerden biridir. Bilinçli farkındalık anda kalmayı ve yargısız kabulü hedefleyen, bedenin ve zihnin o anda olup bitenleri fark etmesini sağlayan, ortaya çıkan sonucu yargılamadan şefkatle kabulü içeren bir yaklaşımdır (Hisli ve Yeniçeri, 2015). Gebelik döneminde kadın ruh sağlığı ve anne-bebek sağlığının maksimum düzeyde tutulması için bilinçli farkındalık temelli müdahaleler çalışmalarla birlikte etkinliği kanıtlanmış olup günümüzde gün geçtikçe popülerliği artan bir yöntem olmuştur. Bilinçli farkındalık temelli müdahaleler, gebelerde fizyolojik ve psikolojik sorunların çözümünde kullanılmış olup pozitif yönde etkili sonuçlar alınmıştır. Bilinçli farkındalık temelli yaklaşımların, gebeliğe bağlı ortaya çıkan diyabette açlık ve tokluk kanında ölçülen glukoz düzeylerini ve hemoglobin A1c düzeylerini düşürdüğü ortaya konulmuştur (Youngwanichsetha ve Phumdoung, 2014). Gebelikte uyku kalitesini artırmıştır (Beddoe ve ark., 2010). Doğum ve doğum sonrasıyla ilgili özyeterlilik ve özgüven düzeyini artırmıştır (Pan ve ark., 2018). Algılanan stres düzeyini düşürerek kadınların yaşam kalitesinde artış sağlamıştır (Shahtaheri ve ark., 2016). Ayrıca bu müdahalelerin gebelerin anksiyete düzeyini düşürdüğü ve duygulanımdaki olumsuzluğu azalttığı belirlenmiştir (Vieten ve Astin, 2008). Bu araştırmada gebelikte kadın ruh sağlığının bilinçli farkındalık perspektifinden ele alınması ve ilgili literatür doğrultusunda etki mekanizmasının ortaya konulması amaçlanmıştır.

Anahtar Kelimeler: Gebelik, Kadın Ruh Sağlığı, Bilinçli Farkındalık, Anne, Bebek, Doğum, Stres

ABSTRACT

Pregnancy, the moment of birth and after, and becoming a parent are important processes in which many physical and psychosocial changes occur in a woman's life cycle (Teixeira and Figueiredo, 2009).

FULL TEXTS BOOK

During this process, changes occur in the mother's physical appearance as well as in her hormones, and all of these affect the woman's reactions to stress. Pregnancy is a happy and exciting process for a woman, such as the excitement of gaining a motherhood identity, the birth of a new individual, and changes in physical appearance, but it also includes many psychosocial variables that need to be managed. Failure to manage stress during this period leads to negative physical and psychological consequences. When a woman has difficulty adapting to this process, she may feel inadequate (Teixeira and Figueiredo, 2009; Priya et al., 2018). It is known that the psychological problems experienced by the expectant mother during pregnancy have negative effects on both the baby and the mother-baby bond; in the postpartum period, the mother feels vulnerable and harms her caregiving role. (Özdamar et al., 2014). On the other hand, pharmacological treatments for these problems cause anxiety during pregnancy due to their side effects and are avoided at first. In this case, interest in different professional approaches has increased in ensuring and increasing the continuity of psychological well-being during pregnancy and in producing solutions to problems. Conscious awareness-based interventions are one of these non-pharmacological methods. Conscious awareness is an approach that aims to stay in the moment and accept without judgment, allows the body and mind to notice what is happening at that moment, and includes compassionate acceptance of the resulting outcome without judgment (Hisli and Yeniçeri, 2015). Mindfulness-based interventions have been proven to be effective in studies to maximize women's mental health and mother-baby health during pregnancy and have become a method that is increasingly popular today. Mindfulness-based interventions have been used to solve physiological and psychological problems in pregnant women and have yielded positive results. Mindfulness-based approaches have been shown to reduce fasting and postprandial blood glucose levels and hemoglobin A1c levels in pregnancy-related diabetes (Youngwanichsetha and Phumdoung, 2014). It increased the quality of sleep during pregnancy (Beddoe et al., 2010). It increased the level of self-efficacy and self-confidence regarding birth and postpartum Pan et al., 2018). It provided an increase in the quality of life of women by reducing the level of perceived stress (Shahtaheri et al., 2016). It has also been determined that these interventions reduce the anxiety level of pregnant women and reduce emotional negativity (Vieten and Astin, 2008). In this study, it was aimed to address women's mental health during pregnancy from the perspective of mindfulness and to reveal the mechanism of action in line with the relevant literature.

Key Words: Pregnancy, Women's Mental Health, Conscious Awareness, Mother, Baby, Birth, Stress

GİRİŞ

Kadınlar yaşam döngüsünün ilk anlarından itibaren anne rahminden başlayan, çocukluk, ergenlik, yetişkinlik ve yaşlılığa kadar uzanan dönemlerden geçmektedir. Bu dönemlerde fizyolojik, sosyolojik ve psikolojik açıdan birçok değişim söz konusudur. Bu değişen faktörlere bakıldığında kadınları olumlu etkilediği kadar olumsuz da etkiledikleri görülmüştür. Kadınların yaşadıkları bu değişimler doğurganlık çağında en yüksek düzeye ulaşarak onları psikiyatrik hastalıklara yatkınlık açısından bir zemin hazırlamaktadır (Taşkın, 2011). Bu durumlar göz önünde bulundurulduğunda kadınların ruh sağlığı açısından erkeklerle kıyaslandıklarında daha riskli bir grup olduğu söylenebilmektedir (Schulz ve Mullings, 2006). Özellikle prenatal dönemde ruh sağlığı sorunlarının görülme sıklığı tüm dünyada artış göstermiştir ve gebelerin %10-20'sinin bu dönemde depresyon tanısı aldığı ve yaşadığı bilinmektedir (Madlala ve Kassier, 2017). Dünya Sağlık Örgütü'nün yayınlamış olduğu bir raporda gelişimde geri kalmış ve gelişmekte olan ülkelerin psikotik olmayan ruhsal hastalıkların oranına bakıldığında doğum öncesinde %15,6, doğum sonrasında %19,8 olduğu bildirilmiştir (Fisher ve ark., 2012). Ülkemizde yapılan bir çalışmada Beck Depresyon Envanteri (BDE) kullanılmış olup sonuçta gebelikte depresif belirtilerin görülme sıklığını; Şahin (2015) %53,1 orta düzey; %17,7 şiddetli düzey olarak; Erdem ve arkadaşlarının çalışmasında (2010) prenatal dönemde bu oran %31, postpartum dönemde ise %29 şeklinde belirlenmiştir (Erdem ve ark., 2010; Şahin, 2015). Kadınlarda gebelik dönemi fizyolojik,

FULL TEXTS BOOK

sosyolojik ve psikolojik değişimlerin eşlik ettiği önemli bir süreçtir. Bu süreçte hormonların değişimi, anneliğe hazır olma, fiziksel görünümde yaşanılan değişiklikler, doğum ve bebek bakımıyla ilgili kaygılar kadınlarda stresi tetikleyen durumlardır. Gebelik bu yüzden hassas bir dönem olabilmekte ve sürecin yönetilememesi kadınların ruh sağlığını olumsuz etkilemektedir (Lobel ve ark., 2008; Alderdice ve Lynn, 2011). Perinatal dönemde görülen ruhsal sorunlar ise gebelerde beslenmede düzensizlik, kilo kaybı, öz bakım yetersizliği, sigara/alkol kullanımı gibi riskli sağlık davranışlarının ortaya çıkmasına sebep olmakta, bu durum anne ve bebek sağlığını olumsuz etkileyebilmektedir. Gebelik döneminde yaşanan yoğun stres, gebelerde özellikle anksiyete ve depresyonun ortaya çıkma riskini artırmaya neden olmaktadır. Gebelikte yaşanan stresin yönetilememesi, doğum öncesi dönemde olumsuz etkilerin görülme ihtimalini artırmanın yanı sıra postpartum depresyon, anne/bebek bağlanmasını olumsuz etkileme, annelik rolüyle başa çıkmada yetersizlik hissi gibi olumsuz sonuçlar da ortaya çıkarmaktadır (Öztürk ve Aydın, 2017). Kadınlar bu süreçte yaşadıkları ruhsal sorunların ortaya çıkması halinde damgalanmaktan, yetersiz hissetmekten, ebeveynlik haklarının elinden alınacağından korkabilmekte ve yaşadıkları zorlanmaları dile getirmekten kaçınmaktadırlar. Bu nedenle gebelikte psikososyal destek uygulamaları oldukça önemlidir (Marjan ve Khajehei, 2015). Günümüzde, prenatal dönemde stres, anksiyete ve depresyonun tedavisinde farmakolojik uygulamaların gebelik sürecini ve bebeğin sağlığını olumsuz etkileyeceği düşünüldüğü için nonfarmakolojik alternatif müdahalelere başvurulmaktadır. Prenatal dönemde kadın ruh sağlığına destek olmak için kullanılan alternatif müdahalelerden biri de bilinçli farkındalık temelli girişimlerdir. Bilinçli farkındalık temelli uygulamaların gebelikte kadın ruh sağlığı üzerindeki etkilerine ilgi giderek artmaktadır (Matvienko-Sikar ve ark., 2016; Goetz ve ark., 2020). Bilinçli farkındalık temelli müdahaleler, gebelerin farkındalık düzeyini ve stres yönetim becerilerini geliştirmek amacıyla kadının düşünce ve duygularını fark etmesi, beden farkındalığı kazanması, kabul ve şefkat kapasitesinin artması, tepkiselliğin azalması üzerine yapılan çalışmalardan oluşmaktadır (Hall ve ark., 2016). Bu derlemenin amacı, gebelikte kadın ruh sağlığının nasıl etkilendiği ve günümüzde gittikçe yaygınlaşan, ilgi odağı haline gelmiş olan bilinçli farkındalık temelli müdahalelerin (mindfulness) gebelik ruh sağlığı üzerine etkilerini incelemektir.

1.Kadın Ruh Sağlığı Açısından Gebelik Dönemi

1.1.Gebelikte Stres

Gebelik, fiziksel değişimin ön planda olduğu bir süreç olarak görünmesinin yanında önemli psikolojik değişimlerin de yaşandığı bir dönemdir. Gebelerin bu dönemde birçok stres yaratacak durumla karşılaşma riski fazladır. Fiziksel görünümde, yakın çevre ve sosyal çevreyle olan ilişkilerde, rol ve sorumluluklarda değişimlerin görülmesi stres düzeyinin artmasına neden olmaktadır (Yali ve Lobel, 2002). Bayık ve ark.'nın (2006) yapmış olduğu bir çalışmada kadın yaşamındaki stresli olayların başında hamileliğin geldiği belirtilmiştir. Çapık ve ark.'nın (2015) yaptığı bir başka çalışmada da gebelik döneminde ciddi oranlarda distres yaşandığı belirtilmiştir. Yapılan bir araştırmada riskli gebeliklerde stres düzeyinin yüksek derecede olduğu ve strese neden olan faktörlere bakıldığında gebelikte yaşanan tehlikeli durumların olması, gebeliğin riskli olması, belirsizliklerin yaşanması, doğum ile ilgili kaygı ve korkuların olması bulunmuştur (Baran vd., 2020). Gebelikte bir başka stres kaynağı da doğum korkusudur ve gebenin duygu durumunu etkilemektedir (Aksoy, 2015). Prenatal dönemde kadınlarda stresi artırarak ruh sağlığını olumsuz etkileyen bazı etmenler vardır. Bunlar;

- Ailevi sorunlar,
- Eş ilgili sorunlar veya kadının eşinin olmaması,
- Önceden geçirilmiş psikiyatrik hastalıklar,
- Eğitim düzeyinin düşük olması,
- Annelik yaşının genç olması,
- Sosyo-ekonomik durumun yetersiz olması,
- Aile içinde şiddet,

FULL TEXTS BOOK

- Kronik hastalıkların varlığı,
- Beden imajında değişim,
- Gebeliğin istem dışı olması olarak sıralanabilir (Harrison ve Sidebottom, 2008; Vırıt ve ark., 2008; Karaçam ve Ançel, 2009; Şahin ve Kılıçarslan, 2010; Rosand ve ark., 2011; Çapık ve ark., 2015). Gebelikte yaşanan stres annenin ruh sağlığını etkilediği gibi bebeğin anne karnındaki gelişimini ve gelecekteki yaşamını da etkilemektedir (Dunkel Schetter ve Tanner, 2012). Gebelik, doğum ve ebeveynlik dönemlerinde annenin yaşadığı stresin azaltılmasını sağlamak, kadının stresle karşılaştığı durumlarda baş etme mekanizmasını geliştirmek, annenin beden ve ruh sağlığı ile bebeğin anne karnındaki ve gelecekteki ruh sağlığı açısından oldukça önemlidir (Boakye-Yiadom ve ark. 2015). Prenatal dönemde yaşanan stresin anne/bebek sağlığını iki farklı boyutta etkileyebileceği belirlenmiştir. Bunlardan ilki gebelik döneminde algılanan stresin artmasıyla birlikte kortizol hormonlarının yükselmesi vücut üzerindeki doğrudan etkisidir. İkincisi ise; gebelikte stresi yönetemeyen annelerde sağlıksız davranışların (alkol/madde kullanımı, sigara içme, kontrolleri aksatma vb.) görülmesi sonucunda anne/bebek sağlığını dolaylı olarak etkilemesidir. Gebelikte başa çıkılamayan stresin spontan abortus, erken doğum, preeklampsi ve düşük doğum ağırlığı gibi sonuçlara neden olduğu bilinmektedir (Bussieres ve ark. 2015; Shay ve ark. 2020). Ayrıca gebelikte yaşanan yoğun stres postpartum süreçte anne-bebek bağlanmasına olumsuz etki göstermektedir (Srivastava ve Bhatnagar, 2020). Yapılan çalışmalara bakıldığında prenatal dönemde stres yaşayan kadınların, mide bulantısı ve kusma gibi fiziksel şikayetlerinde, hastaneye başvurma sayısında, doğum korkusunda ve sezaryen doğum yapma isteğinde artış gibi davranışların olduğu bildirilmiştir (Andersson vd., 2004; Shishehgar vd., 2014). Gebelerin stres düzeyindeki artış, annelik ve beden algılarını olumsuz yönde etkilemektedir (Coşkun vd., 2020). Stresin bebeğe etkileri, erken doğum, bebek kalp hızında değişiklikler, bebeğin aktivitesinde değişiklikler, APGAR Skorunda düşüklük, düşük doğum ağırlıklı bebek, gelişim geriliği, enfeksiyonlar, ölü doğum olarak bildirilmiştir (Baibazarova ve ark., 2013; Graignic-Philippe ve ark., 2014; Staneva ve ark., 2015; Bussières ve ark., 2015).

1.2.Gebelikte Anksiyete

Doğurganlık dönemindeki kadının önemli fizyolojik ve psikolojik değişimler yaşaması, gebelik ve doğum sürecinde anksiyeteye yol açmaktadır. Yapılan çalışmalar gebelikte anksiyete düzeyinin yüksek derecede olduğunu ve en çok üçüncü trimesterda anksiyeteyle karşılaşıldığı bildirilmektedir (Karataylı, 2007, Figuerido ve Conde, 2011). Yaşanılan anksiyete nedenine bakıldığında annenin kendisinden çok bebeğe odaklanmasıyla ilişkilendirilmiştir (Özkan ve Bozkurt, 1999). Gebelerde, anomalili bebeğe sahip olmak, doğum şekli ve doğumun nasıl olacağını bilmemek, bebeğin sağlık durumu ve doğumda karşılaşılabilecek risklerin bebeği olumsuz etkileme ihtimali anksiyeteye yol açmaktadır (Şahin ve Kılıçarslan, 2010; Dönmez ve ark., 2014). Prenatal dönemde anksiyetenin görülme prevalansı %4-39'dur (Goodman ve ark., 2014; Marchesi ve ark., 2014). Gebelikte anksiyete ile ilişkili faktörlere bakıldığında geçmişte psikiyatrik hastalık öyküsü, eşler arasındaki iletişimin zayıf olması, daha önce yaşanmış fetal kayıp ve doğum deneyiminin zor olması yer almaktadır (Giakoumaki ve ark., 2009). Yapılan çalışmalarda anksiyete tedavi edilmezse, postpartum depresyon riskinin arttığı ve annenin özgüveninin olumsuz etkilendiği bildirilmiştir (Prenoveau ve ark., 2013; Zietlow ve ark., 2014). Bu da ilerleyen dönemlerde, anne-bebek arasında güvensiz bağlanma, davranış sorunları, anne-bebek iletişiminde olumsuzluk sonuçlarıyla ilişkilendirilmiştir (Glasheen ve ark., 2010). Prenatal anskiyeteyi etkileyen diğer faktörlere bakıldığında annenin sağlıksız yaşam tarzı ve davranış tutumu (sigara içme, aşırı kilo alımı vb.) kortizol ve epinefrin salınımının yüksek olması da anksiyeteye neden olmaktadır (Calavarini ve ark., 2010). Gebelikte fiziksel veya psikolojik şiddet, sosyal desteğin yetersiz olması, çevre ile ilişkilerin olumsuz olması, yakın geçmişte stresli bir olay yaşanmış olması yine anksiyeteye neden olan faktörler arasındadır (Karacam ve Ancel, 2009; Yelland ve ark., 2010; Giardinelli ve ark., 2012). Perinatal süreçte en sık görülen anksiyete bozuklukları; panik bozukluk ve yaygın anksiyete

FULL TEXTS BOOK

bozukluğudur. Gebelerde uykusuzluk, yoğun endişe, huzursuzluk hissi tarifi görülebilir. Ataklar sırasında, nefes almada güçlük, göğüste sıkışma hissi, ağlama, bulantı-kusma gibi belirtiler görülebilmektedir (Williams, 2014). Yapılmış bazı çalışmalarda prenatal dönemde, anksiyete ve depresyon belirtilerinin arasında paralel yönde ilişkilerin olduğu belirtilmiş olup gebelikte anksiyete düzeyinin artması depresif semptomların görülmesine neden olurken depresyon var olması da gebelerin anksiyete düzeyinin artmasına sebep olmaktadır (Şahin ve Kılıçaslan, 2010; Çelik ve ark., 2013).

1.3.Gebelikte Depresyon

Gebelikte depresyonun varlığı ve postpartum dönemde de devam etme ihtimali anne/bebek sağlığını olumsuz etkiler bu sebeple önemli bir sorun olup erken tanı ve tedavinin rehabilitasyon başarı oranını artırdığı savunulmaktadır (Marakoğlu ve Şahsuvar, 2008: Bunevicius ve ark., 2009; Çalık ve Aktaş, 2011; Savrun, 2008). Depresyonun risk faktörlerine bakıldığında; eşler arası iletişimin olumsuz olması, aile içi şiddetin olması, sosyo-ekonomik düzeyin düşük olması, gebelik bakımının yetersiz olması, eğitim seviyesinin düşük olması, gebelik yaşının erken veya geç olması, daha önceki gebelik ve doğumların sorunlu olması, daha önce tanı konulmuş bir psikiyatrik hastalığın bulunması ve emzirme süreci olarak sıralanmaktadır (Yazıcı ve ark., 2015). Yapılan çalışmalarda daha önce depresyon tanısı almış olmak, gebelik dönemi ve postpartum dönemde annenin tekrar depresyon geçirme ihtimali için önemli bir etkendir (Yazıcı ve ark., 2015; Gentile, 2017). Ülkemizde yapılmış bir çalışmada, gebelik döneminin ilk trimesterında depresyon geçirmiş olan kadınların postpartum dönem depresyon oranı %61,5 bulunmuştur. Çalışmanın sonucuna göre, gebelikte depresyon tanısı konulmuş ve tedavisi yapılmış hastaların hiçbirinde gebelik sonrası dönemde depresyon görülmemiş, gebelik döneminde tedavisi yapılmayanlarda ise postpartum dönemde depresyon görülme oranı %92 olarak bildirilmiştir (Yazıcı ve ark., 2015). Gebelikte depresyonun gidişatı yalnızca anne adayını değil, bebeğini ve ailesini de ilgilendirmektedir. Gebelikte geçirilen depresyonda tedavi alamayan gebelerin %15'inin intihar etmeye kalkıştığı belirtilmiştir (Çalık ve Aktaş, 2011). Gebelik döneminde depresyon tanısı almanın erken doğum riskini artırdığı bilinmektedir. Ayrıca yeni doğanın yoğun bakım ihtiyacında artma, kuvözde uzun süre kalma gibi risklere yol açtığı gösterilmiştir (Gentile, 2017). Yapılan bir çalışmada, ileri yaş gebelerin prenatal depresyon yaşama riskinin genç gebelere göre daha fazla olduğu ve uyku kalitesinin yetersiz olması prenatal depresyonun daha yüksek düzeyde olmasına neden olabileceği belirtilmiştir (Gao ve ark., 2019). Gebelik depresyonunun anne-bebek bağlanmasına etkisinin değerlendirildiği bir çalışmada ise depresyon düzeyinin artmasıyla bağlanmanın azalmasının arasında doğru orantılı ilişki olduğu belirtilmiştir (Tunçel ve Süt, 2019). Anne/bebek arasındaki ilişki ve bağlanmanın şekli sadece bebeklik dönemini değil, çocuğun hayatının geri kalanını da etkileyen ciddi bir faktördür. Prenatal dönem depresyonuna yönelik girişimler arasında ilaçların yan etkileri göz önünde bulundurularak, şiddetli olmayan depresyon tablolarında psikoeğitim ve psikoterapi gibi seçenekler gebelere sunulmaktadır. Ancak ağır depresyon tablolarında, annenin kendisine zarar verme olasılığı göz önünde bulundurularak, farmakolojik tedavi seçeneği devreye girmektedir (Savrun, 2008).

1.4.Gebelik Döneminde Karşılaşılan Stres, Anksiyete ve Depresyonla Başa Çıkma Yolları

Gebelik döneminin iyi bir şekilde devam edebilmesi için anne adayının yaşadığı sorunlarla baş etme gücünün bulunması gerekmektedir. Karşılaşılan sorunlarla etkin bir şekilde baş edebilmek için, bireyin durumunun bilinçlilik halinde olması, daha önce kullandığı stresle baş etme mekanizmaları, aile bireyleri-sosyal çevre desteğinin var olması ve niteliği önemlidir. Gebenin ruh sağlığı ve kendine has özellikleri, gebelikteki duygu ve düşünceleri, gebelikten beklentileri ile ilişkilidir. Gebelikte stresle baş edebilmek içim olumlu bir tutumun olması, gebenin ruh sağlığının korunması, yaşam kalitesinin artırılması, problem çözme becerilerinin geliştirilmesi, aile ve sosyal desteğin olması gerekmektedir (Vırıt ve ark., 2008; Babacan Gümüş ve ark., 2011). Gebelikte ruh sağlığının korunması için gebenin kendiyle ilgili pozitif düşünceleri olmalı, beslenme yeterli ve düzenli olmalı, uyku kalitesi yüksek

FULL TEXTS BOOK

olmalı, alkol/sigara/madde gibi zararlı alışkanlıklardan uzak durmalı, gebeliği riske atmayacak şekilde egzersiz yapmalı ve rutin kontrollerini aksatmamalıdır. Ayrıca gebeler stresin olumsuz etkileriyle baş edebilmek için bazı gevşeme tekniklerine yönlendirilebilirler (Sözeri ve ark., 2006; Baltaş ve Baltaş, 2014). Prenatal dönemde stres azaltmada kullanılan rahatlama ve gevşeme tekniklerinden birkaçı; gebelik yogası, masaj, kas gevşetme egzersizleri, hipnoterapi ve diyafram solunumudur (Bastani ve ark., 2005; Tragea ve ark., 2014). Gebelerin stresle başa çıkma yollarını belirlemek bu mücadelede ciddi adımlardan biridir çünkü kadınların bu dönemde stresle baş etme mekanizmalarının yeterli olmaması anne-bebek sağlığı olumsuz etkileyebilmektedir. Bu süreçte, gebenin baş etme mekanizmasında kullandığı yöntemlerin tanımlanması, yeni ve güncel baş etme stratejilerinin öğretilmesi ve etkisiz baş etme olan durumlarda bu becerilerinin geliştirilmesi oldukça önemlidir (Huizink ve ark., 2002; Dağlar ve Nur, 2014).

2.Gebelikte Bilinçli Farkındalık

2.1.Bilinçli Farkındalık Kavramı

Bilinçli farkındalık kavramı bireyin hissettiklerini, düşünce ve duygularını, bedenini, bilincini ve çevresini olduğu gibi kabul edip, yargılamadığı bir süreçtir (Hoffman,2018; Purser,2015). Bilinçli farkındalık, konsantrasyonun yüksek olmasıyla birlikte, içinde bulunduğu anın farkındalığını sürdürmeyi hem dış hem içsel, hoşa giden ve hoşa gitmeyen durumları izlemeyi açık, sevgi dolu bir şekilde algılamaktır (Huynh, 2019). Farkındalığın kökleri çok eskilere Uzakdoğuda Budist meditasyon geleneklerine dayanmaktadır. Farkındalık, zihinsel ve duygusal bir dikkatin fiziksel uygulama ile bireye kasıtlı olarak verilmesi, odaklanılması, anlık deneyimler ve gözlemler üzerine içsel deneyimler yaşatılması ile oluşturulur (Purser ve Milio, 2015; Schmidt, 2011; Atalay, 2018). Farkındalık temelli müdahalelerin amacı bireyi "otomatik pilottan" çıkararak, günlük rutinlerin farkına vararak ve anda kalarak devam etmeyi sağlamaktır (Baer ve ark., 2004). Birey, hayatın zorlu anlarında dikkat odaklı olma becerisini güçlü tuttuğu sürece içinde bulunduğu durumla o kadar kolay baş edebilecektir. Bilinçli farkındalığın artmasıyla bireyin sevgi, şefkat, kabul ve affetme duyguları beslenir ve bu şekilde birey duygu durumlarının olumsuzluğundan daha az şekilde etkilenir. Bilinçli farkındalık durumunda birey sakin, şefkatli, huzurlu, mutlu, hazır ve uyanıktır (Özyeşil, 2011). Bilinçli farkındalıkta üç önemli nokta vardır. Bunlar; dikkat, niyet ve tutum olarak sıralanmaktadır (Atalay, 2019). Bilinçli farkındalık tutumları da şu şekildedir; anda kalabilme, şefkat, yargıları fark etmek, kabul, başlangıç ruhu, sabır ve akışa bırakmak (Atalay, 2019). Bilinçli farkındalık temelli müdahalelerin bireylerin psikolojik iyi oluş hallerini artırmanın yanında fizyolojik olarak da tansiyon ve kan glukoz düzeyini düzenlediği, nabzı yavaşlattığı, yorgunluğu giderdiği ve fiziksel aktivite düzeylerini iyileştirdiği kanıtlanmıştır (Bishop, 2004; Hoffman, 2018; Shorey, 2019). Kadın ruh sağlığında da bilinçli farkındalık temelli müdahalelerin stres ve anksiyete düzeyini azaltarak iyi oluşu pozitif şekilde etkilediği, aynı zamanda fizyolojik sağlığı da iyileştirdiği kanıtlanmıştır.

2.2.Gebelikte Bilinçli Farkındalık Temelli Müdahaleler

Günümüzde, gebelik döneminde stres, anksiyete ve depresyonun tedavisinde kullanılan farmakolojik yöntemlerin gebelik ve gebelik sonrası dönemde anne-bebek sağlığını olumsuz etkilemesinden şüphe duyulduğu için medikal tedavi içermeyen müdahalelerin önemi giderek artmaktadır (Asford, 2016). Gebelik, annenin iyi oluşu, kendisi için pozitif tutum geliştirmesi ve farkındalığını arttırması için önemli bir süreçtir (Donegan, 2015). Bilinçli farkındalık kapsamındaki uygulamalar gebeliğe uyarlanarak, gebelik dönemindeki stresi azaltmak, doğum korkusunu aşabilmek, anksiyete ve depresyonun belirtilerini en aza indirgemek ve ebeveynlik duygusunu şefkatle kabul etmek hedeflenmektedir (Duncan ve Bardacke, 2010; Bardacke, 2012). Bilinçli farkındalık temelli müdahalelerin ana tekniklerinde meditasyon, beden taraması, yürüme meditasyonu, nefes meditasyonu ve farkındalık yogası yer almaktadır (Kabat-Zinn, 2003). Bilinçli farkındalık uygulamaları iki başlık altında

FULL TEXTS BOOK

toplanmıştır. Bunlar; formal ve informal uygulamalardır. Formal uygulamalarda daha çok meditasyon ağırlıklı beden taraması, hareket ederken farkında olma hali, oturma meditasyonu ve nefes meditasyonu yapılmaktadır. İnformal uygulamalarda daha çok bireyin günlük yaşam aktivitelerini (duş alma, yemek yeme, yürüme, okuma vb.) farkındalıkla yaparak günlük yaşamına dahil etmesi hedeflenmektedir (Cigolla ve Brown, 2011). Bilinçli farkındalık eğitimine katılmış olan gebelerin uygulama sürecince farkındalık seviyelerinde belirgin bir artma olduğu belirtilmektedir. Bilinçli farkındalık uygulamalarının, gebelerde değişim gözlemlenen fizyolojik ve psikolojik durumları onları değiştirmeden olduğu gibi kabul etmeyi ve gözlemleme kapasitesinin geliştiği bildirilmiştir (Beattie ve ark., 2014). Gebelerde bilinçli farkındalık temelli uygulamalar, onları rahatsız eden stres durumları ve tekrarlayan olumsuz düşünceleri zihninde fark edip nefese odaklanmayı bu şekilde nefes farkındalığı geliştirmeyi sağlar. Yine bu uygulamalardan biri olan beden taraması gebenin vücudundaki fiziksel duyumların farkına varmasını, ana bağlı kalmasını sağlayarak dikkatini fetüse, onun bedendeki varlığına ve hareketlerine odaklar. Bilinçli farkındalık, odağı öz şefkat olan, anne-bebek bağlanmasını olumlu etkileyen, doğum ve doğum sonrasında görülen zorluklara eşlik edebilmeyi içeren uygulamaları barındırır (Bardacke, 2012). Hulsboch ve ark.'nın prenatal dönemde algılanan stres düzeyini azaltmaya yönelik bilgisayar ortamı üzerinden online olarak yaptığı bilinçli farkındalık temelli müdahale programında prenatal stres düzeyini ve anksiyeteyi azalttığını belirtmişlerdir. Pan ve ark.'nın doğumda annenin öz-yeterliliğini artırmak için algılanan stres ve depresyon düzeyinin azaltılmasına yönelik farkındalık temelli doğum, doğum sonrası ve ebeveynlik programının etkinliğini kanıtlamak amacıyla yaptıkları çalışmada; gebelerin stres ve depresyon düzeylerinde azalma olduğu, farkındalık ve doğumda öz yeterlilik düzeylerinin artmış olduğu bulunmuştur. Bu sebeple, prenatal dönemde uygulanan bilinçli farkındalık temelli müdahale programlarının, gebelik dönemi ve sonrasında kadın ruh sağlığını iyileştirmek için etkisi oldukça önemli olan bir yaklaşım seçeneği olabileceği öne sürülmüştür. Bilinçli farkındalık temelli uygulamalar, gebeler ve henüz anne olmuş kadınlar için önemli olan kabiliyetlerin geliştirilmesinede imkan tanımaktadır (Hall ve ark., 2016).

3.SONUÇ

Gebelik dönemi ruh sağlığı birey, aile ve toplum açısından oldukça önemlidir. Annenin prenatal dönemde ruh sağlığının iyi oluşu gebelik dönemi, anne-bebek ilişkisinin sağlıklı olması, eş ve çevre ile ilişkilerin iyi olması, postpartum döneme iyi bir başlangıç yapması, gelecekte sağlıklı bireylerin topluma kazandırılması, fizyolojik ve psikolojik değişimlerin değiştirilmeden kabulü noktalarında kolaylık sağlamaktadır. Bu dönemde aile bireylerinden sağlık personellerine kadar herkesin gebe ile ilgili sosyal desteği vermesi ve gebelik sürecini gözlemlemesi gerekmektedir. Bilinçli farkındalık çalışmalarının gün geçtikçe önemi artarken yararları da kanıtlanmaktadır. Temelinde bilinçli farkındalık barındıran müdahalelerin yaşamın stres kaynaklarıyla başa çıkabilme de etkin bir yöntem olduğu yapılan çalışmalarla kanıtlanmış olup elde edilen bu çalışmalar doğrultusunda gebelikte de yaygın kullanımının gebelikte kadın ruh sağlığını olumlu yönde etkileyeceği söylenebilir. Bu amaçla gebelerin daha yakın takibe alınması, hastanelerde, gebe okullarında, psikiyatri kliniklerinde bilinçli farkındalık temelli müdahalelerin uygulanabilirliği konusunda eğitimlere yer verilmesi oldukça önemlidir.

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FULL TEXTS BOOK

THE IMPACT OF SELF-EFFICACY ON NORTH-EAST INDIA STUDENT'S ACADEMIC PERFORMANCE

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ABSTRACT
For the last several years, study on student's academic self-efficacy and performance has been a growing field. The primary goal of this study was to determine the effects of Self-efficacy on student's academic performance in Northeast, India among young adults of 18 to 27 years. The research objectives for the study were: To find out the effects of self-efficacy on student academic performance of university students in Northeast, India. To find out whether there is any significant difference in self-efficacy and academic performance of university students in Northeast, India. To find out whether there is any significant difference in self-efficacy and academic performance of university students in Northeast, India with respect to gender (Male, Female). Purposive sampling technique was used in the study to select a sample size. The sample size consists of 200 participants. Both male and female participants were included. Academic Performance Scale and General Self-Efficacy Scale (GSE) scales were used for collecting data in this study. The data after collection was processed and analysed in accordance with the purpose and objectives of this study. Data was entered into access database before being exported to Statistical Package for Social Science (SPSS) version 16.0 for analyses for quantitative data by using Pearson Correlation and t test. To test the hypothesis, t test was used. Findings stated that there is no significant difference on the self-efficacy and academic performance for male and female. Therefore, the hypothesis that there will be a significant difference between self-efficacy and academic performance with respect to gender was not supported. Results found that there is a moderately positive and significant correlation between academic performance and self-efficacy thus, the hypothesis that there was a significant difference between self-efficacy and academic performance was supported.
Keywords- self-efficacy, Academic Performance, Students

1. INTRODUCTION

1.1 INTRODUCTION

The term "self-efficacy" relates to a person's confidence in his or her capacity to execute behaviors necessary to produce specific performance attainments (Bandura, 1977, 1986, 1997). The belief in one's capacity to exercise control over one's own motivation, behaviour, and the social environment is known as self-efficacy.

Self-efficacy has a big effect on how much work people put in a job. When faced with obstacles, an individual who feels they are highly effective at a particular task will be resilient and persistent, whereas a person with insufficient confidence in one's own ability may withdraw or avoid the circumstance. It's significant that our degree of self-efficacy differs between domains. Several major sources of information serving as the basis for self-efficacy:

- Personal experience: People frequently use their prior performance on similar tasks when predicting their likelihood of success with a new assignment. It makes natural that this knowledge would

FULL TEXTS BOOK

significantly affect our emotions of self-efficacy: if you've done something before, chances are good that you'll think You're capable of doing it again.

➢ Observation: We assess our own abilities by observing others as well. Research demonstrates that when we witness someone else succeeding at a specific activity via labour rather than natural ability, our own self-efficacy for that activity is more inclined to rise as well.

➢ Persuasion: Other individuals may attempt to boost our self-efficacy from time to time by providing encouragement and support. As opposed to the effects of personal experience, this sort of persuasion does not always have a large impact on self-efficacy.

➢ Emotion: According to Bandura, negative sensations like fear and worry might make us feel less self-sufficient. Positive sensations, nonetheless, could heighten feelings of Self-efficacy.

Almost everyone is able to list their desired outcomes, changes they wish to see, and goals they want to achieve. Almost everyone is also conscious of carrying out these ideas is not really that easy. Self-efficacy has been linked to someone's approach to Goals, objectives, and challenges, as stated by Bandura and others.

Individuals with high levels of self-efficacy

- Interested about the events they engage in
- Develop a stronger sense of commitment to their pursuits and hobbies
- Quickly recover from setbacks and disappointments
- Consider difficult issues as tasks to be accomplished

Those with low self-efficacy:

- Avoid difficult tasks.
- Conceive difficult activities and circumstances are past their abilities
- Accentuate one's own transgressions and unfortunate results
- Rapidly lose confidence in one's own talents

Academic performance measures how successfully a student, instructor, or institution has met their immediate or long-term learning objectives. Academic researcher from several fields have been interested by the variables that affect student success. They have made an effort to recognise the elements that have both good and with adverse outcomes on student performance. Academics from a number of disciplines and locations have done investigations into this issue
(Garkaza et al. 2011, Tailab 2013, Sugahara and Boland 2014, Steenkamp and Baard 2009, Cheung and Kan 2002, Kruck and Lending 2003). According to Narad and Abdullah (2016), is the knowledge acquired that is evaluated by a teacher through marks and/or educational goals set by students and teachers to be attained during a specified a time frame. They declared that these the goals are measured through ongoing evaluations or test outcomes.

Background of the study:

Academic self-efficacy is grounded in self-efficacy theory (Bandura, 1977). According to self- efficacy theory, self-efficacy is an "individual's confidence in their ability to organize and execute a given course of action to solve a problem or accomplish a task" (Eccles & Wigfield, 2002, p. 110). According to self-efficacy theory, academic self-efficacy may vary in strength depending on the complexity of the activity; Some individuals may think they are most effective on challenging tasks, while others exclusively on simpler ones. Consequently, rather than being seen as a stable attribute, self-efficacy is thought to have a situational basis (Linnenbrink & Pintrich, 2002a). Students consistently distinguish the intensity of self-efficacy judgements in various academic fields, resulting a flexible hierarchy with multiple dimensions as a whole. Contrary to popular belief, Self-efficacy is distinct from self-esteem or self-concept. Self-efficacy is a task-specific assessment, whereas self-esteem and self-concept are indicators of more all-encompassing affective assessments of oneself (Linnenbrink & Pintrich, 2002a).

FULL TEXTS BOOK

Self-efficacy is thought to possess a causal impact on performance through its influence on task perceptions. Research indicates that an individual with strong self-efficacy approaches difficult tasks with a sense of calm or serenity, whereas someone lacking self-efficacy may perceive a task as more difficult it is actually, which can result in anxiety, stress, and a limited understanding of how to approach a problem or activity (Eccles, 2005). Furthermore, it is thought that how a person interprets a successfully completed mastery experience plays a role in how high their self-efficacy develops since people utilise these interpretations to form perceptions that they subsequently behave in accordance with. Additionally, studies show that seeing others accomplish tasks in an online capacity might help people develop a greater sense of self-efficacy, particularly when individuals are uncertain regarding their abilities or specific tasks and they perceive similar attributes with the observed model.

Academic expectation beliefs have been split in two broad kinds. Expectations for academic results are the notions held by a student that particular actions would result in particular results (for example, "If I finish my homework, my grades will improve"). Expectations for academic effectiveness are a student's convictions regarding their ability to engage in the actions required to bring about a particular result (for example, "I have enough drive to study hard for this test"). Since "individuals can accept that a given behaviour would generate a specific result (outcome anticipation), yet may not believe they can accomplish that behaviour (efficacy expectation)," It is essential to comprehend the distinguishing features of these two kinds of expectancy beliefs (Eccles & Wigfield, 2002, p. 111).

1.2 Research Question:

1. Is there significant difference in self-efficacy and student's academic performance?
2. Is there significant difference in self-efficacy and student's academic performance in relation to gender?

1.3 Hypothesis:

- There will be significant difference between self-efficacy and student's academic performance.
- There will be significant difference between self-efficacy and student's academic performance in relation to gender (Male, Female)

1.4 Objective of the study

- To determine the effects of self-efficacy on student academic performance of university students in Northeast, India.
- To compare whether there is any significant difference in self-efficacy and academic performance of university students in Northeast, India.
- To find whether there is any significant difference in self-efficacy and academic performance of university students in Northeast, India in relation to gender (Male, Female).

2. METHODOLOGY

2.1 DEBRIEFING ABOUT METHODOLOGY

This chapter defines about the methods used to collect and analyse the data for the study. Specifically, this chapter discusses the following: methods; operational definitions; research design; process of data collection; limitations of the research.

2.2 METHOD

A quantitative a technique was employed for this research study. This study uses survey method.

2.3 OPERATIONAL DEFINITION

Self-efficacy: "Self-efficacy means characteristics of an individual's belief in her or his capacity to execute behaviours necessary to produce specific performance attainments" (Bandura, 1977,1986, 1997).

FULL TEXTS BOOK

Academic Performance: "Academic Performance is the acquired information that is evaluated by a teacher using grades and/or educational objectives set by students and teachers to be accomplished over a predetermined period of time. The addition that These objectives are assessed through ongoing evaluation or test outcomes."(Narad et.al., 2016).

Student: a person who is formally learning, particularly one who is enrolled in school or college.

2.4 RESEARCH DESIGN

Quantitative research design was used to study how self-efficacy effect student academic performance in Northeast, India. 200 participants/respondents were randomly selected out of which 100 were male and 100 were female with an age range from 18 to 27. This study employed a Purposive sampling strategy.

Inclusion Criteria:

- Any student in Northeast, India
- Any academic field or major
- Students including male, female and others

Exclusion Criteria:

- Students studying outside Northeast, India

2.5 PROCESS OF DATA COLLECTION

The tools that were utilised for data collection were Academic Performance Scale and General Self-Efficacy Scale (GSE).

1. Academic Performance Scale: The scale was given by Carson, Emily, Sarah, Christopher which consists of 8 questions. The Academic Performance Scale is a Likert scale that assesses student's academic performance. To score the scale, "Strongly Agree" is scored (5); "Agree" is scored (4); "Neutral" is scored (3); "Disagree" is scored (2); and "Strongly Disagree" is scored (1). The scores range from 33 – 40 (Excellent Performance), 25 – 32 (Good Performance), 17 – 24 (Moderate Performance), 9 – 16 (Poor Performance), 0 – 8 (Failing Performance).

2. General Self-Efficacy Scale (GSE): The scale was given by Schwarzer, R., & Jerusalem, M. (1995) which consists of 10 questions. The overall score is calculated by finding the sum of the all items. For the GSE, a higher score denotes greater selfefficacy; the total score ranges from 10 to 40.

Reliability and Validity: Internal reliability for GSE = Cronbach's alphas ranging from .76 to .90. Emotion, optimism, and job satisfaction are all connected with the general self-efficacy scale. For worry, stress, concerns about one's health, burnout, and stress, negative coefficients were discovered.

Statistical Technique Used:

SPSS, or Statistical Packages for the Social Sciences version 16.0 will be use to analyse the collected quantitative data. Pearson's Correlation and t-test will be use to analyse the data.

2.6 Limitation of the study

- Making advantage of self-report questionnaires makes the likelihood of response bias more likely.
- Because of the small number of participants, results cannot be generalised.

3. FINDING & ANALYSIS

3.1 Data Interpretation

The responses of the participants were analysed using t-test to see the significance in Academic Performance and Self-efficacy among the sample of male and female students. Mean, standard deviation and descriptive data is presented in Table 1, Table 2 shows the Co-Relation Matrix, Table 3 shows the Independent Sample T-test, Table 4 represent the Scatter plot correlation, Figure 1 shows

FULL TEXTS BOOK

the distribution of gender, Figure 2 shows the distribution age group and Figure 3 shows the distribution of state wise.

Table3.1: Mean, Standard Deviation of all variables, N=200

	Gender	Academic Performance	Self-efficacy
N	Female	100	100
	Male	100	100
Mean	Female	29.1700	29.1500
	Male	28.9900	29.6200
Standard Deviation	Female	4.87313	4.00599
	Male	4.63856	4.81114

Table 3.2: Correlation of all Variables

Correlation	.368''
P-value	0.01

Table 3.2.1: Scatterplot Correlation between Academic Performance and Self-efficacy

FULL TEXTS BOOK

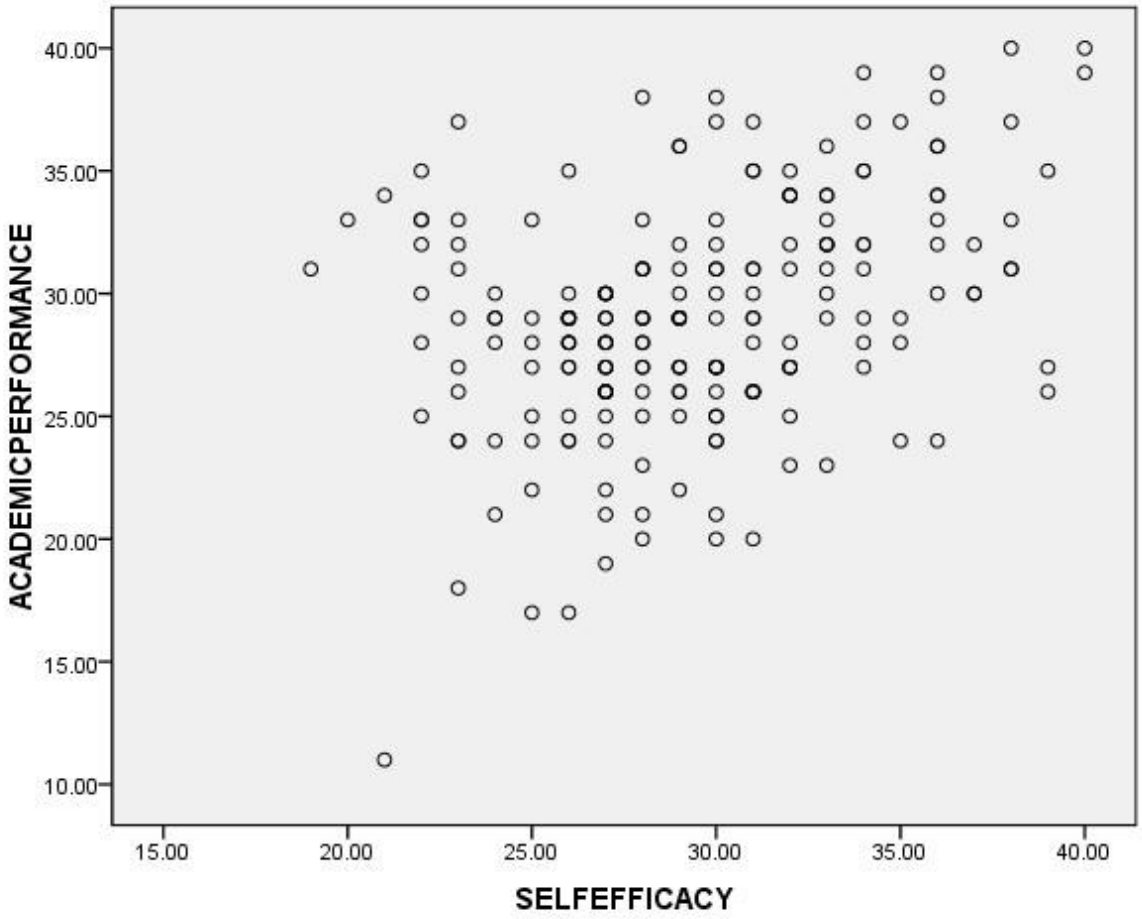


Table 3.3: T-test for male and female students

	Group	N	Mean	SD	"t" Value	DF	Significant Level
Academic Performance	Female	100	29.1700	4.87313	- .268	198	.789
	Male	100	28.9900	4.63856			
Self-efficacy	Female	100	29.1500	4.00599	.751	198	.454
	Male	100	29.6200	4.81114			

FULL TEXTS BOOK

Figure 3.1: Distribution of Gender

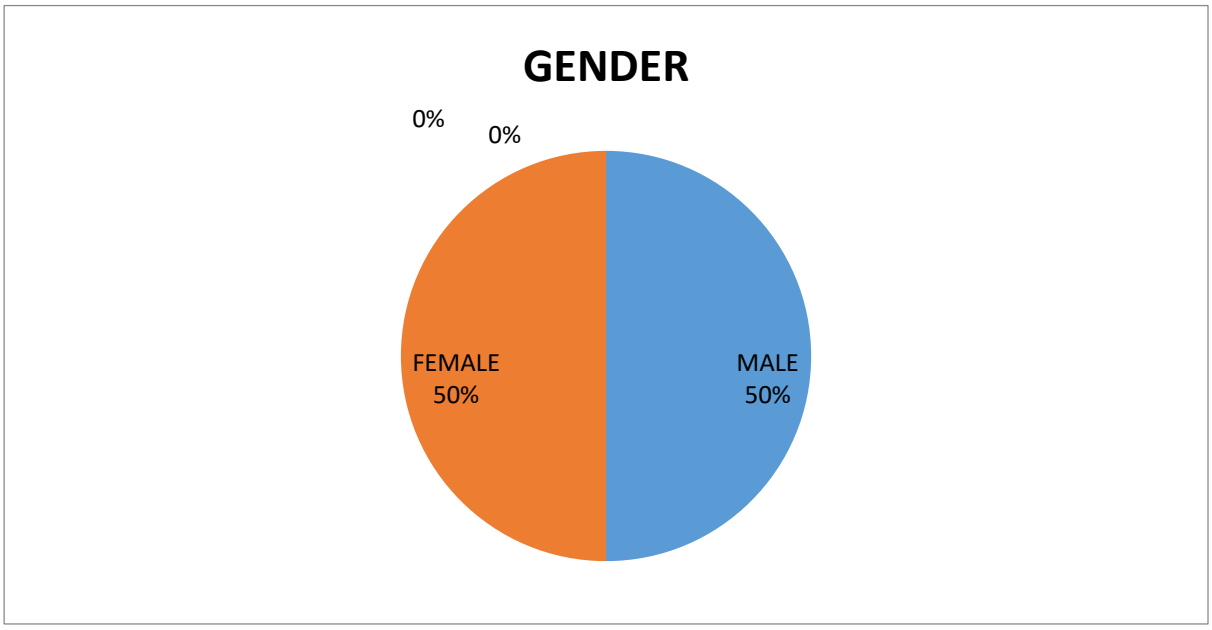
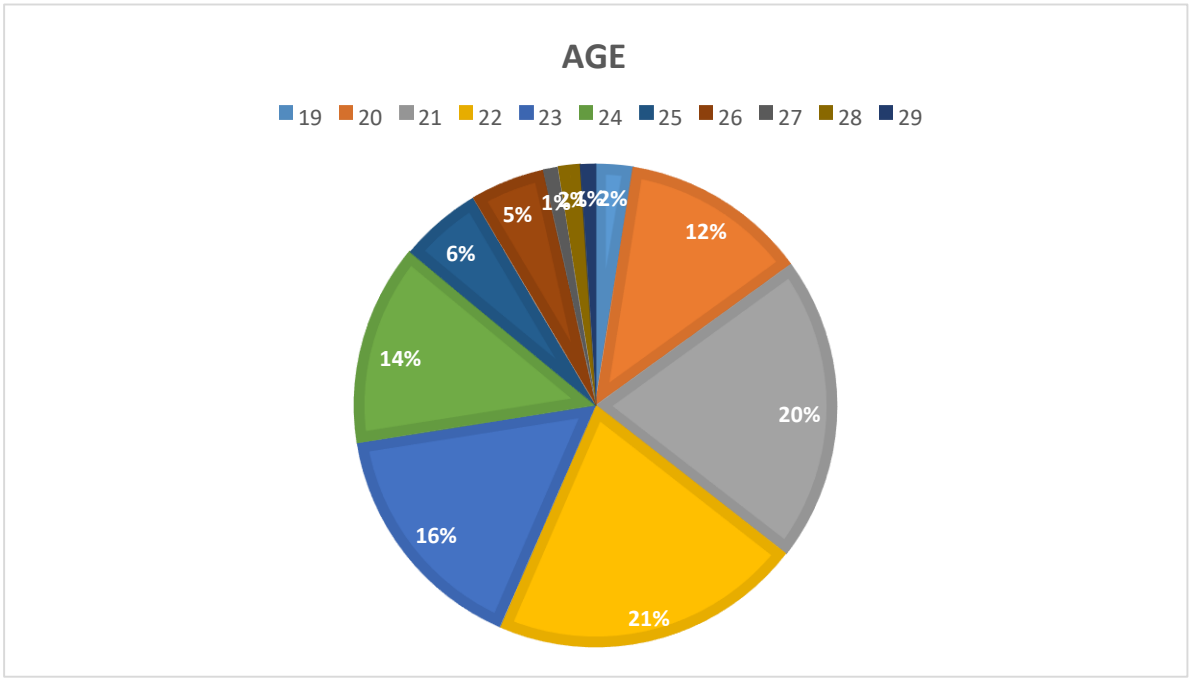
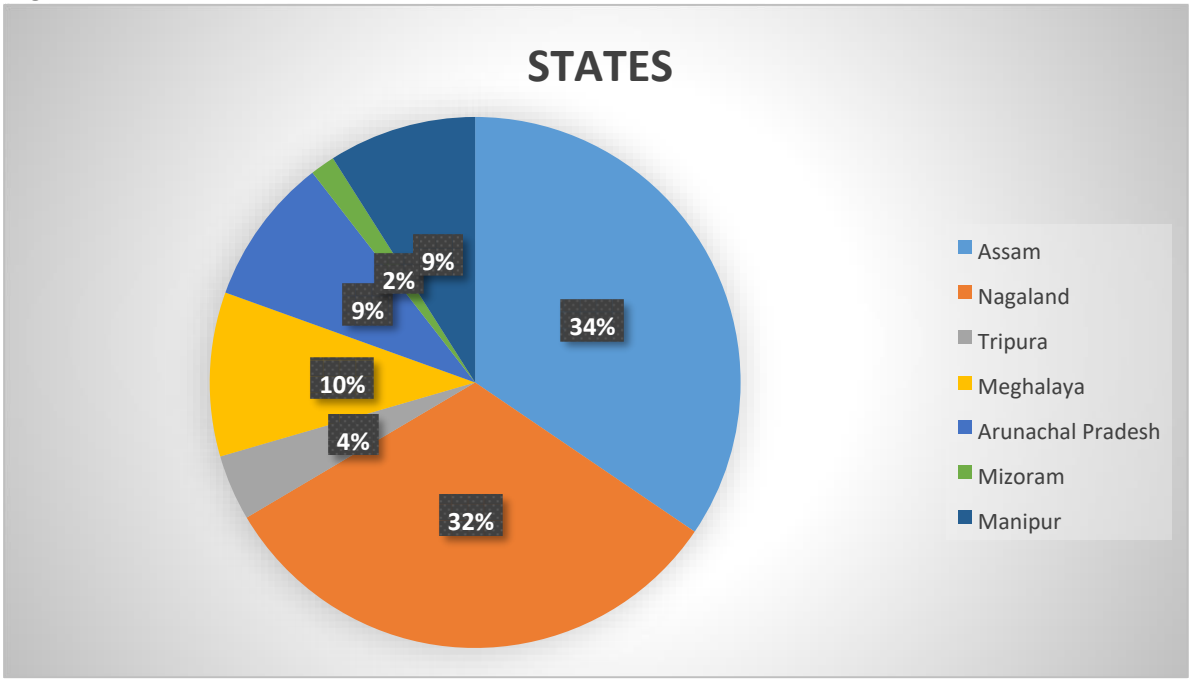


Figure 3.2: Distribution of age group



FULL TEXTS BOOK

Figure 3.3: Distribution of State wise



3.2 Discussion

In many aspects, a higher level of self-efficacy fosters human achievement and well-being. Self-efficacy is seen as a reliable indicator of performance and a crucial cognitive ability that guarantees attainment in life. According to the literature that is currently available, the relationship relating self-efficacy to students' academic performance has been extensively used in this study. Correlation of students' academic performance and self-efficacy was found to be moderately positive and statistically significant ($r = .368$, $p < .001$) thus, the hypothesis which there is significant difference between self-efficacy and academic performance was supported. An independent sample t-test was conducted to compare the self-efficacy for male and female where the result shows no significant differences ($t(198) = .751$, $p = .454$) and the independent t-test for academic performance and male and female shows no significant differences ($t(198) = -.268$, $p = .789$). Therefore, the hypothesis that there will be a significant difference between self-efficacy and student's academic performance with respect to gender (Male, Female) was not supported.

The current study offered understanding of the connection between self-efficacy and students' academic performance in Northeast, India. Students who have confidence in themselves showed better performance in learning and thinking and additionally it ought to function better. in evaluative level of learning. Academic success is positively connected with self-efficacy. Freshmen with higher self-efficacies about their ability to do well in college tend to adapt to their first year in college better to those who have lower self-efficacies (Chemers, Hu, & Garcia, 2001). Alyami et al. (2017) conducted a study on 214 college students and revealed that academic self-efficacy has a strong and positive impact effect on their academic performance. Students who have better abilities outperform those people with lower abilities. The students with better academic standing self-efficacy however, outperform anyone who has lower self-efficacy in a number of students having the same precise degree of academic ability. Schools should enhance classroom procedures for higher academic performance. Teachers should try to offer their lessons in a way that gives students the best chance to feel mastery. Teachers ought to advocate for cooperative learning. Students will learn as much as possible from their lecturers and from one another.

FULL TEXTS BOOK

Students who have confidence in their ability to do well academically tend to be more motivated in school (Schunk, 1991). When self-efficacious students reaching the goals they set, they set even more challenging goals (Schunk, 1990). This can all lead to better performance in school in relation to higher grades and taking more challenging classes (Multon, Brown, & Lent, 1991). The teachers' level of self-efficacy has a bearing on students' academic performance as well. Self-efficacious teachers encourage parents to take a more active role in their children's learning, leading to better academic results (Hoover-Dempsey, Bassler, & Brissie, 1987). Students that have strong self-efficacy also frequently have high optimism levels, and this combination produces a multiple benefits including improved academic achievement, more effective personal adjustment, improved stress management, better health, and increased overall contentment and commitment to continue in school. (Chemers, Hu, & Garcia, 2001). Earlier investigations in large numbers have revealed that a learner's Academic self-efficacy is closely related to academic achievement(e.g., Robbins et al., 2004; Richardson et al., 2012; Honicke and Broadbent, 2016). According to the findings, higher ASE scores more inclined to translate into greater grades of academic achievement. Furthermore, Robbins et al. (2004) established that academic motivation for accomplishment performance. Richardson et al. (2012) found that similar to ASE, grade objectives and effort management play a significant role in academic achievement. According to Honicke and Broadbent (2016), the connection between ASE and Because academic success has been modified by effort regulation, deep processing techniques, and goal orientation. As previously mentioned, two out between three meta-analyses indicated that effort control and goal-related elements, such as grade targets and a focus on goals, are the most powerful influences on academic performance. A greater ASE improves academic performance longitudinally and vice versa, according to the most current meta-analysis, Nevertheless, there are not many longitudinal research on the association between ASE and academic performance (Talsma et al., 2018). ASE is currently believed to be among the most significant elements or determinants of learning achievement for students. This may imply that improving a student's ASE may enable them to attain better academic outcomes.

Nowadays, it is crucial to support students in growing self-efficacy. Other practise procedures should be implemented additional to building a positive school image. Teachers can do this by imposing strict requirements on their pupils and recognising their accomplishments. Helping struggling students with low self-efficacy to encourage them to exert enough effort and persevere in difficult tasks must methodically foster high amount of self-efficacy in these students.

3. CONCLUSION

3.1 Recommendation

Considering the research on how self-efficacy effects students' academic achievement in northeast India, the present research found a there is a strong link between the two so it is recommended that,

- The stakeholders in educational institutions should make sufficient efforts to significantly increase student academic self-efficacy by having Group discussions and workshops need to take place in institutions because of this.
- Parents may also have a responsibility to ascertain whether their children have good self-confidence in their abilities. If not, suitable action should be made because a student's academic self-efficacy is crucial to the ability to handle academic challenges.

3.2 Conclusion

Considering the research findings showing self-efficacy has a beneficial impact on students' academic performance, it is conceivable that pupils with high produce better academic results. Given that one the majority significant influences on learning is self-efficacy, it would appear essential for educators to support their students in increasing their self-efficacy. Students' emotional and psychological states influence their sense of self-efficacy because they typically interpret both good and negative

FULL TEXTS BOOK

psychological states—such as stress, anxiety, despair, and bad moods and positive psychological states as indicators of personal competence. Thus, enhancing pupils' well-being and minimising unfavourable emotional states helps them feel more effective. Accordingly, setting goals that are reasonably simple to reach and thereby allowing students to experience success would help develop and enhance the self-efficacy of the students. Also providing students with particular examples of how individuals are expected to behave under specific circumstances is likely to have positive influence on their self-beliefs about their own abilities and performances (Komarraju & Nadler, 2013). Liem et al (2008) examined self-efficacy, task value and achievement goals in English language ability with a group of secondary school students. It is found that self-efficacy is a predictor to English test scores. Purzer (2011) did a sequential mixed methods study to investigate the connection between team discourse, self-efficacy and achievement. Results showed that self-efficacy is positively and substantial correlation between academic achievement. Louise and Mistele (2011) reported reportedly stated that despite their differences in level of self-efficacy by gender in young adolescents taking mathematics and science, self-efficacy is still considered as a good predictor of the achievement scores. Teachers can raise students' efficacy levels through a number of practical teaching methods. Students who consistently succeed in learning have stronger self-efficacy than those who repeatedly fail. They can help students by motivating students to try, giving compliments and encouraging others is crucial, but it must be credible, Use moderately- difficult tasks. Specify short-term targets that are difficult for the pupils but nonetheless regarded as attainable (Schunk and Pajares, 2002), Encourage pupils to describe their plan for a certain learning technique. Ask students to record their progress and describe the following procedures as they complete the assignment. (Schunk and Pajares, 2002), Instead than contrasting one student with another or with the other students in the class, compare each student's performance to the establish objectives for them. (Bandura). As a result, giving students' a wide range of experiences and developing positive beliefs in them is essential for students to grow in their belief in self-efficacy.

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FULL TEXTS BOOK

DESIGNING MEDICAL EXPERT SYSTEM BASED ON LOGICAL REDUCED RULE FOR ASTHMA DIAGNOSIS

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ABSTRACT
Asthma is a lung disease that can be persistent and explained by similar symptoms such as chest tightness, shortness of breath, cough, and wheezing. In an asthma attack, airflow to the lungs is blocked due to muscle contraction, bloating, and an excessive number of mucous membranes. It is estimated that this lung disease affects approximately 235 million people worldwide. In the study, a new Reduced Rule-Based (RRB) Medical Expert System (MES) was developed for use in the diagnosis of asthma and determining its severity. The RRB, which we use in the system we developed, processes 4096 conditions created over 7 symptoms and 12 input values of these symptoms, which we determined based on the doctor's opinions. Through the 52 conditions obtained at the end of this process, both the need to check 4096 rules one by one disappears and it becomes possible to quickly determine the diagnosis and severity (mild, moderate, and severe) of the asthma disease in emergency services where there is a pandemic-induced density or lack of personnel. The tests of the system were made by comparing the system and the doctor's decisions over the data set (Cronbach's $\alpha>=0.7$), which was compiled by a specialist doctor from studies on asthma and similar diseases. As a result of this comparison, it was seen that the system decisions were similar to the doctor's decisions at the rate of 93.3% in mild asthma, 96.6% in moderate asthma, 91.6% in severe asthma, 87.9% in other conditions, and 90.8% in total. It is thought that our system, which has an accuracy of 93.6% in the diagnosis of asthma, can be installed on smart devices and used as a subsidiary decision support system in emergency services and in environments where there is a shortage of personnel due to the pandemic. Thus, the burden of healthcare workers can be reduced.
Keywords: Asthma, Boolean Function Minimization, Early Diagnosis, Medical Expert System, Reduced Rule Base, Risk Factors for Asthma.

INTRODUCTION
Asthma is a chronic disease that affects a large portion of the population. Although environmental factors causing asthma are not fully understood, using early prevention methods has increased significantly in recent years. Thus, societies suffer less from this disease today. As shown in Figure 1, asthma is generally detected by the symptoms of wheezing, coughing, and unpredictable blockage of airflow [1].

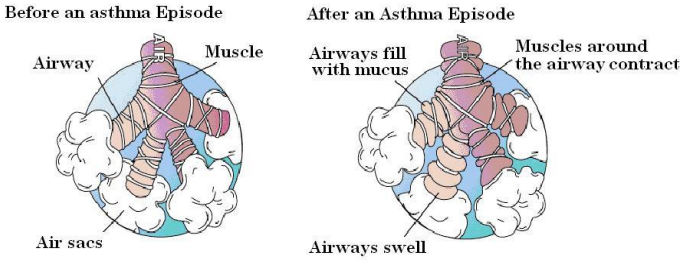


Figure 1. Previous and Next stages of the airways in asthma

FULL TEXTS BOOK

In most developed countries, which have environmental pollution, asthma is effective with allergic reactions like Dermatophagoides pteronyssinus and other environmental allergens. Although asthma can appear at any age, it usually occurs in childhood [2]. Asthma, which usually occurs in childhood, recovers by itself in adolescence, but it may relapse later on [3]; asthma in adults is accelerated together with declining lung function and becomes a chronic disease throughout a lifetime [4]. Respiratory inflammation along with wheezing has a tendency to decrease lung function in children [5], which usually recovers in a few years [6], and it is called asthma or bronchitis.

Although deaths that are caused by asthma are not now common, in the past, there were cases of asthma-related deaths in adults and young children because of using random high-dose formulations of β-agonist drugs [6, 7].

Unfortunately, there is no standard explanation for asthma. Common explanations of asthma studies end in guiding statements, which refer to variable blocking of airflow over short periods, sometimes in connection with indicators of airway hyper-responsiveness; but cannot ensure acknowledged rate for evidence of asthma to clinical results. When certain studies on the diagnosis and classification of asthma and similar lung diseases were examined, it was seen that Gurbeta et al. worked on automatic diagnosis of asthma and Chronic Obstructive Pulmonary Disease (COPD) diseases with the telehealth system they developed [8], Sharif et al. worked on determining the severity of asthma in emergency services by developing a fuzzy rule-based expert system [9], Samad-Soltani et al. tried to determine the severity of COPD by designing a fuzzy decision support system [10], Kukreja worked on the development of algorithms (such as Back-propagation, Context Sensitive Auto-Associative Memory Neural Network, C4.5 Algorithm, Bayesian Network and Particle Swarm Optimization) for the diagnosis of asthma through the symptoms and clinical data of asthma [11], Lee et al. examined data mining methods (Pattern Based Decision Tree (PBDT) and Pattern Based Class-Association Rule (PBCAR)) in their study to observe and prevent asthma disease [12], Spathis et al. examined clinical decision support systems related to the prevention, diagnosis and treatment of diseases such as asthma and COPD in their studies and in their studies where they used machine learning methods (Naive Bayes, Logistic Regression, Neural Networks, SVMs, K-Nearest Neighborhood, Decision Trees and Random Forest) they compared the diagnosis of asthma and COPD disease [13], and Rao et al. used the Support Vector Regression [14] for observing and diagnosing asthma severity.

The reasons for using a reduced rule base in this study, which aims to determine the diagnosis and severity of asthma through the medical expert system are all relevant situations and expert opinions are fully included in the system while creating the decision-making mechanism [15, 16], low computational complexity [17-19], high ability to produce a logical solution [20] and opportunity to update the rules when needed [21] as well as to transfer our knowledge and experience gained in our previous studies to this field.

When the medical expert systems designed using a reduced rule base were examined, it was seen that Selek et al. designed an expert system to be used in the diagnosis of malaria using 7 symptoms [15], Başçiftçi et al. designed an expert system to be used in the diagnosis of 4 different types of cancer using 13 symptoms [22], Isnanto et al. designed an expert system to be used in the diagnosis and management of diabetes using 12 symptoms [23], Cizmeci et al. designed an expert system to determine the life expectancy of intensive care patients using 10 symptoms [17].

In this study, which we carried out based on these studies and which is the continuation of our study in [15], an expert system was designed using 7 symptoms and 12 rules to be used in the diagnosis and determination of the severity of asthma to assist healthcare professionals in health units where situations such as lack of personnel, patient density or pandemics are experienced.

The tests of the designed system were carried out comparatively, as in the studies in [8-14], on the data set compiled by the specialist doctor from the studies and data sets in [24-35]. The adequacy and usability of our system were examined through the results obtained from this comparison and presented

FULL TEXTS BOOK

in the results section together with the data obtained from the reliability analysis of the data set we compiled.

MATERIAL AND METHOD

The Definition, Factors, Diagnosis, and Classification of Asthma

Although there is no standard definition for asthma, asthma is a disease in which various cells and cellular elements play a role, leading to chronic inflammation of the airways [36, 37]. This chronic inflammation is characterized by recurrent cough especially at night or in the morning, chest tightness, and wheezing. The diagnosis rate of this disease, which does not have a standard definition, is approximately 7.6% in adult patients aged 20–44 years and more than 10% in pediatric patients [38, 39].

Provocative Factors for Asthma

The triggering factors that are commonly known for asthma are physical efforts, allergens, chemicals, environmental pollution, and sudden changes in environmental factors such as temperature, etc. While some of these factors seldomly trigger asthma, some others frequently trigger asthma, but other factors trigger asthma attacks. These factors can include medicines, food additives, and food allergies (eggs, soy, etc.) [40, 41].

Some materials in the workplace can trigger an asthma attack because of specific sensitivity, and in European countries, occupational asthma accounts for up to 12% of asthma in young adults [42]. Although the fundamental factors that cause asthma attacks are not completely understood, the most possible asthma-triggering factors [43] include:

- House dust, mites like indoor allergens.
- Pollens, moulds like outdoor allergens.
- Smoke.
- Various chemicals.

Other factors that can trigger asthma include physical exercises, cold air, and extreme emotional conditions like anger or fear. Usage of aspirin, beta-blockers, and non-steroid anti-inflammatory drugs can even trigger asthma attacks in some people [43, 44].

World Health Organization states that 339 million people experience asthma badly. Although asthma cannot be fully cured in some cases, it can be kept under control with the usage of an adequate life management plan. Children who suffer from the mild manner of asthma eliminate asthma symptoms while they are growing [44, 45].

Definitive Diagnosis of Asthma and Spirometry

Patients with respiratory symptoms like coughing, wheezing, and chest tightness must first suspect asthma and alternative diagnostic methods should be applied. Spirometry-like lung function tests must be used to verify airway suffocation and to realize the reversibility of this blockage [46, 47]. Between periods of asthma attacks, there might be no signs of asthma, so physical examinations might give normal results, but the defectiveness of asthma signs does not point that the patient has normal lung functions. Based on this reason, full-capacity tests with complete medical history must be done with patients [48, 49]. As indicated before, the tests must include the full medical history of patients with past and current state of respiratory signs and symptoms associated with asthma, and these results must be combined with the variable airflow obstruction tests. The variable airflow obstruction is explained in below [50, 51] as;

- Obstruction does not necessarily appear at all times,
- It may change over time,
- It may vary depending on asthma triggers and treatment.

Spirometry measures the FVC (Forced Vital Capacity) and the FEV1 (Forced Expiratory Volume), and the FEV1/FVC (Forced Expiratory Volume in 1 second /Forced Vital Capacity) ratio is shown in Table

FULL TEXTS BOOK

1 [52]. The patient takes a breath as deep as possible and after that seals his-her lips around the mouthpiece of the spirometer and blows the air out as fast and fully as possible inside the spirometer [53].

Classification of Asthma Symptoms

Based on the NAEPP EPR-3 [37], asthma symptoms are stated in three main types. These are labeled as mild, moderate, or severe types [54]. These asthma symptoms indicate wheezing attacks, nocturnal symptoms, β2-agonist use, and daily symptoms.

Table 1. Asthma Symptom Intensity Results with Individual Variables

Individual Variables on the Asthma Symptoms	Mild	Moderate	Severe
Wheezing attacks (in the last 12 mo.)	84 (71.2)	23 (19.5)	11 (9.3)
+ Sleep disturbance (Due to wheezing in the last 12 mo.)	81 (68.6)	26 (22.0)	11 (9.3)
+ Daily β_2-agonist use in the last 2 weeks.	66 (66.9)	41 (34.8)	11 (9.3)
+ Daily symptoms (In the last 2 weeks.)	64 (54.2)	43 (36.4)	11 (9.3)
ICS use (Regular)	7 (10.9)	16 (37.2)	5 (45.5)
Symptom severity adjusted for regular ICS use	57 (48.3)	34 (28.8)	27 (22.9)
FEV_1 % (predicted)	106 (89.8)	11 (9.3)	1 (0.9)
FEV_1/FVC	75 (63.5)	22 (18.6)	21 (17.8)
$FEF_{\%25-\%75\,\%}$ (predicted)	102 (86.4)	12 (10.2)	4 (3.4)
Combined symptoms/ β_2-agonist use/ICS use +			
FEV_1 % (predicted)	50 (42.4)	40 (33.9)	28 (3.7)
FEV_1/FVC	42 (35.6)	38 (32.2)	38 (32.2)
$FEF_{\%25-\%75\,\%}$ (predicted)	52 (44.1)	36 (30.5)	30 (25.4)
FEV_1 and FEV_1/FVC % (Predicted)	38 (32.2)	42 (35.5)	38 (32.2)

In defining the severity of asthma, the percentage of predicted FEV1, FEF, and FEV1/FVC is used as the main decision factors, and according to these factors [55, 56], FEV1 is described as;

- 80% or more is described as a mild form of asthma,
- 60% or more and less than 80% are described as a moderate form of asthma,
- And less than 60% is described as severe form.

For predicted FEF25% -75% at mild, moderate, and severe levels, the severity of asthma [57, 58] is defined as;

- The mild form of asthma is defined as 65% or more,
- A moderate form of asthma is defined as 50% or more,
- The severe form of asthma is defined as less than 65% and less than 50%.

For FEV1/FVC at mild, moderate, and severe levels of asthma [58-60], it is defined as;

- the mild form of asthma is defined as 80% or more,
- a moderate form of asthma is defined as 75% or more and less than 80%,
- the severe form of asthma is defined as less than 75%.

The Structure of Asthma Dataset

When we first started our study, our primary goal was to use our system on real patient data simultaneously. For this purpose, as a result of our correspondence with the relevant health institutions,

FULL TEXTS BOOK

we were informed that we would not be able to access patient data both during and after the examination due to the pandemic, social distance, and shortage of personnel.

In our study, we compiled and used the data of patients with asthma and similar diseases (COPD, bronchitis, etc.) including data from studies in SPIROLA [24], NACAP [61], and other datasets [34, 35] and [25-33] as specified in NAEPP EPR-3 [37, 62] for diagnosis of asthma disease.

In this review, the data were obtained by compiling according to NAEPP EPR-3 and doctor's opinions. These data include the data of 296 adult patients specified in Table 1 and do not include the personal data (name, surname, age, gender, nationality, address, etc.) of the patients. Doctor opinions were sought in grouping the data of these 296 patients according to the severity of asthma and it was decided that N = 296 (N = Total number of patients); n1 = 60 (n1 = Mild Asthma), n2 = 60 (n2 = Moderate Asthma), n3 = 60 (n3 = Severe Asthma), and n4 = 116 (n4 = Other (COPD, etc.)). In addition to these, the data of these patients were presented based on Wheezing, ICS Use, and Daily Symptoms in Figure 2. a FEV1, FVC, and FEF in Figure 2. b, and FEV1/FVC in 3. c.

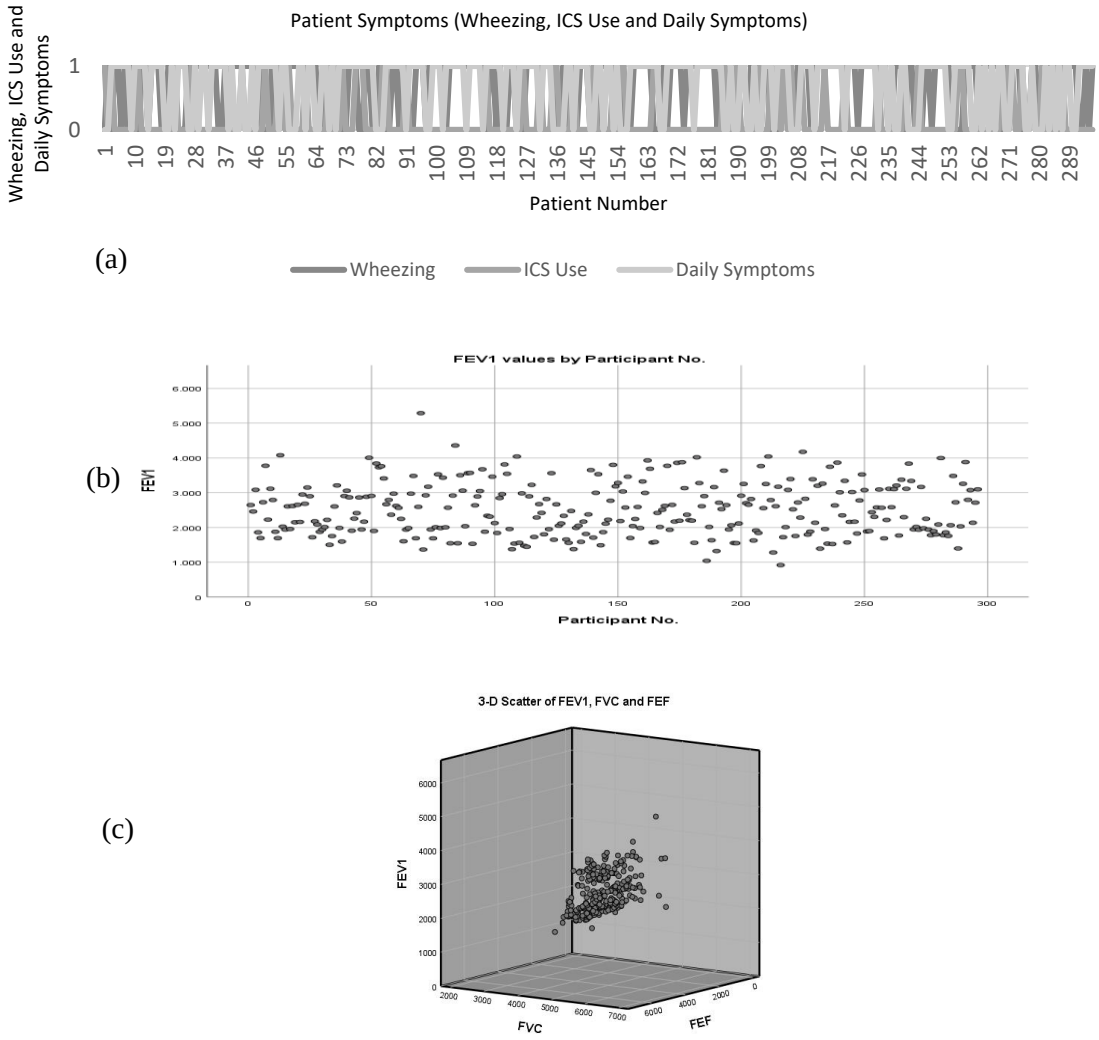


Figure 2. Patient Data Used in Dataset, (a) Wheezing, ICS Use, and Daily Symptoms, (b) FEV1, FVC, and FEF, (c) FEV1/FVC.

Although our data were compiled from previous studies, data reliability is an important issue in the use of data sets [63-65]. Data reliability in data sets is examined through components such as the distribution of the data used, their relations with each other, reliability, and the collected data range [66, 67]. One of

FULL TEXTS BOOK

the most preferred methods for this purpose is Cronbach's α method [68-70]. We also used this method in our study as it was used in studies in the field of asthma [71-75]. As shown in (1), Cronbach's α method is used to examine the reliability of the generated data set [70, 76].

$$\alpha = \frac{k}{k-1} * \left[1 - \left(\frac{\sum \sigma^2 i}{\sigma^2 T}\right)\right] \quad (1)$$

Here, k = number of items on the test, σ^2i = i. item measurement variance, $\Sigma\sigma^2$i = i. the sum of item measurement variances, and σ^2T = the variance of total test measurements. We examined the reliability of the data set we compiled in our study, using the α value obtained through the SPSS (Trial version - IBM SPSS Statistics 26) program using Cronbach's α method, as was done in the studies in [77-79]. The values obtained from Cronbach's α method are analyzed as follows [76, 80-82];

- If the value of α is between $0.00 \leq \alpha < 0.40$, the dataset is unreliable,
- If the α value is between $0.40 \leq \alpha < 0.60$, the dataset is of low reliability,
- If the α value is between $0.60 \leq \alpha < 0.80$, the dataset is quite reliable,
- If the value of α is between $0.80 \leq \alpha < 1.00$, the dataset is highly reliable.

The Structure of MES

The structure of the Medical Expert System (MES), which is one of the sub-branches of artificial intelligence and machine learning, is based on the transformation of the meaning and decision-making mechanisms of an individual/individuals related to their field of expertise by copying them into rule structures [17, 83-85]. This copying process is called the transfer of expert knowledge [15, 86, 87]. For this reason, it is often utilized in medical, sports, process control, logistics, and engineering areas. In addition to these, the opinions and knowledge obtained from the expert(s) in the specific field(s) must be impartial [84, 88, 89].

Since ES is designed depending on the needs of the users, it directs the users depending on these needs and requests during their use. For this reason, the knowledge database, one of the most important parts of ES, should be created from expert knowledge in line with the user's needs during design, and it should be updated when required through logical tests [90]. The workflow of the designed MES is shown in Figure 3.

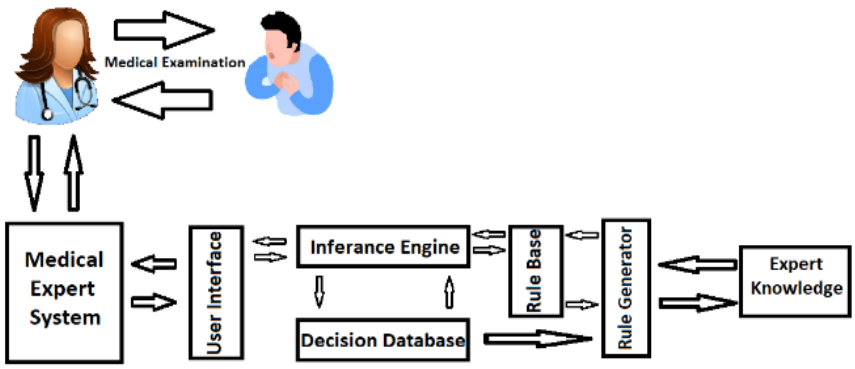


Figure 3. Block Diagram of Designed Medical ES

The system works as follows;

- The doctor enters the data obtained from the patient consultation.
- These data are first processed in the Inference Engine (IE).
- The rules required for processing patient data in IE are drawn from the Rule Database (RB).

The rule structures used in RB are "if-then" structures. These rules used in RB are produced in the Rule Generator (RG). A simple example of these generated rules is shown below;

If (One or more condition == True) then (Corresponding result)

FULL TEXTS BOOK

While designing an "If-Then" structure, if more than one condition is required, it can be combined using "Or" and "And" phrases according to the situation. A simple example of this situation for asthma is shown below;

if (Wheezing when breathing both in and out= True and (80% > FEV1 or 60% ≥ FEV1/FVC)) then ''Patience status = Severe asthma''.

"If-Then" structures used in RB are obtained through the Minimization of Boolean Functions (MBF) of asthma symptoms as expressed in [15, 17, 22]. In our study, we preferred the use of MBF, as it was used to write programs that work more effectively and faster, as stated in [91, 92]. Instead of using all rules created with expert opinion in MBF, the Reduced Rule Base (RRB) obtained by the MBF method was used [15, 91].

In IE, instead of all the rules that are stated from expert opinions, RRB was checked, and formed with MBF. Seven risk factors were used in this study (Wheezing when breathing both in and out, Daily symptoms ICS use (Regular), FEF%25-%75 (%predicted), FEV1/FVC, and FEV1) (See Table 3). Instead of evaluating 212 = 4096 output rules from these risk factors RR was analyzed. Thus, asthma disease was identified. These factors are shown in Table 2 with their symbols and outcome values of different conditions.

Table 2. Input and Output Values

Inp. no	Inp. symbols	Inp. names	Out no	Out. symbols
1	Z1	Wheezing when breathing both in and out,	1	Y
2	Z2	Daily symptoms,	2	
3	Z3	ICS use (Regular),	3	
4	Z4	$FEF_{\%25-\%75\ \%} \geq 65\%$	4	
5	Z5	$65\% > FEF_{\%25-\%75\ \%} \geq 50\%$	5	
6	Z6	$50\% > FEF_{\%25-\%75\ \%}$	6	
7	Z7	$FEV_1/FVC \geq 80\%$	7	
8	Z8	$80\% > FEV_1/FVC \geq 60\%$	8	
9	Z9	$60\% > FEV_1/FVC$	9	
10	Z10	$FEV_1 \geq 80\%$	10	
11	Z11	$80\% > FEV_1 \geq 75\%$	11	
12	Z12	$80\% > FEV_1$	12	

According to Table 2, all conditions were expressed as 0 and 1 as in [22, 93, 94] (See Table 5). However, in this form, to express the input and output values given in Table 2 with Boolean values "0 and 1", the relevant value ranges should be determined by examining. For example, if the FEV1 value was higher than 60%, it would be expressed with the Boolean value of 1. Boolean values for 12 different input and output variables are shown in Table 3.

Table 3. How to Define Input and Output Variables

No	Input and output cases	Description
1	Z1	Wheezing when breathing both in and out (1/0)
2	Z2	Daily symptoms (1/0)
3	Z3	ICS use (Regular) (1/0)
4	Z4	FEF%25-%75 % ≥ 65% (1/0)

FULL TEXTS BOOK

5	Z5	65% > FEF%25-%75 % ≥ 50% (1/0)
6	Z6	50%> FEF%25-%75 % (1/0)
7	Z7	FEV1/FVC ≥ 80% (1/0)
8	Z8	80% > FEV1/FVC ≥ 60% (1/0)
9	Z9	60% > FEV1/FVC (1/0)
10	Z10	FEV1 ≥ 80% (1/0)
11	Z11	80% > FEV1 ≥ 75% (1/0)
12	Z12	75% > FEV1 (1/0)

In Table 3, all risk factors are expressed in Boolean values (0 and 1) according to their real values in Table 1. As a sample, real values (a) and Boolean values (b) corresponding to these risk factors values are shown in Table 4.

Table 4. Real Values and Expressions as Boolean Values

Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	Z9	Z10	Z11	Z12
(a) Real Values											
Yes	Yes	No	35 %	35%	35%	65%	65 %	65 %	72 %	72 %	72 %
No	No	No	80%	80%	85%	85 %	85 %	55 %	75 %	75 %	75 %
No	No	Yes	70%	70%	70%	80 %	80 %	80 %	85%	85 %	85 %
(b) Boole values											
1	1	0	0	0	1	0	1	0	0	0	1
0	0	0	1	0	0	1	0	0	0	1	0
0	0	1	1	0	0	1	0	0	1	0	0

To put it explicitly, the seven input variables, based on these risk factors, used in this table as Boolean values and conditional truth table were created with 4096 input conditions for 12 inputs according to 7 risk factors. In addition to these, these 4096 input cases were analyzed together with the values used as input, taking into account the expert opinion. As a result of this analysis, the truth table expressed in Boolean values is presented in Table 5.

Table 5. Truth table

No.	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	Z9	Z10	Z11	Z12	S
1	0	0	0	0	0	0	0	0	0	0	0	1	x
2	0	0	0	0	0	0	0	0	0	0	1	0	x
…	…	…	…	…	…	…	…	…	…	…	…	…	…
127	0	0	0	0	0	0	1	1	1	1	1	1	1
128	0	0	0	0	0	1	0	0	0	0	0	0	0
…	…	…	…	…	…	…	…	…	…	…	…	…	…
290	0	0	0	1	0	0	1	0	0	0	1	0	1
…	…	…	…	…	…	…	…	…	…	…	…	…	…
3153	1	1	0	0	0	1	0	1	0	0	0	1	1
…	…	…	…	…	…	…	…	…	…	…	…	…	…
4096	1	1	1	1	1	1	1	1	1	1	1	1	x

In this study, the minterm minimization analysis was performed after obtaining Table 5. In this minterm minimization analysis, output functions "Q" was obtained by prime implicants "PI" in (3), and PI selection procedure in (4) [93, 95-98]

$$Q_{PI}(x) = \{PI(x)\}_{n=1}^{M} \quad (3)$$

$$PI_m(x) > PI_n(x) \leftrightarrow |Q_{ON} \cap PI_m(x)| > |Q_{ON} \cap PI_i(x)| \quad for\ all\ n \neq m \quad (4)$$

FULL TEXTS BOOK

In (3) minterms were selected by PI(x). In minterm and PI simplification, the Near-Minimal Cover Algorithm was used which is shown in Algorithm 1[93, 95].

Algorithm 1. Near-Minimal Cover

```
NMC_Algorithm (X, Y)
Begin
    While (x)
        F = X1;
        T = Expand (F, y);
        G = Cover (T);
        Prime = Complement(1-G);
        Foreach (Element in Prime)
        {
            N = Ratio (X - Element);
            If (N < N2)
                N2 = N;
                PI = Element;
}
All_PI = All_PI + PI;
X = X – PI;
    End While
    Return All_PI;
End
```

In this algorithm, firstly, the implicant containing the most minimum is selected. For this process, first of all, as (X, Y) (1/0-On/Off) is the minterm set, the first element of the "1" (On) minterm set is taken (F=X1) and expanded with the "0" (Off) minterm set as shown in (5).

$$z = x \otimes y \; and \; z_i = x_i \otimes y_i \quad (5)$$

After this expansion operation, the coverage operation is performed and only the prime minterm set (Prime) is detected as shown in (6).

$$x \wedge (x \vee y) = x \vee (x \wedge y) = x \quad (6)$$

In this coverage operation, if "xi=1" for minterms with "yi=1" for "x" and "y", the coverage operation is performed. Afterward, the result set that is made prime is removed from the full set as shown in (7). Thus, the set of implicants covering the minterm (Prime) is determined.

$$f(z_i) : (x_i =\rightarrow y_i \Longrightarrow x \wedge y = \emptyset \Leftrightarrow x \ominus y = x) \quad (7)$$

Then, in this overlying set of implicants, the "1" minterms covered by the implicants are counted (N), and the implicant that covers the most minterms (N < N2) is selected as PI (PI = Element) and added to the PI set (All_PI = All_PI + PI). The "1" minterms covered by the PI are removed (X = X – PI), and the simplification process continues until the set of "1" Minterms remains empty.

As a result of this algorithm, fifty-two rules emerged according to the truth table of these factors, and are shown in Table 5. Three of the obtained are shown in Table 6. In this table, while "1" means that the related symptom exists, "0" means that the related symptom is latent, and "u" means that the related symptom is unimportant. The If-Then version of the first two rules is shown in Table 7.

Table 6. Sample Output Values

Output cases	Output Conditions											
	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	Z9	Z10	Z11	Z12
001xx1xx1xx1	0	0	1	x	x	1	x	x	1	x	x	x
001x1xx1xx1x	0	0	1	x	1	x	x	1	x	x	1	x
11xx1xxx1xx1	1	1	x	x	1	x	x	x	1	x	x	1

FULL TEXTS BOOK

Table 7. Two of The Fifty-Two Reduced Rules Shown Using If–Then Constructs

Symbolic display	Real display
001xx1xx1xx1	**if** "Wheezing when breathing both in and out is No and Daily symptoms are Unimportant and ICS (Regular) use is Yes and $FEF_{\%25-\%75}$ % ≥ 65% is No and 65% > $FEF_{\%25-\%75}$ % ≥ 50% is No and 50% > $FEF_{\%25-\%75}$ % is Yes and FEV1/FVC ≥ 80% is No and 80% > FEV1/FVC ≥ 60% is No and 60% > FEV1/FVC is Yes and FEV1 ≥ 80% is Yes 80% > FEV1 ≥ 75% is No and 75% > FEV1 is Yes" **then** "The patient may have severe asthma" **else "Further investigation needed"**
001x1xx1xx1x	**if** "Wheezing when breathing both in and out is Unimportant and Daily symptoms are Unimportant and ICS (Regular) use is Yes and $FEF_{\%25-\%75}$ % ≥ 65% is No and 65% > $FEF_{\%25-\%75}$ % ≥ 50 % is Yes and 50% > $FEF_{\%25-\%75}$ % is No and FEV1/FVC ≥ 80% is No and 80% > FEV1/FVC ≥ 60% is Yes and 60% > FEV1/FVC is No and FEV1 ≥ 80% is No 80% > FEV1 ≥ 75% is Yes and 75% > FEV1 is No" **then** "The patient may have moderate asthma" **else "Further investigation needed"**

These rules, produced in the RG and stored in the RB, were used in the inference engine. According to the data obtained as a result of the consultation in IE, the relevant rules were created as feed-forward [15, 86]. Obtained inference results were both presented to the user in the UI and stored in the database. In addition to keeping the inference results, the database also presented its data to RG to update the RRB with new rules.

RESULTS

Reliability analysis of the compiled data set

In Cronbach's α analysis conducted by using SPSS, "Wheezing when breathing both in and out", "Daily symptoms", and "ICS use (Regular)" columns were used by being converted from yes/no to 1/0 for ease of processing the data. The object statistics, one of the first data we obtained from the analysis of our compiled data set, are presented in Table 8.

Table 8. Object Statistics of Dataset

Symptoms	Mean	Std. Deviation	N
Wheezing	0.65	0.477	296
ICS Use	0.18	0.387	296
Daily Symptoms	0.68	0.466	296
FEV1	2522.96	744.270	296
FVC	4266.67	813.399	296
FEV1/FVC	58.36	9.094	296
FEF	2903.09	1064.489	296

In this table, the mean and standard deviation values of the data we used in the data set are shown separately according to the column names.

Table 9 presents the Item-Total Statistics data we obtained. The data we present underlined in these data (Cronbach's Alpha if Item Deleted) shows the change in the reliability of the data set when one of the columns we specified in the data set is deleted.

Table 9. Item-Total Statistics of Dataset

Symptoms	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	**Cronbach's Alpha if Item Deleted**

FULL TEXTS BOOK

Wheezing	9751.95	5995900.149	-0.132	0.175	**0.730**
ICS Use	9752.42	5995638.703	-0.025	0.173	**0.730**
Daily Symptoms	9751.92	5995432.915	0.069	0.087	**0.730**
FEV1	7229.64	3045132.820	0.923	0.991	**0.493**
FVC	5485.93	3050313.662	0.804	0.977	**0.536**
FEV1/FVC	9694.24	5963700.469	0.716	0.972	**0.727**
FEF	6849.51	2280614.533	0.803	0.720	**0.560**

When the table is examined, it is stated that there will be an increase in the reliability of the data set when the first three data columns “Wheezing, ICS Use, Daily Symptoms” and the sixth column “FEV1/FVC” are deleted separately. However, since it is stated that these data columns are important in the studies conducted and in the diagnosis of asthma disease, these columns were preserved as they were in the data set. In addition to these, when the "FEV1/FVC" and "FEF" columns are removed, it is seen that the reliability of the data set will decrease.

Finally, the reliability rate obtained from the data set analyzed with Cronbach's α method is presented in Table 10 in comparison with similar studies.

Table 10. Comparison of Reliability of the Data Set with Other Studies

Reliability Statistics		
Datasets	**N of Items**	**Cronbach's Alpha**
[71]	5	**0.77**
[72]	17	**0.802**
[73]	6	**0.8**
[74]	5	**0.74**
[75]	23	**0.8**
Our dataset	7	**0.71**

When Table 10 is examined, it is seen that the data set we compiled in our study is a reliable dataset, as stated in the studies in [69, 70, 76, 79, 81], when analyzed in terms of both the number of objects (n=7) and Cronbach's α value (α=0.71).

The Accuracy and Reliability of the System

The accuracy and adequacy of the results we obtained from our system were checked first by comparing the system's decisions with the doctor's decisions. While making this comparison, the asthma dataset, which we compiled according to doctors' opinions, was used as an input in our system. The results obtained from the system and the results obtained from the doctor's decisions are presented in Table 11.

Table 11. Comparison of System Decisions with Doctor Decisions

Type of Lung Disease	**Asthma Severity and Number of Patients**	**Decisions**		**Similarity Rate**
		Doctor	**System**	
Asthma	Mild (n=60)	**60**	**56**	**93,3%**
	Moderate (n=60)	**60**	**58**	**96,6%**
	Severe (n=60)	**60**	**55**	**91,6%**
	Asthma Average	**180**	**163**	**93.83%**
COPD, Cystic Fibrosis vs.	Others (n=116)	**116**	**102**	**87,9%**
Overall Average				**90,86%**

When Table 11 is examined, it is seen that the decisions we obtained from our system show similarity to the doctor's decisions at the rate of 93.3% for mild asthma, 96.6% for moderate asthma, 91.6% for severe asthma, 87.9% for other conditions, and 90.86% overall.

FULL TEXTS BOOK

The comparison of the accuracy of the decisions regarding the diagnosis and classification of asthma disease obtained from our system with other studies is shown in Table 12.

Table 12. Comparison of the System's Accuracy Rate with Other Studies

Study No.	Methods Used	Accuracy Rate
[8]	Fuzzy Rule Base	97.32%
[9]	Fuzzy Rule Base	100%
[10]	Fuzzy Rule Base	92%
[11]	Associative Memory Model	94.2%
[12]	Data Mining	87.52%
[13]	Random Forest classifier	80.3%
[14]	Support Vector Regression	77.7%
Our System	Reduced Rule Base	93.83%

When Table 12 is examined, it is seen that the expert system we designed using the reduced rule base has a higher accuracy than the studies in [10, 12-14] and that our system can be used in the diagnosis and classification of asthma disease, like the systems in [8, 9, 11], with an accuracy rate greater than 93%.

CONCLUSION

Our study consists of two parts. In the first part, a new Reduced Rule-Based (RRB) Medical Expert System (MES) was developed for use in the diagnosis and determination of asthma severity (mild, moderate, and severe). In the second part, a data set based on doctor's opinions was compiled to be used in the tests of this system.

The RBB we used in the system we developed consists of 52 rules. These rules were obtained by processing 4096 conditions created over 7 symptoms and 12 input values of these symptoms, which we determined according to doctors' opinions, by minimizing boolean functions. Through the 52 conditions obtained at the end of this process, the need to check 4096 rules one by one is eliminated, and it becomes possible to diagnose and determine the severity (mild, moderate, and severe) of asthma disease. The test results of our system were compared with the doctor's decisions (Table 11), and in these results, our system showed 93.83% similarity with the doctor's decisions in diagnosing asthma. In comparison with other systems (Table 12), it is thought that it can be used in the diagnosis and classification of asthma with a high accuracy rate of >90%. The data set we compiled according to the doctor's opinions seems to be a reliable dataset, as in similar studies, in terms of both the number of objects (See Table 8, n=7) and Cronbach's α value (See Table 10, α=0.71).

As a result, it is thought that our system can be installed on smart devices and used as a subsidiary decision support in emergency services or polyclinics where situations such as pandemics, density, or lack of personnel are experienced. Thus, the burden of healthcare workers can be reduced.

In our next study, we plan to integrate our system with image processing systems that can process data obtained from CT (Computerized Tomography), MRI (Magnetic Resonance Imaging), and similar imaging examinations to use it in the diagnosis of asthma and other lung diseases such as COPD, bronchitis, mesothelioma, and emphysema.

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FULL TEXTS BOOK

DETERMINATION OF EPS PRODUCTION, ORGANIC ACID AND ANTIMICROBIAL LEVELS OF SOME LACTIC ACID BACTERIA ISOLATED FROM BUFFALO YOGURT AND MILK

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ABSTRACT

In our study, buffalo yogurt and milk used as materials were obtained from the Dairy Products Technologies Application and Research Center Directorate of Burdur Mehmet Akif Ersoy University in December 2023. The counts of anaerobic bacteria and microorganisms belonging to the *Lactobacilli* species in raw buffalo milk and yogurt samples were to be in the range of 5.65-5.87 and 7.88-8.12 log CFU/mL; 2.10-2.17 and 5.11-5.18 log CFU/g, respectively. Among from 36 isolates, 12 possible *Lactiplantibacillus* strains were selected as a result of phenotypic tests. Selected lactic acid bacteria (LAB) were identified using MALDI-TOF MS in the species level. The results of the study revealed that the EPS production levels of the cultures varied depending on the species and highest EPS production was detected in *Lactiplantibacillus plantarum* LB6 and *Lactobacillus bulgaricus* LB12 strains. Accordingly, 4 *Lactobacillaceae* family strains with high EPS production value selected from 12 *Lactobacillaceae* strains was evaluated for their features organic acid and antimicrobial activity. It was found that the strains with high EPS production also produced malic, pyruvic and acetic acids in addition to lactic acid and exhibited high antimicrobial levels against four different pathogens. This study suggests that LAB isolated from buffalo yogurt with high EPS and antimicrobial properties have potential for widespread use in probiotic foods, and in health fields such as intestinal microbiota adherence.

Keywords: Buffalo yogurt, Lactic acid bacteria, Exopolysaccharide, MALDI-TOF MS, *Lactiplantibacillus*

INTRODUCTION

Fermented foods generally contain beneficial flora that support the regularity and health of the human digestive system. The flora in fermented foods primarily consist of lactic acid bacteria (LAB), which produce lactic acid by metabolizing fermentable sugars. Lactic acid fermentation is considered a common and effective method for food preservation (Kumari et al., 2024). Additionally, most lactic acid bacteria can produce organic acids, hydrogen peroxide, diacetyl, and bacteriocins substances with various properties, including the ability to inhibit the growth of pathogenic microorganisms. Consequently, contemporary food production methods often incorporate microorganisms with these characteristics (Ertürkmen, 2024). Furthermore, many compounds produced by LAB, such as antimicrobials, lactic, acetic, formic, phenylacetic, and caproic acids, as well as carbon dioxide, hydrogen peroxide, diacetyl, ethanol, and bacteriocins like reuterin, play a crucial role. These antimicrobial substances can prevent mold spoilage, and other LAB-produced compounds such as sugar polymers, sweeteners, aromatic compounds, and useful enzymes enhance health properties (Choi et al., 2018). These significant features of LAB starter cultures contribute to ensuring food safety and maintaining the technological quality of fermented products (Ertürkmen, 2024).

In today's food industry, EPS are of great interest as stabilizers, thickeners, gelling agents, and emulsifiers, and for their potential use in food packaging (Nguyen et al., 2020; Moradi et al., 2021). Microbial exopolysaccharides (EPS) are biological polymers synthesized by various microorganisms, including some bacteria, microalgae, yeasts, and fungi (Nguyen et al., 2020; Shankar et al., 2021). LAB

FULL TEXTS BOOK

are among the EPS-producing bacteria and are the subject of many studies due to their EPS production capabilities. Particularly, genera such as *Fructilactobacillus*, *Lacticasseibacillus*, *Lactiplantibacillus*, *Lactobacillus*, *Lactococcus*, *Latilactobacillus*, *Lentilactobacillus*, *Leuconostoc*, *Limosilactobacillus*, *Pediococcus*, and *Streptococcus* can synthesize EPS. LAB are considered "generally regarded as safe (GRAS)" and are classified as consumable bacteria, thus they are used in foods as starter cultures or probiotics. Due to their presence in various foods, LAB can produce a wide range of different EPS structures (Daba et al., 2021; Maajid et al.2022).Due to their beneficial effects on the host immune system and their contribution to the adhesion and survival of lactic acid bacteria, EPS also have applications as prebiotics in foods.

Consumers have recently shown increased interest in the relationship between health and fermented foods. Although cow's milk is often preferred as the raw material for yogurt production, buffalo milk, with its high dry matter content and unique nutritional composition, is emerging as a more suitable product for yogurt production. Buffalo yogurt is a good example of naturally preserved food items acidified by various LAB species (Terzioğlu et al., 2023). In this study, the antimicrobial activity and organic acid production of lactic acid bacteria isolated from buffalo yogurt and milk, which have many positive characteristics and high EPS production, were determined. These new groups of microorganisms are added to yogurt milk during production, resulting in yogurt with more distinctive flavor and aroma characteristics. Additionally, the exopolysaccharides produced by these bacteria impart functional properties to the product. Thus, it is possible to produce buffalo yogurt of higher quality in terms of both sensory attributes and nutritional value.

METHODOLOGY

Microbial counts of samples and lactic acid bacteria isolation

For anaerobic bacteria and Lactobacilli counts of buffalo yogurt and milk samples were diluted in separate test tubes with sterile 0.1% (w/v) ringer solution for each dilution. Additionally, 100 µL from each serial dilution was spread on Reinforced Clostridial Medium (RCM, Merck, Darmstadt, DE) to cultivate following 48 hours of anaerobic incubation at 37 °C. Lactobacilli counted De Man Rogosa and Sharpe (MRS) at 30ºC for 2 days (Harrigan ve Mc Cance, 1966). In this study, 12 potential LAB strains, characterized as Gram-positive, catalase-negative, non-spore-forming, and non-hemolytic, were isolated from Buffalo yogurt and milk samples. The isolation and selection procedures followed the methods described by Schillinger and Lücke (1989). The strains were identified using MALDI-TOF MS (Bruker Daltonics, Autoflex Speed, Germany) based on mass spectrum analysis.

Exopolysaccharide production

To determine the exopolysaccharide production of isolates using different carbohydrate sources, the MRS medium was modified and used. For this purpose, both standard MRS medium and MRS medium containing fructose, lactose, and sucrose at 2% instead of glucose were used. Firstly, to identify potential EPS-producing strains, the cultures were incubated on solid MRS medium containing different sugars at 30°C for 3 days. At the end of the incubation, isolates forming mucous colonies were selected as potential exopolysaccharide producers. The selected colonies were transferred to liquid MRS medium prepared with the same sugar composition and incubated again at 30°C for 3 days. At the end of the incubation, the samples were boiled for 10 minutes at 100°C. Then, 900 µl of 85% trichloroacetic acid (TCA) and 900 µl of sample were added to pre-weighed 2 ml centrifuge tubes and centrifuged at 10,000 rpm for 25 minutes. After centrifugation, 500 µl of the supernatant was taken, and 1500 µl of cold ethanol was added and left overnight at -18°C. The next day, the samples were centrifuged again at 10,000 rpm for 25 minutes. After centrifugation, the supernatant was discarded, and the ethanol was removed by leaving the tubes at 60°C overnight. The dried tubes were weighed again at the end of the period, and the results were calculated as mg/L (Feng et al., 2012).

FULL TEXTS BOOK

Antimicrobial activity

The antimicrobial activity of the LAB isolates was evaluated against indicator bacteria, namely *Staphylococcus aureus* ATCC 25923, *Listeria monocytogenes* ATCC 19115, *Escherichia coli* ATCC 25922, and *Salmonella typhimurium* ATCC 14028, using the agar well-diffusion technique. LAB cultures in MRS broth and indicator bacteria in CASO broth were activated at 37 °C for 18 hours. Subsequently, the indicator microorganisms were added to sterilized Nutrient agar medium at a ratio of 1 mL per 100 mL of medium, mixed homogeneously, and poured into sterilized petri dishes in approximately 25 mL volumes, ensuring a thickness of 4 mm. Once the medium solidified, 8 mm diameter wells were created on the agar at specific intervals using a cork borer. LAB cultures activated in MRS broth were pipetted into the wells at a volume of 100 µL and incubated at 37 °C for 24 hours. Following incubation, the diameters of the inhibition zones around the wells were measured (Ertürkmen et al., 2024).

Determination of organic acids produced by lactic acid bacteria

The method of determining organic acids was modified from the work of Kaminaids (2007). Organic acids were determined at YETEM (Application and Research Center for Innovative Technologies) center of Süleyman Demirel University by Thermo Scientific Ultimate 3000 HPLC device.

CONCLUSION AND DISCUSSION

The microscopic appearance, Gram reaction, and catalase activities of the strains subjected to purity control were examined. Isolates that were cocci-shaped, Gram-positive, and catalase-negative were evaluated as potential enterococci and lactococci. Isolates that were rod-shaped, Gram-positive, and catalase-negative were evaluated as potential lactobacilli. In this study, Among from 36 isolates phenotypic characterictied, 12 possible *Lactiplantibacillus* strains were used (Figure1).



Figure 1 Phenotypic characterization of strains

The selected strains were identified at the species level (score value >2.00) using the MALDI-TOF MS BioTyper System. Seven isolates were identified as *L. plantarum*, two as *L. paracasei*, and two as *L. bulgaricus* by the MALDI-TOF MS BioTyper System, while one could not be identified. (Table 1).

FULL TEXTS BOOK

Table 1 Identification of strains

Strain code	Phenotypic diagnosis	MALDI-TOF MS BioTyper system	Scor value
LB1	*Lactobacillus spp.*	*L. plantarum*	2.125±0.10
LB2	*L. plantarum*	*L. plantarum*	2.003±0.00
LB3	*Lactobacillus spp.*	*L. plantarum*	2.014±0.09
LB4	*Lactobacillus spp.*	*L. plantarum*	2.129±0.03
LB5	*Lactobacillus spp.*	-	
LB6	*L. plantarum*	*L. plantarum*	2.171±0.11
LB7	*Lactobacillus spp.*	*L. paracasei*	2.147±0.01
LB8	*Lactobacillus spp.*	*L. paracasei*	2.142±0.01
LB9	*Lactobacillus spp.*	*L. plantarum*	*2.056±0.12*
LB10	*Lactobacillus spp.*	*L. bulgaricus*	2.365±0.00
LB11	*L. plantarum*	*L. plantarum*	2.268±0.08
LB12	*Lactobacillus spp.*	*L. bulgaricus*	2.243±0.04

The counts of anaerobic bacteria in raw buffalo milk and yogurt samples were to be in the range of 5.65-5.87; 2.10-2.17. Studies have linked the presence of high spore counts of thermophilic bacteria such as *Clostridium* in dairy products to silage feeding (Garde et al., 2011; Reindl et al., 2014). The pH of the feed plant used in silage production plays an important role in the activity of *Clostridium* species microorganisms (Jakob, 2011). The counts of microorganisms belonging to the *Lactobacilli* species in raw buffalo milk and yogurt samples were to be in the range of 7.88-8.12 log CFU/mL and 5.11-5.18 log CFU/g (Figure2).

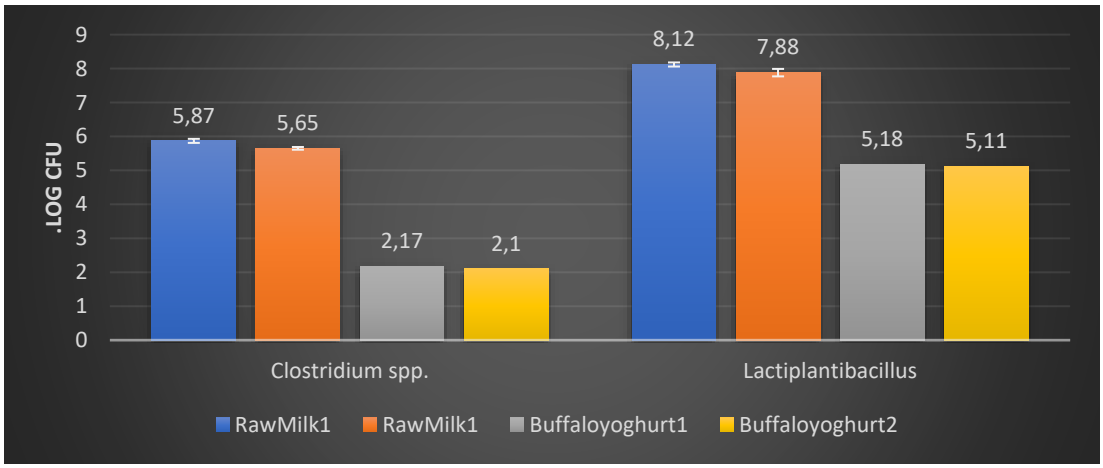


Figure 2 Microbial counts of samples

In the analysis conducted to determine exopolysaccharide production, the strains produced a shiny, mucous structure on MRS solid medium. Accordingly, 4 *Lactobacillaceae* family strains with high EPS production value selected from 12 *Lactobacillaceae* species was evaluated for their features organik acid and antimicrobial activity (Table 2). In the analyses conducted, the highest EPS production was detected in LB12 *L. bulgaricus* with 10.9 mg/L and in LB6 *L. plantarum* with 9.1 mg/L. The presence of lactic acid, pyruvic acid, acetic acid and malic acid was examined in the microorganisms studied. As a result of the study, the microorganisms predominantly produced lactic acid. Additionally, they were found to produce pyruvic acid, acetic acid, and malic acid. Organic acid production, such as lactic acid, can vary between different LAB species as well as between individual strains within a species (Peev et

FULL TEXTS BOOK

al. 2017). This variability is also noteworthy in our study. When the organic acid contents of the strain groups were examined separately, the most common organic acids were lactic, acetic and malic acid. Kaminarides et al. (2007) determined the organic acid content of yogurt samples with different fat contents and found that in yogurt with 6.6% fat, pyruvic acid had the lowest amounts among the acids. In this study, trace amounts of pyruvic acid were detected in the strains isolated from yogurt samples, which was thought to result from the conversion of glucose by lactic acid bacteria.

Table 2 EPS, antimicrobial and organic acid levels of selected strains

		The inhibition zone diameters of pathogen bacteria (mm)				**Organic acids peak height (µg/mL)**			
Strain	***EPS mg/L***	***E. coli***	***S. Enteritidis***	***L. monocytogenes***	***S. aureus***	**Pyruvic acid**	**Malic acid**	**Lactic acid**	**Acetic acid**
LB1 *L. plantarum*	8.6	25.66	34.00	35.66	44.00	34.637	40.401	1541.807	68.180
LB6 *L. plantarum*	9.1	40.33	34.33	44.33	44.33	21.035	34.575	1530.548	52.041
LB10 *L. bulgaricus*	8.4	35.00	54.66	35.33	40.33	35.209	21.353	1574.417	67.162
LB12 *L. bulgaricus*	10.9	33.00	44.66	41.00	47.00	30.032	23.514	1630.808	51.045

The antimicrobial activity between various groups of microorganisms like lactic acid bacteria and pathogens is widely known in nature and their these abilities are based on their organic acids, carbon dioxide, and specific antibiotic substances synthesize (Tsugkiev et al. 2018). In this study, antimicrobial activity against various pathogen bacteria (Table 2). It has been observed that the same strain may have different antimicrobial activity different pathogens. Against *E. coli*, the largest zone (40.33 mm) and the lowest zone (25.66 mm) were showed respectively LB6 *L. plantarum*, and LB1 *L. plantarum* . Compared to other pathogens zone diameters against *S. aureus* were larger among all tested bacteria, giving the largest zone by *LB12 L. bulgaricus* (47.00 mm).These differences in the antimicrobial efffect of lactic bacteria were thought to be due to their ability to synthesize organic acids, carbon dioxide, and certain antimicrobial substances.

CONCLUSION

In this study, strains were identified at the species level using the MALDI-TOF MS BioTyper System, which is frequently used in clinical microbiology. The antimicrobial analysis results were consistent with other studies. The presence of lactic acid, pyruvic acid, acetic acid and malic acid in strains with high EPS production levels was investigated. The study found that microorganisms primarily produced lactic acid. Additionally, the production of pyruvic acid, acetic acid, and malic acid was also detected. Furthermore, the strains showed high antimicrobial activity against four different pathogens. It is

FULL TEXTS BOOK

believed that LAB isolated from buffalo yogurt and milk, which exhibit high EPS and antimicrobial properties, could have widespread potential for use in health-related fields such as probiotic food and intestinal microbiota colonization.

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THE EFFECT OF GENDER AND RELIGIOSITY ON SUICIDE IDEATION IN A SAMPLE OF TURKISH MUSLIM-MAJORITY YOUTH

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ABSTRACT
Suicide is a significant global health problem for several compelling reasons, including its devastating effects on individuals and communities as well. It becomes even more alarming for specific developmental periods, such as young and emerging adulthood. Religiosity has been identified as a unique contextual protective factor that helps prevent various behaviors associated with suicidality, including suicide ideation, attempts, and completed suicides. Therefore, the purpose of this study was to examine to what extent religiosity and gender explain suicidal thoughts among a conveniently selected sample of 221 college students (55.66% female). The results showed that while religion significantly and negatively predicted suicide ideation, gender did not have a significant effect. Overall, religiosity explained 22% of the variance in suicidal thoughts. There was no significant difference between males and females in terms of the scores in suicide ideation, although females reported relatively higher scores. Findings were discussed in the light of the relevant literature.
Keywords: suicide; religiosity; gender; protective; Türkiye.

INTRODUCTION
Across the globe, suicide remains one of the leading causes of death, casualty, and premature mortality for individuals of all ages (WHO, 2021). Particularly, suicide is the second and third leading cause of death among the age periods 10-24 and 15-44 (WHO, 2021). As suicide is believed to have a ripple effect, 135 individuals, including family members, friends, and colleagues, are affected by one completed suicide (Cerel et al., 2019), which occurs every 40 seconds across the globe (WHO, 2021). Given that, because of its prevalence and impact on communities, it is essential to address suicide as a public health crisis and to bear a multifaceted approach, including revealing both risk and protective factors related to suicidal behavior.

Suicide has been associated with a wide range of psychiatric conditions, including depression, anxiety, and substance use disorders. Although traditional endeavors in exploring the psychiatric risk factors are extremely valuable, solely focusing on those factors might be an impediment in understanding the concept of suicide from an integrative perspective. Therefore, along with psychiatric conditions, it is crucial to include contextual factors as they also play a prominent role in the spectrum of suicidal behaviors. Based on the biopsychosocial model, the joint contribution of both distal (long-term) and proximal (acute) risk factors prepare for the onset of suicidal behavior (Turecki et al., 2019).

Religiosity, one of the distal factors that hypothetically protect individuals against suicidal behavior, can be defined as the degree of religious devotion and engagement in religious practices. It has long been a subject of interest in the field of suicide. Both concepts are assumed to have a complex structure as suicide encompasses ideation, attempt, and completion, and religiosity includes affiliation, participation in religious activities, and doctrine. Empirical evidence suggests that religiosity is a distal protective factor and is related to suicidal behavior across different contexts (Wu et al., 2015; Rasic et al., 2009; Rasic et al., 2011). However, some studies reported religious attendance only protects individuals from suicide attempts (Rasic et al., 2011). Apart from that, religious belief and community support received from religious officials play a crucial role in the bereavement process of survivors of suicide attempts (Vandercreek & Mottram, 2009).

FULL TEXTS BOOK

Along with significant associations between suicide and religiosity, there are studies where the two were not associated (Lawrence et al., 2016) and even inversely related (Zhao et al., 2012). Based on Koeing's (2012) work, as religiosity is related to improved psychological stability, hope, feelings of empowerment, social networking opportunities, and adoption of healthy lifestyle habits, it protects individuals against suicidal behavior. Similarly, as higher levels of religiosity is associated with lower rates of psychopathology (Dervic et al., 2004; Levav et al., 2008; Vitorino et al., 2018), which is one robust predictor of several behaviors within the spectrum of suicidality (e.g., suicide ideation, attempt, completed suicides), it is reasonable to argue that religiosity provides a buffering effect on suicidality through indirect means. In a similar vein, a meta-analysis study consisting of 1000 empirical studies indicated that the relationship between religiosity and suicide creates several pathways, including through major risk factors such as low level of depression, hopelessness, alcohol, and substance use (Koeing, 2012). This finding implies that there is an indirect relationship between religiosity and suicidality.

In Türkiye, most of the citizens were initially (inborn) recorded as Muslim. In Muslim-majority countries, suicide is often seen as a taboo because it is banned by fate (Pritchard & Amanullah, 2007). Therefore, in countries where Muslims make up the majority of the population, there is a shortage of studies and there are challenges in systematic reporting on suicides (Lester, 2006). In addition, around 80% of the completed suicides occur in middle-low-income countries, and most of the Muslim-majority countries belong to this scale (WHO, 2023), although an overwhelming majority of around 94% of empirical studies were conducted in high-income countries (Bantjes et al., 2016). Therefore, the impact of religiosity on suicidality remains a topic of profound intrigue and scholarly interest, especially in Muslim-majority countries.

Gender is another peculiar variable that has been associated with suicidal thoughts. Known as the 'Gender paradox in suicide' (Canetto & Safinofsky, 1998), females tend to exhibit non-fatal suicidal behaviors such as suicide ideation and attempts, while males tend to engage in fatal suicidal behaviors such as suicide attempts. One potential explanation for this phenomenon is that although men are more likely to suffer from externalizing disorders, women are more prone to experience internalizing disorders. Another potential reason could be that males tend to perceive that expressing emotions and vulnerabilities points out a state of powerlessness, desperation, and misery (Möller-Leimkühler, 2003). Therefore, it becomes crucial to address unique challenges faced by both men and women to make efficacious intervention programs. In a meta-analysis conducted by Miranda-Mendzibal et al. (2019), it was concluded that while females bear a higher risk for suicide attempts, males are more likely to be responsible for suicide deaths. In Türkiye, similar trends were reported (Atay et al., 2012; Göktaş & Metintaş, 2019).

Within those lines, the current study aimed to investigate the effect of religiosity and gender on suicide ideation among college students. Therefore, the following hypotheses were formed:

H1: The religiosity will negatively and significantly predict suicide ideation.

H2: There will be a significant effect of gender on suicide ideation.

H3: Females will report significantly higher scores in suicide ideation than males.

METHODOLOGY

Participants

221 individuals (123 female, 55.66%) residing in five different cities in Turkey participated in the study. The age of the participants ranged from 18 to 34, with a mean of 19.66 and a standard deviation of 1.81. The mean score for individual religiousness was 16.11 (*SD* = 4.69), and it was 12.74 (*SD* = 2.98) for suicidal thoughts. More than half of the sample was recruited from the Faculty of Education (n = 163, 73.76%), followed by the Faculty of Arts and Sciences (n = 52, 23.53%) and other faculties (n = 6, 2.71%). The first-grade students consisted of 44.34% (n = 98), the second-grade students consisted of

FULL TEXTS BOOK

32.13% (n = 71), the third-grade students consisted of 14.48% (n = 32), and the fourth-grade students consisted of 9.05% (n = 20) of participants. Most participants (n = 217, 98.19%) indicated that they believe in a religion, and all believers reported that they believe in Islam.

Measures

Demographic Information Form

The demographic information form prepared by the researcher was used to collect more in-depth information about the sample studied. In line with the purposes of the current study, the demographic variables of age, gender, the city resided, faculty, grade level, the status of religious belief (i.e., Do you believe in a religion?), and what religion they believe in were asked to depict a more thorough picture of the sample studied.

Individual Religiousness Scale (IRS)

Developed by Zagumny et al. (2012), the IRS is a 6-item Likert-type scale where 1 and 5 represent 'not suitable to me at all' and 'completely suitable for me', respectively. Therefore, the minimum and maximum scores that can be obtained from the scale were 6 and 30. Higher scores represent higher levels of individual religiousness. In this study, the reliability evidence was ensured by calculating Cronbach's alpha, which was found to be .89.

Suicide Probability Scale (SPS)

The scale developed by Cull and Gill (1988) to measure suicide risk is a 4-point Likert-type scale and consists of 4 subscales and 36 items in total. The scale consists of 4 subscales: hopelessness, suicidal ideation, negative self-evaluation, and hostility. The lowest and highest scores obtained from the scale are 36 and 144, respectively. High scores on the scale indicate a high risk of suicide. The scale was adapted into Turkish by Batıgün and Şahin (2018). Exploratory factor analysis and confirmatory factor analysis procedures were applied for the validity evidence. The Cronbach's alpha coefficient of the Turkish form of the scale was found to be .74. The Turkish version of SPS consisted of four subdimensions: self-perception, impulsivity, hopelessness, and suicide ideation. Within the scope of this study, only the sub-dimension of suicide ideation, which contains 7 items on a 4-point Likert-type scale (i.e., 0%, 30%, 70%, and 100%), will be used. In this study, the Cronbach's alpha coefficient was found to be .71 for the suicide ideation subscale.

Procedure

Data were collected by creating a survey package in Google Forms, which included all the instruments mentioned above. The online data collection method, held during the 2023-2024 Spring semester, was preferred because of its convenience, practicality, and ease of accessing a wider range of individuals from the targeted population. The participants were provided with information about the study's objectives and ethical considerations of anonymity, confidentiality, and the right to withdraw from the study. The only inclusion criterion was being above 18 years of age or older. No identifiable information was collected so as not to violate confidentiality.

Results

Preliminary Analysis

To conduct linear regression, several assumptions, including linearity, univariate-multivariate normality, and homoscedasticity, were checked, and no violation was observed except for multivariate normality. Seven individuals were excluded from the analysis due to the violation of multivariate normality. For the t-test, the assumptions of normality and Levene's test for homogeneity of variances were applied.

Main Analysis

A linear regression was applied using the JASP Team to test the study hypothesis (2019). Along with that, to investigate whether there is a statistically significant difference in suicidal thoughts among males and females, an independent samples t-test was utilized. To check the assumptions of the t-test, Levene's test for homogeneity of variances was applied, and the result was non-significant, F (1, 219) = .05, p >

FULL TEXTS BOOK

.05. The normality assumption was checked through skewness and kurtosis, which were found to be .03 and -1.29. Therefore, no violation has been found based on Hair et al.'s (2009) criteria.

Table 1 shows the results of linear regression analysis. The results indicated that the hypothesized regression model was significant, F (2, 218) = 31.06, $p < .05$, $R^2 = .22$. Additionally, religiosity significantly and negatively predicted suicidal thoughts ($\beta = -.46$, $p < .05$). Therefore, hypothesis 1 was supported. Gender did not have a significant impact on suicidal thoughts ($\beta = .09$, $p > .05$), although it was found that females reported relatively but not significantly higher scores in suicide ideation. Thus, hypothesis 2 was not supported. Religiosity explained 22% of the variance in suicidal thoughts. The results of the t-tests showed no significant difference between males ($M = 12.38$, $SD = 3.01$) and females ($M = 13.02$, $SD = 2.94$), in terms of their scores in suicide ideation, t (219) = 1.61, $p > .05$. For this reason, hypothesis 3 was not supported.

Table 1.

The Results of Linear Regression Analysis

	β	St. Error	t	p
gender	.09	.36	1.61	.11
religiosity	-.46	.04	-7.67	< .001*

Note: $p < .05$.

DISCUSSION AND CONCLUSION

The purpose of the current study was to investigate the effect of gender and religiosity on suicidal thoughts among a sample of university students. The predictor variables were gender and religiosity, and the outcome variable was suicidal thoughts. The findings revealed that religiosity was a significant predictor of suicidal thoughts, while gender was not.

The findings of the current study largely support the existing literature, indicating that divergent dimensions of religiosity have a protective role against suicidality. For instance, in a recent cross-sectional study conducted with 36,984 individuals, it was revealed that religiosity protects against suicide ideation and attempts after controlling the effect of various demographic variables such as age and gender (Saiz et al., 2021). In a similar vein, religiosity protects individuals against suicide ideation resulting from depression (Mosquerio et al., 2021), impulsivity (Caribe et al., 2015), and aggression (Ghossoub et al., 2022). It is well-known that religiosity is a multidimensional construct (Hayward, 2021). Some indicators of religiosity were reported to be participation in religious activities, degree of religious commitment, and importance of God in one's life. In a similar vein, suicide emerges as a multifaceted construct, encompassing suicide ideation, attempts, and completed suicides, all of which require different explanations (Klonsky et al., 2021). For instance, in a recent meta-analysis, religious affiliation and attending religious activities did not have a significant impact on suicide ideation, but religiosity has a protective role against suicide attempts (Lawrence et al., 2016).

Although the empirical evidence largely supports the buffering role of different dimensions of religiosity, it is important to understand by which means religiosity offers a protective role against suicidal behavior. With that respect, some argue that as Abrahamic religions put firm restrictions on suicide and the act is banned by fate (Gearing & Lizardi, 2008), individuals have a decreased inclination towards exhibiting suicidal behavior, including suicide ideation. Another explanation would be that religious communities offer a sense of belonging and social support (Cheng et al., 2000), the protective effect of religiosity might be an indirect one. Those studies imply that religion might prevent individuals from acting on suicidal thoughts by offering access to supportive communities, influencing beliefs and attitudes toward suicide, providing a source of hope, and providing alternatives for restructuring the

FULL TEXTS BOOK

suffering. Therefore, further research could delve into those mechanisms of how religiosity works within this relationship.

It is important to consider the complex relationship between religiosity and suicide, as the literature indicates that in some situations, religiosity is less likely to protect individuals against suicide (Zhao et al., 2012; Zhang et al., 2006). For instance, in some cases, adhering to a minority religion, being abandoned by the community or feelings of guilt as a result of religious doctrines might lead to social isolation (Lawrence et al., 2016). Within the scope of this study, all of the participants reported that they belonged to a majority religion. Therefore, one reason why religiosity has a protective role could be related to the fact that all participants did not suffer from feelings of exclusion as a consequence of any minority religion they believe in.

As previously argued under the term of 'gender paradox in suicide', the results of t-tests were in line with the literature indicating that women are more prone to engage in non-fatal suicidal behavior, such as suicide ideation (Canetto & Safinofsky, 1998), although the difference was not significant at the pre-determined probability level within the scope of this study. One reason behind this result could be the result of differences in the help-seeking behavior of men and women because females are more likely to seek help and share their thoughts, while men only seek help when they are in crisis (Freeman et al., 2017).

LIMITATIONS

Some limitations of the current study are worth mentioning. As the correlational method was used, causal inferences cannot be made. This limitation might partly be overcome by using experimental and longitudinal designs. The second limitation is related to generalizability, as the sample consisted of college students residing in two cities. Therefore, it is not possible to generalize the findings to college students in Turkey. Furthermore, as college students were the main data source, the findings cannot be generalized to other developmental periods. To overcome this, the same study can be designed using different samples. In addition, using self-report instruments might have invited social desirability bias.

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MUSICAL IMPROVISATION, TURKISH MUSIC, AND SOCIAL STRUCTURE: A PHILOSOPHICAL DISCUSSION

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ABSTRACT

Musical improvisation, the spontaneous creation of music within or beyond established frameworks, serves as a profound mode of artistic expression and social interaction. In Turkish music, improvisation plays a dormant yet powerful role, surfacing as a critical element of personal and cultural identity through practices such as taksim (instrumental improvisation) and gazel (vocal improvisation). This paper examines the philosophical dimensions of improvisation in Turkish music and its interplay with social structure.

The dormant role of improvisation in Turkish music reflects a balance between tradition and individual expression, where musicians navigate and renew cultural norms. This contrasts with the overt and communal nature of improvisation in other cultures. For example, in Indian classical music, raga improvisation emphasizes spiritual and emotional exploration, reinforcing social hierarchies within the guru-shishya (teacher-student) tradition. West African drumming involves communal improvisation that strengthens social bonds and collective identity. In jazz, improvisation signifies individual freedom and innovation within a collaborative context, often challenging and redefining social boundaries.

The paper also explores how improvisational training impacts various forms of intelligence. Emotional intelligence is developed through the expressive and responsive aspects of improvisation, fostering empathy and self-awareness. Social intelligence benefits from the collaborative nature of musical interaction, enhancing communication and teamwork skills. Cultural intelligence is cultivated by engaging with and internalizing diverse musical traditions, promoting respect and appreciation for cultural diversity. Creative intelligence is stimulated by the necessity to innovate within or beyond established frameworks, enhancing problem-solving abilities and original thinking.

The purposes of this paper are to: (1) analyze the dormant yet significant role of improvisation in Turkish music and its reflection of social structures; (2) compare the pedagogical approaches to improvisation across different cultures and their impact on emotional, social, cultural, and creative intelligence; (3) investigate the philosophical underpinnings of improvisational practices and their influence on individual and collective identities; and (4) explore the potential transformative effects of improvisational training on personal development and community cohesion.

Keywords: Musical Improvisation, Turkish Music, Social Structure, Cross-Cultural Comparison, Music Pedagogy.

INTRODUCTION

Musical improvisation is simply defined as the art of spontaneously creating and performing music or the art of composing on the fly. In other words, the improvising musician or musicians create and compose on the fly, consciously or unconsciously, drawing on a lifetime of theoretical knowledge and accumulated aural memories. Of course, learned theoretical knowledge and accumulated aural memory here means that there is a limit to the spontaneity of improvisational practice (Sawyer, 2006). In this respect, it is not a completely unproblematic concept; it is open to discussion, but thinking about what improvisation is not can be helpful at this point. In this respect, music with a notation, where the performer plays what has already been written by a composer or himself, is not considered improvisation. Nor can improvisation be defined as just any musical performance that is not performed from a notation, because although unwritten, there are songs in many musical traditions that are

FULL TEXTS BOOK

structured and have reached a certain standard in terms of the way they are performed. The performance of such songs, in which the performer and the listener are aware of the progression, also does not fall under the category of improvisation. Therefore, improvisation is a form of performance that has a certain degree of spontaneity, where there is very limited predictability about what will happen in the musical field and is shaped by the instant decisions of the performer or performers.

WORLD MUSIC CULTURES AND IMPROVISATION

Improvisation, which anthropologists and ethnologists today tend to view as a profound form of artistic expression and social interaction, still plays a very important role in a large part of the world's musical cultures and is recognized as a dynamic and integral component of musical expression, cultural identity and social interaction (Nettl, 1998). For example, in the music of Pakistan, Bangladesh and especially in the music of northern India, known as Hindustani as a cultural region (Indian Classical Music), performance is based almost entirely on improvisation. The idea that a piece of music is something that cannot be changed and must always be performed in the way the composer intended does not really apply in the music of this region (Clayton, 2000). For example, from the point of view of an Indian musician whose job it is to improvise within certain melodic and rhythmic rules, the way any piece of western music is performed is uninteresting because it takes away the opportunity to be creative, as it requires them to perform an existing piece exactly as it is notated and as it has been played many times before. In this musical culture it is very hierarchical in terms of the high level of authority of the master teacher called guru, but here improvisational performance is seen as a spiritual and emotional exploration that reflects the musician's inner journey and mastery of the art form. At the same time, the fact that composition is a form that can only be performed once can be considered one of the factors that increase musical diversity.

In Africa, especially in West African drumming traditions, improvisation is a collective activity that strengthens social bonds and collective identity. Drumming ensembles often include question-and-answer patterns in which the lead drummer improvises, and the rest of the ensemble responds, creating a dynamic and interactive performance (Locke, 1998). Again, within today's social science paradigm, anthropologists often state that this form of improvisation reflects social structure by emphasizing collaboration, communication and shared cultural values.

Although it has lost its effectiveness today, improvisational composition was an important part of formal music education in Europe, especially in the early modern era. For example, in music schools and conservatories in Naples in the 17th and 18th centuries, students were required to spend three years memorizing numerous melodies, known as *solfeggi,* to build the melodic aural memory necessary for future keyboard improvisation and composition lessons. These memorized melodies were transferred to improvisation and composition training through keyboard-based exercises called *partimenti* (Sainsbury, 1824).

Interestingly, a similar method, which once formed the basis of music pedagogy in western Turkey, is still used today in eastern Turkey, in Iran. Iranian Classical Music today, where the strict role of memorization is still emphasized, is largely improvisational and the compositional activity is based on the memorization by the musicians of short pieces or melodies (in Italy they were called *sofeggi*), called *gushe*, ranging from 15 seconds to two minutes in length, as in 17th and 18th century Italy. A song played in a modal system called *dastgah* begins with an introductory *gushe*, and then improvises in a specific order, moving through various *gushe* evoking different moods. Since musical performance is based on the idea of recreating tradition in a unique way, musicians never perform from sheet music because each performance is considered a spontaneous expression by the musician.

FULL TEXTS BOOK

In North America, jazz is a performance genre and a way of producing music that is dominated by improvisation from beginning to end, and in fact, it is this aspect that has managed to arouse curiosity all over the world and has become almost representative of world music today. In jazz music, which emerged in African-American communities and became a symbol of cultural resistance and creativity, musicians often develop motifs or short musical phrases during their solos, often use chord changes and chord extensions to add color and complexity to their performances, use a question-and-answer technique that creates a sense of dialogue by presenting musical phrases to each other as a way to create interaction and spontaneity within the group, and place accents on parts of the music that are not expected to be emphasized (syncopation), they can construct their improvisations by using multiple rhythms in which several contradictory rhythms are played at the same time, creating rhythmic variations aimed at creating a sense of surprise and excitement, exchanging solos between musicians every 4 or 8 measures to encourage listening and responding, spontaneously developing and structuring a theme during their solos, or applying spontaneous composition techniques that allow complete freedom to create music without following traditional harmonic or rhythmic structures, and many other techniques (Johnson-Laird, 2002). These improvisational techniques are an integral part of jazz, and according to music anthropologists, improvisation in jazz music allows musicians to express their individuality while contributing to the collective sound (Berliner, 1994). In this sense, jazz improvisation is interpreted as a way of balancing structure and freedom, tradition and innovation, individual expression and group interaction.

Jazz, which spread from North America to the rest of the world, led to the revival of musical improvisation, which had lost its importance in the pedagogical system in Europe, as a performance method in this continent after the second half of the 20th century. On the other hand, this improvisational wind blowing from the west, the east and across the Mediterranean has not yet reached the world of music production in Turkey and has not yet been felt enough to trigger the improvisational culture that already existed in Turkey's historical and cultural geography but was in a kind of hibernation.

IMPROVISATION IN TURKISH MUSIC

In classical Turkish music, improvisation has historically played a critical role through forms such as taksim (instrumental improvisation) and gazel (vocal improvisation). These practices have historically allowed musicians to delve deeper into the maqamal system and express their individuality, while providing a space for creativity and innovation. Despite this, the importance given to improvisation in contemporary Turkish music education has greatly diminished.

ALAN LOMAX AND CANTOMETRICS

This research assumes that the concept of musical improvisation can lead us to some important insights into the nature of individual action, social action and creativity, and aims to understand and generate ideas about the interaction between the social structure and the actual and potential role of improvisation in Turkish music. Another point of departure for the research is Alan Lomax's (musician, folklorist, ethnomusicologist, archivist, author, academic, political activist, oral historian and filmmaker) 1960s global project called 'Cantometrics', which defines music as a social behavior. According to Lomax, song is the measure of culture, and with his Cantometrics project, he argues that songs and song performances are consistent with performances in social relationships. According to him, the most popular song style of a culture gives a clear idea of the social structure and accepted behaviors of that culture.

Lomax's method begins by gathering samples from 400 different cultures from all over the world, collected by anthropologists and folklore researchers, of 10 different song performances that are considered to best represent that culture. Then a group of experts, trained by him, analyzes each song

FULL TEXTS BOOK

and performance sample according to 36 different parameters: melodic form, volume, ornamentation, vocal quality, rhythmic structure, choral and orchestral organization, the way the performers come together, lyrics, etc. As the table roughly shows, he categorizes the most popular song styles of the culture in terms of melodic form, loudness and softness, ornamentation, rhythmic structure, choral and orchestral organization, the way the performers come together, lyrics, etc. Using statistical analyses of this data, he generates theses about song structures and the social structures of the community that produces them. For example, he argues that the narrower and smaller the intervals between pitches in the music of a community, the more social stratification there is in that community. He bases this hypothesis on the following point: In the case of frequent references to higher and lower statuses, interpersonal interaction becomes more difficult and restricted, and therefore much more careful and small steps are taken. Lomax's ambitious and controversial method, which he put forward as a universal theory for understanding music and its relationship with society, was not well received in the late 1960s, as comparative methods were being abandoned and the idea that each culture had its own unique evolution was gaining ground. For this reason, in an academic environment dominated by research on the profound differences even within each culture, Lomax's method was criticized for being too generalizing.

Although ethnomusicologists and music anthropologists today do not necessarily agree with Lomax's view that the relationship between song style and social style is predictable, they do believe that music is a social behavior and that the relationship between music and other social behaviors can be demonstrated through rigorous ethnographic study. For example, the performance structure of North Indian classical music is in some ways like the hierarchical social system (caste system) of Indian society. In the musical tradition, some vocal singers come from a higher social group, while instrumental accompanists come from a lower social group. On the one hand, the soloist makes the concert arrangements and controls the organization and direction of the performance, on the other hand, he or she usually showcases his or her own talent and determines the remuneration of the accompanists.

However, after Lomax's death in 2002, there has been a revival of interest in Cantometrics and the possible parallelism between societies' musical practices and their social structures, and new kinds of studies have emerged. This study is one of them, and its main argument assumes that if social structure feeds and shapes music, music can feed and shape social structure, and in this context, it specifically examines the concept of musical improvisation. Despite the general acceptance that the relationship between social structure and musical improvisation is complex and multifaceted, recent studies on the possible relationships between musical improvisation and social structure, based on findings from various music workshops, case studies and projects, frequently mention the main effects of musical improvisation such as initiating constructive dialogues between people, creating an inclusive, heterogeneous approach, countering the dichotomy of 'inclusion' and 'exclusion' and facilitating collaboration processes, facilitating intercultural dialogue and fostering a sense of social inclusion (Schroeder et al. 2019).

MUSICAL IMPROVISATION AND SOCIAL STRUCTURE

This research, especially in the light of these studies, suggests that the relationship between musical improvisation practices and training and social structure in any society can be addressed under 4 main headings. For example, in many cultures, musical improvisation is transmitted through oral traditions and master musicians teach apprentices. This structure both reflects and reinforces existing social structures. On the other hand, improvisation often reflects the cultural values and social realities of a community (Cobussen, 2008). For example, improvisational forms in African American jazz express themes of freedom and flexibility, while improvisation in Indian classical music often explores spirituality and emotional depth. The research examines these points under the heading 'Cultural

FULL TEXTS BOOK

Context and Tradition'. On the other hand, in societies with hierarchical structures, the role of improvisation can be tightly controlled. For example, in classical Indian music, on the one hand improvisation is encouraged, but on the other hand strict adherence to rules within a system of melody and rhythm that reflects respect for tradition and authority is expected. In more egalitarian societies, improvisation allows all participants to contribute equally to the performance. This is seen in some folk traditions and in genres such as jazz, where collective improvisation often becomes a dialog between musicians. In terms of community and identity, improvisation can strengthen community bonds by enabling members to participate in a shared cultural practice. This is often seen in West African drumming practices where communal improvisation reinforces social cohesion and cultural identity. Improvisation also allows individuals to express their unique identities within a social context. In this improvisational practice, seen in many musical traditions, personal expression and individual creativity are balanced between collective performance and group dynamics. Finally, improvisation can be a vehicle for social change by challenging and transforming traditional practices. Musicians who innovate within or beyond established norms can influence broader cultural shifts. Also, as societies change, so do musical practices. Improvisation helps music adapt to new social realities through the incorporation of new technologies, blending different musical traditions or responding to political and social movements.

CONCLUSION: REDISCOVERING IMPROVISATION IN TURKISH MUSIC

Under these titles, when we consider how social norms, values and hierarchies shape musical practices and how they can be shaped by musical practices, the possible results of systematically reintegrating improvisation into Turkish music performance practices and education can be summarized as follows: The awakening of improvisation, which has been dormant in Turkish music, may mean the reawakening of the structure and values of society. Music is an important part of social and religious gatherings, and improvisation adds a personal touch and a layer of authenticity to these events. This reflects the social hierarchy where respect for tradition coexists with individual expression and innovation. Improvisation in Turkish music, as in many other musical traditions, is closely linked to notions of authenticity (Blum, 2001). The ability to improvise effectively within the framework of traditional forms is seen as a sign of a musician's deep understanding and mastery of the musical system. In this respect, this interplay between improvisation and authenticity may reignite the tension between preserving tradition and encouraging innovation. Improvisation training in Turkish music has profound transformative effects on both musicians and listeners. Musicians develop a deep understanding of the cultural and emotional nuances of music, developing a strong sense of identity and belonging. Listeners, in turn, experience a sense of connection and continuity with their cultural heritage. The effects of improvisation training on emotional, social, cultural and creative intelligence can have transformative potential for both individuals and communities. The practice of improvisation, which allows musicians to blend elements from different regional musical styles, can have significant potential to reflect the cultural, ethnic, religious and linguistic diversity in and around Turkey and the rich cultural heritage of the geography, enriching and enhancing intercultural dialogue.

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FULL TEXTS BOOK

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FULL TEXTS BOOK

ENDÜSTRİ ALANLARININ YENİDEN KULLANIMINA YÖNELİK BİR ÇALIŞMA : ZONGULDAK ÖRNEĞİ

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ÖZET
Endüstriyel alanların endüstri mirasına dönüştürülmesi, kültürel değerlerin korunması ve gelecek nesillere aktarılması açısından hayati önem taşır. Bu dönüşüm, geçmiş sanayi devrimlerinin izlerini taşıyan yapıların yaşatılmasını sağlar. Ayrıca, turistik cazibe merkezleri olarak kullanılarak bölgeye turizm geliri getirir ve ekonomik canlandırmaya katkı sağlar. Zonguldak, Türkiye'nin en eski kömür madenciliği bölgelerinden biridir ve endüstriyel tarih açısından önemli bir mirasa sahiptir. Çalışma, bu alanların yeniden kullanımıyla ilgili stratejileri araştırarak, bölgenin ekonomik ve sosyal gelişimine katkıda bulunmayı amaçlamaktadır. Zonguldak'taki endüstriyel mirasın korunması ve sürdürülebilir bir şekilde değerlendirilmesi şehrin kalkınması ve gelişmesi için önemli bir adımdır. Zonguldak'ın endüstriyel mirasının korunması ve değerlendirilmesi, yerel halkın katılımı ve desteklenmesi ile daha etkili hale gelebilir. Bu alanların yeniden kullanımı, atıl durumda olan alanların ekonomik ve sosyal açıdan yeniden canlanmasını sağlayarak toplumun kalkınmasına da destek olmaktadır. Bu geçmişin hatıralarını canlı tutmanın yanı sıra turistik ve kültürel cazibe merkezleri oluşturarak bölgeye turist çekme potansiyelini artırır. Ayrıca, bu tesislerin yeniden kullanımıyla yeni iş imkanları yaratılabilir ve bölgenin ekonomik canlanmasına katkı sağlanabilir. Zonguldak'ın endüstriyel mirasını korumak ve gelecek nesillere aktarmak için yapılan çalışmaların etkisi ve başarısı, hem tarihi ve kültürel zenginliğin korunmasına hem de bölgenin turizm potansiyelinin artırılmasına katkı sağlayabilir. Bu çalışmaların sürdürülebilirliği, Zonguldak'ın endüstriyel mirasının uzun vadeli korunmasını sağlayacaktır.
Anahtar Kelimeler: Zonguldak, Endüstriyel Miras, Sürdürülebilirlik, Sanayi

ABSTRACT
Transforming industrial areas into industrial heritage is vital for preserving cultural values and transferring them to future generations. This transformation ensures that structures bearing the traces of past industrial revolutions are kept alive. Additionally, they are used as tourist attractions, bringing tourism income to the region and contributing to economic revitalization. Zonguldak is one of the oldest coal mining regions in Turkey and has an important heritage in terms of industrial history. The study aims to contribute to the economic and social development of the region by investigating strategies for the reuse of these areas. Preserving and sustainably utilizing the industrial heritage in Zonguldak is an important step for the development and development of the city. Preserving and utilizing Zonguldak's industrial heritage can become more effective with the participation and support of local people. The reuse of these areas also supports the development of society by ensuring the economic and social revitalization of idle areas. In addition to keeping memories of the past alive, this increases the potential to attract tourists to the region by creating tourist and cultural attractions. Additionally, by reusing these facilities, new job opportunities can be created and contribute to the economic revitalization of the region. The impact and success of the work carried out to preserve Zonguldak's industrial heritage and transfer it to future generations can contribute to both preserving the historical and cultural richness and increasing the tourism potential of the region. The sustainability of these works will ensure the long-term preservation of Zonguldak's industrial heritage.
Keywords: Zonguldak, Industrial Heritage, Sustainability, Industry

FULL TEXTS BOOK

GİRİŞ

İnsanlar, yaşamları boyunca çeşitli nedenlerle bulundukları yerden başka yerlere taşınmışlardır. Bu hareketler bazen bir gereksinimden, bazen de merak ve keşif arzusundan, yeni yerler görme, bu yerler hakkında bilgi edinme ve belki de yeni yerler keşfetme isteğinden kaynaklanmıştır (Varlıklı 2023). Bu tür geziler ve seyahatler zamanla turizm olarak adlandırılmaya başlanmış ve niteliklerine göre çeşitli türlere ayrılmıştır (Uzun 2009).

Turizm sektörü birçok ülkede olduğu gibi Türkiye'de de işsizliğe, cari açığa ve diğer ekonomik sorunlara çözüm olduğu için ilgi duyulan sektörlerden biri haline gelmiştir Varlıklı 2023). Diğer ülkelere kıyasla Türkiye, bulunduğu coğrafi konumu, doğal kaynakları, tarihi yapısı ve aynı anda farklı iklim çeşitlerini ülke içerisinde barındırması nedeniyle turist çekme potansiyelinin en yüksek olduğu ülkeler arasına girmektedir (Aslan, 2014: 363-372). Günümüzde, insanların isteklerine, zamanlarına, ilgi alanlarına, kişiliklerine ve yaşlarına göre çeşitli turizm alternatifleri gelişmektedir. Turizmin çeşitlenmesi, Türkiye'deki mevcut ve gelecekte turizme açılacak alanların, doğal güzelliklerin değerlendirilmesi açısından büyük önem taşımaktadır. Bu temel hususlar etrafında, alternatif turizm kavramının anlamı duruma göre değişiklik göstermektedir. (Ulusan 2009).

Sanayi Devrimi'nin başlangıcı olarak kabul edilen 18. yüzyılda İngiltere'de başlayan ilerlemeler, kısa sürede dünyaya yayıldı. Ancak, 20. yüzyılın ikinci yarısından itibaren başlayan çevrecilik hareketi, eski sanayi tesislerinin çevreyi kirletme eğilimlerini azaltacak modern tesislere yer açmaya yönlendirdi. Bu yenilikçi hareket, birçok üretim tesisi ve fabrikanın kapanmasına neden oldu, ancak aynı zamanda daha sürdürülebilir üretim yöntemlerinin benimsenmesine de öncülük etti. (Ćurčić ve ark., 2015).

Endüstriyel miras, tarihi, teknolojik, sosyal, mimari ve bilimsel açıdan değer taşıyan endüstriyel kültür kalıntılarından oluşur. Bu kalıntılar, binalar ve makineler, atölyeler, imalathane ve fabrikalar, maden ocakları, işleme ve arıtma tesisleri, depo ve kilerler, enerji üretim, nakil ve kullanım alanları, taşıma altyapıları, çeşitli tarzlarda inşa edilmiş konutlar, ve endüstriyle ilgili sosyal etkinlikler için kullanılan ibadet ve eğitim yerleri olarak tanımlanabilir (TMMOB, 2006; Elhan, 2009:12).

Alternatif turizm faaliyetlerinden biri olan endüstriyel miras turizmi, atıl durumdaki endüstriyel varlıkların yeniden canlandırılması ve turizme kazandırılmasıyla sürdürülebilir turizm düşüncesini merkezine alan bir turizm türüdür (Xie, 2015). Son dönemde, endüstriyel miras alanlarına artan ilgiyle birlikte, endüstriyel miras turizmi önemli bir turizm şekli haline gelmiştir (Kaya & Yılmaz, 2018). Bu akım, kısa süreli yoğun turistik faaliyetlerin ortaya çıkmasına neden olurken, taşıma kapasitesinin aşılması gibi durumlar sebebiyle doğaya ve yenilenemeyen kaynaklara ciddi zararlar verdiği de zamanla anlaşılmıştır. Bu nedenle, destinasyonların taşıma kapasitesini aşmayan ve yıl boyunca devamlılık arz eden turizm faaliyetlerinin hedeflendiği sürdürülebilir turizm türlerine yönelik bir eğilim oluşmaya başlamıştır (Albayrak, 2013; Hacıoğlu & Avcıkurt, 2008).

Bu kapsamda, endüstriyel kentlerin turizm yoluyla yeniden canlandırılma olanaklarının tartışıldığı (Mansfeld, 1992), bu destinasyonların pazarlama politikalarına odaklanarak şehirlerarası kıyaslamaların yapıldığı (Bramwell & Radwing, 1994), endüstriyel turizm potansiyelinin sürdürülebilir turizm çerçevesinde ele alınarak spesifik alanlarda değerlendirmelerin yapıldığı ve endüstri mirasının özelliklerinin geliştirilmesine yönelik çalışmaların ağırlık kazandığı gözlemlenmektedir (McMahon, 1998; Pozo & Gonzalez, 2012).

MATERYAL ve METOT

Materyal

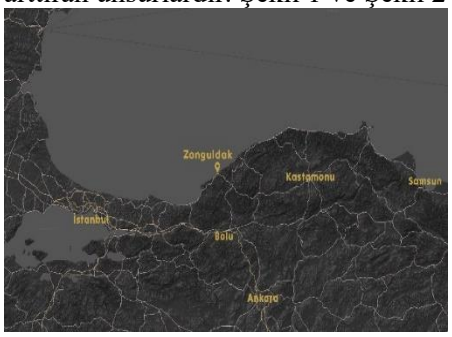
Zonguldak; Türkiye'nin Batı Karadeniz Bölümünde, Karadeniz'e kıyı olan ve Türkiye'nin sanayileşme sürecinde oldukça önem arz eden bir kenttir..

Zonguldak'ın endüstriyel tarihi, 1829'da taş kömürünün bulunması ve yaklaşık 1838 yıllında madencilik çalışmalarının başlamasıyla şekillenmiştir. Zengin taş kömürü yataklarının bulunması, demir-çelik endüstrisi ve madencilik faaliyetlerinin büyük ölçüde gelişmesini sağlamıştır. Zonguldak'ın köklü

FULL TEXTS BOOK

endüstriyel geçmişini, kömür havzaları, kömür hazırlama ve yıkama tesisleri, yeraltı siloları, demir yolları, trenler, konveyör bantlardan oluşan ulaşım ağları, limanlar, maden ocakları, sanayi yapıları ve çeşitli üretim alanları açıkça ortaya koymaktadır (Köşker & Özbey, 2022).

Çalışma alanı Batı Karadeniz'de Bölgesinde bulunan Zonguldak ilinde, Zonguldak il merkezinde yer alan 'Lavuar Alanı' , 'Üzülmez Maden Ocağı' ve 'Asma Maden Ocağı' olarak görülmektedir. Lavuar alanı ise atıl alan olarak kalmaktadır. Bu kapsamda şehir merkezinde yer alan Üzülmez ve Asma ocakları aktif olarak çalışmaktadır. Şehir merkezinde yer alan bir diğer alan olan Lavuar Alanı atıl bir halde yer almaktadır. Bu seçilen alanların şehrin merkezinde bulunması, kolay erişimi olması, endüstriyel tarihi yapıların bulunması, yaşam alanlarına yakın olması ve turizm potansiyelinin olması; alanın önemini arttıran unsurlardır. Şekil 1 ve Şekil 2'de çalışma alanının konumu görülmektedir.



Şekil 1.



Şekil 2.

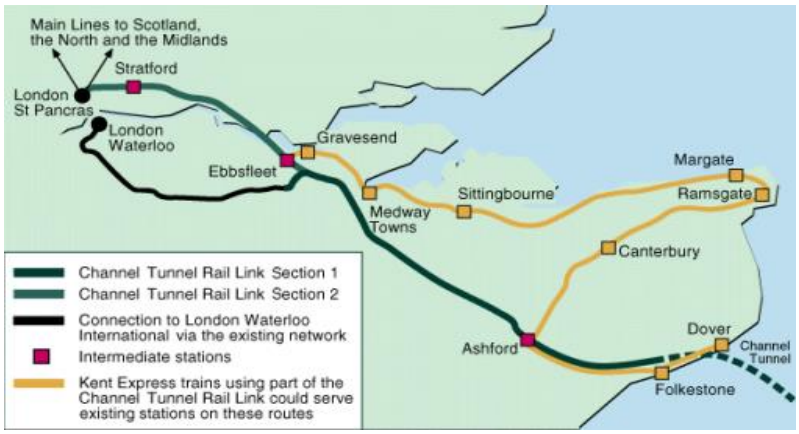
Metot

Çalışma alanı içerisinde yerinde gözlem ve araştırmalar yapılmıştır. Konu hakkında literatür taraması yapılarak bulgulara ulaşılmıştır. Ayrıca uzmanlar (mimar, mühendis, sanat tarihçi, şehir plancı)ile yüz yüze görüşmeler gerçekleştirilmiştir.

ARAŞTIRMA VE BULGULAR

1. Londra Kings Cross Bölgesi

İngiltere/London'da bulunan King's Cross bölgesinin 1850 yılında inşa edilen yapılar tarihi kömür depoları olarak hizmet vermekteydi. The Kings Cross/St. Pancras bölgesi, on dokuzuncu yüzyılın ortalarından beri Londra'nın merkezinden İngiltere'nin bir demiryolu ulaşım merkezi olmuştur. Manş Tünelinin duraklarından biri olan Kings Cross Demiryolu Durağı, yüksek hızlı demiryolu bağlantısı Avrupa Kıtasını Londra'nın merkezine bağlamak için 2001-2007 yılları arasında inşa edilmiştir. Yüksek hızlı demiryolu bağlantısı ile bölgenin yoğunluğu artarak bir kentsel dönüşüm projesine ihtiyaç duyulmuştur. Bölgenin eski itibarını kazanması ve şehir içinde kalan bir endüstriyel, tarihi mekân olan alanın yeniden insanların kullanımına kazandırılması için 2008 senesinde dönüşümüne karar verildi (Haynes & Savage, 2006).



Görsel 3. Londradan Manş Denizine Tren Hatları

FULL TEXTS BOOK



Görsel 4. Kings Cross Bölgesi



Görsel 5. Yerleşim Planı

King’s Cross Dönüşüm Projesi, Avrupa'da gerçekleştirilen en büyük ve en kapsamlı dönüşüm projelerinden biri olarak tanıtılmıştır. Proje, adını uygulandığı bölgeden almaktadır. Kentsel Dönüşüm Projesi'nin sloganı, "KX'a mümkün olan en iyi geleceği vermek" olarak belirlenmiştir(Öztürk 2010).

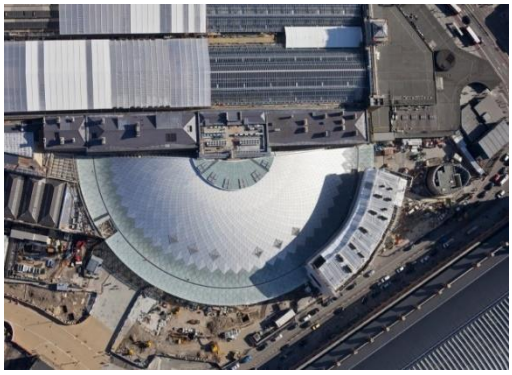


Görsel 6. Kings Cross Kentsel Dönüşüm Projesi

Sürecin uzaması , projenin sürekli değişmesi üzerine paranın, zamanın ve iradenin olduğu gelişmekte olan ülkelerde görülen tamamlanmamış inşaatları da hatırlatıyorlar. Projenin devam etme süresi çoktan doldu. Lakin proje yönetici firmalarının gücü İngiltere otoritesi ve onlar için çok büyük. Gelişmekte olan dünyaysa, geç modernizmin Avrupa toprağı için fazla otoriter olduğu düşünülen büyük planlarıdır (Ferguson, 2016).

FULL TEXTS BOOK

Yenilenmiş alanlar, yerel topluluğun ve ziyaretçilerin sosyal etkileşimlerine ve etkinliklerine ev sahipliği yapar hale gelmiştir. King's Cross bölgesinin endüstriyel dönüşümü, Londra'nın modern bir sembolü haline gelmiş ve şehirdeki diğer bölgeler için bir ilham kaynağı olmuştur. Bu dönüşüm, eski endüstriyel alanların yeniden canlandırılmasının ve şehir yaşamının çeşitlendirilmesinin mümkün olduğunu göstermiştir (Holgersen, 2007).



Görsel 7.



Görsel 8.



Görsel 9.



Görsel 10.

2. Ruhr Bölgesi

18. yüzyıl sanayi devrimi sonrasında hızlı bir şekilde gelişen Ruhr Bölgesi'nde bu süreç boyunca kömür alanları, madencilik ve çelik üretimi baş aktör olarak ön plana çıkmaktadır. Endüstriyel alanlar aynı zamanda Almanya için gelecekte ortaya çıkacak sorunlardan dolayı etkilerini çok hissedeceği göç gibi bir takım oluşumları da beraberinde getirmiştir. 19. yüzyıl boyunca Ostflucht göçü olarak bilenen Polonya başta olmak üzere Baltık kıyılarından (o dönem Batı Prusya) ve Silesia Bölgesi'nden (Çekoslovakya yakınları) aldığı işçi göçü 500.000 civarında olan nüfusunun 3,8 milyona yükseltmiştir (Haznedar 2008).



Görsel 11. Ruhr Sanayi Bölgesi / Essen Uydu Görüntüsü

FULL TEXTS BOOK

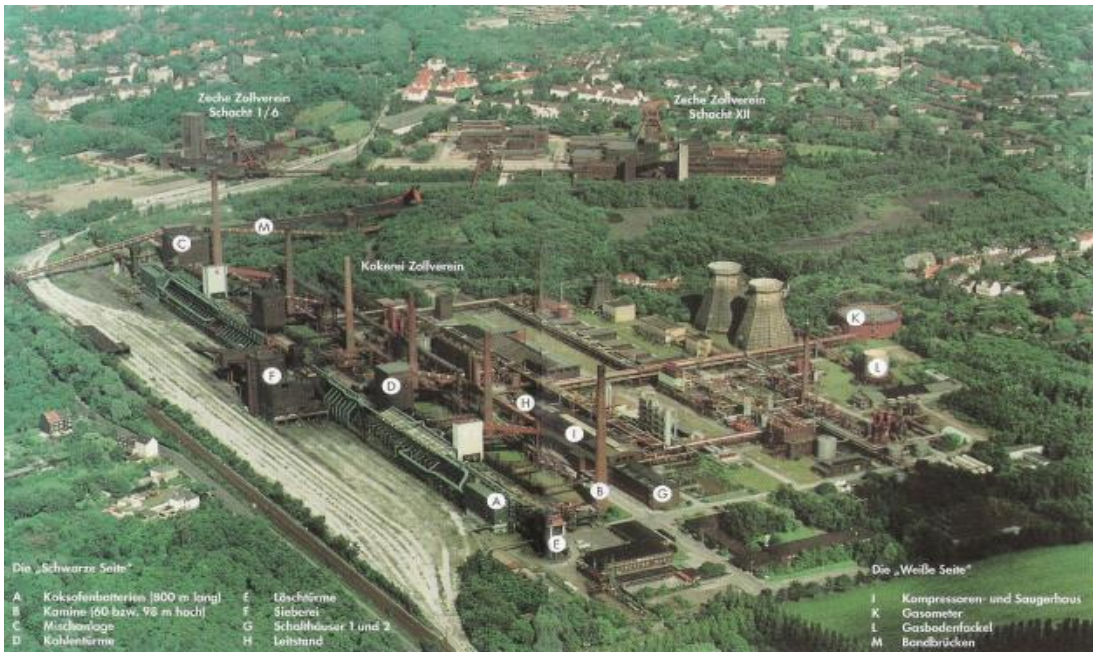
Essen kentinin kuzeyinde bulunan Zeche Zollverein, büyük ve işlevini yitirmiş bir kömür işleme endüstriyel kompleksidir. 100 hektarlık bir alanı kaplayan bu yapılar, 1847'de üretime başlamış ve büyük kömür kuyularını içermektedir. 1986 yılında son kömür ocağının kapanmasıyla birlikte, kompleks faaliyetlerine son vermiştir.

Maden kuyuları ve tesisleri, ana kok kömürü işleme tesisi, kömür siloları ve işçi yerleşkeleriyle 19. ve 20. yüzyıllarda kömürle faaliyet gösteren endüstrinin önemli kalıntılarından biri olan Zeche Zollverein, kömür ve çelik endüstrisinin hem sosyoekonomik hem de estetik açıdan belirleyici olduğu bir dönemi temsil etmektedir. Bu kompleks, bölgedeki kültürel dönüşümün önemli bir sembolü olarak günümüzde varlığını sürdürmektedir (Can et al., 2022)



Görsel 12. Zeche Zollverein Sanayi Tesisi Uydu Görüntüsü

Maden kuyuları ile Kokerei Zollverein bölümleri bu dönüşüm çalışması kapsamında ele alınan Schupp ve Kremmer'in imzasını taşıyan dönüşüm projesi ise Rem Koolhaas'ın master planı çerçevesinde hayata geçirilmiştir. Aynı zamanda alan içerisinde fabrika yapısının dışında yeni yapılar da kurgulanarak eğitim işlevinin de projeye dâhil edilmesi sağlanmıştır. Bu yeni eğitim yapıları arasında Avrupa'nın en iyi mimarlık okullarından biri olarak gösterilen Sanaa'nın tasarladığı Zollverein Okulu da bulunmaktadır (Haznedar 2008).



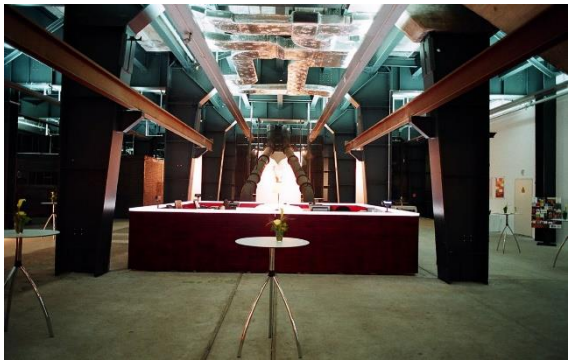
Görsel 13. Zeche Zollverein Endüstri Alanı Planı

FULL TEXTS BOOK

Zeche Zollverein kompleksi, kendisi başlı başına bir müze olmasının yanı sıra, içinde barındırdığı okul ve eğitim yapıları, sergi salonları, ofisler, restoranlar ve kültür merkezleri ile tarihle iç içe geçmiş bir ortam sunmaktadır. Bu rekreatif kullanım doğrultusunda oluşturulan yapılar, sadece bölgeye gelen ziyaretçiler için değil, aynı zamanda bölge sakinleri için de sıkça ziyaret edilen bir alan haline gelmiştir. Bölge, eski endüstriyel alanların rehabilite edilmesi ve yeşil alanlara dönüştürülmesi yoluyla çevresel iyileştirmeler yapmıştır. Ayrıca, yenilenebilir enerji kaynaklarına yönelik yatırımlar da artmıştır. Bu dönüşüm süreci, Ruhr Bölgesi'nin endüstriyel geçmişini geleceğe taşımayı ve bölgenin ekonomik ve sosyal yapılarını yeniden şekillendirmeyi amaçlamaktadır. Bölge, kültürel zenginliği, tarihi mirası ve yenilikçi yaklaşımıyla endüstriyel dönüşümün başarılı bir örneği olarak kabul edilmektedir (Dağ & Özberk, 2012).



Görsel 14.



Görsel 15.



Görsel 16.



Görsel 17.



Görsel 18.

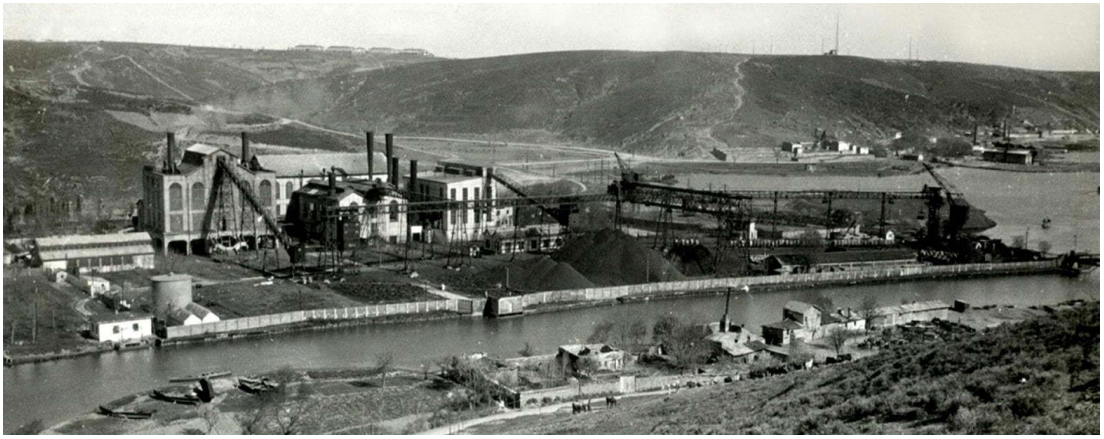


Görsel 19.

FULL TEXTS BOOK

3. Silahtarağa Elektrik Santrali

1980'lerin sonlarına doğru boş kalarak kaderine terk edilen Silahtarağa Elektrik Santrali'nin bir Enerji Müzesine dönüştürülme uğraşı, 1990lı yıllarda Eyüp Belediyesi vasıtasıyla başlatılmıştır. Kültür Bakanlığı İstanbul I Numaralı Kültür ve Tabiat Varlıklarını Koruma Kurulu, 2532 sayılı ve 6.3.1991 tarihli kararıyla santral yapılarının tescil edilmesine ve koruma kapsamına alınmasına karar vermiştir. Bölgenin endüstri müzesi işlevi görmesi amaçlanmış, Eyüp Belediyesi'nin 10.01.2002 tarihli Kültür Tesisi (Endüstriyel Müze, Teknoloji ve Bilim Merkezi) önerisi İstanbul Büyükşehir Belediye Meclisi tarafından kabul edilmiştir



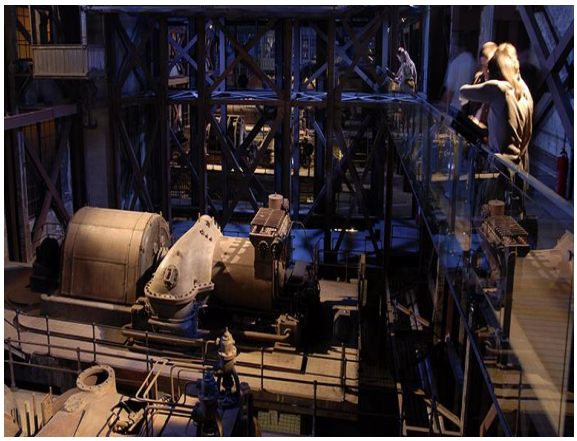
Görsel 20. Silahtarağa Elektrik Santrali, Haliç

2004 yılında Türkiye Cumhuriyeti Enerji ve Tabii Kaynaklar Bakanlığı tarafından 20 yıllığına İstanbul Bilgi Üniversitesi'ne tahsis edilen Silahtarağa Elektrik Santrali, 2005 yılında Koruma Kurulu onayını alarak, Birinci Ulusal Mimarlık Akımına uygun şekilde restorasyonu tamamlanmış ve 2007 yılında resmi olarak hizmete açılmıştır (Okandan, 2016, s. 40).

Silahtarağa Elektrik Santrali'nin restorasyon süreci, İstanbul Bilgi Üniversitesi'nin kurucuları arasında yer alan ve yönetim kurulunda yer alan iş insanı Oğuz Özerden tarafından başlatılmıştır (Kadak, 2005). 2004-2007 yılları arasında santral binasında kapsamlı yenileme çalışmaları yapılmış, yok olma tehlikesiyle karşı karşıya olan bu önemli yapı, İstanbul Bilgi Üniversitesi'nin katkılarıyla Türkiye'de kültür ve sanat alanında gerçekleştirilen oldukça kapsamlı dönüşüm projelerinden biri olarak insanların kullanımına sunulmuştur. Santralin açılışı 8 Eylül 2007'dir.



Görsel 21.



Görsel 22.

FULL TEXTS BOOK



Görsel 23.



Görsel 24.

4. Hasanpaşa Gazhanesi

İstanbul'da modern hayatın ilk görünümü, 19. yüzyılın ortalarında, Dolmabahçe Sarayı için inşa edilen Dolmabahçe Gazhanesi ile sokakların aydınlatılmasına başlanmıştır. Kadıköy Kurbağalıdere'deki Hasanpaşa semtinde inşa edilmesi kararlaştırılan Hasanpaşa Gazhanesi, 1891'de tamamlanmış olup, İstanbul'un son gazhane yapısıdır. Gazhane yapısı, 1939 yılında İstanbul Büyükşehir Belediyesi'ne, ardından 1945 yılında İstanbul Belediyesi Elektrik Tramvay Tünel İdaresi Genel Müdürlüğü'ne (İETT) devredilmiştir (Kavut ve Selçuk, 2022).

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Görsel 25. Kadıköy Hasanpaşa Gazhanesi Geçmiş Görünümü



Görsel 26. 2007 Uydu Görünümü



Görsel 27. 2022 Uydu Görünümü

Yaklaşık 130 yıllık tarihi ile Türkiye'nin önemli endüstriyel miraslarından biri olan bu örnek tarihi yapı, bir dönem İETT'nin otobüs garajı olarak kullanıldıktan sonra uzun yıllar kaderine terkedilmişti. Ancak,

FULL TEXTS BOOK

yıllar boyu süren kamu mücadelesi ile kurtarılan yapı, detaylı bir restorasyon sürecine tabi tutularak 9 Temmuz 2021 tarihinde İstanbul'a kazandırılan Müze Gazhane olarak yeniden açıldı.
Müze Gazhane, toplam 32 bin metrekarelik bir alan üzerine yayılmakta olup, İklim Müzesi, Karikatür ve Mizah Müzesi, Çocuk Bilim Merkezi, Afife Batur Kütüphanesi, Gazhane Galeri, geçici sergi alanı, sesli/sessiz çalışma alanları, İBB Şehir Tiyatroları'na ait iki tiyatro ve konser salonu, ve İstanbul Kitapçısı gibi birçok birimi barındırmaktadır. Ayrıca, kafe, restoran ve kapalı otopark gibi sosyal alanları da içermektedir. Tarihi alanın bahçesinde ise Haliç Tersanesi'nde atık materyallerden yapılmış heykelleriyle 7 heykeltıraşın eserleri ziyaretçileri karşılamaktadır [URL 2]. Hasanpaşa semti ve çevresindeki bölgelerden gelen ziyaretçiler için eğlence ve dinlenme alanı olarak kullanılan bu mekan, büyük kitlelerin katılımıyla gerçekleştirilen konser ve gösteri gibi etkinliklerde yoğun olarak kullanılmaktadır (Güneş, 2022).

SONUÇ VE ÖNERİLER

Zonguldak bölgesindeki endüstriyel yapılar, zamanla kullanımlarını tamamlayarak geçmişlerini yansıtmaktadır. Bazıları, tarihi ve kültürel değerlerin korunması için restore edilerek veya farklı amaçlar için yeniden kullanılarak bölgeye hizmet etmektedir. Örneğin, eski maden tesisleri müze veya turistik mekan olarak ziyaretçilere açılmıştır, böylece endüstriyel geçmişin yanı sıra bölgenin turizm potansiyelini de artırmıştır. Ancak, bazı yapılar bakımsızlık nedeniyle çürümeye terk edilmiş durumdadır ve bu durum hem bölgenin estetiğini olumsuz etkileyebilir hem de güvenlik riskleri doğurabilir. Bu yüzden, bu yapıların korunması ve uygun şekilde kullanılması, bölgenin kimliğinin ve geçmişinin bir parçası olarak büyük önem taşımaktadır.
Zonguldak il merkezinde atıl durumda bulunan Lavuar Alanı da bu potansiyel örneklerden biridir. Bu endüstriyel kalıntılar olan alanın düzenlenmesinde , endüstriyel miras kavramından yola çıkılarak yapılacak ağaıdaki iyileştirmeler öneri olarak sunulabilir;

- Halkın kullanımına açık peyzaj alanları
- Endüsri ürünleri ile iç içe, erişilebilir bir açık hava müzesi
- Tarihi demir yolu ve araçları ile ulaşım
- Deneyim merkezi oluşturulması
- Kömürün çıkarıldıktan sonraki kullanım aşamalarının kademeli olarak tanıtımı, yaşayan müze kavramından yola çıkılarak yapılacak bir müze
- Bölgede yapılacak çalışmalarla lansman toplantıları, kongreler, festivaller, konserler ve konferanslar

Sonuç olarak, Zonguldak'ta yer alan endüstriyel yapılar, bölgenin tarihini ve kültürünü yansıtan önemli unsurlardır. Bu yapıların korunması ve yeniden değerlendirilmesi, gelecek kuşaklara aktarılacak mirasın sürdürülebilirliği için kritik bir adımdır ve aynı zamanda turizm potansiyelini artırarak bölgenin ekonomik kalkınmasına katkı sağlayabilir.

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BIOFEEDBACK EĞİTİMİNİN ATLETİK PERFORMANSA VE PSİKOLOJİK İYİ OLUŞA ETKİSİ

THE EFFECT OF BIOFEEDBACK TRAINING ON ATHLETIC PERFORMANCE AND PSYCHOLOGICAL WELL-BEING

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ÖZET

Bu çalışma, biyolojik geri bildirim (BGB) yönteminin spor performansını artırmada etkili bir araç olarak kullanımını incelemektedir. BGB, elektronik cihazlar aracılığıyla vücut fonksiyonlarını izleyerek kişiye anlık geri bildirim sağlayan bir süreçtir. Bu süreç, sporcuların fiziksel ve zihinsel olarak optimal performans seviyelerine ulaşmalarına yardımcı olabilir. Araştırmalar, BGB'nin sporcularda stresi ve kaygıyı azaltarak otonom sinir sistemi dengesini geliştirebileceğini ve bu sayede atletik performanslarını artırabileceğini göstermektedir. BGB eğitimi, kas gerginliğini azaltmak, gevşemeyi kolaylaştırmak ve stresi optimum düzeyde tutmak gibi hedeflerle kullanılmaktadır. Bu eğitimlerde yaygın olarak elektromiyografik (EMG), elektrodermal aktivite (EDA) ve kalp hızı değişkenliği (KHD) gibi modüller kullanılmaktadır. Bu çalışma, BGB'nin sporcuların performansını artırmak ve kişisel gelişimlerini desteklemek için nasıl etkili bir şekilde kullanılabileceğini anlamamıza katkı sağlamaktadır. Sonuç olarak, BGB eğitimi, sporcuların hem fiziksel performanslarını hem de psikolojik iyi oluşlarını iyileştirmek için güçlü bir araç olarak değerlendirilmektedir. Bu yöntem, spor bilimleri ve psikoloji alanında daha fazla araştırmayı teşvik etmekte ve uygulamaların sporcuların genel iyilik halini artırma potansiyelini vurgulamaktadır.

Anahtar Kelimeler: Biyolojik Geri Bildirim, Performans, Spor

ABSTRACT

This study examines the use of biofeedback (BFB) as an effective tool for enhancing sports performance. BFB is a process that provides individuals with real-time feedback on their physiological functions through electronic devices. This feedback can help athletes achieve optimal physical and mental performance levels. Research indicates that BFB can reduce stress and anxiety in athletes, improve autonomic nervous system balance, and consequently enhance athletic performance. BFB training is employed with objectives such as reducing muscle tension, facilitating relaxation, and maintaining stress at optimal levels. Commonly used modules in these trainings include electromyographic (EMG), electrodermal activity (EDA), and heart rate variability (HRV). This study helps us understand how BFB can be effectively used to improve athletes' performance and support their personal development. In conclusion, BFB training is considered a powerful tool for enhancing both the physical performance and psychological well-being of athletes. This method encourages further research in sports sciences and psychology and highlights its potential to improve the overall well-being of athletes.

Keywords: Biofeedback, Performance, Sport

GİRİŞ

Sporcuların en iyi performanslarını gösterebilmeleri, özellikle olimpiyatlar gibi yüksek baskı altındaki durumlarda stres ve kaygılarını etkili bir şekilde yönetebilmelerine bağlıdır. Ancak bu tür stresli zamanlarda, yetenekli sporcular zaman zaman performans sorunları yaşayabilir ve gerçek potansiyellerini tam olarak ortaya koyamayabilirler (Davis ve Sime, 2005). Baskı altındayken

FULL TEXTS BOOK

sporcuların potansiyellerini başarıyla ortaya koymalarının temel faktörlerinden biri, kendi fizyolojilerini etkili bir şekilde kontrol edebilme yetenekleridir (Bertollo ve ark., 2013). Başarıya odaklı sporlar, uzun ve yoğun antrenman süreçleri nedeniyle sporcuların fiziksel ve fizyolojik stres düzeylerini artırarak, mental sağlık durumlarını olumsuz yönde etkileyebilmektedir. Bu süreçler, sporcuların zihinsel olarak da yıpranmasına ve bazı durumlarda psikolojik zorluklar yaşamalarına neden olabilir (Rice ve ark., 2016). Yüksek rekabetin yaşandığı sporlar, çeşitli iç ve dış faktörlerden kaynaklanan psikolojik stresi artırarak kaygı düzeyini etkileyebilir (Borkoles ve ark., 2018; Dziembowska ve ark., 2016). Bu sebeple, elit seviyede yarışan bir sporcu, performansını en üst düzeye çıkarmak için sadece yoğun antrenman yüklerinin etkilerine değil, aynı zamanda zihinsel ve psikolojik faktörlere de uyum sağlamayı öğrenmelidir (Walsh, 2018). Biyolojik geri bildirim yöntemi, çeşitli tekniklerin entegrasyonunu içermekle birlikte bu teknikleri EMG (Elektromiyografi), EEG (Elektroensefalografi) ve EKG (Elektrokardiyografi) gibi adlandırmak mümkündür ve spor ve egzersiz bilimlerinde bu yöntem perspektifinde farklı teknikler de kullanılmaktadır (Ash ve Zellner, 1978).

Son zamanlarda sporcular, atletik ve branşa özgü performanslarını geliştirmek için fiziksel antrenmanların yanında zihinsel antrenmanlardan da destek almaktadırlar (Rijken ve ark., 2016). Yapılan bu antrenmanlara BGB yöntemlerini de ekleyerek (deri ısısı, kalp aktivasyonu, EEG ölçümü) yapıldığı takdirde sporcuyu daha da teşvik edecektir (Shokri ve Nosratabadi, 2021). Belli bir seans sayısına ulaşıldığında "BGB antrenmanı" olarak adlandırılan bu teknik, klinik vakalarda olduğu kadar sporcularda da kaygı düzeyinin kontrolü, stres yönetimi ve atletik performansı geliştirmek için kullanılmaktadır (Deschodt-Arsac ve ark., 2018).

Bu çalışmada, biyolojik geri bildirimin ne olduğundan, spor ile ilişkisinden, bazı biyolojik geri bildirim araçlarından ve kullanım şekillerinden bahsedilmiştir. Son olarak da spor bilimleri alanında ne tür uygulamalar olduğu kısaca ele alınmıştır.

1. BİYOLOJİK GERİ BİLDİRİM (BİOFEEDBACK)

Geribildirim yani feedback kelimesi “Hatayı düzeltmek veya belirli bir isteğe uygun olarak çıkışı yeniden şekillendirmek için çıkışın kaynağa geri dönmesi veya karşılaştırma yapılması” anlamına gelmekle birlikte biyolojik geri bildirim, "Elektronik cihazlarla vücut fonksiyonlarını izleyen ve kişiye bilgi veren bir sistemdir. (Oğuz ve ark., 2004). Psikofizyoloji alanından benimsenen biyolojik geri bildirim yöntemi, kullanılacak olan tekniklerin düzgün bir biçimde uygulanmasıyla, sporcuların zihinsel ve fiziksel olarak optimal performans seviyelerine ulaşmalarına hazırlanabileceğine inanılmakta, bu uyum da sporcuların bedensel ve zihinsel olarak en iyi durumlarını elde etmelerini sağlar ve böylece performanslarını maksimize etmelerine yardımcı olur (Schwartz ve Andrasik, 2016). BGB'nin daha resmi olarak, 2008 yılında alanı temsil eden AAPB, BCIA ve ISNR tarafından onaylanarak; “BGB, bireyin sağlığı ve performansı geliştirmek amacıyla fizyolojik aktiviteyi nasıl değiştireceğini öğrenmesini sağlayan bir süreç” olarak tanımlanmıştır (Schwartz, 2010). Hassas cihazlar aracılığı ile kişinin fizyolojik aktivitesini ölçer. Bu cihazlardan sağlanan bilgiler kişiye, hızlı ve düzgün bir şekilde "geri bildirim" sağlar böylece kişide istenilen fizyolojik değişiklikler meydana gelir ve daha sonra kişi bunu benimseyerek cihaz olmadan istenilen durumu sürekli hale getirebilir (Schwartz, 2010).

Biyolojik geri bildirimin amacı, gönüllü kontrol veya biyolojik tepkilerin kendi kendini düzenlemesini teşvik etmek için stratejiler geliştirmek ve bu yeteneği günlük yaşamda herhangi bir cihaza ihtiyaç duymadan kullanabilmektir (Blumenstein ve ark., 1997). Bu amaç doğrultusunda da fizyolojik sinyal kaydı için çeşitli hassas elektronik cihazlar veya yöntemler kullanılarak geri bildirim alınır (Blumenstein ve Hung, 2016).

1960’lı yıllarda ortaya çıkan biyolojik geri bildirim kavramı, zihnin ve bedenin uyumunu incelemek adına oldukça önemlidir. İnsanların bedensel anlamda yapmış olduğu hareketlerden geri bildirim alarak davranışlarını değiştirmelerine yardımcı olmak için kullanılan bir yöntemdir ve uygulamalı psikofizyolojinin bir türü olarak görülebilir (Schwartz ve Andrasik, 2015). Yüzyılın sonuna doğru,

FULL TEXTS BOOK

insanların hem içsel hem de dışsal durumlarını gönüllü olarak kontrol edebilecekleri gözlemlenmiştir ve fizyoloji ile zihin/duygu arasında belirgin bir ilişki olduğu da saptanmıştır (Green ve ark., 1970). Bu keşifler, insanların duygusal ve fiziksel durumlarını yönetme yeteneklerine ilişkin anlayışımızı genişletmiştir (Green ve ark., 1970). Günümüze gelinceye kadar bu alanda oldukça geniş bir yelpazede araştırmalar yapılmış ve nörolojik geri bildirim ile de birleşerek klinik bir araç olduğu kanıtlanmıştır (Fisher ve ark., 2016).

1960'yılların sonlarında katılımcıların zihinsel aktivitesi (Kamiya, 1968), periferik deri sıcaklığı (Green, 1973), tek motorlu üniteler (Basmajian, 1972) bedenlerini ve zihinlerini istedikleri gibi yönlendirmeyi ve düzenlemeyi öğrenebilecekleri gösterilmiştir. Yapılan ilk araştırma çalışmalarında bazı EMG teknikleri kullanılarak kas gerginliğini düşürmeye yoğunlaşılmıştır (Croce, 1986; DeWitt, 1980; Zaichkowsky ve Kamen, 1978).

2000'li yılların başına kadar araştırmalar daha da genişletilerek çeşitli biyolojik geri bildirim metotları kullanılarak farklı spor branşlarının üzerinde çalışılmaya başlanmıştır ve sadece vücutta oluşan kas gerginliğine değil, derinin vermiş olduğu tepki, solunum ve kalp atım hızı da incelenerek çalışmalar genişletilmiştir (Blumenstein ve ark., 1995).

2. SPOR VE BİYOLOJİK GERİBİLDİRİM

Sporcular için oldukça yararlı olan BGB eğitimi, kişinin stres veya kaygı yaşadığında sempatik sinir sisteminin aşırı aktif hale gelmesini engelleyerek, otonom sinir sistemi dengesini geliştirmekle birlikte verilen bu eğitim, sporcuların sadece stres ve anksiyete ile başa çıkmakla kalmaz, aynı zamanda otonom ve somatik sinir sistemlerini etkili bir şekilde yönetmelerini öğrenmelerine de yardımcı olur (Paul ve Garg, 2012). Bu sayede, sporcular, zorlu rekabet ortamlarında daha sakin ve odaklanmış kalabilirler, performanslarını artırabilirler ve yaralanma riskini azaltabilirler.

Ülkemizde BGB eğitimlerinin spor performansı üzerinde etkisiyle ilgili çalışmalar sınırlıdır ancak dünya genelinde bu alandaki araştırmalar artmaktadır. Biyolojik geri bildirim eğitimleri kas gerilmelerini azaltmakla birlikte (Voerman ve ark., 2007), progresif antrenmanlarla gevşemeyi kolaylaştırarak (DeWitt, 1980) kaygı ve stresi optimum düzeyde tutmaya (Paul ve Garg, 2012) yardımcı olur. Bu açılardan bakıldığında öz-denetim ve öz-farkındalık için performansı olumlu yönde etkileyerek, bu becerilerin desteklenmesine katkı sağlar (Bar-Eli ve Blumenstein, 2004; Dupee ve ark., 2015; Morgan ve Mora, 2017; Perry, 2018).

Biyolojik geri bildirim, sporcu için psikolojik ve zihinsel durumun değerlendirilmesine katkı sağlar. Bir spor yarışması anında atletik performansın saptanmasında ve yapılan davranışın zihinsel ve duygusal yönlerinde önemi büyüktür. Araştırmalar, zihinsel hazırlığın olimpiyat sıralamasıyla güçlü bir istatistiksel ilişkiye kurduğunu göstermektedir (Bali, 2015). Ancak, yalnızca performans sporcuları tarafından değil, aynı zamanda rekreatif amaçlı spor yapan bireyler tarafından da kullanılmaktadır ve NGB'nin kazandırdığı öz bakım becerisi ve gelecekteki bakım ihtiyaçlarını kolaylaştırma potansiyeli, sadece bireylerin kendilerine değil, aynı zamanda potansiyel ailelerine de fayda sağlar (Kee ve Wang, 2008).

BGB eğitimlerinde, vücudun çeşitli noktalarına yerleştirilen sensörler veya elektrotlar aracılığıyla iç dinamiklere ilişkin veriler toplanarak kişinin hareketlerinin incelenmesi ve fizyolojik tepkilerin izlenmesi için kullanılır (Pusenjak ve ark., 2015). Elde edilen veriler, antrenörler ve sporcular tarafından analiz edilerek, sporcuların performanslarını anlık olarak izlemelerine ve hedeflerine ulaşmak için gerekli değişiklikleri yapmalarına yardımcı olur (Pusenjak ve ark., 2015). Yapılan bu uygulamada önemli olan, kişinin kendisiyle ilgili daha iyi bilgi edinmesi, farkındalığının artması ve içinde bulunduğu durumu dengeleyebilmesidir (Pusenjak ve ark., 2015). BGB ve NGB, her bedensel değişimin, zihinsel faaliyetler ve duygusal tepkilerle paralellik gösterdiği düşüncesine dayanılarak oluşturulur ve yapılan antrenmanlar ilerledikçe sporcular, hedefleri doğrultusunda kendi kendilerini düzenlemeyi

FULL TEXTS BOOK

öğrenebilirler (Levy ve Baldwin, 2019). Bu sebeple, sporcularda zihinsel antrenmanla birlikte BGB ve NGB sıkça tercih edilir (Blumenstein ve Orbach, 2018).

3. BİYOLOJİK GERİ BİLDİRİM ARAÇLARI

BGB eğitimi, sporcuların bedenlerinden ve zihinlerinden gelen bilgi veya geri bildirimlere dayanarak kendi performanslarını yönlendirme yeteneklerini geliştiren bir yöntem olmakla birlikte sporcuların hem fiziksel hem de zihinsel olarak kendi gelişimlerini takip etmelerine ve iyileştirmelerine olanak tanır, sporcuların kendi performanslarını değerlendirme ve gerektiğinde düzeltme becerisi, onların daha tutarlı ve etkili bir şekilde hedeflerine ulaşmalarını sağlar (Makaracı, 2022).

3.1 ELEKTROMİYOGRAFİK (EMG) GERİBİLDİRİM

Kas geribildirimi, kişinin kas aktivitesini gerçek zamanlı olarak ölçmek ve bu bilgiyi kullanarak kaslarını kontrol etmeyi öğrenmesini sağlayan bir biofeedback tekniğidir ve aşırı kas gerginliğinin azaltılması, stresin yönetilmesi ve gevşeme durumunun teşvik edilmesi gibi hedeflerle kullanılır (Sayın ve ark., 2010; Yılmaz ve ark., 2013). Bu eğitimde, genellikle elektromiyografi (EMG) sensörleri kullanılır. Bu sensörler, kaslardan gelen elektriksel aktiviteyi ölçer ve bu bilgi, kişinin geribildirim alması için bir görsel veya işitsel geribildirim aracılığıyla sunularak kişinin kaslarını istenilen düzeyde gerginleştirmeyi veya gevşetmeyi öğrenir (Van Deusen ve Angulo Kinzler, 2008).

Kas geribildirim eğitiminin temeli, bireylere belirli bir kas bölgesindeki gerginlik hakkında bilgi sağlamak ve bu kas gerginliğini kontrol etmeyi öğrenmelerini kolaylaştırmak amacıyla kişide oluşan aşırı ve uygun olmayan gerginliği gevşetmektir. Sensörler, değişimi hedeflenen kas üzerindeki deriye yerleştirilir ve vücudun farklı bölgelerindeki kaslar hedeflenebilir. Örneğin, alın ve üst omuz kas aktiviteleri, genel uyarılma ve kas gerginliğinin mevcut göstergeleridir (Arena ve Schwartz, 2003). Kaslardan yayılan sinyaller, aktivitenin yoğunluğuyla doğru orantılı olarak, görsel bir ekran veya sesli sinyal aracılığıyla kullanıcıya iletilir ve yorumlanarak poligrafik tarzda çizgi veya renklerle dönüt sağlar (Blumenstein ve ark., 2002). EMG eğitiminin hedeflerinden biri genellikle kriter belirlemektir. Örneğin, 2 mikro volt üzerindeki kas gerginliği gevşemiş olarak değerlendirilirken, 1 ile 2 mikro volt arasındaki değerler hafif gevşeme olarak kabul edilir ve 1 mikro volt altındaki değerler ise derin gevşeme olarak kabul edilir (Blumenstein ve ark., 2002).

3.2. ELEKTRODERMAL AKTİVİTE (EDA) GERİBİLDİRİM

Galvanik deri tepkisi veya deri iletkenliği olarak bilinen EDA, parmaklar üzerinden ölçülür ve derinin elektriksel iletkenliğini yansıtan bir ölçümdür (Blumenstein ve ark., 2002). Stres, duygusal uyarılmalar ve diğer psikolojik faktörler genellikle deri iletkenliğindeki değişikliklere neden olarak ter bezlerinden gelen sıvı miktarındaki artış veya azalışla ilişkilidir ve elektrodermal aktiviteyi ölçmek için kullanılan elektrotlar aracılığıyla algılanır (Blumenstein ve ark., 2002). Elektrodermal aktivite geri bildirimi, kişinin deri iletkenliğini görsel veya işitsel geri bildirim aracılığıyla izlemesine ve istenen bir duygusal durumu veya stres seviyesini elde etmeye çalışmasına yardımcı olabilir ve bu bağlamda, deri iletkenliğini ölçmek ve kişinin duygusal durumunu kontrol etmesine yardımcı olmak için kullanılır (Blumenstein ve ark., 2002).

EDA, mikro-Siemens biriminde ölçülür ve genellikle stresli zamanlarda artarken, gevşeme sırasında azaldığı gözlemlenir (Blumenstein ve ark., 2002). EDA sensörleri, genellikle tek başına kullanılmazlar, genellikle poligrafik yöntemlerde yardımcı parametre olarak kullanılırlar (Dolu ve ark., 2007). Biofeedback terapisinde ve duygusal durumun izlenmesinde, örneğin, bir kişi stresli bir durumdayken veya anksiyete hissettiğinde, deri iletkenliğinde artış gözlemlenebilir, EDA sensörü aracılığıyla ölçülerek kişinin stres seviyesini belirlemesine ve uygun stres yönetimi tekniklerini uygulamasına yardımcı olabilir (Blumenstein ve ark., 2002).

FULL TEXTS BOOK

Sporcuların uyarılma durumları arttığında, artan sempatik aktivite ter bezlerinde daha fazla nem salgılanmasına yol açar, bu da elektrodermal aktiviteyi arttırarak sporculardaki duygusal düzenleme yeteneğini belirlemek açısından etkilidir (Blumenstein ve ark., 2002). Bir sporcu duygusal durumunda değişiklik yaşadığında veya kaygı düzeyi arttığında, deri iletkenliği hızla etkilenebilir (Sime, 2003). Buradaki ani değişiklikler, performansı olumsuz etkileyebilecek şekilde deri iletkenliğini artırabilir (Blumenstein ve ark., 2002; Paul ve Garg, 2012).

3.3. KALP HIZI DEĞİŞKENLİĞİ (KHD) GERİBİLDİRİM

Sinüs hızının ani değişimleri veya ortalama kalp hızındaki dalgalanmaları belirli bir zaman diliminde açıklanabilen kalp hızı değişkeni, bu dalgalanmaların uyumlu bir şekilde olması şeklinde açıklanabilir (Ayyıldız, 2009). Bu uyum bazı durumlarda bozulabilmektedir. Buna ise, ritim bozukluğu denir (Kayacan, 2009). Kalp hızı değişkenliği (KHD) değerlendirmesinde en sık kullanılan ölçümler SDNN ve RMSSD'dir ve KHD genellikle kalp atış hızının yüksek seviyelerinde azalma gösterir, bu nedenle SDNN, RR aralığının bölünmesiyle bu etkiye karşı standart hale getirilebilir (Lehrer, 2012). Bir kişinin duygu durumunu stabil hale getirip sakinleştirilmesi sağlanılarak solunumu yavaşlatılabilir ve KHD arttırılabilir (Lehrer ve ark., 2013). Bu, sporcu için nefes alma hızını ve ritmini düzenlemeyi öğrenmeyi içerir, böylece daha fazla parasempatik sinir sistemi aktivasyonunu teşvik eder ve sempatik-parasempatik dengeyi iyileştirmeye yardımcı olur (Strack ve Gevirtz, 2011).

KHD, beyin ve kalp arasındaki koordinasyonu yansıtır, böylece beyin ve kalp arasındaki düzenleyici sinyallerin kalbin yanıt yeteneğini ölçmemize olanak tanır. (Berntson ve Cacioppo, 2004). BGB tekniklerinin kullanıldığı KHD eğitimi, sporcular için yarışma öncesi kaygıyı yönetme, stresi azaltma, özgüvenlerini artırma, duygusal dengeyi sağlama ve performanslarını iyileştirme konularında etkili olmaktadır (Edvardsson ve ark., 2012; Lagos ve ark., 2008; Sime, 2003).

Solunum Sensörü, insanın nefes hızını ölçerek ve hem karın hem de göğüs solunumunun göreceli derinliğini belirleyerek solunum aktivitesini detaylı bir şekilde izler ve kıyafetlerin üzerine giyilebilir (Grossman, 1991). Solunumun kalp atışlarını nasıl etkilediğini daha iyi anlamak ve solunumun stres seviyeleri, fizyolojik tepkiler ve duygusal durumlar gibi faktörlerle ilişkisini incelemek mümkündür.

3.4. TERMAL GERİBİLDİRİM

Termal geribildirim, genellikle parmaklar ve ellerdeki deri sıcaklığındaki değişimlerin işitsel veya görsel sinyallere dönüştürülmesidir (Blumenstein ve ark., 2002). Sensörler cilt bölgesine yerleştirildikten sonra sıcaklık verileri okunur ve anlık olarak yansıtılarak analizleri yapılı, işlenen veriler ise son olarak görsel veya işitsel olarak sunulur. Örneğin, bir ekranda renk değişiklikleri veya bir ses cihazından çıkan farklı sesler aracılığıyla kullanıcıya bilgi iletilir (Blumenstein ve ark., 2002). Ölçümde, stres halinde sempatik sinir sistemi aktivasyonuyla periferik damar daralmasına neden olabilir, böylece vücut sıcaklığı düşer ve deri ısısı değerleri belirli aralıklara ayrılır. Örneğin, 18-21 santigrat derece arası yüksek sempatik uyarılmayı temsil ederken, 32-35 santigrat derece arası düşük sempatik uyarılmayı temsil eder (Wilson ve ark., 2011).

4. TÜRKİYE'DE SPOR BİLİMLERİ ALANINDA UYGULANAN BİYOLOJİK GERİ BİLDİRİM

Sporun yüksek rekabet ortamı, maddi getirilerle doğrudan ilişkilendirilmiştir, bu da sportif başarının daha önce hiç olmadığı kadar büyük bir öneme sahip olduğunu göstermektedir. Dolayısıyla, sporcuların psikolojik dayanıklılıklarını ve zihinsel sağlamlıklarını artırmak, yapılan çalışmalarda sıklıkla vurgulanan bir gereklilik haline gelmiştir (Duppe, 2016). Spor ile ilgili yapılan çalışmalar, sık sık atletlerin sadece fiziksel becerilerini değil, aynı zamanda ruhsal dayanıklılıklarını da geliştirmelerinin önemini vurgular (Duppe, 2016).

FULL TEXTS BOOK

Sporcuların yaptıkları antrenmanların günümüzde daha bütünsel bir şekilde ele alınması gerekmektedir. Bu açıdan bakıldığında da yüksek teknolojinin de yardımıyla sporcuların biyolojik verilerinin elde edilmesi mümkündür (Fernandez, 2019). Algısal-bilişsel yetenekler, sportif başarı üzerinde dikkat ve bellek, zamanın algılanması, duyusal uyum gibi önemli bir etkiye sahiptir ve bu becerilerin yardımcıyla rakip atletlerin hamlelerini öngörmeyi, daha seri ve daha doğru kararlar almayı sağlayabilir. Bu tür yeteneklerin geliştirilmesi, sporcular açısından kaygıyı azaltarak rakip atletlerin stratejilerini önceden anlama ve uygun bir şekilde tepki verme yeteneği için hayati önem taşımakta olup bu beceri gelişimini, BGB girişimleriyle olanak sağlanabilir (Zadkhosk, 2018).

SONUÇ

Bu kapsamlı inceleme, biyolojik geri bildirimin spor performansı üzerindeki etkilerini ve uygulama yöntemlerini detaylı bir şekilde ele almaktadır. Biyolojik geri bildirim, sporcuların zihinsel ve fiziksel olarak optimal performans seviyelerine ulaşmalarına yardımcı olmak için kullanılan etkili bir araç olarak ortaya çıkmaktadır. Bu yöntem, sporcuların stresle başa çıkma, odaklanma becerilerini geliştirme, performanslarını artırma ve yaralanma riskini azaltma gibi pek çok fayda sağlamaktadır.

Biyolojik geri bildirim araçları arasında elektromiyografik (EMG) geri bildirim, elektrodermal aktivite (EDA) geri bildirim, kalp hızı değişkenliği (KHD) geri bildirim ve termal geri bildirim gibi çeşitli teknikler bulunmaktadır. Bu araçlar, sporcuların kas aktivitesini, duygusal durumlarını, stres seviyelerini ve vücut sıcaklığını izlemelerine ve kontrol etmelerine yardımcı olur. Sporculardaki duygusal ve fizyolojik durumların belirlenmesi, performanslarını daha iyi anlamalarına ve geliştirmelerine olanak tanır.

Türkiye'de spor bilimleri alanında biyolojik geri bildirim uygulamaları henüz yaygınlaşmamış olsa da sporcuların psikolojik dayanıklılığını artırmak ve performanslarını iyileştirmek amacıyla yapılan çalışmaların arttığı gözlemlenmektedir. Bu çalışmalar, sporcuların sadece fiziksel becerilerini değil, aynı zamanda zihinsel sağlamlıklarını da geliştirmelerini vurgulamaktadır. Biyolojik geri bildirim, sporcuların kişisel gelişimlerini desteklemek ve performanslarını optimize etmek için önemli bir araç olarak değerlendirilmektedir.

Sonuç olarak, biyolojik geri bildirim, sporcuların zihinsel ve fiziksel sağlığını iyileştirmek ve performanslarını en üst düzeye çıkarmak için güçlü bir araçtır. Bu yöntem, sporcuların bedensel ve zihinsel uyumlarını artırarak, daha tutarlı ve etkili bir şekilde hedeflerine ulaşmalarına yardımcı olabilir. Türkiye'de spor bilimleri alanında biyolojik geri bildirim uygulamalarının daha da yaygınlaşmasıyla, sporcuların performanslarını optimize etmeleri ve daha sağlıklı bir spor yaşamı sürdürmeleri beklenmektedir.

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FULL TEXTS BOOK

THE RIGHT OF WORKERS TO REINSTATMENT IN THE CASES OF UNLAWFUL TERMINATION: A COMPARATIVE APPROACH

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ABSTRACT
The right to work is a fundamental socio-economic right, guaranteed by article 49 of the Constitution of the Republic of Albania. In addition to its constitutional protection, the right to work is also guaranteed by several international treaties to which Albania is a member. Due to the importance of the right to work, most international instruments guarantee the protection of workers from unlawful or unjust termination. According to the Convention no. 158 of the International Labour Organization, should an employee unlawfully terminate a worker, the latter has the right to compensation of the damages incurred or reinstatement. A similar provision is also stipulated by the Albanian Labour Code, which stipulated the right of workers employed in the public sector to reinstatement, with the amendments it incurred in 2003.
Whether there is a broader general right to seek reinstatement judicially (i.e., by means of filing a claim at the competent court or tribunal) has been subject to debate among Albanian scholars and courts alike during the last twenty years. Due to the relevance of this ongoing debate, this paper examines the aforementioned issue based on a comparative analysis of the case-law of the Albanian courts, the European Court of Human Rights, the Administrative Tribunal of the International Labour Organization, as well as the Court of Justice of the European Union, the principles set forth by which serve as guidance for the Albanian courts when interpreting unclear legal provisions.
Key words: the right to work, unlawful termination, the right to reinstatement, judicial remedies.

1. INTRODUCTION

The right to work is a fundamental constitutional right pertaining to the category of social and economic rights, guaranteed by Article 49 § 1 of the Constitution of the Republic of Albania.[1] Besides constitutional protection, this fundamental right is also sanctioned as such by several conventions to which Albania is a party.[2] Although the right to work does not enjoy explicit protection under the European Convention on Human Rights ('ECHR'), it is indirectly guaranteed as a part of other Convention rights through the integrative method of interpretation adopted by the European Court of Human Rights ('ECtHR').[3] The right to work is also enshrined in Article 15 of the Charter of Fundamental Rights of the European Union ('EU Charter').
Due to its importance, most legal instruments in the field of labour law guarantee the protection of individuals against unjustified or unreasonable termination. The International Labour Organization ('ILO') has regulated the procedure and causes allowing the employer to unilaterally terminate an employment contract in the Termination of Employment Convention no. 158 ('Convention No. 158') . Article 10 of this Convention provides that in cases of unlawful termination, the employee is entitled to compensation and/or reinstatement. These provisions constitute international standards of labour law.[4]

[1] All relevant legal provisions concerning labour rights of the worker and the right to reinstatement referred in this paper shall be cited in the attached Appendix 'Relevant Provisions of the Albanian Legal Framework'.
[2] The right to work is specifically stipulated in Article 23 of the Universal Declaration of Human Rights, Article 6 of the International Covenant on Civil, Social and Cultural Rights, as well as the ILO Declaration of Philadelphia 'Concerning the aims and purposes of the International Labour Organisation' (1944).
[3] Mantouvalou, V. (2013). Labour Rights in the European Convention of Human Rights: An Intellectual Justification of an Integrated Approach to Interpretation. *Human Rights Law Review:* 1-27.
[4] Shtylla, A. (2016). *Komentari i Kodit të Punës* [En.: 'Commentary of the Labour Code']. Tirana: International Labour Organization.

FULL TEXTS BOOK

Therefore, although the Convention No. 158 has not been ratified by Albania, all law-enforcing institutions including courts, are inclined to comply with it. Indeed, the Convention No. 158 has served as inspiration for the 2015 amendments of the Albanian Labour Code ('ALC').[5] Meanwhile, Article 30 of the EU Charter stipulates that 'Every worker has the right to protection against unjustified dismissal, in accordance with Community law and national laws and practices'. Lastly, based on Article 13 of the ECHR, Member States also bear the positive obligation to enact an adequate legal framework which provides effective remedies for the restitution of the rights of workers in the event of unlawful termination, when the latter leads to a violation of their fundamental rights and freedoms.

In line with these standards, the ALC also stipulates that if an employer terminates the contract for abusive or unreasonable causes, they are liable be sued in judicial proceedings initiated by the employee, based on Article 146 § 3 or Article 155 § 3 of the ALC, whichever is applicable depending on the type of termination. Initially, workers enjoyed only the right to compensation, but with the 2003 amendments of the ALC, it was established that the court may order reinstatement if the employer is a public administration body.

Whether there is exists a general right to judicially seek reinstatement (i.e., by means of filing a claim at the competent court or tribunal) has been subject to debate among Albanian scholars and courts alike during the last twenty years. Due to the relevance of this ongoing debate, this paper seeks to address the aforementioned issue based on a comparative analysis of the case-law of the Albanian courts, the ECtHR, the Administrative Tribunal of the ILO, as well as the Court of Justice of the European Union ('CJEU'), the principles set forth by which serve to orient the interpretation of Albanian courts in cases of unclear provisions.[6]

2. ORDINARY AND *ULTIMA RATIO* TERMINATION

Articles 143-144 and 153 of the ALC respectively govern two separate procedures for the unilateral termination of an employment contract by the employer: the ordinary procedure and the extraordinary procedure *(ultima ratio)*.

Article 144 of the ALC stipulates as valid reasons for ordinary termination the insufficient competence of the worker, his inappropriate behaviour, or the operational requirements of the employer. Although the causes for ordinary termination may seem quite broad, Article 146 § 1 reduces the possibility for arbitrariness by providing an exhaustive list of causes that are considered unreasonable or abusive. This implies that the employer is prohibited from terminating the contract for one or more of these causes. If the employer violates this prohibition, the termination is null and void. In addition to abiding by the aforementioned procedural and substantial criteria, the employer should also the grant the notice term stipulated in Article 143 § 1 of the ALC to the worker. This term varies depending on the duration of employment. If the procedure for termination is violated or the causes motivating the termination are arbitrary, the worker has the right to sue the employer for damages and reinstatement, if the latter is applicable. Should the worker satisfy the burden of proof in regards of the arbitrariness, the court should order the employer to compensate the worker with an amount corresponding to the aggregate salaries of up to one year.

In some cases, the District Court of Tirana has maintained that for a termination to be considered unreasonable, the abusive cause must have been explicitly stated as a motivation for termination in the

[5] Republic of Albania, *Law No. 136/2015 'On some additions and amendments to the Law no. 8961 of 12 July 1995 'The Labour Code of the Republic of Albania', as amended',* OJ 2015 220/14450.

[6] Regarding the principles of pro-European interpretation adopted by the Albanian courts in cases of unclear norms or *praeter legem*, see: Hamzaj, I., Isak, E. & Velo, I. (2024). 'Risky Business': Can Provisional Measures Issued by the Albanian Courts Safeguard the Rights of EU Creditors? In: EJTN, *EU and European Civil Procedural Law: Semi-Final C.* Available at https://osp.ejtn.eu/dth-api/osp/events/1768/document/c6158e66-48d4-41c1-a4fb-28db9682ef67.

FULL TEXTS BOOK

employer's decision for the dismissal of the worker. In different words, the employer must explicitly state that they are terminating the employment contract for one of the causes referred in Article 146 of the ALC.[7] I believe that this interpretation is very narrow and it would preclude any real possibility of the worker to seek redress based on Article 146 of the ALC. Considering that termination for unreasonable causes gives rise to the civil liability of the employer, it is hard to believe that they would state the real cause of termination should it be abusive. The need for courts to be able to uncover the objective truth was precisely the rationale leading to the adoption of Article 14 of the Albanian Code of Civil Procedure, which vests judges with the power to conduct a full and comprehensive examination of the case.[8] In wrongful dismissal cases, the court must not be take for granted the causes that have been formally listed by the employer in the dismissal decision, but rather investigate whether they seek to cover for one or more of the abusive reasons stated in Article 146 of the ALC.

The employer also has the right to terminate the employment contract immediately *(ultima ratio)* for the valid causes stipulated in Article 153 § 3 of the ALC, which include '*all grave circumstances that, in accordance with the principle of good faith, do not allow the continuation of the employment relationship',* specifically *'cases where the employee breaches their contractual obligations with grave culpability, as well as cases where the employee repeatedly breaches contractual obligations with negligence, despite previous warning issued in writing from the employer.'*[9] When the aforementioned valid causes for immediate dismissal exist, the employer is relieved from the obligation to respect the notice term for termination. However, they must still follow the procedure provided in Article 144 of the ALC. Unlike termination for abusive causes, immediate termination is valid even if it is motivated by causes other than those stipulated in Article 153 of the ALC, irrespective of its irregularity.[10] Based on the same provision, if the court considers that causes leading to the immediate termination of the worker are unjustified, the worker has the right to compensation with the equivalent of his aggregate salary for up to one year of work, in addition to the salary corresponding to the notice period. They also have the right to reinstatement if the employee is a public administration body. Should the court accept the claim, the employer is obliged to comply with this decision and therefore, reinstate the claimant to his previous job.[11]

The remedies available to the worker depend on the type of termination that was applied by the employer: (i) ordinary termination, the remedies for which are stipulated in Article 146 of the ALC or (ii) *ultima ratio* termination, the remedies for which are stipulated in Article 155 of the ALC. These provisions cannot be simultaneously applied as possible remedies for the termination of an employment contract. According to the consolidated case-law of the Albanian courts, when the employer has granted the notice term to the worker, the remedies for the unlawful dismissal shall be those provided in Article 146 § 3 of the ALC, whereas in cases of immediate termination (i.e., when the notice term has not been granted), Article 155 § 3 of the ALC will apply.[12] The rationale behind this approach is that the employee cannot be compensated twice for the same *causa petendi*. Although these two articles constitute different *causa petendi*-s, thus resulting in two different claims, their purpose is the same, namely, to provide restitution for the worker that has been unlawfully terminated, either by financially compensating him, reinstating him, or both.

7 See for example: District Court of Tirana (Albania), judgment no. 1487 of 10 March 2021
8 Article 14 of the Law No. 8116 of 29 March 1996 'The Code of Civil Procedure of the Republic of Albania', as amended, OJ 1996 L 9, 10, 11.
9 Article 153 §§ 2-3 of the ALC.
10 Supreme Court, Joint Chambers (Albania), unifying judgment no. 7 of 1 June 2011.
11 Articles 146 § 3 and 155 § 3 of the ALC.
12 See, among others: Supreme Court, Joint Chambers (Albania), ordinary judgment no. 1 of 30 June 2017; District Court of Tirana (Albania), judgment no. 5727 of 11 June 2018.

Nevertheless, as stated above, one must bear in mind that while article 146 § 3 of the ALC specifically provides that the termination for abusive reasons is void, Article 155 § 3 does not stipulate the same sanction regarding immediate unjustified termination. Based on an *a contrario* interpretation, the Albanian courts are often inclined to consider the latter type of termination valid, regardless of its irregularities, as the legislator has not sanctioned it with voidance and nullity.[13] Per this stance, even if the employer acts in violation of Article 153 of the ALC by terminating the employment contract for unjustified reasons, reinstatement of the employee does not enjoy legal protection, and the only remedy available for the worker shall be compensation, as provided by Article 155 of the ALC.

The most heated debate concerns the interpretation of Article 146 of the ACP. The cause of this debate lies in the theory of void and voidable legal actions, according to which, a legal action, when ascertained as void by a court, is deemed to have never existed. Based on Article 106 of the Albanian Civil Code, the remedy for voidance is *restitutio in integrum*, meaning that the parties should return to the same legal standing they enjoyed prior to the performance of the void action. Based on this provision, it would appear that reinstatement should be an available remedy for all abusive terminations stipulated by Article 146 of the ACP. However, that is not always the case. Therefore, the following section shall explore the question of whether reinstatement constitutes an available remedy for workers whose employment contract has been terminated for abusive reasons.

3. REINSTATEMENT ACCORDING TO THE CASE-LAW OF ALBANIAN COURTS

Scholars and judges alike have continuously been part of the debate on whether employees have the right to reinstatement when their employment contract is terminated for unjustified (abusive) reasons. The issue has been partially resolved regarding a specific category of workers. With the unifying judgment no. 31 of 14 April 2003 concerning the unjustified termination of the employment contract of a police officer, the Joint Chambers of the Supreme Court of Albania maintained that *'[t]he right to reinstatement does not enjoy judicial protection, whereas the right to compensation is a right that enjoys protection.'* As per the *ratio decidendi* of this judgment, its application should be confined to the cases when the employee is a police officer.

When discussing the current relevance of this judgment, one must bear in mind that the interpretation of Article 146 § 3 of the ALC adopted therein concerns the wording of the said article *prior* to its amendment. At the time of the judgment, Article 146 was formulated as follows: *'The employer, who has terminated the causes for unreasonable causes, is obligated to compensate the worker with the salary of up to one year, which is added to the salary that they would have received during the notice period'.* As apparent, it neither guaranteed the right to reinstatement, nor sanctioned dismissals contrary to its provisions as void.[14] These provisions were added with the amendments of the ALC. Additionally, the right to reinstatement was not sanctioned in the applicable *lex specialis* on the state police either. Therefore, the approach of the Supreme Court did not do much other than follow a literal interpretation of the relevant provisions in force. However, upon adoption of the Law no. 152/2013 "On Civil Servants", police officers were given the status of civil servants and therefore, their employment relationship would also be regulated by the relevant provisions of the law on civil servants in addition to the ALC, unless the lex specials on the state police provides otherwise.[15] Article 66/1 of the Law No.

[13] This approach is not unanimously applied by courts. However, it constitutes a consolidated approach embraced by most judges in the District Court of Tirana (Albania). To this effect, see: District Court of Tirana (Albania), judgments no. 5939 of 18 June 2018; no. 5727 of 11 June 2018; no. 8633 of 18 October 2017 and no. 13599/3543 of 1 February 2013.

[14] This provision has been amended by the law No. 9125 of 29 July 2013 "On some additions and amendments to the law no. 7961 of 12 July 1995 'The Labour Code of the Republic of Albania', as amended by the law no. 8085 of 12 March 1996' and still remains in force.

[15] Article 3 of the Law No. 152/2013 'On civil servants'.

152/2012 explicitly guarantees the right of civil servants to reinstatement. On the other hand, the *lex specialis* only provides the right to compensation and not the right to reinstatement. The question arose whether Article 66/1 alone gives rise to the right of reinstatement for police officers and whether with the adoption of the law No. 152/2013, the stance adopted by the Supreme Court in the aforementioned unifying judgment is *de facto* repealed. Regardless of these unresolved questions, this judgment continues to find a broad application in the case-law of lower courts.

Suspicions regarding its relevance are also supported by the fact that this judgment has been explicitly abrogated in the part where the Supreme Court maintained that employment contracts between private individuals and public bodies constitute public service contracts and fall within the scope of administrative law. This stance was reversed by the Supreme Court itself eight years later by virtue of the unifying judgment no. 7 of 1 June 2011, in which the Joint Chambers held that irrespective of whether the employer is a public or a private entity, the legal relationship between a worker and an employer cannot be deemed as having a purely administrative nature, as it is governed by the law of contracts.

Since 2020 and onwards, the Administrative Chamber of the Supreme Court has changed its stance regarding police officers. With judgment no. 00-2020-265 of 1 July 2020, the Administrative Chamber initially brought to attention the aforementioned amendments and the fact that the unifying judgment no. 31/2003 was issued at a time of *praeter legem* in respect of applicable remedies for unjustified terminations. According to the Administrative Chamber, as long as the right to reinstatement was guaranteed by the law no. 152/2013, police officers should benefit from it.[16] This judgment leads us to the conclusion that the stance maintained in the unifying judgment no. 31/2003 has somewhat lost its relevance, or at least ceased to be as absolutist as initially served.

In another judgment, the Administrative Chamber maintained that reinstatement does not stem from the provisions of the ALC *per se*, but from the provisions of the other applicable specific laws.[17] From this line of reasoning, one may extrapolate that if Article 146 § 3 or Article 153 § 3, whichever applicable, is not supported by another provision of the *lex specialis* governing the employment relationship of the claimant, the latter cannot benefit from the right to reinstatement. Although there have been implicit attempts by the chambers of the Supreme Court as well as the lower courts to amend this stance, these attempts only constitute a minority. This become more visible in 2017, when although the Supreme Court Chambers convened to change stance adopted in the case-law of the lower courts regarding reinstatement, among several other labour law issues, including, at the end of the proceedings, they were not able to reach the necessary quorum and therefore, revoked their decision on initiating the Joint Chambers proceedings. Instead of adopting a new or at least a modified stance, the Joint Chambers only reconfirmed the stance held in the previous unifying judgment that, despite of the legislative changes, reinstatement still does not enjoy legal protection, if exclusively based on the provisions of the ALC.[18]

[16] Specifically, the Administrative Chamber of the Supreme Court maintained that: 'the stance adopted in several cases, that the police officer that has been unlawfully terminated cannot be reinstated to his previous job even after the enactment of the law no. 152/2013 constitutes an incorrect interpretation of the legislation regulating this field … [i]f the officer of the State Police has been dismissed in breach of the law, the only consequence of this conclusion is the reinstatement of this officer to his previous job and the compensation of his salaries from the moment of dismissal'. This stance has been consequently maintained in the consequent case-law of the Administrative Chamber. See to this effect: Supreme Court, Administrative Chamber (Albania), judgments no. 00-2022-2255 (336) of 6 October 2022 and no. 00-2021-9 (3) of 11 January 2021.

[17] Supreme Court, Administrative Chamber (Albania), judgment no. 00-2021-10 (1) of 11 January 2021.

[18] Supreme Court, Joint Chambers (Albania), ordinary judgment no. 1 of 30 June 2017. It is worth bringing to attention that the four dissenting Justices maintained in their dissenting opinion that the amendments incurred by the ALC granted the right to reinstatement not only to the employees of the public administration whose work relationship was exclusively regulated by the ALC, but also to those employed in the private sector.

FULL TEXTS BOOK

However, the Tirana District Court held a different stance in 2018, by adopting a systematic interpretation of Article 146 § 3 of the ALC with articles 92 et seq. of the Albanian Civil Code, which regulate voidance and voidability of legal actions, as well as respective remedies. The District Court stated that 'as long as the termination was considered unreasonable (abusive), then according to the remedies that the provision itself prescribes, the options available to the worker are either claiming absolute invalidity of the termination and reinstatement, or claiming only pecuniary compensation, by deeming the termination valid regardless of its irregularities. In the first option of course of action, the termination is considered absolutely null and void, which – in the context of private law – means that the parties must return to their previous state.'[19] This reasoning in fact complies with the unifying judgment no. 7/2011 which characterizes employment relations as falling within the scope of contract law. Were we to adopt this interpretation, then we would have to agree that the employment contract, in addition to the provisions of the ALC, must also be governed by the general provisions of the Civil Code on the validity of legal actions. Therefore, based on article 92 (a) of the Civil Code, dismissal conducted in breach of Article 146 of the ALC is null and void as, not only it violates a binding provision of the law, but is also explicitly sanctioned as such by paragraph 3 of the said article.

Nevertheless, this line of reasoning has not found much support in practice, especially when the employer is a private legal entity, where courts have almost always awarded only compensation. I believe that the latter approach better represents the main socio-legal feature of all employment relations: the existence of mutual trust. Since this trust relationship is presumed to be broken upon the unilateral termination of the contract, regardless of the fact whether it is valid or not, it would be illogical to force the employer to reinstate the worker, as the newly restituted work relationship is destined to fail again.

4. REINSTATEMENT ACCORDING TO THE CASE-LAW OF INTERNATIONAL COURTS

Labour rights are not specifically guaranteed by the ECHR. However, by virtue of an integrative interpretation, the ECtHR has afforded indirect protection to the right to work by analysing it under Articles 6, 8, 10, 12, and 13 of the ECHR.[20] One of the most important ECtHR cases in labour law is *Pellegrin v France*,[21] where the applicant sought reinstatement in the civil service. The ECtHR concluded that the specific dispute did not fall within the scope of protection granted by Article 6 § 1 of the ECHR, reasoning that 'the only disputes excluded from the scope of Article 6 § 1 of the Convention were those raised by public servants whose duties typified the specific activities of the public service in so far as the latter was acting as the depositary of public authority responsible for protecting the general interests of the State or other public authorities. A manifest example of such activities was provided by the armed forces and the police.'[22]

On the other hand, in the previous case *Ruotolo v. Italy*,[23] whereby the applicant claimed reinstatement as well as damages for wrongful dismissal, the ECtHR, albeit not explicitly holding whether reinstatement could be considered as stemming from Articles 6 and 13 of the ECHR, did accept the allegations of the claimant for violation of his right to a fair trial due to the unreasonable length of the proceedings. By an *a contrario* interpretation, we could conclude that should the ECtHR have

[19] District Court of Tirana (Albania), judgment no. 5939 of 31 January 2018.

[20] European Court of Human Rights. (2023). *Factsheet – Work-related rights.* Available at: https://www.echr.coe.int/documents/ fs_work_eng.pdf.

[21] Application No. 28541/95, judgment of 8 December 1999.

[22] Cf. ECtHR. (9 December 1999). *Press Release Issued by the Registrar*. 698. Available at https://hudoc.echr.coe.int/app/conversion/pdf/?library=ECHR&id=003-68450-68918&filename=003-68450-68918.pdf. A similar stance has also been adopted in several previous cases. See for example: ECtHR, cases *Massa v. Italy*, application no. 14399/88, judgment of 24 August 1993, § 26 and *Niegel v. France*, application no. 18725/91, judgment of 17 March 1997.

[23] Application No. 12460/86, judgment of 27 February 1992.

FULL TEXTS BOOK

maintained that reinstatement does not enjoy protection as a remedy under the Convention, it would have declared the application inadmissible as it did in the case of *Pellegrin*. The fact that the ECtHR found a violation of Article 6 in respect of the unreasonable length of the judicial proceedings for reinstatement must be construed as meaning that, if the right to reinstatement is sanctioned by the domestic legislation as was the case with Italy, this right shall also enjoy judicial protection and must be afforded all guarantees under Article 6 of the ECHR.[24]

In *Heinisch v Germany*,[25] a landmark case in labour law, the ECtHR explicitly held that a dismissal of the reinstatement claim by domestic courts constitutes a violation of the ECHR. In this case, the applicant, an employee of a commercial company, had filed a criminal complaint against his employer acting as a whistle-blower. For this reason, the employer had immediately terminated the employment contract. The applicant had sought reinstatement before the German courts, but his attempts were unsuccessful. Heinisch claimed that the immediate termination of the employment contract motivated solely by his decision to file a criminal complaint, and the subsequent refusal of the domestic courts to order his reinstatement constituted a violation of his freedom of expression, guaranteed by Article 10 of the ECHR.[26] The ECtHR found that there indeed was a violation of the applicant's right to freedom of expression, arguing that the refusal of the domestic courts to reinstate the claimant indicates that they failed to strike a fair balance between the need to protect the employer's reputation on the one hand and the applicant's right to expression on the other.[27] A similar stance was held in the 2021 case of *Melike v Turkey*,[28] where the applicant was a hired employee of the Ministry of Education, who did not enjoy civil servant status and whose work relationship was exclusively regulated by the employment contract. Based on the above, one may conclude that, similarly to the Albanian courts, the ECtHR has been reluctant to grant automatic protection to the right to reinstatement, rather opting for examination on a case-by-case basis, leaving the decision of whether to sanction the right to reinstatement to the margin of appreciation of Member States.

This reluctance is also present in the case law of the CJEU, which also reviews the right to reinstatement separately for each case presented, depending on whether it is stipulated by the domestic legal frameworks. In the *Marshall* case,[29] the CJEU stated that, when an employee is dismissed for discriminatory reasons, the equality between the parties can only be restored through two alternatives: reinstatement or compensation. This stance was reconfirmed in 2015.[30] In the 2020 preliminary ruling on the case of *QH v the Supreme Court of Cassation of the Republic of Bulgaria*,[31] the CJEU confirmed that the provisions of national law stipulating reinstatement as a remedy for unfair dismissal are in

[24] Similarly, the ECtHR has also held that Article 6 applies when the worker seeks reinstatement judicially in the case *Buchholz v. Germany*, although it found no violations in this case (application No. 7759/77, judgment of 6 May 1961, § 52).

[25] Application No. 28274/08, judgment of 21 July 2011.

[26] Ibid, § 41.

[27] Ibid, §§ 94-95.

[28] ECtHR, case of *Melike v. Turkey*, application no. 35786/19, judgment of 15 June 2021. In this case, the applicant was dismissed by the Ministry of Education, because it had 'liked' several Facebook posts which were considered disturbing for the public. The applicant had claimed reinstatement, but this claim was dismissed by the domestic courts. She alleged before the ECtHR that her dismissal together with the decisions of the Turkish courts constituted a violation of her right to freedom of expression, guaranteed by Article 10 of the ECHR. The ECtHR accepted this argument, as the immediate termination of the contract was disproportionate to the motive alleged by the employer. Thus, the ECtHR has indirectly granted protection to the right to reinstatement.

[29] CJEU, case C-271/91 *Marshall v Southampton and South-West Hampshire Area Health Authority*, judgment of 2 August 1993, § 25

[30] CJEU, case C-407/14 *María Auxiliadora Arjona Camacho v Securitas Seguridad España SA*, judgment of 17 December 2015.

[31] CJEU, joint cases C-762/18 and C-37/19 *QH v Varhoven kasatsionen sad na Republika Bulgaria*, judgment of 25 June 2020, § 78

accordance with the EU law. Therefore, an employee who has been granted the right to reinstatement by a judgment which is yet to be enforced by the employer, should enjoy the right to compensation for annual leave until his effective reinstatement.

It is worth noting that scholars have consistently underlined that the only valid interpretation of Article 15, 30 and 47 of the EU Charter must lead to the conclusion that wrongful dismissal should give rise to an automatic right of workers to seek reinstatement, as it is the only remedy capable of fully restoring their rights.[32] However, the above judgments indicate that the *acquis* as interpreted by the CJEU grants protection to reinstatement only if it is stipulated by national legislation. This reluctance to expand the applicability of the right to reinstatement may be influenced by the impact of the principle of freedom to conduct business,[33] deeply entrenched in the case-law of the CJEU, which constitutes a direct barrier prohibiting courts from ordering a company to reinstate a former worker.[34]

Finally, it is also worth mentioning the relevant case law of the ILO Administrative Tribunal, as the ILO standards in labour law constitute standards of universal application. Article 10 of the ILO Convention No.158 provides that in cases of unlawful dismissal, the employee must be guaranteed either reinstatement or compensation. In a 2021 case, the Tribunal held that 'as a rule, an employee dismissed for disciplinary reasons, whose dismissal is annulled by the court, has the right to be reinstated. However, the Tribunal may refuse to make this order if reinstatement is no longer possible or when it is inappropriate. According to the Tribunal's jurisprudence, reinstatement is not granted when the employer has valid reasons for losing trust in the worker.'[35] This shows that both reinstatement and compensation are equally acceptable alternatives.

5. CONCLUSION

International organizations which Albania has adhered to or aspires to become a member to and their courts agree that every worker has the right to have their rights restituted when the employer unlawfully terminates the employment contract. Restitution can be achieved through either reinstatement or compensation. From the examined case-law, it appears that the ECtHR, the CJEU, or the ILO Administrative Tribunal have not expressly given prevalence to one remedy over the other. All three leave this choice to member states, upon the condition that, should the latter decide to enact the right to reinstatement in their legal framework, they must guarantee it.

The ALC guarantees the right of public administration employees to reinstatement in case of termination for unreasonable (abusive) causes (Article 146 § 3 of the ALC), as well as when the contract is immediately terminated for unjustified causes (Article 155 § 3 of the ALC). While termination in breach of Article 146 of the ALC is null and void, termination in breach of article 155 is not sanctioned as such. I believe that if the legislator had had the will to consider unjustified termination void, he would have stipulated so in the relevant Articles, because in similar cases such as that of Article 146 of the ALC, voidance this was explicitly stipulated. Therefore, I believe that in the case of immediate and unjustified termination of the contract, reinstatement does not constitute an available remedy to the worker, unless specifically provided by a separate law regulating the work relationship. The rationale behind this stance is that, irrespective of being irregular, the termination continues to be valid.

[32] See for example: Hepple, B. (1981). A Right to Work? *International Law Journal, 10:* 76-78 and Barnard, C. (2012). *EU Employment Law* (4th Ed.). Oxford: Oxford University Press.

[33] This right is also guaranteed by Article 16 of the EU Charter.

[34] Kenner, J. (2016). *Article 30 – Protection in the event of unjustified dismissal.* In: S. Peers et al, The EU Charter of Fundamental Rights – A commentary, p. 17, 2016, Hart Publishing. Also see: CJEU, case C-426/11 *Alemo-Herron and Others v Parkwood Leisure Ltd*, judgment of 18 July 2013.

[35] The Administrative Tribunal of the ILO, case *M. v Global Fund to Fight AIDS, Tuberculosis and Malaria*, no. 4579 of 21 October 2022.

Indeed, the Supreme Court of Albania has also maintained in the unifying judgment no.31/2003 that reinstatement does not enjoy judicial protection. This judgment continues to remain in force partially, with the amendment that when the employment relationship is regulated by another specific law which recognizes the right to reinstatement in addition to the ALC, the employee will enjoy the right to reinstatement. Since lower courts are bound by the unifying judgments of the Supreme Court, their case-law cannot diverge from this stance until the Supreme Court decides to change it, or the ALC itself is amended so as to provide a more favourable regulation.

Based on the general principles of public and private law, while agreeing with the stance held by the Supreme Court in the unifying judgment No. 31/2003 on most matters addressed therein, I – at the same time – hold a different opinion on several points. First, I also agree that reinstatement should not enjoy judicial protection when the employer is a private company. Since these relationships are built on the principle of mutual trust, with the termination of employment, such trust ceases to exist. Otherwise, the parties would not invest the court, but would renew their contract freely, without the need for judicial intervention. Therefore, regardless of the breach of the rules in force regulating *ultima ratio* termination, it would be a disproportionate burden for the employer to be obliged to reinstate the employee when trust no longer exists between them. This stance also satisfied the principle of freedom to contract, the only logical derivative of which is that if the employer unlawfully terminates the contract, they should only bear the obligation to compensate the damage incurred by the worker. If the court orders the company to reinstate the worker, the execution of this order would result in a *de facto* obligation of the employer to re-enter into a contract against their free will.

I believe the situation is different when the employer is a public body, regardless of whether the employment relationship is regulated by a specific law or not. This is the main point where I hold a different approach than that maintained in the unifying judgment no. 31/2003. The public body is a representative of state interests. To achieve these interests and to ensure the proper functioning of the state, the public administration apparatus makes use and operates through its employees. Therefore, I believe that when the termination of the employment contract is abusive, the principle of trust between the *State* and the employee is not broken. This is because the higher interest of the state is to ensure the principle of legality and the employment of the most competent persons to perform their corresponding duties, in the framework of guaranteeing the proper functioning of the state apparatus as to achieve the best interest of the public. Conversely, it is the person wo has carried out the unlawful termination the one who has broken the principle of trust. That is because the said official has acted in abuse of his powers to appoint and dismiss the personnel of the institution. Had there been a more competent person responsible, the terminated worker would not have been terminated. This conclusion applies to both civil servants and employees of the public administration the work relationship of whom is regulated based on the provisions of the ALC. Therefore, I believe that the laws by which the work relationship is regulated (i.e., if it is regulated exclusively by the ALC, or by additional specific laws) hold no relevance in respect of determining whether there is a right to reinstatement, especially since this right is explicitly guaranteed by Article 146 § 3 of the ALC for cases when the termination is ascertained as null and void by the court. As a consequence, I believe that it is the time for a change in the approach adopted by the Albanian courts, including the Supreme Court. This would serve to achieve a double-purpose: first, to ensure a better representation of the state interests, and second, to guarantee the legal certainty and equality among workers.

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FULL TEXTS BOOK

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FULL TEXTS BOOK

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FULL TEXTS BOOK

APPENDIX: Relevant Legal Provisions on the Rights of Workers

1. The Constitution of the Republic of Albania

Article 49: 1. Everyone has the right to earn the means of living by lawful work chosen or accepted by himself. He is free to choose his profession, place of work, as well as his own system of professional qualification.

2. Employees have the right to social insurance of work.

2. The European Convention on Human Rights

Article 6 § 1: In the determination of his civil rights and obligations or of any criminal charge against him, everyone is entitled to a fair and public hearing within a reasonable time by an independent and impartial tribunal established by law. Judgment shall be pronounced publicly but the press and public may be excluded from all or part of the trial in the interests of morals, public order or national security in a democratic society, where the interests of juveniles or the protection of the private life of the parties so require, or to the extent strictly necessary in the opinion of the court in special circumstances where publicity would prejudice the interests of justice.

Article 8: 1. Everyone has the right to respect for his private and family life, his home and his correspondence.

2. There shall be no interference by a public authority with the exercise of this right except such as is in accordance with the law and is necessary in a democratic society in the interests of national security, public safety or the economic well-being of the country, for the prevention of disorder or crime, for the protection of health or morals, or for the protection of the rights and freedoms of others.

Article 10 § 1: 1. Everyone has the right to freedom of expression. This right shall include freedom to hold opinions and to receive and impart information and ideas without interference by public authority and regardless of frontiers. This Article shall not prevent States from requiring the licensing of broadcasting, television or cinema enterprises.

Article 13: Everyone whose rights and freedoms as set forth in this Convention are violated shall have an effective remedy before a national authority notwithstanding that the violation has been committed by persons acting in an official capacity.

3. The Universal Declaration on Human Rights

Article 23 § 1: Everyone has the right to work, to free choice of employment, to just and favourable conditions of work and to protection against unemployment.

4. International Covenant on Economic, Social and Cultural Rights

Article 6 § 1: The States Parties to the present Covenant recognize the right to work, which includes the right of everyone to the opportunity to gain his living by work which he freely chooses or accepts, and will take appropriate steps to safeguard this right.

5. ILO Termination of Employment Convention No. 158

Article 10: If the bodies referred to in Article 8 of this Convention find that termination is unjustified and if they are not empowered or do not find it practicable, in accordance with national law and practice, to declare the termination invalid and/or order or propose reinstatement of the worker, they shall be empowered to order payment of adequate compensation or such other relief as may be deemed appropriate.

6. Charter of Fundamental Rights of the European Union

Article 15: 1. Everyone has the right to engage in work and to pursue a freely chosen or accepted occupation.

2. Every citizen of the Union has the freedom to seek employment, to work, to exercise the right of establishment and to provide services in any Member State.

3. Nationals of third countries who are authorised to work in the territories of the Member States are entitled to working conditions equivalent to those of citizens of the Union.

FULL TEXTS BOOK

Article 30: Every worker has the right to protection against unjustified dismissal, in accordance with Community law and national laws and practices.

7. Labour Code of the Republic of Albania

Article 143: 1. After the probation period, to terminate the contract of undefined duration, the parties shall respect a notice deadline of two weeks, when the employment relation has lasted up to six months, of a month, for the duration of over six months up to two years, of two months for the duration of more than five years.

2. Repealed.

3. The deadline notice to terminate the contract shall be extended up to the end of the month. The same rule shall be applied, when the notification deadline is suspended during the period of disability to work or pregnancy (dismissal at inappropriate moment).

4. When one of the parties terminates the contract without respecting the deadline notice, then the termination shall be considered as a termination of contract with immediate effect.

5. During the notification period, when the work contract is terminated by the employer, the employee benefits at least 20 hours of payable leave per week to look for a new job. The duration of the leave and the procedures for receiving and using it shall be stipulated in the collective or individual work contract.

Article 144: 1. After the probation period, when the employer thinks to terminate the contract of employment, he/she must inform the employee in writing at least 72 hours before the meeting, and talk with him/her.

2. The employer, during the conversation, shall present to the employee the reasons concerning the decision planned to be taken, and offer him/her the opportunity to express himself/herself.

3. The termination of the contract shall be made known to the employee within a time limit of 48 hours up to one week after the appointment. In the written notification, the employer stipulates the reasons for terminating the contract, which are related to the grounds such as the capability, the conduct of the employee or the operational request of the company. It shall be made in writing.

4. When the employer deems that that it is the case of fair motives of immediate dismissal, he can suspend the employee during the procedure.

5. The employer failing to respect the procedure provided for by this Article, shall be obliged to pay the employee a damage compensation equal to a salary of two months, which is added to other possible damage compensations.

5/1. It is up to the employer to prove that the procedure provided for by this Article has been respected.

6. This provision does not apply to the cases of collective dismissals from work, but the reasons in writing on the termination of the contract shall be given to the employee, according to the time limits provided for in paragraph 5, Article 148, of this Code

Article 146: 1. The termination of the contract by the employer shall be considered of no reasonable causes, when:

a) The employee has claims that result from the contract of employment;

b) The employee has fulfilled a legal obligation;

c) It violates the prohibition of discrimination according to the stipulations in this code and in the special law for the protection from discrimination;

d) It is done for motives that are connected with the employee's exercise of a constitutional right, which however does not lead to the violation of the obligations resulting from the contract of employment;

e) It is done for motives that are connected with the employee's being or not a member of Trade Unions created as defined by law, or because of his/her participation in Trade Union activities on the basis of law;

FULL TEXTS BOOK

f) The employee is a member of the steering body of the trade union and the employer does not have a motif to dismiss him;

g) The employee violates the rules for consultation with the trade union recognized as the representative, or with the employer on the transfer of the company and the collective dismissal;

gj) It is done in contradiction to the provision of paragraph 3, article 144 of this Code, related to the reasons for the termination of the work contract.

2. If the contract is terminated for no reasonable cause, then the employee has the right to sue the employer at the court within 180 days, starting from the day on which the notice deadline has expired.

3. The termination of the contract for unreasonable causes shall be invalid. The employer who has terminated the contract for unreasonable causes is obliged to pay the employee a damage that may amount up to the salary of one year, which is added to the salary he/she shall receive during the notice deadline. As concerns the employers of the Public Administration, where there is an irrevocable court decision on returning to the same workplace, the employer is obliged to execute this decision.

Article 153: 1. At any time the employer and the employee may immediately terminate their contract for justified grounds.

2. Justified grounds shall be considered all the serious circumstances that, in accordance of the principle of mutual trust, do not allow for asking the one who has terminated the contract to continue the labour relations.

3. The court decides itself whether there have been justified grounds for the immediate termination of the contract. Justified grounds shall be considered only those cases where the employee violates the contractual obligations of serious offence, as well as the cases where the employee repeatedly violates the contractual obligations of nonserious offence, regardless of the employer's written warning.

Article 155: 1. The employee enjoys the right to the salary that he/she would have gained if the labour relations had expired at the end of the notice deadline defined by law or contract or with the expiry of the contract of defined duration.

2. The employer may subtract from the salary the income that the employee has saved as a result of work interruption, the income from another job, or the income that he/she has deliberately waived.

3. In the cases of the immediate and unjustified termination of the contract of employment by the employer, the court, after having assessed all circumstances, shall decide to oblige the employer to pay the employee damages that equal to not more than the salary of a working year. With regard to the employees of the Public Administration, when there is an irrevocable decision on returning to the previous workplace, the employer is obliged to execute this decision.

4. If the contract is terminated without justified grounds, the employee is entitled to sue the employer at the competent court within 180 days from the day when the work relations are terminated. In the case when the unjustified motif is revealed after this time limit has expired, the employee submits a claim within 30 days from the day when this motif is revealed.

8. Civil Code of the Republic of Albania

Article 92: The invalid/void legal actions do not create any legal consequences. Such ones are those which: a) conflict with a binding provision of law; b) are performed to defraud the law; c) are performed by minors under the age of fourteen; d) are done in agreement between parties without aiming to bring legal consequences (fictive or simulated).

Article 105: The legal transaction declared invalid/void is considered as such from the moment it was performed.

9. Law No. 152/2013 'On Civil Servants'

Article 3 § 1: Police officers and officers of the external service are civil, towards whom this law shall apply, unless otherwise provided by the special laws.

Article 66/1 § 1: Final court judgments ordering the reinstatement of civil servants shall be immediately enforced by the responsible unit.

FULL TEXTS BOOK

DETERMINATION OF DNA DAMAGE PROTECTIVE ACTIVITIES OF WATER EXTRACTS OF DİFFERENT PART OF DANDELION (*Taraxacum officinale*) PLANT

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ABSTRACT
This study involved collecting dandelion plants (*Taraxacum officinale*) from the Sivas province of Türkiye during the months of May and June. Water extraction was then conducted on the root, stem, and flower sections of the plant. The resulting extract was tested for its DNA protecting ability. We conducted a study where we extracted water from different portions of the dandelion plant, including the flower, root, and stem. We then analyzed the chemicals acquired from the plant and recorded the presence of effective compounds, comparing our findings with existing literature on similar plants. The effectiveness of extracts obtained from root, stem, and flower sections in protecting DNA from UV and oxidative damage was determined using pBR322 plasmid DNA. The plasmid DNA underwent damage when exposed to H_2O_2 and UV radiation in the presence of the extracts. The imaging procedure was conducted using a 1.5% agarose gel. The data regarding the DNA protective activity of the plant indicated that the plant demonstrated varying levels of DNA protection at different concentrations and in different extracts of the plant. The plasmid DNA patterns, to which the extracts were applied, demonstrate the preservation of ocDNA and linDNA bands. Based on the observed band pattern in the gel picture, it is evident that the scDNA band is present in certain extract and dose groups. Based on the data, it was found that *Taraxacum officinale* plant extracts, which are significant in terms of ethnopharmacology, effectively safeguarded plasmid DNA from damage at high doses. However, the protective effect slightly diminished as the dose of diluted plant extract decreased. Upon examination of the gel image generated from this investigation, it is evident that the flower and stem extracts of *Taraxacum officinale* (dandelion) exhibit greater efficacy at lower concentrations compared to the root extract.
Keywords: *Taraxacum officinale*, DNA preservation activity, ethno-pharmacology.

INTRODUCTION
Throughout history, plants and their extracts have served as a valuable resource for human healing in various domains such as nourishment, rejuvenation, and illness treatment. Due to technological advancements, synthetic and semi-synthetic substances have quickly become popular in both the global and Turkish markets for medicinal purposes. The number of studies on the content analysis of plants used in the treatment of diseases is on the rise. While there may be plants of the same species in a given region, the plant content can be influenced by several circumstances, such as differences in crop covering. The focus of this study will be on *Taraxacum officinale*, a perennial medicinal plant belonging

FULL TEXTS BOOK

to the Asteraceae family. The plant exhibits a yellow-flowered structure with roots during the months of April to May. The herb, commonly utilized by the general population, possesses numerous qualities including diuretic, antidiarrheal, appetite-suppressing, edema-relieving, and stomach-discharge-regulating effects (Sarı et al., 2020; Sohail et al., 2014). Consistent with these attributes, coffee derived from the dehydration of the plant's root is currently utilized and commercially available in Türkiye as a herbal dietary supplement in pharmacies. The study assessed the DNA preservation capability of the extract by extracting water from the root, trunk, and flower components of the dandelion plant, which were taken from the province of Sivas during May-June. Not only were the floral sections of the plant, which are commonly recognized as a medicinal plant, extracted, but also the root and other components of the plant, as well as water extraction. The literature has extensively examined and recorded the analysis of plant-derived compounds and the identification of potent molecules. This study examines the capacity of the plant *Taraxacum officinale*, which holds ethno-pharmacological importance, to protect against DNA damage caused by harmful UV radiation and substances like H_2O_2. Agarose gel electrophoresis was employed to assess DNA damage in the plasmid pBR322 DNA, specifically in the dandelion plant sections, as a plasmid.

METHODOLOGY

Material

The specimen for the investigation was obtained from Sivas province between the months of May and June. The plant samples were desiccated in a shaded area at room temperature. The desiccated aerial components of the plant were pulverized using a domestic food processor and measured for the purpose of water extraction (Figure 1).



Figure 1. Dry leaf milled sample and weighing

Obtaining Plant Extracts

To extract water, 20 grams of herbal material from each plant part were weighed and placed in flasks. Then, 200 milliliters of hot distilled water were added, and the mixture was kept in a closed incubator for 10-15 minutes with periodic shaking. After the designated time, the extract was filtered, and another 200 milliliters of hot distilled water were added to the herbal materials once again. The procedure was iterated thrice, and the samples obtained after 24 hours were subsequently subjected to lyophilization to eliminate all traces of water. Following a 24-hour incubation period, the plant solutions (root, stem, and flower) were transferred to filter paper within a filtering system and subsequently filtered into sterile sample containers (Figure 2).

FULL TEXTS BOOK



Figure 2. Filtration of plant solutions after incubation

Using this technique, the pulp and the liquid component of the solution were effectively isolated. The sterile containers holding the filtered solutions were labeled with the date, solvent information, and location on their lids. Subsequently, the samples were preserved at a temperature of -80°C for a duration of three days. The frozen solution samples were subjected to sublimation of ice crystals using a lyophilizer equipment, which caused the frozen water (i.e. ice crystals) in the solution to transition from a solid state to a gaseous state by decreasing the ambient pressure (Figure 3). The cryogenic solutions were stored in the lyophilizer for a duration of roughly 3 days. The samples extracted from the lyophilizer were kept at a temperature of -20°C. The percentage yield was determined for the extracts collected from each individual section of the plant.



Figure 3. Plant extracts dried under pressure in a lyophilizer

Determination of the DNA Preservation Activity

The protective activity of extracts from the root, stem, and flower sections of the dandelion plant against DNA damage was assessed using pBR322 plasmid DNA. The pBR322 plasmid is a 4361 base pair long plasmid, which is one of the initial cloning vectors used in *E. coli*. The plasmid harbors two antibiotic resistance genes, specifically ampicillin and tetracycline (Watson, 1988). The plasmid DNA underwent damage when it was exposed to H_2O_2 and UV radiation in the presence of extracts. Imaging was conducted on a 1.5% agarose gel using the methodology outlined by Russo et al. (2000) (Figure 4).

FULL TEXTS BOOK



Figure 4. Agarose gel preparation

Control tubes were also produced to assess the effectiveness of diluted and undiluted stock plant extracts in preserving activity. The table below (Table 1) provides information on the contents and treatments of the experimental and control tubes. 3 µl of pBR322 plasmid, 5 µl of plant extract, and 1 µl of H_2O_2 were added to the Eppendorf tubes holding extracts, resulting in a total volume of 9 µl. The mixture was then exposed to UV light for a duration of 2 minutes. Four control groups were established, and the second and third control groups were subjected to ultraviolet (UV) radiation for a duration of 2 minutes, as indicated in Table 1. The ingredients were manufactured in accordance with the specified codes and quantities for all samples. The UV light source used was a UV transilluminator device (DNR-IS) that emitted light at a wavelength of 302 nm and had an intensity of 8000 µW.cm-1 at ambient temperature. Next, 2.0 µL of loading buffer (loading dye 6x) was introduced into the Eppendorf tubes and placed onto a 1.5% agarose gel (Figure 5). Following agarose gel electrophoresis with a concentration of 1.5%, the gel casting system (DNR-IS, MiniBIS Pro) was used to do imaging (Tepe et al., 2011).

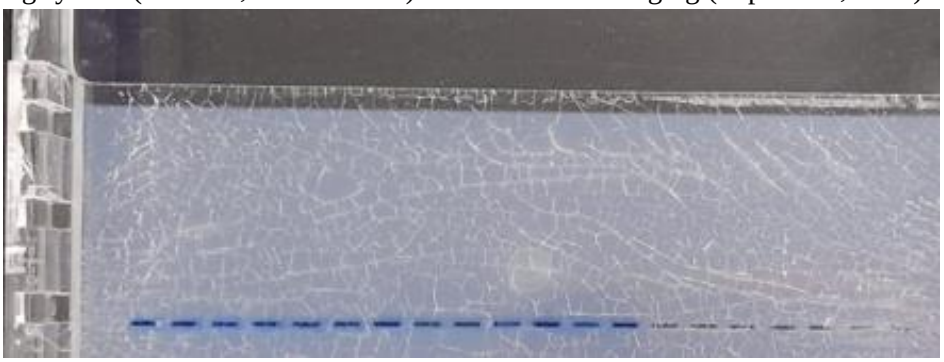


Figure 5. Loading samples into agarose gel wells

Table 1. Content of control and experimental tubes and damage treatments.

Number	Labels	Plazmid DNA	H_2O	UV	H_2O_2	Extract
1	K1 (Control 1)	3 µl	6 µl	-	-	-
2	K2 (Control 2)	3 µl	6 µl	+	-	-
3	K3 (Control 3)	3 µl	6 µl	-	+	-
4	K4 (Control 4)	3 µl	6 µl	+	+	-
5	*T. officinale* flower part stock concentration	3 µl	-	+	1 µl	5 µl

FULL TEXTS BOOK

6	*T. officinale* stem part stock concentration	3 µl	-	+	1 µl	5 µl
7	*T. officinale* root part stock concentration	3 µl	-	+	1 µl	5 µl
8	*T. officinale* flower part at a concentration of 0.1 mg/mL	3 µl	-	+	1 µl	5 µl
9	*T. officinale* stem part at a concentration of 0.1 mg/mL	3 µl	-	+	1 µl	5 µl
10	*T. officinale* root part at a concentration of 0.1 mg/mL	3 µl	-	+	1 µl	5 µl
11	*T. officinale* flower part at a concentration of 0.01 mg/mL	3 µl	-	+	1 µl	5 µl
12	*T. officinale* stem part at a concentration of 0.01 mg/mL	3 µl	-	+	1 µl	5 µl
13	*T. officinale* root part at a concentration of 0.01 mg/mL	3 µl	-	+	1 µl	5 µl

RESULTS

This study examined the effects of water extracts from three different sections of the dandelion plant (root, stem, and flower) on the supercoiling of pBR322 plasmid DNA. This approach evaluates the capacity of plant extracts to inhibit DNA damage in the presence of DNA-damaging agents, namely hydrogen peroxide (H_2O_2) and UV radiation. The photographs depicting the protective impact of plant extracts on DNA damage revealed the presence of form I and form II bands of plasmid DNA on the gel. Additionally, in certain images, a form III band emerged accompanied by a decrease in the brightness intensity of both bands (Figure 6). The study found that dandelion plant extracts effectively safeguarded plasmid DNA from harm at high dosages, however the protective effect marginally diminished when the plant extract was diluted (Figure 6). Due to the combined effects of ultraviolet light damage and hydrogen peroxide application, the plasmid DNA in tube K4, which functioned as a control test tube, was fragmented. As a result, no band profile was detected in the agarose gel electrophoresis. Indeed, the presence of low-level swabs at certain wells where diluted plant samples were sprayed suggests that the DNA has undergone fragmentation. Observing bands 1-3, it is evident that the plasmid DNA bands are highly noticeable in the wells when concentrated doses (1mg/ml stock dose) of various portions of the dandelion plant were administered. The samples exhibit a noticeable disparity in brightness and intensity between the Form 1 band, which represents the supercoil form of pBR322 plasmid DNA, and the somewhat weaker Form 2 band. Additionally, a feeble line was detected between the Form 3 band (Figure 6). Upon analyzing the band profiles in wells 4-6, where the plant extracts were administered at a concentration of 0.1 mg/mL with a 10-fold dilution, it is evident that the intensity of the Form 1 band is rather low, although the Form 2 and Form 3 bands exhibit a minor increase in prominence. These findings indicate that the supercoil DNA (Form 1) structure of the plasmid DNA has transformed into the open circular (Form 2) structure as a result of minor fractures. Furthermore, in wells 7-9, when the plant samples were diluted by a factor of 100 at a concentration of 0.01 mg/mL, a noticeable DNA smear was visible throughout the gel. Additionally, the Form 1 band became extremely faint and completely disappeared in samples 8 and 9. This scenario signifies disturbances and discontinuities in the DNA structure (Figure 6). Upon further examination of the gel image, it is evident that the flower and stem extracts of Taraxacum officinale (dandelion) exhibit greater efficacy at lower concentrations compared to the root extract (Figure 6).

FULL TEXTS BOOK

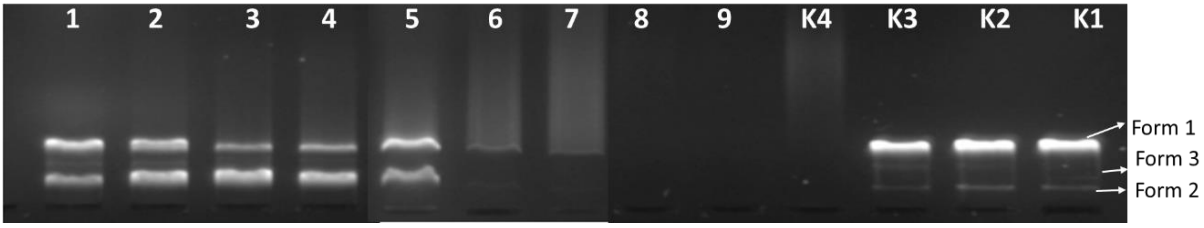


Figure 6. Visualization of DNA protective activity of water extracts of different parts of *Taraxacum officinale* on agarose gel

Details of the Figure 6:

Column K1: Plasmid DNA + distilled water

Column K2: Plasmid DNA + distilled water + UV

Column K3: Plasmid DNA + distilled water + Hydrogen peroxide

Column K4: Plasmid DNA + distilled water + UV + Hydrogen peroxide

Column 1: Plasmid DNA + *Taraxacum officinale* flower part stock concentration (1 mg/mL) + UV + Hydrogen peroxide

Column 2: Plasmid DNA + *Taraxacum officinale* stem part stock concentration (1 mg/mL) + UV + Hydrogen peroxide

Column 3: Plasmid DNA + *Taraxacum officinale* root part stock concentration (1 mg/mL) + UV + Hydrogen peroxide

Column 4: Plasmid DNA + *Taraxacum officinale* flower part dilute concentration (0.1 mg/mL) + UV + Hydrogen peroxide

Column 5: Plasmid DNA + *Taraxacum officinale* stem part dilute concentration (0.1 mg/mL) + UV + Hydrogen peroxide

Column 6: Plasmid DNA + *Taraxacum officinale* root part dilute concentration (0.1 mg/mL) + UV + Hydrogen peroxide

Column 7: Plasmid DNA + *Taraxacum officinale* flower part dilute concentration (0.01 mg/mL) + UV + Hydrogen peroxide

Column 8: Plasmid DNA + Taraxacum officinale stem part dilute concentration (0.01 mg/mL) + UV + Hydrogen peroxide

Column 9: Plasmid DNA + *Taraxacum officinale* root part dilute concentration (0.01 mg/mL) + UV + Hydrogen peroxide

CONCLUSION AND DISCUSSION

Due to its geographical position and climate, Türkiye possesses a diverse and polymorphic floral abundance. Anatolia serves as both a source region and a hub for hybridization and transition of several species. Anatolia has served as a sanctuary for species from colder regions during glacial eras and as a pathway for species throughout non-glacial periods. Anatolia, located at the intersection of the Asian and European continents and adjacent to Africa, is a region with diverse climates. It plays a crucial role in hosting a significant portion of the world's plant species, as it is the only country where the Europe-Siberia, Mediterranean, and Iran-Turan geographical regions converge. Simultaneously, Anatolia is recognized as a region where old wisdom and natural remedies have been enhanced over time. The literature affirms that plants have been extensively employed in our country throughout history for a wide range of reasons, including food, health, and treatment. Today, with the advancements in technology and science, it is now possible to scientifically demonstrate and validate the biological activities and therapeutic effectiveness of the majority of plant species that have been traditionally used in medicine. This is achieved through experimental methodologies and processes. This approach allows for the scientific demonstration and standardization of the procedures used in traditional medicine treatments. Conversely, it is crucial to identify the specific molecules among the multitude found in

FULL TEXTS BOOK

plants that possess the primary therapeutic properties, and subsequently isolate and refine these compounds. The objective of this study was to determine whether *Taraxacum officinale* (dandelion) plant, which is commonly found in parks and gardens in Sivas province, possesses DNA molecule protective qualities against experimental DNA damage. The results demonstrated that water extracts of the dandelion plant exhibit DNA molecule protection ability against oxidative DNA damage at various doses. The various components of the dandelion plant possess varying degrees of efficacy in combating UV damage and protecting the DNA molecule from harm caused by free radicals like hydrogen peroxide. However, doing more extensive trials and verifying the issue using various methodologies would yield more precise results. This study is an exploratory study, and we anticipate that it will be highly valuable in strategizing future studies for assessing the plant's potential in domains such as healthcare, pharmaceuticals, cosmetics, and more.

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FULL TEXTS BOOK

DIGITAL PREFERENCES IN POLITICAL PARTICIPATION: THE CASE OF PLATFORM X

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ABSTRACT
The innovations brought by the digital age have radically changed the forms of political participation. In addition to traditional methods of political participation, digital platforms offer new ways of facilitating and diversifying individuals' participation in political processes. Digital political participation encompasses the ways in which individuals engage in political processes online. This takes place in various ways, such as online voting, social media campaigns, digital petitions and online discussion platforms. Digital tools make political participation more accessible, fast and effective. By removing geographical and physical barriers, these tools make it possible for everyone to participate in political processes. Digital preferences have significant impacts on political participation. In addition to traditional methods of participation, digital platforms enable wider audiences to engage in political processes. Digital tools increase the speed and interactivity of political participation and make processes more transparent and accountable. Platform X stands out as a platform that encourages and facilitates political participation in a digital environment. This platform aims to increase participation in political processes by offering its users various tools and opportunities. The X Platform offers features such as online surveys and referendums, training and information, events and discussion groups, and donation and support campaigns. Digitalisation offers new and diverse ways of participation in addition to traditional methods of political participation, enabling individuals to participate in political processes more easily and effectively. The aim of this study is to examine the effects of digitalisation on political participation and to explain how this process works through the example of X Platform. In addition, this study aims to define the forms of digital political participation, examine the characteristics and role of the X Platform, evaluate the effects of digital preferences on political participation, and identify the challenges faced by digital political participation.
Keywords: Political Participation, Digital Participation, Platform X, Digital Age.

INTRODUCTION
The innovations brought by the digital age have led to radical changes in forms of political participation. Traditional methods of political participation are gradually being replaced by forms of participation realised through digital platforms. This transformation has a profound impact not only on voting habits of voters but also on the way they are involved in political processes. The speed, accessibility and interaction opportunities provided by digital technologies redefine citizens' political participation.
This study analyses in detail the impact of the services offered by Platform X on political participation and the barriers to digital participation. It analyses the functioning of online surveys and referendums, training and information activities, events and discussion groups and how these processes shape democratic participation. In addition, threats to digital participation and suggestions on how these threats can be addressed are presented. This study aims to identify the necessary strategies for the X Platform to provide a more effective, secure and inclusive participation environment.
A deep understanding of the effects of digitalisation on political participation is critical for the development of modern democracies. This study aims to provide an important reference point for future

FULL TEXTS BOOK

studies and applications by revealing the dynamics of digital political participation through the example of Platform X.

CONCEPTUAL FRAMEWORK

The Concept of Political Participation

In the literature, it is necessary to include different definitions in order to correctly analyse the concept of political participation, the definition of which is not agreed among political scientists (Eser & Sarışahin, 2016: 39). According to Barber, political participation is a universal principle and is defined as "the masses acting with a sense of "we" sharing, discussing and contributing to certain facts together" (Barber, 1995: 195-200). Verba, Nie and Converse, on the other hand, take political participation in a broader sense and define it as the actions citizens take by directly influencing government decisions. In this sense, political participation is not limited to voting and campaigning, but also includes other legitimate actions that citizens may resort to. In addition, it is emphasised that participation in government "can also be achieved through other spheres of life such as family, school, associations and workplace" (Verba, Nie and Converse, 1989: 1-4).

Kalaycıoğlu, on the other hand, defines political participation as "the actions and activities carried out by individuals to influence those who will come to political decision-making positions or those who hold these positions as a result of the preferences and decisions they make autonomously", and unlike Verba, Nie and Converse, he includes not only legitimate actions and activities but all actions within the definition. According to him, even if the citizen actions that affect government decisions are assassination, coup d'état, rebellion and participation in revolution, the fact that he/she performs the action with his/her own will means political participation. (Kalaycıoğlu, 1998: 10-11). Finally, according to Gökçimen, "political participation is the individual's relationship with the political system". It manifests itself in different forms such as following social events and obtaining information, voting, becoming a candidate, and participating in political decision-making mechanisms (Gökçimen, 2008: 7).

Variables Affecting Political Participation

While performing political participation activities, some variables that voters have affect participation. These variables are grouped in different ways by political scientists (Silsüpür, 2021: 165).

According to Kışlalı, age, gender, family, education, occupation, occupation, income and settlement type are variables that affect political participation (Kışlalı, 1987: 358). Dursun, on the other hand, explains the variables affecting political participation from a broader perspective and categorises them as socio-economic, psychological and political factors (Dursun, 2004: 236). Age and gender, which are accepted as biological variables by Erdinç (Erdinç, 2020: 23), are the determinant variables affecting political participation.

Milbrath explains the relationship between political participation and age with the statement "Participation increases gradually with age, reaches a peak in the forties and fifties, and gradually declines over sixty" (Milbrath, 1965: 134). Quintelier explains the low level of political participation especially in the twenties with the life cycle. Factors such as the ongoing education process, the housing they do not own, and the marriage that has not yet taken place reduce the rate of political participation of young people (Quintelier, 2007: 166-177).

Studies have shown that men's political participation rates are higher than women's political participation rates in almost all societies (Burns, 2007: 113-117). The fact that women have the childbearing function pushes them to housework. For this reason, the social role attributed to women results in a decrease in interest in politics. Therefore, it also affects political participation (Kışlalı, 1987: 359).

There is a positive relationship between education, which is accepted as a socio-economic variable (Dursun, 2004: 236-237), and political participation. Verba, Schlozman and Brady have shown that individuals with higher levels of education have higher rates of political participation compared to

FULL TEXTS BOOK

individuals with lower levels of education. Education directly increases political participation by improving political skills. In addition, acquiring speaking and writing skills also provides knowledge on how to cope in an organisational environment (Verba, Schlozman and Brady, 1995: 305). In addition to skills, it has also been argued that education contributes to the increase in political competence (Persson, 2013: 690). In his article "Clarifying the Relationship between Education and Participation", Jackson stated that education increases both the potential voter's belief that he/she can influence what the government does and the potential voter's belief that he/she has the ability to understand politics and participate in politics (Jackson, 1995: 280).

In addition to the role of the family in the formation of the child's personality and identity during childhood, the opportunities it offers are considered to be very effective in terms of the internalisation of political participation. Family support facilitates participation, especially for young people who join political parties and become active in their youth (Erdoğan, 2007: 89).

By associating the occupations of individuals with their social status, it is explained how occupation affects political participation. According to Kalaycıoğlu, there is a directly proportional correlation between high social status and participation in public policies. Individuals with high social status are more likely to maintain this status and those whose occupation is related to politics show higher political participation (Kalaycıoğlu, 1984: 30-32).

Kislali states that there is a direct proportion between income level and political participation. As the income level increases, political participation increases, while political participation decreases as this level decreases (Kışlalı, 1987: 359). In addition, this relationship is maintained even if the level of education is not sufficient (Görücü, 2021: 169).

Baykal evaluated the relationship between settlement type and political participation and put forward the view that urbanisation increases political participation (Baykal, 1970: 66). Since cities offer wider educational opportunities, they are considered more advantageous than rural areas in terms of following political developments and participating in political decisions (Kalaycıoğlu, 1984: 21).

Levels of Political Participation

Robert Dahl states that political participation can be realised at different levels. He also categorises the levels of political participation as high, medium and low.

High level political participation refers to a type of participation in which individuals are involved in political processes and directly influence decision-making mechanisms. In addition to voting, individuals with a high level of participation are members of political parties and actively participate in campaigns. They also participate in rallies and protests and hold public office. According to Dahl, this type of participation is critical for the ideal functioning of democracy because the direct intervention of the people ensures that political decisions are more legitimate and in line with the needs of the people (Dahl, 2001: 45-48).

Moderate political participation is a level at which individuals participate in basic political activities. This type of participation usually includes actions such as voting and sometimes participating in political debates. Individuals who participate at the intermediate level may not directly influence political processes, but they still play an important role in the functioning of democratic processes. Dahl argues that moderate levels of participation enable large segments of society to be involved in the political process and thus the political system becomes more inclusive (Dahl, 2001: 49-52).

Low level political participation is a type of participation in which individuals are minimally involved in political processes. Individuals with this level of participation generally do not exercise even the most basic political rights such as voting. The reasons for low participation include factors such as lack of political knowledge, apathy, socio-economic barriers and educational level. According to Dahl, low levels of participation can weaken the effectiveness of democratic processes and lead to the exclusion of large segments of the population from political processes (Dahl, 2001: 53-56).

Historical Development from Web 1.0 to Web 4.0

FULL TEXTS BOOK

Technologies that are renewed in direct proportion to the development of the Internet provide great advantages in terms of the benefits they provide to people. Looking at the current development process since the development of web technology, each period has emerged with new features and opportunities. The formation process of these developments is changing day by day as the concept of the Internet and the relationship between people are shaped in different ways (Ersöz, 2020: 59).

The World Wide Web (www), first introduced by computer scientist Berns-Lee, is defined as "hypertext for linking and accessing various types of information as a network of nodes that the user can navigate as they wish" (Choudhury, 2014: 8096).

Web 1.0

Web 1.0, the first application of the Web, was created in 1989 (Choudhury, 2014: 8096). Web 1.0, which is quite primitive compared to today (Latorre, 2018: 2), is defined as a read-only, one-way network that users can only use to get information and cannot interact with the content (Nath & Iswary, 2015). In addition to being a network where only static information could be accessed, the content also had the disadvantage of not being compatible with machines (Choudhury, 2014: 8096).

Web 2.0

Web 2.0 (Latorre, 2018), which was first introduced as a concept by Tim O'Reilly's vice president Dale Dougherty in 2004, has a dynamic structure unlike Web 1.0 and has a collaborative structure by facilitating data sharing and interaction. So much so that it has brought along the development in social networks and enabled users to participate in the content production process. Websites such as Wikipedia, Facebook, Youtube, Twitter or Instagram and their accessibility via mobile phones have encouraged the participant to produce content and thus increased their participation (Almedia, 2017).

Web 3.0

The term Web 3.0 was first used in 2006 in an article by Jeffrey Zeldman, which was associated with technologies such as AJAX (Król, 2020: 44). With Web 3.0, user data in search engines were evaluated and managed, and the possibility of customisation was offered for user preferences. Basically, it is aimed to define data and support the creation of user profiles by enabling these data to connect with each other in order to be more effective (Ersöz, 2020: 61).

Web 4.0

Web 4.0, which is also called symbiotic or smart web, is stated by Nath and Iswary to be in a structure that can think and also make decisions about user searches and content (Nath & Iswary, 2015). With this innovation of the web, direct interaction between the human mind and machines has been achieved.

Web 1.0, Web 2.0, Web 3.0 and Web 4.0 Comparison

Feature	Web 1.0	Web 2.0	Web 3.0	Web 4.0
Time Interval	Early 1990s - early 2000s	mid-2000s - present	2020s and beyond	Near future (under development)
Basic Concept	Static web	Social web	Semantic web	Smart and connected web
User Engagement	Passive consumer	Active participant	Personalised user experience	Proactive, AI-powered user interaction
Content Type	Static pages, rarely updated content	User-generated content, blogs, social media	Semantic tagging, personalised content	Artificial intelligence, machine learning, contextual interactions
Technologies	HTML, GIF, frames	AJAX, Flash, JavaScript, RSS, social media platforms	RDF, OWL, SPARQL, semantic labelling, data integration	AI, IoT, big data analytics, augmented reality, virtual reality
Data Management	Static data, server-based	User-generated and shared data	Semantic data, machine-readable data	Contextualised and personalised data, integrated with smart devices
Interactivity	Low	Centre	High	Very high, rich and natural interaction
Examples	First websites, Yahoo! Directory, Britannica Online	Facebook, YouTube, Wikipedia, Twitter	Wolfram Alpha, Google Now, Siri	Smart assistants, IoT devices, personalised AR/VR experiences
User Interface	Simple and static pages	Dynamic and interactive pages	Personalised and contextual interfaces	Fully contextual, intuitive and natural user interfaces
Business Models	Advertising-based, e-commerce	Social networks, content sharing, adverts	Data-driven business models, smart services	Contextual services, smart business processes, business models based on personal data

Table 1: Historical Development of the Web

X Platform: Pioneer of Digital Political Participation

The digital age has given birth to new technologies and platforms to increase and diversify political participation. In this context, Platform X stands out as an innovative platform that encourages and facilitates political participation in the digital environment. It aims to increase participation in political processes through the various tools and opportunities it offers to its users. When the main features of the X Platform and the effects of these features on political participation are analysed, the prominent topics are Online Surveys and Referendums, Education and Information, Events and Discussion Groups, Donation and Support Campaigns.

Online Surveys and Referendums

Online surveys and referendums have become one of the most important tools of political participation in the digital age. These tools enable citizens to communicate their views quickly and effectively, while helping politicians to keep their finger on the pulse of the public. They can be easily organised through digital platforms and reach large audiences. It enables everyone to participate by eliminating geographical barriers (Trechsel & Vassil, 2003). For example, Estonia implemented an online voting system in a national election for the first time worldwide in 2005, enabling voters to vote faster and more securely (Vassil & Weber, 2011).

These tools are particularly popular among young people and groups with access to technology and can increase overall participation rates, leading to more inclusive and representative results (Boulianne, 2009). Online platforms can offer various incentives to encourage participation in surveys and referendums, which can further increase participation rates. They also facilitate large-scale data collection and analysis processes so that policy makers and researchers can better understand the views of the public (Couper, 2000). For example, surveys conducted through social media platforms offer the opportunity to collect and analyse users' instant feedback (Mossberger, Tolbert, & McNeal, 2008).

There are also important issues in terms of security and confidentiality. The protection of participants' data and the transparency of electoral processes increase the reliability of these tools. In this context,

FULL TEXTS BOOK

blockchain technology can be used to secure online voting systems (Noizat, 2016). The development of security protocols and encryption methods helps to protect the data of participants.

However, the digital divide may hinder the participation of individuals without internet access or with low digital literacy (Norris, 2001). Moreover, information pollution and misinformation on online platforms may affect the reliability of survey and referendum results (Allcott & Gentzkow, 2017). Therefore, it is important to increase digital literacy and promote reliable sources of information.

Training and Information

Platform X aims to increase political participation by providing its users with comprehensive information about political processes, elections and laws. This information and educational materials support users to participate in an informed way. Digital education tools increase political literacy and enable users to participate more effectively and consciously.

Online courses can be presented in various formats such as videos, infographics and interactive content (Anderson, 2008). For example, online courses allow users to gain in-depth knowledge about political systems, electoral processes and legislative activities (Means et al., 2010). Platform X provides its users with continuous training and updates, ensuring that they are always up to date on political processes. This helps users to quickly adapt to changing political conditions and new legal regulations. For example, constantly updated blogs, newsletters, and podcasts allow users to closely follow political developments (Mitchell et al., 2016).

Political literacy refers to the capacity of individuals to understand and act effectively within political systems. By increasing political literacy, digital platforms enable users to participate in political processes in a more informed and effective manner (Delli Carpini & Keeter, 1996). For example, a study conducted by the Pew Research Center reveals that individuals with high digital literacy show more active political participation through online platforms (Pew Research Center, 2018).

Digital platforms facilitate users' access to reliable sources of information. This enables users to make political decisions based on accurate and up-to-date information. For example, fact-checking sites such as FactCheck.org and Politifact play an important role in combating disinformation by providing users with access to accurate information (Graves, 2018). In addition, digital platforms facilitate users' access to various news sources, enabling them to obtain information from different perspectives (Fletcher et al., 2020). Official pages such as the Centre for Combating Disinformation of the Turkish Presidency of Communication also operate on Platform X in order to increase information reliability.

Events and Discussion Groups

Platform X has a structure that encourages users to participate in various political events and take an active role in discussion groups. Digital platforms play an important role in organising political events and increasing participation. Online events provide users with access to meetings, seminars and rallies that they cannot physically attend. For example, video conferencing tools such as Zoom and Microsoft Teams have played a major role in moving political events online during the pandemic (Wiederhold, 2020). Such platforms encourage widespread participation and offer the possibility to record events and watch them later (Morgan, 2020).

Online discussion groups enable users to exchange ideas about political issues and understand various perspectives. These groups can be organised through social media platforms, forums and private discussion rooms. For example, platforms such as Reddit are important digital spaces where users discuss political issues and reach large audiences (Massanari, 2015). Such platforms encourage the active participation of individuals, while raising political awareness and engaging them in democratic processes (Halpern & Gibbs, 2013). Platform X also allows people to share their ideas and participate through the communities tab and chat rooms.

Social media has become a central part of political debates and events. Platforms such as Facebook, Twitter and Instagram allow users to share, discuss and organise political content. The opportunities for interaction offered by social media enable political campaigns to reach large audiences and spread

FULL TEXTS BOOK

rapidly (Gil de Zúñiga, Molyneux, & Zheng, 2014). For example, the #MeToo movement generated wide participation and awareness through Platform X, and its political impact was felt on a global scale (Banet-Weiser, Gill, & Rottenberg, 2020).

Interactive discussion formats enable users to address policy issues in a more in-depth and structured way. Webinars, online panels and live broadcasts make it possible for participants to interact directly with experts and pose their questions. These formats increase the level of knowledge of participants and encourage democratic participation (Janssen & Kies, 2005). For example, the online debates organised by the Oxford Union provide a wide range of participation and interaction across the world (Coleman, 2013).

Digital events and discussion groups foster a sense of community and belonging among users. These platforms enable individuals with common interests to come together and form collective movements. This encourages individuals to participate more actively and willingly in political processes (Putnam, 2000). For example, online activism groups allow users to organise and take effective actions for a specific purpose (Shirky, 2011).

Donation and Support Campaigns

Digital platforms play an important role in increasing political participation by facilitating political donations and support campaigns. These platforms allow users to make online donations to their favourite politicians or campaigns, thereby financially supporting political movements.

Digital donation platforms enable more people to contribute to political campaigns by simplifying the donation process and expanding access. These platforms offer a variety of payment methods so that users can easily donate. For example, ActBlue is a platform that has enabled the collection of large donations for Democratic Party candidates in the United States (Karpf, 2012). The success of ActBlue demonstrates the impact of digital donation platforms on campaign finance (Bimber, 2014).

Micro-donations and crowdfunding enable the collection of small amounts of donations from large audiences through digital platforms. This model was used with great success in Barack Obama's 2008 and 2012 presidential campaigns. Obama's campaign raised large sums of money from millions of supporters who donated small amounts, which increased the financial strength of the campaign (Kreiss, 2012). Crowdfunding enables campaigns to reach wider audiences and gain grassroots support (Agrawal, Catalini, & Goldfarb, 2014).

Social media platforms play a critical role in publicising and disseminating donation campaigns to large audiences. Platforms such as Twitter, Facebook and Instagram allow users to share their donation campaigns and reach large audiences (Enli & Moe, 2013). The viral effect of social media enables campaigns to spread quickly and raise more donations. For example, Bernie Sanders' 2016 and 2020 presidential campaigns managed to raise large amounts of donations through social media (Bimber, 2014).

Digital donation platforms also offer significant advantages in terms of transparency and security. Users can easily track the financial status and expenditures of the campaigns they donate to. This transparency increases donor trust and encourages more people to donate (Strömbäck & Kiousis, 2011). Furthermore, innovations such as blockchain technology increase the security of donation processes, preventing fraud and abuse (Noizat, 2016).

Donation and support campaigns create a strong bond between participants and the campaign. Donors feel more responsible for the success of the campaigns they support, which increases political participation (Verba, Schlozman, & Brady, 1995). By establishing regular communication with donors, digital platforms keep them informed about campaign processes and ensure their continued participation (Howard & Parks, 2012).

Threats to Digital Participation on Platform X

While digital platforms have the potential to increase political participation and support democratic processes, they also face various threats and challenges. While digital tools such as Platform X enable

FULL TEXTS BOOK

users to participate in political processes more easily and effectively, it is crucial to be aware of the threats to digital participation and to take measures against these threats. The main threats to digital participation on Platform X are as follows:

-Digital Divide
-Information Pollution and Misinformation
-Cyber Security Threats
-Privacy Concerns
-Algorithmic Biases.

The digital divide is an important problem that hinders the digital participation of individuals without internet access or with low digital literacy. Individuals without internet access cannot access online surveys, referendums and other digital participation tools. This leads to inequalities in political participation and makes it difficult for certain groups to be represented (Norris, 2001). In addition, individuals with low digital literacy may not be able to use available digital tools effectively, which reduces participation rates.

Digital platforms also face the problems of information pollution and misinformation. Social media and other digital tools allow misinformation to spread rapidly. Misinformation prevents users from making the right decisions and makes it difficult for democratic processes to function properly (Allcott & Gentzkow, 2017). Disinformation campaigns can undermine users' trust and negatively affect political participation. Therefore, it is important to increase digital literacy and promote reliable sources of information.

Cyber security threats are one of the most significant threats to digital participation. Online voting, surveys and other digital participation tools can be vulnerable to cyber attacks. Such attacks can lead to the theft, manipulation or destruction of data. Innovations such as blockchain technology can play an important role in enhancing cyber security (Noizat, 2016). However, such technologies need to be widely adopted and implemented.

Digital platforms collect users' personal data and the privacy of this data is a major concern. When users are concerned about the protection of their personal information, they may be reluctant to participate digitally. The development of security protocols and encryption methods can help protect user data (Acquisti, Brandimarte, & Loewenstein, 2015).

Algorithms used on digital platforms determine how content appears and with whom it is shared. These algorithms can favour certain political views and suppress others. Algorithmic biases ensure that users are exposed to certain content and are not aware of other content, which can lead to information asymmetry and polarisation (Noble, 2018). Algorithmic transparency and accountability play an important role in solving this problem.

CONCLUSION and DISCUSSION

Innovations and technological developments brought by the digital age have radically changed the forms and dynamics of political participation. As one of the pioneers of this transformation, the X Platform stands out as an innovative tool that encourages and facilitates political participation in the digital environment. With the various tools and opportunities it offers to users, it aims to increase participation in political processes and strengthen democratic participation.

Platform X offers many advantages by digitalising various aspects of political participation. Online surveys and referendums reach large audiences, enabling citizens to communicate their views quickly and effectively. This enables politicians to better keep their finger on the pulse of the public. Education and information activities increase users' political literacy, leading to more informed participation. Events and discussion groups foster a sense of community and belonging among users and encourage active participation in democratic processes. Donation and support campaigns provide financial support for political movements and help build strong ties between participants and campaigns.

FULL TEXTS BOOK

However, threats to digital participation should not be ignored. The digital divide prevents digital participation of individuals without internet access or with low digital literacy, leading to inequalities in political participation. Information pollution and misinformation prevent users from making the right decisions and make it difficult for democratic processes to function properly. Cyber security threats can jeopardise the security of online voting, polls and other digital participation tools. Privacy concerns may lead users to be reluctant to participate in digital participation due to concerns about the protection of their personal data.

Algorithmic biases can favour certain political views and suppress others, leading to information asymmetry and polarisation. To reduce the digital divide, it is necessary to expand internet access and increase digital literacy. Governments and the private sector can collaborate to expand internet access by investing in infrastructure. In addition, digital literacy trainings can be provided in schools and community centres to enable individuals to use digital tools effectively.

In order to combat information pollution and misinformation, tools that facilitate users' access to reliable information sources should be developed. Platform X can provide accurate and up-to-date information to its users by cooperating with verification websites and reliable news sources. It can also prevent the spread of misinformation by developing disinformation detection systems on the platform.

Advanced security protocols and encryption methods should be used against cyber security threats. X Platform can ensure the security of user data by adopting innovative solutions such as blockchain technology. It can also continuously improve the security of the platform by conducting regular security audits and updates.

To address users' privacy concerns, transparency should be provided about how data is collected, used and protected. Platform X can increase user trust by providing detailed information to its users about its data policies and implementing data protection measures. It can also reduce privacy concerns by providing tools for users to control their data.

To reduce algorithmic bias, there should be transparency about how algorithms work and they should be regularly audited. Platform X can reduce information asymmetry and polarisation by taking measures to promote diversity and inclusion in algorithmic decision-making. It can also ensure that the platform is fair and balanced by providing options for users to have control over the algorithms.

In line with these recommendations, it is possible for Platform X to promote digital inclusion in a more secure, transparent and egalitarian environment. Reducing the digital divide, combating information pollution, strengthening cybersecurity measures, addressing privacy concerns and reducing algorithmic biases will be key steps in achieving these goals. In this way, the sustainability and effectiveness of political participation in the digital age can be enhanced.

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FULL TEXTS BOOK

INVESTIGATION OF FATIGUE LIFE TESTS IN A CRUCIFORM STRUCTURE WITH WELDED JOINT

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ABSTRACT
In this study, the results of six different tests performed for fatigue life estimation were examined. Fatigue is a complex process that causes materials to become damaged and ultimately break under repetitive loads. Therefore, fatigue tests are critical to evaluate material performance and predict life. The tests performed include cyclic testing of various material samples under certain loads. Each test was carried out in accordance with standard testing protocols and was designed to determine the fatigue strength of the material. Loads were applied sinusoidally between 50 kN and 0 kN. The stress ratio value is defined as 0. As a result of the tests, it was determined that the materials reached the fatigue limit in an average of 20,000 cycles. This finding is an important factor in material selection and engineering design processes. During the measurement and analysis processes, the initial and propagation stages of fatigue cracks were examined in detail. The results enabled the fatigue behaviour of different materials to be compared and the most suitable materials to be selected for specific applications. The data obtained in this context also formed a basis for evaluating the accuracy of existing models used in fatigue life prediction and for developing new models. In conclusion, the findings of this study can contribute to the development of strategies to increase material life in engineering applications.
Keywords: Welded Joints, Fatigue Life, Structural Safety, Fatigue Test.

INTRODUCTION
Material fatigue, particularly in welded joints, is a critical concern in engineering and structural applications. Fatigue refers to the progressive and localized structural damage that occurs when a material is subjected to cyclic loading. Over time, even stresses well below the material's ultimate tensile strength can cause the formation of cracks, leading to catastrophic failure. Understanding the fatigue behaviour of welded connections is essential for ensuring the safety, reliability, and longevity of various structures, including bridges, buildings, pipelines, and vehicles.

Fatigue is important for structural safety, especially in structures manufactured with steel construction. In particular, the lower FAT classes of welded connections and the use of welding in many structures show the importance of examining welded connections in detail. Fatigue also becomes important in terms of life safety at stresses below the yield strength. For this reason, fatigue life predictions must be made with correct values. There are widely used IIW recommendations for welded joints in the literature. These recommendations include nominal stress, hotspot stress, effective notch and linear elastic fracture approaches (Hobbacher, 2016; Niemi et al., 2018). There are many studies in the literature that use and validate these approaches. In finite element analysis, there are studies not only for the determination of stress in welded connections but also in many engineering applications and different applications. Different types of weld modelling can be found in finite element analyses (Gökçe & Özden, 2023; Özden, 2018; Özden & Gökçe, 2023a, 2023b, 2023c, 2024a, 2024b, 2024c; Özden et al., 2022; Özden & Savrukoğlu, 2024). It may also vary depending on the approach chosen in shell and solid modelling techniques. For this reason, modelling techniques applied together with the chosen approach also gain importance. Optimization algorithms are used in many applications in the literature (Büyüköz & Haklı; Faouri & Kasap, 2023; Ünlü & İlhan, 2023). Such optimization algorithms can be used in fatigue life predictions.

FULL TEXTS BOOK

This study focuses on the fatigue behaviour of welded joints, exploring the factors that influence their durability and the mechanisms that lead to their eventual failure. The research involved conducting six different tests designed to evaluate the fatigue performance of welded connections under various conditions. These tests aim to provide a comprehensive understanding of how welded joints respond to cyclic stresses and to identify the critical parameters that affect their fatigue life. In this study, 6 fatigue tests were carried out. These tests are designed to simulate real-world conditions that welded joints might encounter in service. By analysing the results, this study aims to identify the key factors that contribute to fatigue failure in welded connections and to develop strategies for enhancing their fatigue resistance. The insights gained from this research will inform the design and maintenance practices for structures that rely on welded joints, ultimately contributing to improved safety and performance. In conclusion, the fatigue behaviour of welded joints is a complex phenomenon influenced by a variety of factors, including loading conditions, material properties, environmental influences, and joint configurations. This study's comprehensive approach to testing and analysis provides valuable data that can be used to enhance the understanding and management of fatigue in welded connections. The findings are expected to have significant implications for the fields of structural engineering, materials science, and industrial design, guiding future efforts to mitigate fatigue-related failures and extend the service life of critical structures.

MATERIAL AND METHOD

In the study, 6 cruciform structure samples were prepared with fillet welds. S960QL was used as the main material and workpiece. Aristorod89 material was used as welding filler wire. The geometry measurements of 6 samples are shown in Figure 1. The dimensions used are different from many fatigue test studies carried out for cruciform structures in the literature. The width is set to 20 mm in geometric dimensions. The reason for this is that the capacity of the fatigue tester is 100 kN. In this way, the tension became higher and thus higher frequency values were reached.

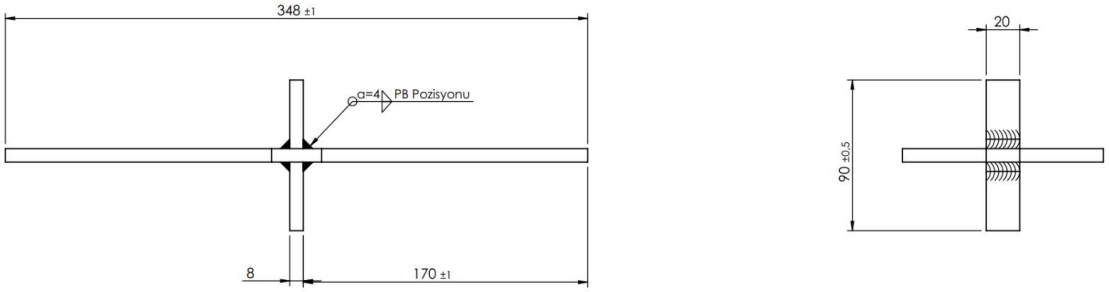


Figure 1. Geometric dimensions of the samples

The welding process was carried out at average values of 23 volts and 220 amperes. It was carried out with automatic robot MAG welding and M20 gas group, 80% Argon and 20% CO2 protective gases were used. The feed rate was welded at 20 cm/min. Thus, a weld seam with an average weld thickness of 4 mm was obtained. The weld thickness was checked with a welding calliper and the average weld thickness was determined. The mold used to avoid distortion during the welding process is shown in Figure 2.

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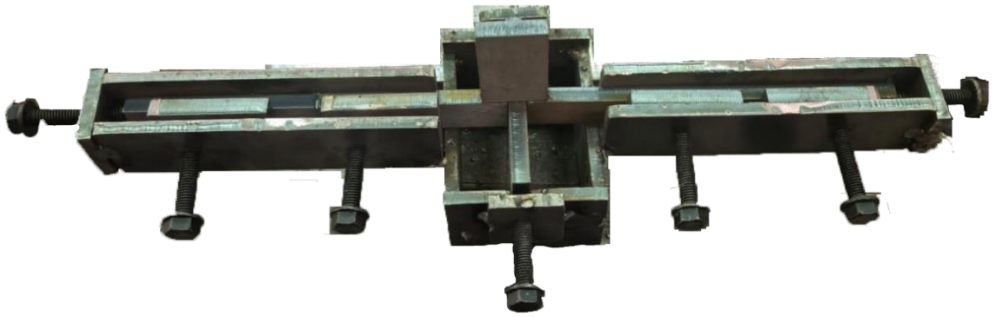


Figure 2. Mold used during the welding process

The chemical compositions of S960QL and Aristorod89 materials used in the welding process and samples are stated in Table 1 and Table 2 (Özden et al., 2023).

Table 1. S960QL Chemical compositions

C %	Si %	Mn %	P %	S %	Cr %	Ni %	Mo %	V %	Ti %	Cu %
0.17	0.22	1.24	0.01	0.001	0.2	0.06	0.597	0.04	0.002	0.02

Table 2. Aristorod89 Chemical compositions

C %	Si %	Mn %	Cr %	Ni %	Mo %
0.17	0.80	1.75	0.41	2.22	0.53

S960QL The mechanical properties of the S960QL material were also examined. Yield strength 1027 MPa, elasticity modulus 203.4 GPa, tensile strength 1066 MPa, percent elongation value 16%, and Poisson's ratio 0.33 values were examined.

In this study, 6 fatigue tests were carried out. Shimuz brand fatigue test device was used. Sinusoidal forcing was applied by defining the maximum force as 50 kN and the minimum force as 0 kN. The stress type was set by taking the stress ratio value specified in the Equation 1 formula to 0. When connecting to the fatigue test device, it was connected to the holders of the device at a distance of up to 50 mm from the corners. In this way, the piece is prevented from slipping. The average room temperature during the tests was 22.4 C0. After connecting to the device, a 15 mm stroke size was defined in the software, and when it exceeded this value, the device detected that it was broken and stopped the system. All 6 tests were applied in this way. Figure 3 shows the device used in the fatigue test.

$$R = \frac{\sigma_{min}}{\sigma_{max}} \quad (1)$$

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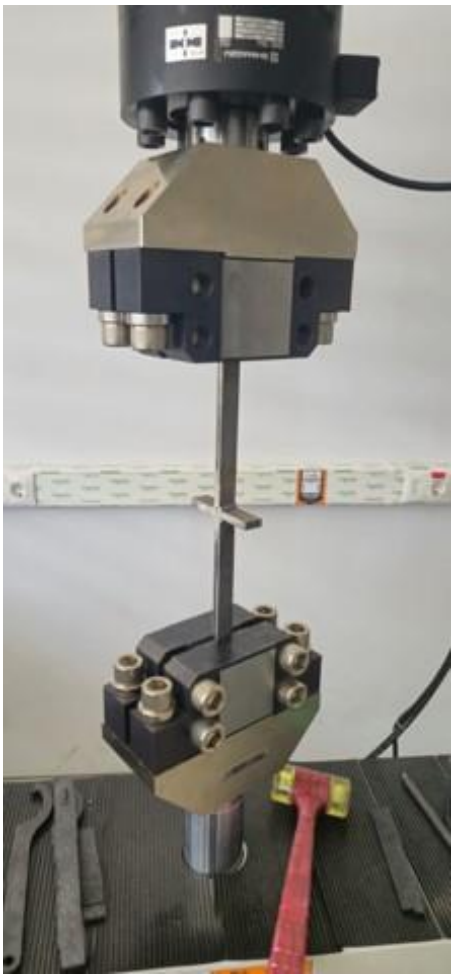


Figure 3. Connecting the devices and samples used in fatigue testing

The fatigue test device works with hydraulic equipment. It can reach a load capacity of 100 kN with the valve that can go up to a maximum of 50 Hz. There is a cooler to cool the hydraulic oil. In this way, more efficient tests are carried out. Different loading conditions can be defined as desired in the software interface, and sinusoidal forcing type was preferred in this study. This type of forcing has been used in many studies in the literature.

RESULTS AND DISCUSSION

Fatigue tests were carried out for samples prepared according to the specified geometric dimensions. All 6 samples were forced below their yield strength, causing fatigue damage. It was damaged by 50 kN and 0 kN sinusoidal stress. After the damage occurred, the device stopped itself and gave a warning. The number of cycles was determined from the software of the fatigue test device. The damages started and progressed with a crack forming at the weld tip. It was broken instantly and the cycle numbers were obtained. Before starting the tests, finite element analysis was performed with the effective notch method. In the analysis, the weld modelling was modelled as 4 mm thick and a 1 mm radius was opened at the weld tip. The finite element analysis result is shown in Figure 4.

FULL TEXTS BOOK

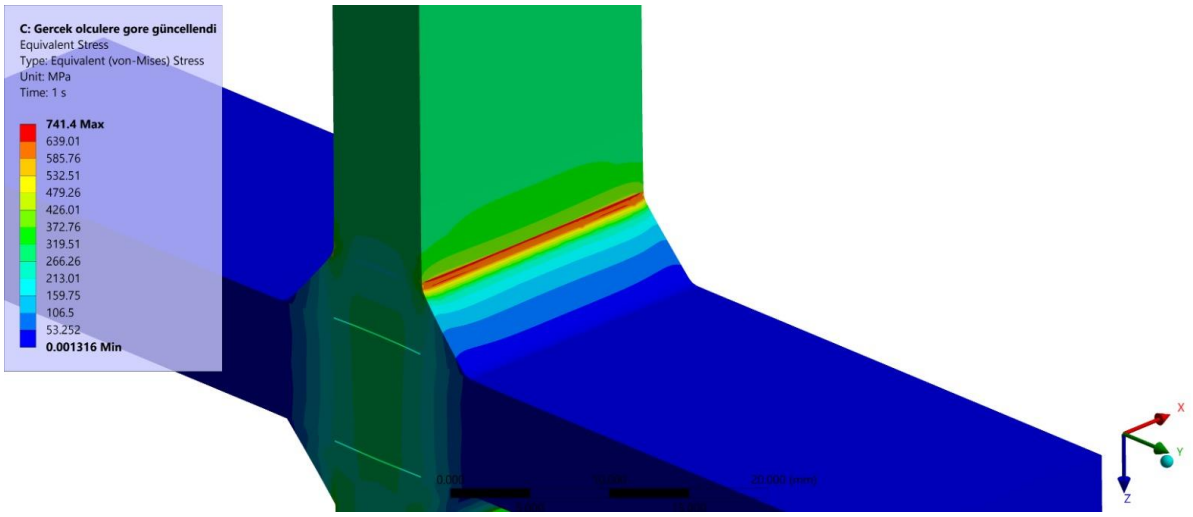


Figure 4. Finite element analysis stress results

Attention has been paid to the meshes applied in this modelling technique. Hexagonal mesh type and quadratic mesh type were preferred whenever possible. Evaluations were also made according to mesh quality criteria. Element quality values, which are among the mesh quality criteria, were examined and an average element quality value of 0.92 was determined in the analysed structure. The mesh size value is defined as 0.1 mm in the welded connection region and 2 mm in other regions. After the finite element analyses were carried out, it was determined that the tests would be carried out with a stress ratio of 0 between 50 kN and 0 kN Tests have been carried out and the results show damage at 21210, 20520, 19810, 18250, 17250, 18560 cycles. The damages occurred at the weld end and the results were evaluated. Figure 5. shows that crack formation occurs at the weld end of a damaged sample.

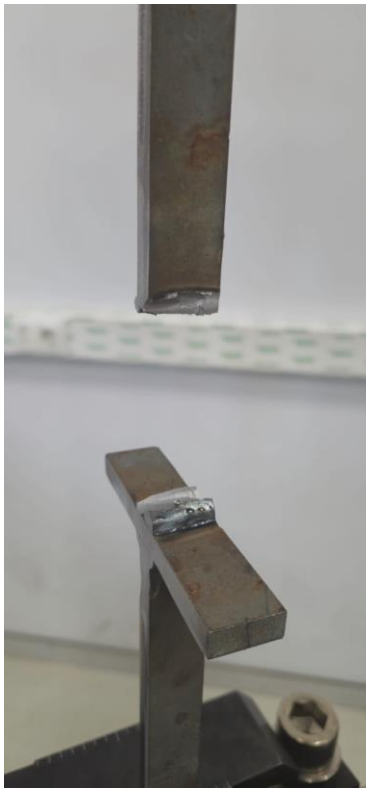


Figure 5. Fatigue damage occurring at the weld end of the sample damaged in 20520 cycles

The results were compared with the Basquin slope of 3 according to the FAT 80 class recommended by the International Welding Institute. It is seen that it is quite high in this S-N curve created according to

FULL TEXTS BOOK

the 95% probability value. Figure 6. shows the S-N curve created according to the tests and FAT 80 class.

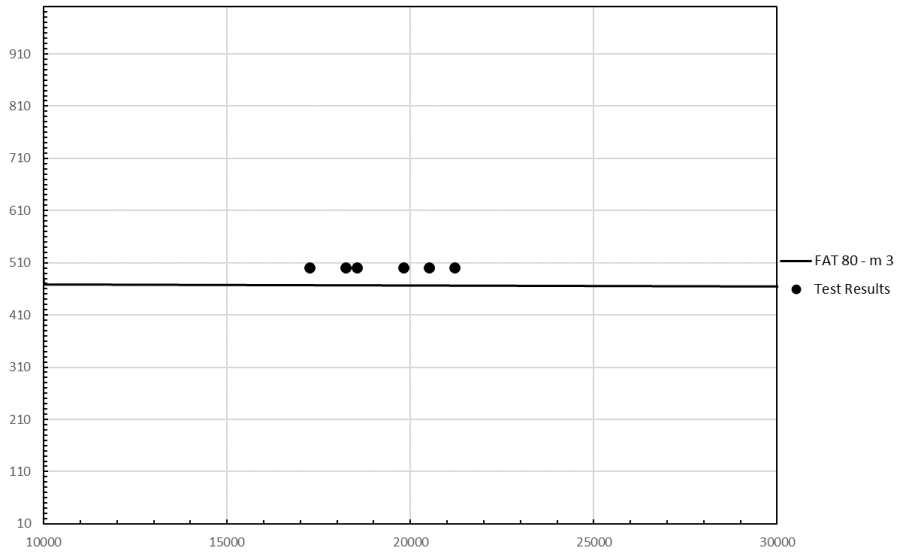


Figure 6. IIW FAT 80 Fatigue class and fatigue test results

Quite a few tests were performed in this study. Performing more than 20 fatigue tests to obtain the new Basquin equation will result in very accurate results. However, when the methodology and results used in this study were compared to the FAT 80 class, it was seen that correct results could be obtained. In the literature, new S-N curves are created by creating the Basquin equation by performing multiple fatigue tests.

CONCLUSION

In this study, 6 samples were prepared using S960QL material and a 4 mm thick weld seam was obtained with the appropriate filler wire. Fatigue test results were made for comparison purposes at FAT 80 IIW fatigue class value. Before the tests, the stresses occurring at the weld tip were determined using the effective notch method. The cycle values corresponding to this stress were found as 21210, 20520, 19810, 18250, 17250, 18560, and the structures subjected to fatigue damage were examined. When the damages were examined, it was observed that cracks appeared at the weld end. It was observed that it was above the line in the FAT 80 class, which was prepared according to the 95% probability value. In future studies, it is planned to prepare more than 80 samples and determine the new Basquin slope and FAT value. It is also planned to make comparisons with weld tip forging and burr grinding processes performed after welding.

ACKNOWLEDGEMENTS

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FULL TEXTS BOOK

INVESTIGATION OF THE BALLISTIC PERFORMANCE OF Al_2O_3-Sm_2O_3 CERAMICS AND Al_2O_3 BASED ZRO_2 AND SM_2O_3 ADDED SANDWICH SAMPLES

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ABSTRACT
In this work, it is aimed to investigate the ballistic performance of alumina (Al_2O_3) based sandwich composites containing 0.8vol% samarium oxide (Sm_2O_3) and 5vol.% zirconia (ZrO_2) additives. For the ballistic tests, the samples with hexagonal geometry which have an edge length of 25 mm were prepared by dry pressing followed by cold isostatic pressing. The bulk densities of the samples after sintering were determined via volumetrically and the Archimedes method. The samples were analyzed by X-ray computed tomography (XCT) to determine the cracks and defects in the samples before the ballistic tests and to examine the deformation caused by the bullet in the backing plate after the ballistic test. The ceramic composite samples were placed on a polycarbonate backing plate, and their ballistic performance was determined by a depth of penetration (DOP) test according to the STANAG 4569 Level 1 standard. During the DOP tests, a 7.62 x 51 mm NATO ball bullet was fired toward the samples from a distance of 15 meters with a velocity of 839 ± 10 m/s. Consistent with the density results, the highest density (99.8%) was obtained in the sandwich samples that have Al_2O_3+5vol.%ZrO_2 composition in the middle layer. As a result of the ballistic tests, it was observed that the sandwich structured samples (outer layers: Al_2O_3+0.8vol.%Sm_2O_3, middle layer: Al_2O_3+5vol.%ZrO_2 and outer layers: Al_2O_3+0.8vol.%Sm_2O_3, middle layers: Al_2O_3+5vol.%ZrO_2+0.8vol.%Sm_2O_3) exhibited better ballistic performance than the samples with Al_2O_3-0.8vol.%Sm_2O_3 composition. The residual depth of penetration was measured as 13.87 mm for the Al_2O_3+0.8vol.%Sm_2O_3. It was observed that the deformation was lower in the sandwich-structured samples compared to the Al_2O_3+0.8vol.%Sm_2O_3 sample and the residual depth of penetration was determined as 4.44 mm in the sandwich-structured samples with the middle layer of Al_2O_3+5vol.%ZrO_2. The ballistic efficiency factor was calculated as 3.7 for the samples with the middle layer of Al_2O_3+5vol.%ZrO_2. It was observed that the impact energy was absorbed more efficiently due to the interlayer cracking effect of the layers in the sandwich structured samples.
Keywords: Al_2O_3, Composite, Sandwich Structure, Ballistic Test.

INTRODUCTION
Laminated ceramics/composites are formed by layering at least two layers of ceramics on top of each other. The residual compressive stresses caused by the thermal expansion difference of the ceramic layers can effect the mechanical properties positively. In addition, the laminated structures can be used as armor components effectively and there are many studies about the impact behavior of these materials (Huang & Chen, 2016b, 2016a)

FULL TEXTS BOOK

The most commonly used armor ceramics are Al_2O_3, silicon carbide (SiC), and boron carbide (B_4C). Among these, Al_2O_3 is the most preferred ceramic as armor material due to its low cost. Although fracture toughness and bending strength of alumina are low with high specific gravity, its high hardness, wear resistance, and low cost are the reasons why it is widely preferred as an armor material (Krishnan et al., 2021).

The determination of ballistic performance in ceramic materials is a complex problem. Many parameters should be evaluated together such as projectile velocity, projectile geometry, type of ceramic, dimensions and geometry of ceramic, firing distance, impact angle, and thickness and type of support material etc. (Madhu et al., 2005). Also, there are many different test methods (ballistic limit velocity, non-deforming penetration, semi-infinite penetration, depth of penetration) to evaluate ballistic performance. The depth of penetration (DOP) test is a simple and easy method commonly used to determine and compare the ballistic performance of ceramic materials (Dresch et al., 2021; Madhu et al., 2005; Savio & Madhu, 2018). During the DOP test, the penetration of the projectile is measured with and without the ceramic material. The ballistic performance of the ceramic material is determined by comparing the difference between these two penetrations. This method enables a lot of data to be collected quickly in a short time (Dresch et al., 2021).

In literature research, studies on the ballistic performance of Al_2O_3 ceramics have been observed. Cura et al. produced laminated ceramics (Al_2O_3, SiC, and B_4C) in different geometries (hexagonal and square) and determined their ballistic performance compared to the monolithic structures by DOP test. As a result of the tests, it was observed that the ballistic performance of monolithic structures was higher compared to the laminated structures (Cura et al., 2024). Appleby-Thomas et al. studied the ballistic performance of Al_2O_3 ceramics produced in different thicknesses by the DOP test (Appleby-Thomas et al., 2020). Carton et al. carried out DOP testing of Al_2O_3 ceramics produced in hexagonal form. During the tests, different projectiles and velocities (7.62 mm APM2 - 800 m/s and 7.62 mm AP8 - 900 m/s) were used and ballistic performance was evaluated (Carton et al., 2019).

It has been observed that there are only a few studies in the literature to investigate the ballistic performance of laminated structures. In this study, the densification and ballistic performance of Al_2O_3+0.8vol.%Sm_2O_3 ceramics and layered samples with a sandwich structure (outer layers: Al_2O_3+0.8vol.%Sm_2O_3, middle layer: Al_2O_3+5vol.%ZrO_2 and outer layers: Al_2O_3+0.8vol.%Sm_2O_3, middle layers: Al_2O_3+5vol.%ZrO_2+0.8vol.%Sm_2O_3) were evaluated. The effect of the sandwich structure on ballistic performance was analyzed. The ballistic performance of the samples was compared by measuring the deformation caused by the projectile on the support plate with the DOP test.

MATERIALS AND METHOD

In this study, α-Al_2O_3 (Alfa Aesar, 99.95% purity, 0.25-0.45 μm), Sm_2O_3 (Nanography, 99.95% purity, 50 nm) and 3 mol% yttria stabilized ZrO_2 (MSE Technology, <0.5 μm) ceramic powders were used. As a dispersant, polyacrylic acid was employed (Darvan 821A, MSE Tech Co. Ltd.). Glycerol (plasticizer; Sigma Aldrich) and polyvinyl alcohol (binder; Sigma Aldrich) were used to make the binder solution.

Firstly, Al_2O_3+0.8vol.%Sm_2O_3, Al_2O_3+5vol.%ZrO_2, and Al_2O_3+5vol.%ZrO_2+0.8vol. %Sm_2O_3 composite powders were prepared to be used in the ballistic sample production. The mixture containing ceramic composite powder, dispersant, and Al_2O_3 balls were mixed in distilled water for 24 hours in a ball mill. A binder solution was added to the prepared powder mixture consisting of 2 wt% polymers (polyvinyl alcohol and glycerol). The powder was prepared for shape after it had been dried and sieved. The prepared powder (52 grams) was poured into a hexagonal die and pressed first in a uniaxial press under 35 MPa pressure and then in a cold isostatic press under 200 MPa pressure. During the production of the sandwich samples, the powders were poured sequentially into the die to ensure a thickness ratio of 1:6 between the surface/center layers. After all the layers were poured in order into the die, uniaxial dry pressing was performed at a pressure of 80 MPa. The samples were then cold isostatically pressed

FULL TEXTS BOOK

at a pressure of 200 MPa. After the forming process, all the samples were subjected to the binder burn-out that was performed for 1 hour at 200°C, 2 hours at 250°C, 1 hour at 450°C and 1 hour at 600°C with a heating rate of 1°C/min. The samples were pressureless sintered at 1550°C (2°C/min heating rate) in an air environment. The sample compositions produced are presented in Figure 1.

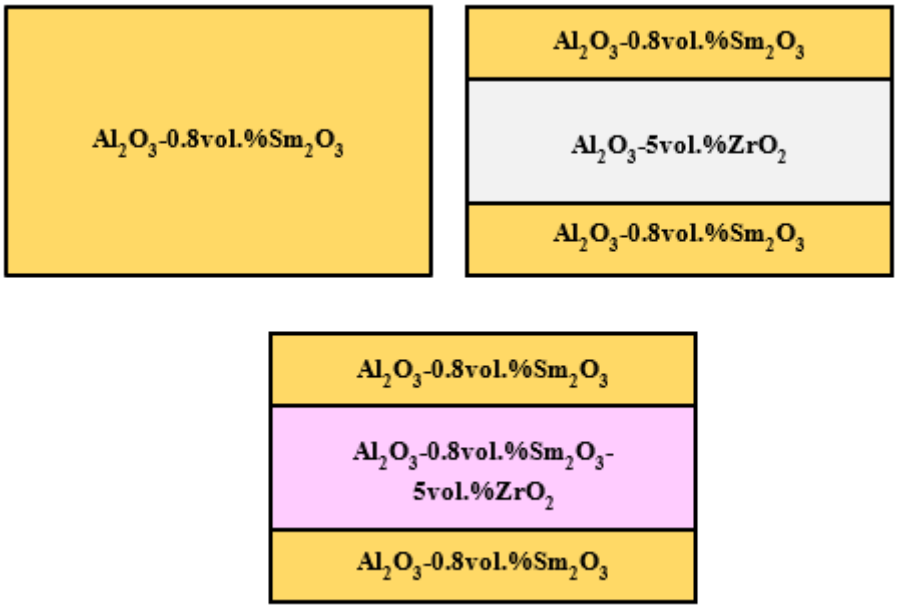


Figure 1. The produced compositions for the study.

The bulk density values were determined both volumetrically from the sample dimensions and by the Archimedes method. For the evaluation of ballistic performance, the DOP test schematized in Figure 2 was performed. In the DOP test, the projectile propagation in the support plate is determined without ceramic material and with a ceramic material of a certain thickness. By comparing the difference between these two penetration depths, the ballistic performance of the ceramic armor was evaluated.
The ballistic performance of the produced samples was compared with the help of the differential efficiency factor (Δec) equation given in Equation 1.

$$\Delta ec = \frac{\rho_b.(P_0 - P_b)}{\rho_c.t} \quad \textbf{(1)}$$

In this equation, ρ_b is the density of the support material, ρ_c is the ceramic composite material density, t is the thickness of the ceramic composite, P_0 is the penetration depth in the support material without ceramic composite material and P_b is the penetration depth in the support material in the presence of the ceramic composite material.

FULL TEXTS BOOK

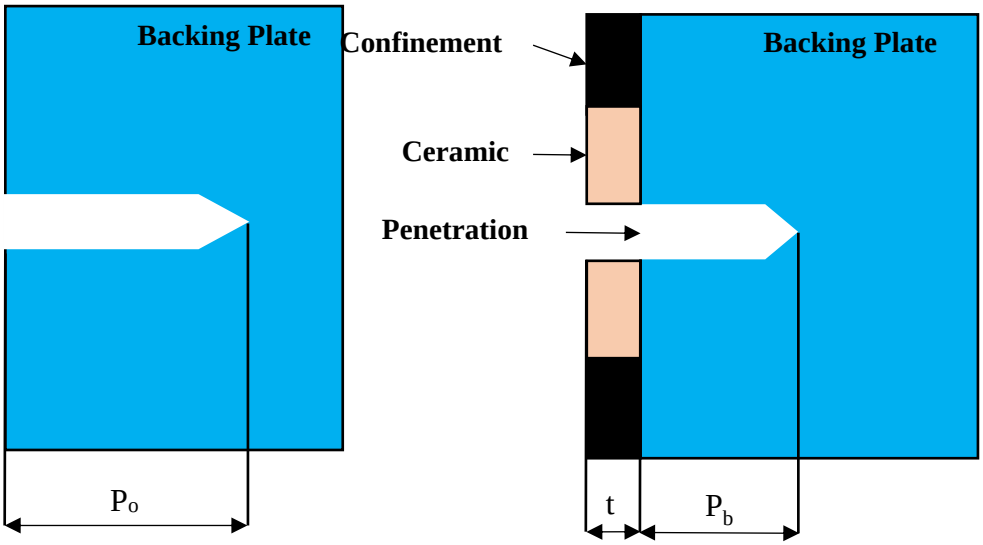


Figure 2. Schematic representation of the DOP test.

The DOP test was carried out at Kayseri Advanced Materials Industry and Technology Inc. (KIM TECHNOLOGIES) by STANAG 4569 Level 1 standard. Polycarbonate was used as the backing plate material during ballistic tests. When placing the samples, 7 samples were used, one was placed in the center and the other six were placed around it. The ceramic composite samples were placed on the backing plate by using polymer adhesive. Then the samples were covered with a fibre glass coating to prevent the samples from spreading during the shot. The adhesive was allowed to dry for three days before the ballistic test. Figure 3 displays the placement of the samples.



Figure 3. The placement of the samples

In the DOP tests, a 7.62x51 mm NATO Ball projectile was fired at a distance of 15 meters with a velocity of 839 ± 10 m/s, towards to the sample in the middle region. Laser alignment was made to ensure that the shots hit exactly the center. In order to provide the specified velocity, 2634 g of gunpowder was used.

The DOP test was conducted both prior to and following XCT scanning. Before the ballistic tests, invisible cracks and defects in the samples were detected by XCT scanning. After the ballistic tests, a 3D XCT scan was performed to determine the penetration depth in the samples.

FULL TEXTS BOOK

RESULTS AND DISCUSSIONS

The bulk densities of the samples were determined both volumetrically and through the Archimedes method. The obtained density results are presented in Table 1. Since the measurement technique is sensitive to the volumetric method, the results obtained with the Archimedes method were taken into account. When the values were analyzed, it was seen that the density was 98.8% in the Al_2O_3+0.8vol.%Sm_2O_3 samples and 98.5% in the sandwich samples that have Al_2O_3+5vol.%ZrO_2+0.8vol.%Sm_2O_3 composition in the middle layer. The relative density value is an important parameter for ceramic armor materials. A ceramic material to be used as an armor material is required to have high densification after sintering.

Table 1. Relative density values of the samples after sintering.

Composition	Relative Density (Archimedes)(%)	Relative Density (Volumetrically)(%)
Al_2O_3+0.8vol.%Sm_2O_3	98,8 ± 0,2	98,9 ± 0,4
Middle layer Al_2O_3+5vol.%ZrO_2 sandwich	98,7 ± 1.2	99,8 ± 0,1
Middle layer Al_2O_3+0.8vol.%Sm_2O_3+5vol.%ZrO_2 sandwich	98,5 ± 0,1	99,0 ± 0,4

Figure 4 presents the XCT scan images before the ballistic tests. When the images were examined, it was observed that some samples had cracks and pores due to the production process. During the DOP tests, the sample placed to the center of the mechanism should have a high density and not contain cracks or pores. These cracks and pores in the structure of the samples would negatively affect the ballistic performance and cause early damage to the ceramic armor so the samples containing large cracks were not used in the ballistic tests.

FULL TEXTS BOOK

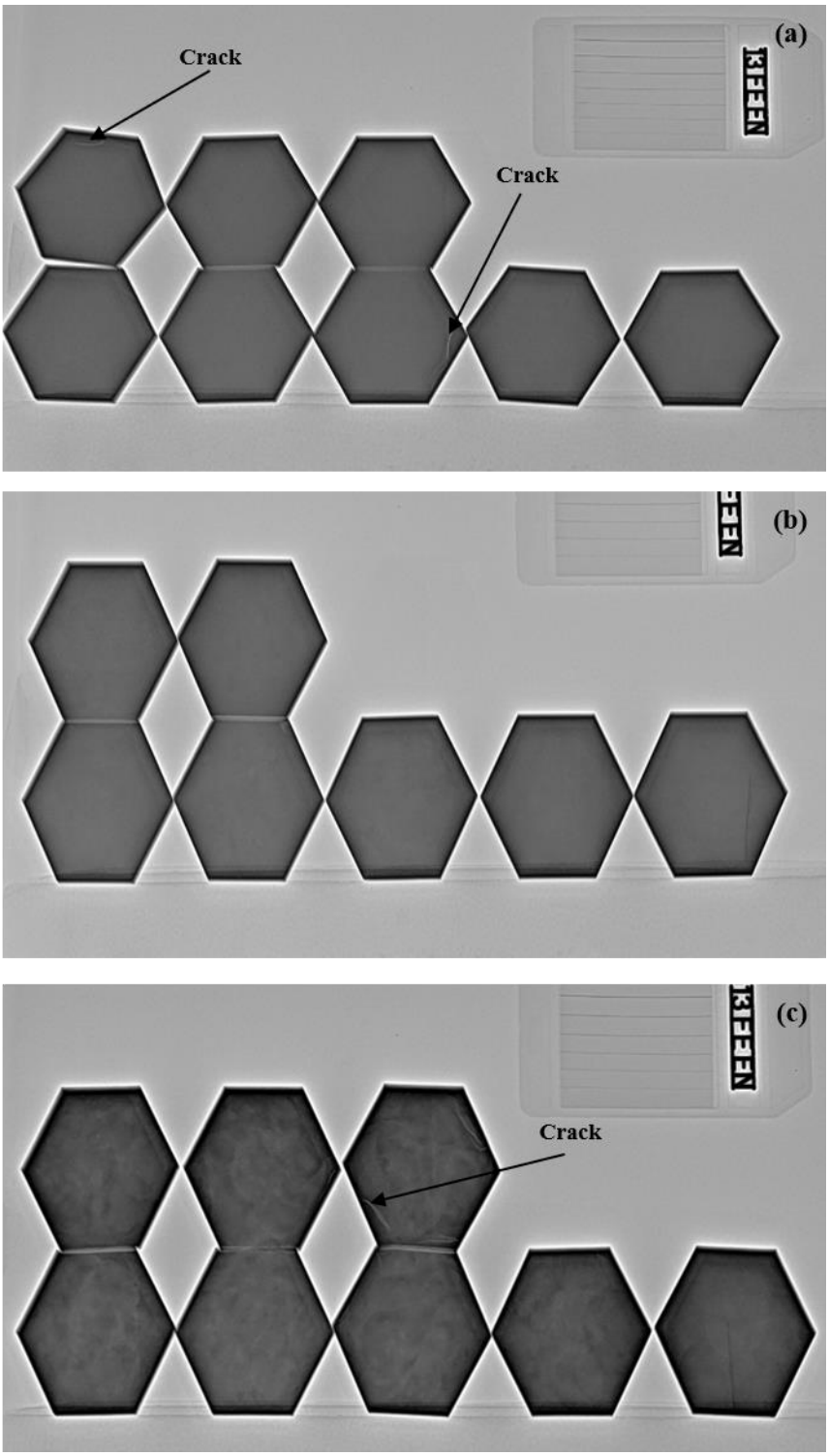


Figure 4. (a) X-ray image of Al_2O_3+0.8vol.%Sm_2O_3 samples, (b) X-ray image of layered samples with the middle layer Al_2O_3+5vol.%ZrO_2, (c) X-ray image of layered samples with the middle layer Al_2O_3+0.8vol.%Sm_2O_3+5vol.%ZrO_2

Although the impact caused a deformation on the support plate, the bullet did not spread during the testing and instead bounced back after deforming the ceramic material. The ballistic performance was evaluated by measuring the amount of this deformation and the diameter of the crater caused by the impact at the point of bullet penetration. Figure 5 demonstrates the 3-D XCT scan images after the DOP tests. The residual depth of penetration caused by the bullet is clearly visible in the images. The highest

FULL TEXTS BOOK

residual depth of penetration (13.87 mm) was observed in the Al_2O_3+0.8vol.%Sm_2O_3 composite samples. In comparison to the Al_2O_3+0.8vol.%Sm_2O_3 composite sample, it was seen that the bullet propagated less in the sandwich structure samples, and the sandwich structure enhanced the ballistic performance. The sandwich samples with the middle layer Al_2O_3+5vol.%ZrO_2 composition (4.44 mm) had a lower residual depth of penetration compared to the sandwich samples with the middle layer Al_2O_3+0.8vol.%Sm_2O_3+5vol.%ZrO_2 composition (6.74 mm) and exhibited the highest ballistic performance.

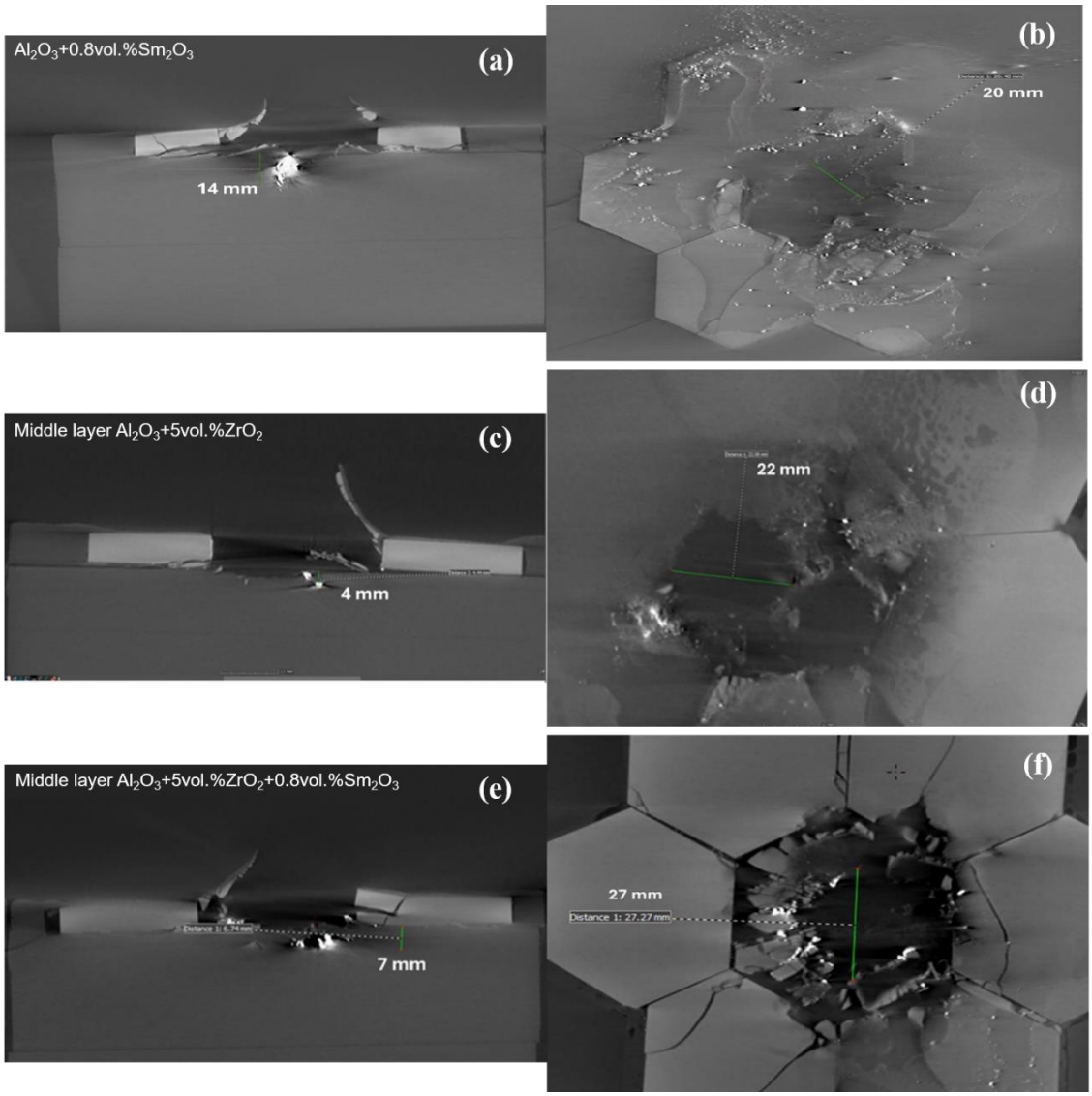


Figure 5. 3D XCT scan images after DOP test: (a) P_b of the Al_2O_3+0.8vol.%Sm_2O_3 sample, (b) crater diameter of the Al_2O_3+0.8vol.%Sm_2O_3 sample, (c) P_b of the layered sample with middle layer Al_2O_3+5vol.%ZrO_2, (d) crater diameter of the layered sample with middle layer Al_2O_3+5vol.%ZrO_2, (e) P_b of the layered sample with middle layer Al_2O_3+5vol.%ZrO_2+0.8vol.%Sm_2O_3, and (f) crater diameter of the layered sample with middle layer Al_2O_3+5vol.%ZrO_2+0.8vol.%Sm_2O_3

During the DOP tests, laser alignment was performed to ensure that the bullet hits the middle area of the mechanism. Since the required velocity (839 ± 10 m/s) could not be set precisely, the bullet velocities showed variations. The velocity was measured in each test and found to be within the determined tolerances. The bullet velocities during the tests are given in Table 2. Based on the residual depth of penetration of the samples, the differential efficiency factor was calculated according to Equation 1 and

FULL TEXTS BOOK

the data obtained are presented in Table 2. It is seen that the ballistic efficiency factor is higher in the sandwich samples compared to the Al_2O_3+0.8vol.%Sm_2O_3 composite samples. The highest ballistic efficiency factor value (3.7) was calculated in the sandwich samples with a middle layer of Al_2O_3+5vol.%ZrO_2 composition. The data were consistent with the residual depth of penetration determined after the ballistic test.

Table 2. The sample properties, DOP test datas, and the calculated differential efficiency factor values.

Composition	Bullet Velocity (m/s)	t (mm)	(Po) (mm)	Pb (mm)	Density of ceramic (g/cm^3)	Δec
Al_2O_3+0.8vol.%Sm_2O_3	825.5	8.0	98.39	13.87	3.97	3.2
Middle layer Al_2O_3+5vol.%ZrO_2	835.0	7.5	98.39	4.44	4.09	3.7
Middle layer Al_2O_3+0.8vol.% Sm_2O_3+5vol.%ZrO_2	842.5	7.5	98.39	6.74	4.04	3.6

The fracture surface SEM images taken from the impacted areas of the samples are seen in Figure 6. Al_2O_3-%0.8Sm_2O_3 sample had almost completely cleavage fracture character, a transition in fracture mode due to compositional transition was also observed in sandwich samples. It is thought that this situation plays a role in reducing the energy of the bullet. In three-layer sandwich structures with compositional changes, the upper and middle layers were tightly bounded diffusionally. In the images, the layers can be easily recognized from each other due to the grain size difference. In the outer layers, a large-grained microstructure was formed and the cleavage fracture character was observed to be dominant. In the middle layers, a fine-grained microstructure was observed and a mixed fracture characteristic was observed.

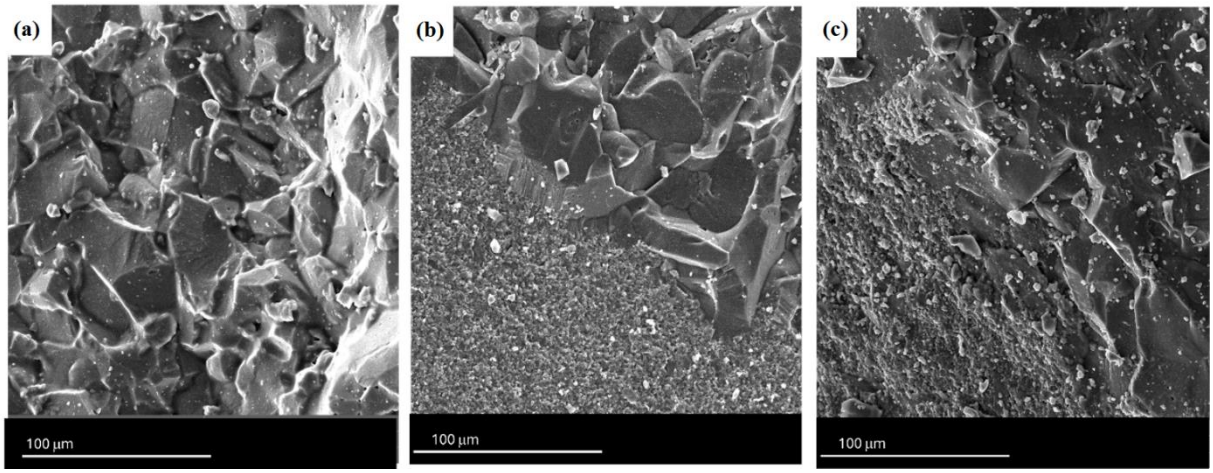


Figure 6. SEM images of fracture surface after ballistic test (a) Al_2O_3+0.8vol.%Sm_2O_3 (b) sandwich samples with the middle layer of Al_2O_3+5vol.%ZrO_2 composition (c) sandwich samples with the middle layer of Al_2O_3+5vol.%ZrO_2+0.8vol.%Sm_2O_3 composition

Figures 7 and 8 show close-up photographs of the damaged areas for the sandwich samples. Photographs were taken after the middle sample pieces that were hit by the bullet were removed. Figure 7 reveals that the desired layered structure was achieved in the samples. The presence of gradual cracking zones in both compositions is seen in the samples located on the side of the sample hit by the bullet. It is thought that these layers were forced to separate during the impact, and that the grain sizes of the

FULL TEXTS BOOK

compositions forming the layers were different and therefore their fracture characteristics are different (cleavage on the surface, mixed fracture mode in the middle region) and that more energy can be absorbed. The interlayer cracking ensures that the impact energy can be absorbed more effectively during the ballistic test. This condition has a positive effect on the ballistic performance.

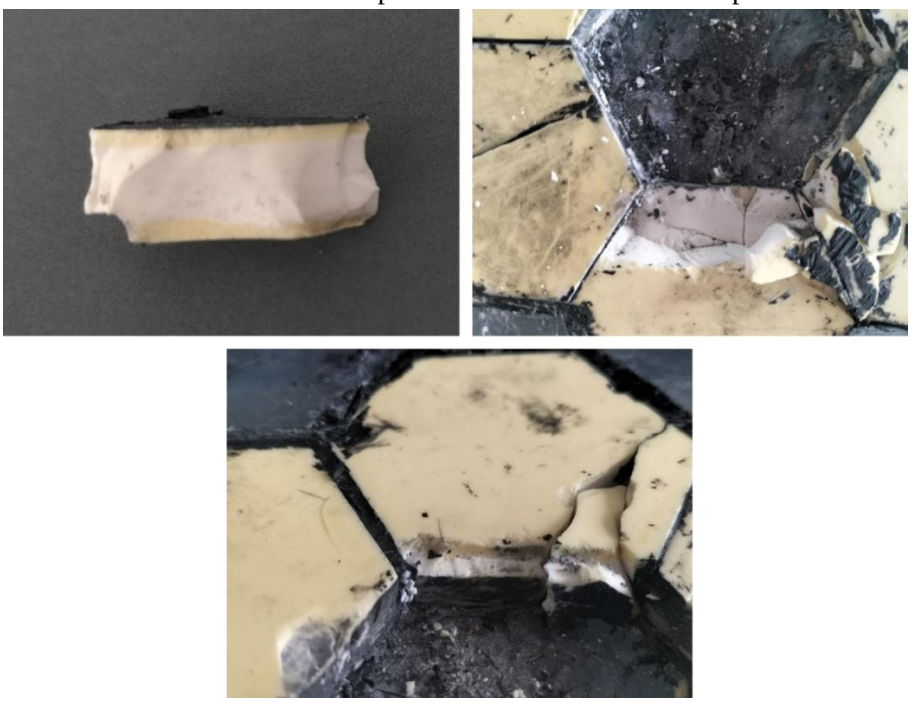


Figure 7. Fracture zone and layering in the cross-sectional view of sandwich samples with the middle layer of Al_2O_3+5vol.%ZrO_2 composition after DOP tests

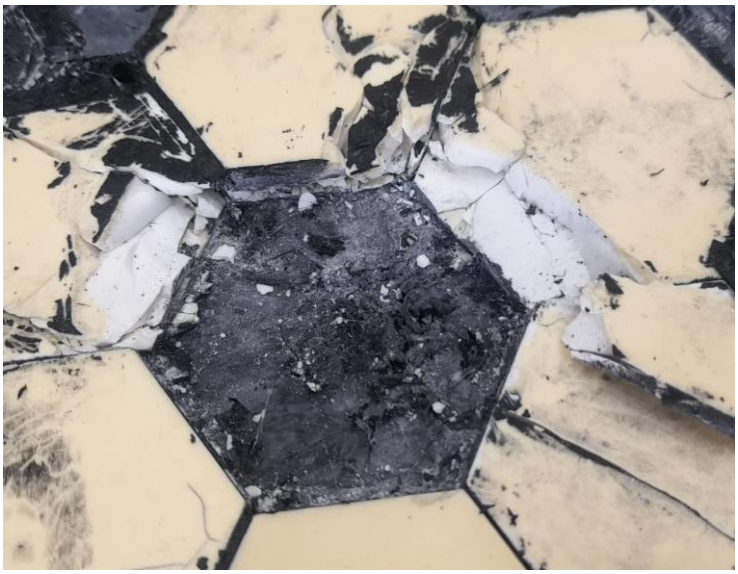


Figure 8. Fracture zone of sandwich samples with the middle layer of Al_2O_3+5vol.%ZrO_2+0.8vol.%Sm_2O_3 composition after DOP test.

CONCLUSION

In this research, the ballistic performance of Al_2O_3+0.8vol.%Sm_2O_3 samples and the sandwich-structured layered samples (outer layers: Al_2O_3+0.8vol.%Sm_2O_3, middle layer: Al_2O_3+5vol.%ZrO_2 and outer layers: Al_2O_3+0.8vol.%Sm_2O_3, middle layers: Al_2O_3+5vol.%ZrO_2+0.8vol.%Sm_2O_3) were compared. The DOP tests were performed to evaluate the ballistic performance and the results were

FULL TEXTS BOOK

compared. It was observed that the ballistic performance of sandwich-structured layered samples was better than Al_2O_3+0.8vol.%Sm_2O_3 samples. The lowest residual depth of penetration (4.44 mm), the highest density (99.8%), and the highest ballistic efficiency factor (3.7) were achieved in the sandwich structure sample with the middle layer of Al_2O_3+5vol.%ZrO_2 composition. In the samples with compositional transition, a tight diffusion bond was formed between the layers. It is thought that the ballistic performance has improved as more energy can be absorbed with the separation of this bond by the impact effect. Besides, the grain size difference between the layers in the sandwich samples and the different fracture characteristics of the layers also positively affected the ballistic performance.

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FULL TEXTS BOOK

A REVİEW ON THE ROLE OF FEEDBACK İN FOREİGN LANGUAGE TEACHİNG

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ABSTRACT
Feedback remains a pivotal topic within foreign language didactics and language teaching/learning research, as well as among foreign/second language teachers. Questions regarding the functions, forms, effectiveness, and other side effects of feedback—such as corrective feedback/error correction or instructional feedback aimed at guiding learners—regularly surface. Giving and receiving feedback are fundamental activities in any teaching-learning setting and must be reflected upon concerning teachers' role understanding, particularly within teacher education.
Educational science studies present new perspectives on feedback in pedagogical contexts. From a didactic standpoint, a culture of feedback is considered significant. Changing conditions for teaching and learning foreign and second languages, especially against the backdrop of digitalization and the instrumentalization of language learning, prompt renewed questions. Feedback, as a term, can be related to the teaching-learning culture and the overall school environment. All participants—learners, teachers, parents, and school administrators—engage in giving and receiving feedback. The goal of feedback is to generally and desirably improve the quality of teaching, learning performance, and processes.
Historically, feedback in teaching/learning situations originated from the behaviorist learning theory of the 1960s as positive reinforcement or an "impulse for behavior change". However, the perception of teacher feedback has since shifted significantly, aligning now with a competency-oriented understanding of evaluation.
The aim of this article is to explore the multifaceted roles and impacts of feedback in foreign language teaching, examining both traditional and contemporary approaches. It seeks to provide a comprehensive overview of current research, discuss practical applications, and offer insights into developing an effective feedback culture that enhances both teaching and learning experiences.
Keywords: Feedback, Foreign language teaching, Corrective Feedback, Instructional Feedback, Teaching-Learning culture

1. What is Feedback?

Feedback is a crucial component in our society, frequently discussed in research over recent years. Its meaning often varies, thus this text aims to clarify its understanding. Feedback is an important tool for formative assessment, primarily used to evaluate how successfully a task is completed. Learning, whether physical, social, or intellectual[36], requires practice in a supportive environment, typically provided by teachers in schools. Teachers know what needs to be learned and how to recognize and improve performance (Sadler, 1989).

[36] Types of Learning: Learning can be of various types - physical, social, or intellectual.
Physical Learning: This involves acquiring and refining motor skills and physical abilities, such as learning a sport or developing coordination.
Social Learning: This pertains to developing social skills and behaviors, such as learning how to interact effectively with others, understanding social norms, and building relationships.
Intellectual Learning: This involves the acquisition of knowledge and cognitive skills, such as understanding academic subjects, problem-solving, and critical thinking.
Each type of learning requires specific methods and environments to be effective, highlighting the diverse nature of the learning process.

FULL TEXTS BOOK

Ramaprasad defines feedback as information about the gap between the current and reference levels of a system parameter, used to alter the gap (Ramaprasad, 1983). Hattie and Timperley (2007) add that feedback should address understanding or performance areas to close knowledge gaps. Information about the gap between actual and reference levels is considered feedback only if it is used to change the discrepancy. Otherwise, it remains ineffective, as often seen in schools where grades are given without actionable feedback (Hattie & Timperley, 2007).

It is crucial that learners understand feedback from teachers to avoid misunderstandings. Clear, precise feedback is essential, along with communication that allows for clarification. Effective feedback requires collaboration between learners and teachers, involving discussions to analyze and understand performance, both retrospectively and prospectively. This process helps in overcoming obstacles and making decisions on further learning. Teachers must provide criteria and tools for self-assessment, demonstrating dialogic assessment methods, such as learning journals[37] (Jürgens & Lissmann, 2015).

Hattie's (2014) meta-study differentiates between various types and levels of feedback, with differing effect sizes, making some types more effective than others.

2. Types of Feedback

Feedback can be categorized in various ways. This work attempts to name the most common types and delve deeper into their specifics. The simplest distinction is between oral and written feedback. Oral feedback typically occurs during lessons, while written feedback in schools often takes the form of grades received at the end of a term. Grades provide a comparison of a learner's performance with their peers but do not offer insights into individual strengths, weaknesses, or strategies for improvement (Harks et al., 2014).

Summative and formative feedback are important distinctions. Summative feedback summarizes performance, such as in the evaluation of a test, and has traditionally been dominant in education. In contrast, formative assessment, introduced in the mid-1990s, integrates evaluation into the learning process to empirically assess learning gains (Maier, 2019). Hattie (2014) advocates for formative feedback, emphasizing its benefits in improving learning processes and outcomes.

This work utilizes Narciss's (2006) classification of feedback, which includes informative feedback provided after task completion. This type of feedback informs learners about the gap between their current state and the desired state and suggests ways to bridge this gap. Other forms include motivational feedback, which uses rewards or punishments but has minimal impact on learning outcomes.

Informative feedback can be further divided into various types:

- *Knowledge of Performance (KP):* Summative feedback on performance after task completion.
- *Knowledge of Result/Response (KR):* Information on whether an answer is correct or incorrect.
- *Knowledge of the Correct Response (KCR):* Demonstrating the correct answer.
- *Answer Until Correct (AUC) or Multiple Try Feedback (MTF):* Providing KR with opportunities for retrying until the correct solution is found.
- *Elaborated Feedback (EF):* Providing additional information along with KR or KCR to aid future tasks.

Different types of elaborated feedback can be distinguished, highlighting content or functional aspects, such as explanatory, directive, and supervisory feedback (Narciss, 2006).

[37] A learning journal is a tool where students record their reflections, experiences, and progress during the learning process. It helps develop self-assessment and critical thinking skills by encouraging students to think critically about their learning experiences.

FULL TEXTS BOOK

3. Impact of feedback on learning performance

Feedback's impact on learning performance has been established in numerous studies and research texts. For feedback to be effective, it is crucial to recognize the learner as an individual and to select the appropriate type and level of feedback at the right time (Butler et al., 2012; Hattie, 2014; Huber, 2010). This analysis considers three factors: the teacher, the feedback, and the learner.

The teacher plays a central role by providing feedback content and knowledge about learning strategies. According to Reich (2010), the teacher's goal should be to support all leaners in the classroom. Teachers must master and convey strategies and methods to the learners. Feedback is essential for evaluating learners' successes, and effective measures must consider the individual. Standardized support concepts measured against a comparison norm are not effective. Constructivist didactics, as introduced by Reich (2010), emphasize evaluating, reflecting, and adapting teaching actions to enhance learning outcomes. Teachers act as both facilitators and researchers, actively participating in the learning process.

Effective feedback significantly impacts performance and motivation when it focuses on task performance and understanding and regulation processes. It should inform learners about their current learning and performance levels relative to their goals, provide tailored learning strategies, and address the causes of failures. Common forms of feedback, such as grades, often lack these beneficial characteristics (Harks et al., 2014).

Research on feedback reception shows how feedback can achieve the desired effects (Kluger & DeNisi, 1996; Helmke, 2009; Hattie & Timperley, 2007). Helmke's (2010) psychological framework divides the reception process into four steps: reception, reflection, action, and evaluation. (Bushi/ Kristo 2021) Learners must first receive and understand the feedback (reception), then analyze and reflect on it (reflection). Next, they implement the decisions and plans (action). Finally, they evaluate the actions' effectiveness to facilitate learning (evaluation). The process sequence is flexible, allowing different entry points (Helmke, 2010).

Reflection often reveals errors or faulty actions. How one addresses these errors is crucial for further learning. Errors can be seen as personal failures or as challenging learning opportunities. The latter is preferred in practice and research and should be communicated to learners. Good teaching includes a culture that embraces errors as part of learning (Helmke, 2009; Spychinger, 2003, 2006). Reflection-oriented didactics ensure room for errors without negative connotations (Spychinger, 2010).

4. The role of feedback in foreign language learning (German): An empirical study

This empirical study aims to investigate the role of feedback in the teaching and learning process of foreign languages, specifically German, in secondary schools. Feedback is a critical component in the educational process, helping learners understand their current performance and areas for improvement. This study involves a sample of 30 learners from three different secondary schools in Albania and uses a questionnaire to gather data on their experiences and perceptions of feedback in learning German as a foreign language.

Research Questions

1. How do learners perceive the feedback they receive from their German language teachers?
2. What types of feedback do learners find most effective in learning German?
3. How does feedback influence learners' motivation and performance in learning German?

4.1. Methodology

Sample

The sample consists of 30 learners from three secondary schools where German is taught as a foreign language. The demographic details are as follows:

- 10 male and 20 female learners
- Ages ranging from 15 to 18 years old

FULL TEXTS BOOK

- Diverse socio-economic backgrounds

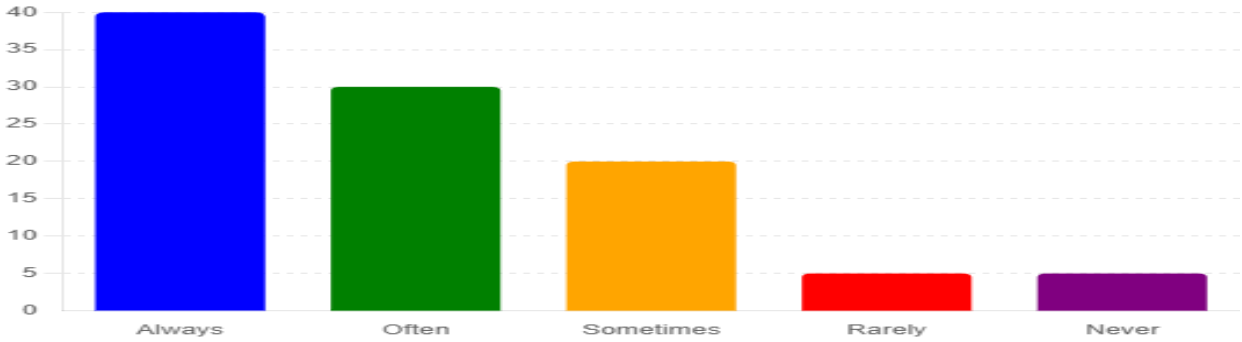
Data Collection

A questionnaire with 10 questions was designed to collect data on learners' perceptions of feedback. The questions included both closed and open-ended items to capture quantitative and qualitative data.

4.2. Results of the questionnaire

4.2.1. How often do you receive feedback from your German teacher?

- Always
- Often
- Sometimes
- Rarely
- Never



Frequency of Receiving Feedback from German Teacher

Always (40%): A significant portion of learners (40%) receive feedback from their German teacher on a consistent basis. This high frequency suggests that teachers are actively engaging with learners and providing regular input on their progress.

Often (30%): 30% of learners report receiving feedback often, indicating that they receive periodic but not constant feedback.

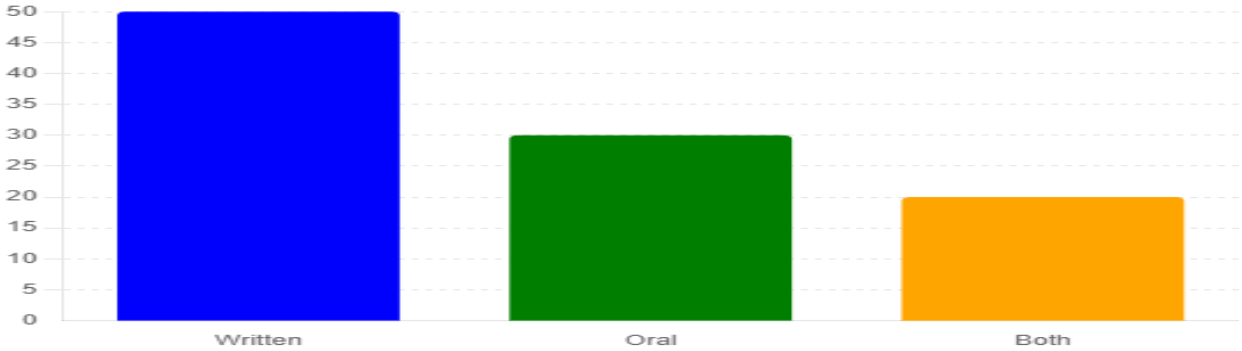
Sometimes (20%): 20% of learners receive feedback only occasionally. This sporadic feedback may not be sufficient to guide learners effectively in their learning process.

Rarely (5%): A small percentage (5%) of learners rarely receive feedback. This lack of regular feedback can hinder their ability to understand their progress and areas needing improvement.

Never (5%): Another 5% of learners never receive feedback. This absence of feedback can severely impact their learning outcomes as they lack the necessary guidance to improve.

4.2.2. What type of feedback do you find most helpful in learning German?

- Written
- Oral
- Both

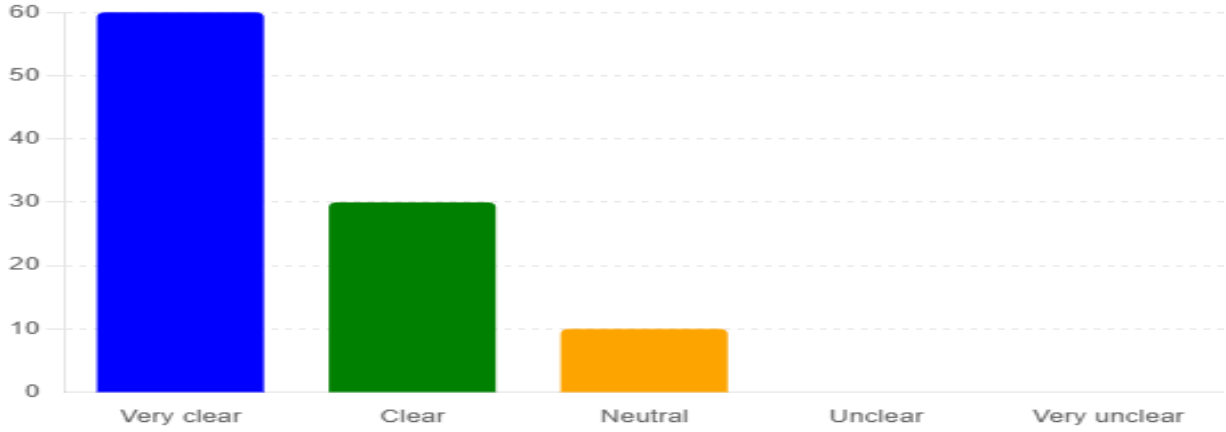


FULL TEXTS BOOK

Written (50%): Half of the learners (50%) find written feedback most helpful in learning German. Written feedback provides a tangible record that learners can refer back to, allowing them to review specific comments and suggestions at their own pace.
Oral (30%): 30% of learners prefer oral feedback. Oral feedback allows for immediate clarification and interaction, enabling learners to ask questions and receive instant responses.
Both (20%): 20% of learners find both written and oral feedback equally helpful. This group appreciates a combination of both types of feedback, leveraging the strengths of each method.

4.2.3. How clear is the feedback you receive from your German teacher?

- *Very clear*
- *Clear*
- *Neutral*
- *Unclear*
- *Very unclear*

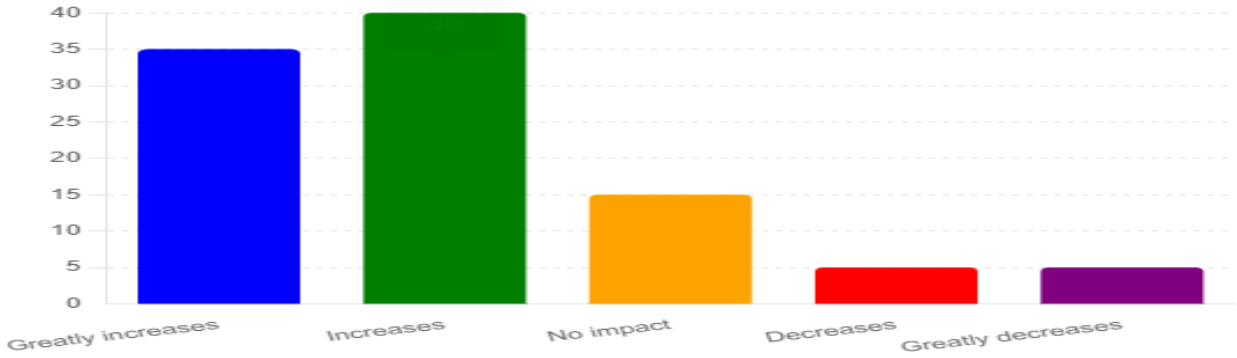


Clarity of Feedback from Teacher
Very Clear (60%): A majority of learners (60%) find the feedback from their German teacher to be very clear. This high percentage suggests that most learners can easily understand and interpret the feedback they receive, which is crucial for effective learning.
Clear (30%): 30% of learners find the feedback clear. While not as emphatic as "very clear," this indicates that a significant portion of learners still find the feedback understandable and useful.
Neutral (10%): A small percentage (10%) of learners are neutral about the clarity of feedback. These learners may sometimes find the feedback helpful but other times may struggle to understand it fully.
Unclear (0%) and Very Unclear (0%): None of the learners find the feedback unclear or very unclear. This indicates that the current feedback methods are effective for the vast majority of learners.

4.2.4. How does feedback from your teacher impact your motivation to learn the language?

- *Greatly Increases*
- *Increases*
- *No Impact*
- *Decreases*
- *Greatly Decreases*

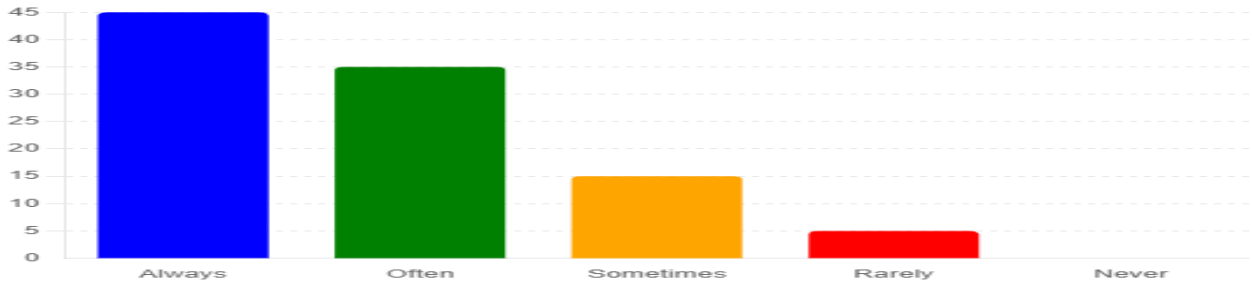
FULL TEXTS BOOK



Greatly Increases (35%): Feedback greatly increases motivation for 35% of learners. This suggests that for a significant portion of the class, feedback is a powerful motivator and plays a crucial role in their learning process.
Increases (40%): For 40% of learners, feedback increases their motivation to learn German. This group finds feedback helpful and motivating, though not to the same extent as the first group.
No Impact (15%): 15% of learners feel that feedback has no impact on their motivation. These learners may not see the relevance of feedback to their learning or may need different types of feedback to feel motivated.
Decreases (5%): For 5% of learners, feedback decreases their motivation. This is a concerning response as it indicates that feedback may be perceived negatively or as discouraging by these learners.
Greatly Decreases (5%): Another 5% of learners feel that feedback greatly decreases their motivation. This indicates a significant issue where feedback might be demoralizing or counterproductive.

4.2.5. How often do you use the feedback from your teacher to improve your work?

- *Always*
- *Often*
- *Sometimes*
- *Rarely*
- *Never*



Always (45%): A significant portion of learners (45%) always use the feedback from their German teacher to improve their work. This indicates that nearly half of the learners consistently integrate feedback into their learning process.
Often (35%): 35% of learners often use the feedback they receive to enhance their work. This shows that a majority of learners are regularly applying feedback, even if not every time.
Sometimes (15%): 15% of learners sometimes use feedback to improve their work. This suggests that while these learners recognize the value of feedback, they may not always act on it.
Rarely (5%): A small percentage (5%) of learners rarely use feedback to improve their work. This indicates a minimal level of engagement with the feedback provided.
Never (0%): None of the learners report never using feedback. This is a positive sign that all learners recognize feedback to some extent.

FULL TEXTS BOOK

4.2.6. What specific type of feedback helps you the most in learning German?

- *Detailed written feedback (including grammar corrections, vocabulary suggestions, and sentence structure improvements)*
- *Verbal explanations and clarifications*
- *Examples and sample sentences*
- *Interactive feedback (like one-on-one sessions, group discussions)*
- *Peer feedback (feedback from classmates)*



Detailed written feedback (40%): A significant portion of learners (40%) find detailed written feedback most helpful. This type of feedback likely provides learners with clear, precise information that they can refer back to and review multiple times.

Verbal explanations and clarifications (25%): 25% of learners prefer verbal feedback. Verbal explanations allow for immediate clarification and interaction, enabling learners to ask questions and receive instant responses.

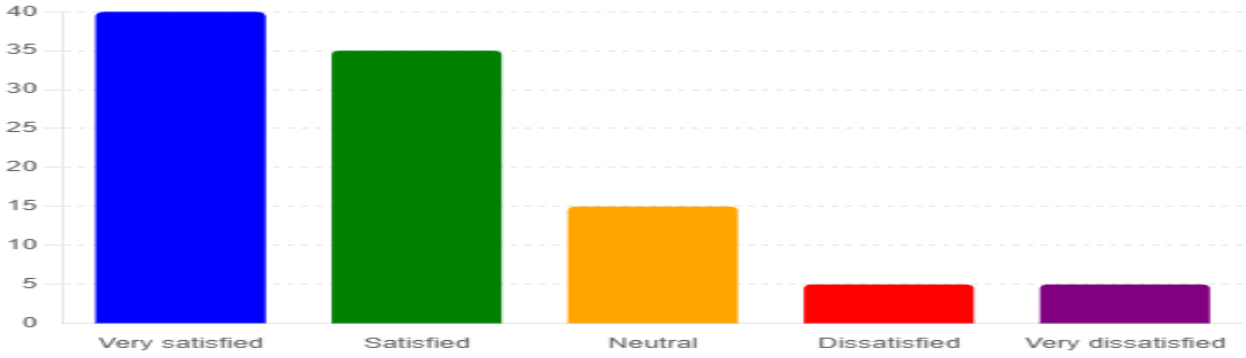
Examples and sample sentences (15%): 15% of learners benefit most from examples and sample sentences. This type of feedback helps learners understand the practical application of rules and concepts.

Interactive feedback (10%): 10% of learners find interactive feedback most beneficial. Interactive feedback involves active participation and can include one-on-one tutoring or group discussions.

Peer Feedback (10%): Another 10% of learners value feedback from their peers. Peer feedback can provide a different perspective and promote collaborative learning.

4.2.7. How satisfied are you with the feedback you receive from your German teacher?

- *Very satisfied*
- *Satisfied*
- *Neutral*
- *Dissatisfied*
- *Very dissatisfied*



FULL TEXTS BOOK

Very Satisfied (40%): A significant portion of learners (40%) are very satisfied with the feedback they receive from their teacher. This high level of satisfaction suggests that the feedback provided is perceived as highly effective, clear, and valuable in aiding their learning process.
Satisfied (35%): 35% of learners are satisfied with the feedback. While they generally find the feedback useful, there may be some aspects that could be improved to elevate their experience to a higher level of satisfaction.
Neutral (15%): 15% of learners feel neutral about the feedback they receive. This indicates that the feedback does not have a significant positive or negative impact on their learning experience.
Dissatisfied (5%): A small percentage (5%) of learners are dissatisfied with the feedback. This suggests that the feedback may not be meeting their expectations or needs.
Very Dissatisfied (5%): Another 5% of learners are very dissatisfied with the feedback they receive. This indicates significant issues with the feedback process.

4.2.8. Do you prefer individual feedback or group feedback in your German class?

- *Individual*
- *Group*
- *Both*

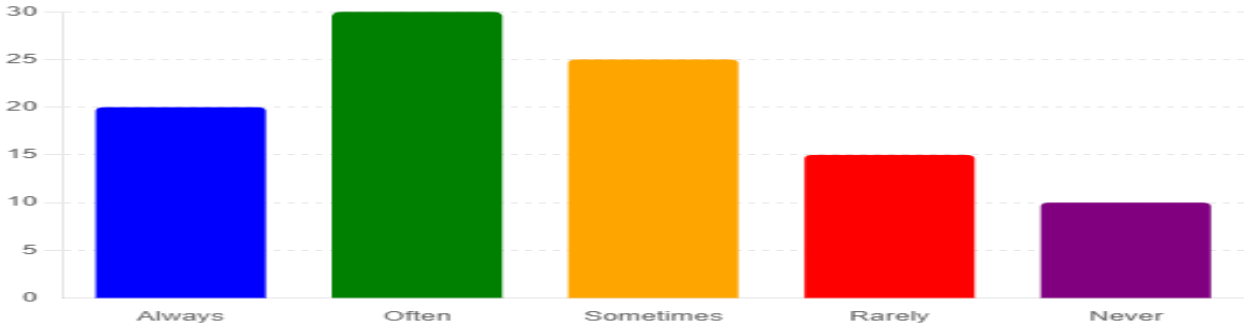


Individual Feedback (70%): The majority of learners (70%) prefer individual feedback in their German class. This preference indicates that learners value personalized, one-on-one feedback that addresses their specific needs and learning progress.
Group Feedback (20%): 20% of learners prefer group feedback. This preference suggests that some learners find value in feedback that is shared with the entire class, possibly because it allows them to learn from the mistakes and successes of their peers.
No Preference (10%): A small percentage (10%) of learners have no preference between individual and group feedback. These learners may find both types of feedback equally beneficial.

4.2.9. How often do you seek feedback from your German teacher?

- *Always*
- *Often*
- *Sometimes*
- *Rarely*
- *Never*

FULL TEXTS BOOK



Always (20%): 20% of learners always seek feedback from their German teacher. This group likely views feedback as an essential component of their learning process and consistently looks for ways to improve.
Often (30%): 30% of learners often seek feedback. These learners regularly engage with their teacher for feedback but may not do so as consistently as the "always" group.
Sometimes (25%): 25% of learners seek feedback sometimes. These learners may seek feedback when they feel it is necessary or when they encounter specific challenges.
Rarely (15%): 15% of learners rarely seek feedback. These learners might not see the value of feedback, may lack confidence in approaching the teacher, or might be unsure how to use the feedback effectively.
Never (10%): 10% of learners never seek feedback from their German teacher. This indicates a potential disengagement or a lack of understanding of the feedback's importance.

4.2.10. What changes would you suggest to improve the feedback process in learning German?
More detailed feedback (25%): Learners expressed a need for more detailed and specific feedback. They want to understand not just what was wrong but also how to improve and why certain mistakes were made.
Timely feedback (20%): Timeliness of feedback was a concern for some learners. They indicated that receiving feedback promptly after assignments or tests helps them understand and correct their mistakes while the material is still fresh in their minds.
Personalized feedback (15%): Some learners suggested that feedback should be more personalized to address their individual learning needs and styles. They feel that generic feedback is less helpful.
Interactive feedback sessions (15%): Learners expressed interest in having interactive feedback sessions where they can discuss their performance and receive immediate clarification and guidance.
Positive reinforcement (10%): Some learners highlighted the importance of positive reinforcement in feedback. They believe that acknowledging what they did well can motivate them to continue improving.
Use of technology (10%): A few learners suggested the use of technology to enhance the feedback process. This includes using online platforms for quicker feedback, and digital tools for tracking progress and areas of improvement.
Regular Feedback (15%): Some learners mentioned that feedback should be more regular and consistent throughout the course, rather than just at major assessment points.

5. Conclusions
The results indicated that most learners receive regular feedback from their teachers. Specifically, 35% of the learners reported always receiving feedback, while 30% stated they often receive it. This high frequency of feedback underscores its importance in the learning process and suggests that it is an integral part of classroom instruction.
When it comes to the type of feedback, 50% of the learners expressed a preference for a combination of written and oral feedback. This preference highlights the need for diverse feedback formats to address different learning styles and needs effectively.

FULL TEXTS BOOK

Clarity of feedback is another critical factor. The survey revealed that most learners find the feedback from their teachers to be clear (40%) or very clear (30%). Clear feedback is essential as it helps learners understand their progress and areas that need improvement.

Feedback also significantly impacts learners' motivation to learn German. According to the survey, 40% of the learners said that feedback increases their motivation, and 35% reported that it greatly increases their motivation. This demonstrates that constructive feedback can be a powerful motivator, encouraging learners to engage more deeply with their studies.

In terms of utilizing feedback, 30% of the learners indicated that they often use the feedback they receive to improve their work, and 20% stated that they always use it. This shows that feedback is not only given but also actively used by learners to enhance their learning outcomes.

Interestingly, a significant majority of learners (70%) prefer individual feedback over group feedback. This preference suggests that personalized feedback is perceived as more effective and valuable, allowing learners to receive specific guidance tailored to their individual needs.

The survey also found that learners are proactive in seeking feedback, with 30% often and 25% sometimes asking for feedback from their teachers. This proactive approach indicates that learners recognize the importance of feedback and are eager to use it to improve their learning.

When asked for suggestions to improve the feedback process, learners emphasized the need for more detailed, timely, and personalized feedback. They also recommended interactive feedback sessions and the use of positive reinforcement and technology to enhance the feedback experience.

Regarding satisfaction with the feedback they receive, 35% of the learners reported being satisfied, and 40% were very satisfied. However, a small percentage of learners expressed dissatisfaction, indicating that there is still room for improvement in the feedback process.

Overall, the survey results highlight the crucial role that feedback plays in motivating and guiding learners in learning German. Regular, clear, and personalized feedback is highly valued and actively used by learners to improve their performance. However, it is essential to continuously refine feedback methods to ensure that all learners benefit from this critical educational tool.

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FULL TEXTS BOOK

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FULL TEXTS BOOK

EĞİTİM KURUMLARINA YÖNETİCİ SEÇME VE GÖREVLENDİRME UYGULAMALARINA İLİŞKİN OKUL YÖNETİCİLERİNİN VE ÖĞRETMENLERİN GÖRÜŞLERİ

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ÖZET
Okul yöneticileri etkili okul kavramının en önemli unsurlarından biridir. Bu önemine rağmen ülkemizde okul yöneticilerinin seçilme, yetiştirilme ve görevlendirilmesine ilişkin tartışmalar yıllardır sürmektedir. Eğitim kurumlarına yönetici seçme ve görevlendirmelerine ilişkin öğretmen ve okul yöneticilerinin görüşlerini belirlemeyi amaçlayan bu çalışma, tarama deseni kullanılarak yapılmış nitel bir çalışmadır. Araştırma kapsamında görüşme yapılacak katılımcıların belirlenmesinde tabakalı amaçsal örnekleme stratejisi tercih edilmiştir. Araştırma verileri yarı yapılandırılmış görüşme formu kullanılarak katılımcılarla yapılan yüz yüze görüşmelerle toplanmıştır. Araştırmaya Balıkesir ili Altıeylül ve Karesi ilçelerinde görev yapan, 9 öğretmen, 7 müdür yardımcısı ve 4 okul müdürü katılmıştır. Araştırmaya katılan öğretmen ve yöneticilere, araştırmanın amacı, kapsamı ve veri toplama yöntemi hakkında bilgilendirme yapılmıştır. Görüşmelerde elde edilen veriler yazılı hale getirildikten sonra betimsel ve içerik analizi yöntemleriyle analiz edilmiştir. Araştırmada, yöneticilerin seçilmesine ilişkin ölçüt ve yöntemlerin gözden geçirilmesi, yöneticilerin eğitim ihtiyacı, mevcut haliyle yönetici seçiminin sağlıklı yapılmadığı yönünde bulgulara ulaşılmıştır. Araştırma sonucunda, okul yöneticiliğinin meslekleşmesi için gerekli çalışmaların yapılması, seçme ve görevlendirme süreçlerinin liyakat ilkesine uygun olarak düzenlenmesi, yönetici eğitimlerine önem verilmesi gibi önerilere yer verilmiştir.
Anahtar Kelimeler: Eğitim, Eğitim yönetimi, Okul yönetimi, Okul yöneticisi, Görevlendirme, Yönetmelik

ABSTRACT
School administrators are one of the most important elements of the effective school concept. Despite this importance, discussions regarding the selection, training and assignment of school administrators have been continuing for years in our country. This study, which aims to determine the opinions of teachers and school administrators regarding the selection and assignment of administrators to educational institutions, is a qualitative study conducted using the screening pattern. Stratified purposive sampling strategy was preferred in determining the participants to be interviewed within the scope of the research. The research data were collected through face-to-face interviews with participants using a semi-structured interview form. Nine teachers, seven assistant principals and four school principals working in Altıeylül and Karesi districts of Balıkesir province participated in the research. Teachers and administrators who participated in the research were informed about the purpose, scope and data collection method of the research. The data obtained from the interviews was transcribed and analyzed using descriptive and content analysis methods. In the research, findings were reached regarding the review of the criteria and methods for the selection of managers, the training needs of managers, and the fact that the selection of managers is not done properly in its current state. Because of the research, suggestions were made such as carrying out the necessary studies for the professionalization of school administration, organizing the selection and appointment processes in accordance with the principle of merit, and giving importance to administrator training.
Keywords: Education, Education Management, School Management, School Administrator, Assignment, Regulation

FULL TEXTS BOOK

GİRİŞ

Yönetim, en genel haliyle örgütlerin amaçlarına ulaşması için sahip olduğu maddi kaynaklarla insan kaynağını etkili şekilde kullanabilmektir. Eğitim yönetimi de aynı şekilde eğitim sistemi içerisinde yer alan madde ve insan kaynağını verimli şekilde kullanmayı amaçlar. Yönetim biliminin eğitime uyarlanmış hali olan eğitim yönetiminin en somut şekli ise okul yönetimidir. Dolayısıyla okul yönetiminin, eğitim yönetiminin okula uyarlanmış biçimi olduğu söylenebilir (Bursalıoğlu, 2022).

Okul yöneticileri, okulun etkililiğinde hayati bir rol oynarlar ve bu etkililik doğrudan okul yöneticisinin liderlik davranışlarıyla ilişkilidir (Balcı, 2022). Bugün, okul müdürlerinden, okuldaki çeşitli paydaşlarla (öğrenciler, öğretmenler, veliler vb.) işbirliği içinde karmaşık kararlar almaları beklenmektedir. Bu durum ise okul yöneticilerinin görevlerini, yetkilerini ve sorumluluklarını eskiye göre daha karmaşık ve zorlu hale getirmiştir. Zira okul yöneticilerinden beklentiler ve okulların öğrencilere kazandırmayı hedeflediği beceriler, eski döneme göre ciddi şekilde farklılaşmıştır (Öztabak, 2015).

Okul yöneticilerinin eğitim sistemi içerisinde yukarıda bahsedilen önemlerine rağmen, ülkemizde yönetici yetiştirilmesi konusunda ciddi ve tutarlı bir politikanın varlığından bahsetmek oldukça zordur. Bu hususta, yapılan mevzuat değişikliklerine bakmak yeterli olacaktır. Son yirmi yılda yönetici atamalarına ilişkin yönetmelik on üç kez tamamen değiştirilmiştir. Son kez 2021 yılında yayınlanan yönetmeliğin de önümüzdeki günlerde tamamen değiştirileceği Milli Eğitim Bakanlığı yetkilileri tarafından açıklanmıştır (MEB Yönetici Atama Yönetmeliği Değişiyor, 2023). Hal böyleyken eğitim kurumlarına yönetici seçme ve atama uygulamalarının tutarlı bir politika dâhilinde sürdürüldüğünü söylemek oldukça zorlaşmaktadır.

Bu çalışmada, uygulamanın içerisinde yer alan okul yöneticileri ve öğretmenlerin yönetici seçme ve görevlendirme uygulamalarına ilişkin görüşleri derlenerek incelenmiş, yönetici seçme ve görevlendirme uygulamalarına ilişkin bir vizyon ortaya konulmaya çalışılmıştır.

Araştırmanın Amacı

Bu çalışmanın amacı, Milli Eğitim Bakanlığı'na bağlı eğitim kurumlarına yönetici seçme ve görevlendirme uygulamalarına ilişkin okul yöneticilerinin ve öğretmenlerin görüşlerini ortaya koymaktır.

Araştırmanın Modeli

Eğitim kurumlarına yönetici seçme ve görevlendirme uygulamalarına ilişkin okul yöneticilerinin ve öğretmenlerin görüşlerini değerlendirmeyi amaçlayan bu araştırma tarama modelindedir. Tarama modelleri geçmişte var olan veya mevcut durumu olduğu şekilde betimleyen araştırma yaklaşımıdır. Araştırma konusu olan birey veya nesne doğal koşulları içerisinde tanımlanır ve herhangi bir şekilde değiştirilme çabası gösterilmez. Önemli olan araştırma konusunu var olduğu şekilde gözlemleyip belirleyebilmektir (Karasar, 2023).

Araştırmanın Çalışma Grubu

Çalışmada ulaşılan bulgular ve çıkarılan sonuçların genellenmek istendiği araştırmanın çalışma evreni, 2023-2024 eğitim öğretim yılında Balıkesir ili, Altıeylül ve Karesi ilçelerindeki ilkokul, ortaokul ve liselerde görev yapan okul yöneticileri ve öğretmenlerden oluşturulmuştur.

Araştırmanın çalışma grubunu, araştırma evreninde görev yapan 9 öğretmen, 7 müdür başyardımcısı/müdür yardımcısı ve 4 okul müdürü oluşturmaktadır. Araştırma 2023-2024 eğitim ve öğretim yılının ikinci döneminde gerçekleştirilmiştir.

Veri Toplama Aracı

Bu çalışmada veri toplama yöntemi olarak yarı yapılandırılmış görüşme tekniği kullanılmıştır. Bu yöntem ne tam yapılandırılmış görüşmeler kadar katı ne de yapılandırılmamış görüşmeler kadar esnektir; iki uç arasında yer almaktadır (Karasar, 2023). Araştırmacıya bu esnekliği sağladığı için yarı yapılandırılmış görüşme tekniği kullanılmıştır. Araştırmaya katılanlar ile yüz yüze görüşülmüş, katılımcıların verdikleri cevaplar yazılı olarak kayıt altına alınmıştır.

FULL TEXTS BOOK

Verilerin Analizi ve Yorumu

Nitel araştırma yaklaşımı doğrultusunda tasarlanan bu araştırmada betimsel analiz ve içerik analizi yöntemi kullanılmıştır. Betimsel analiz, araştırma sonucunda elde edilen verilerin belirli temalara uygun olarak düzenlenmesi ve yorumlanması yaklaşımıdır. Betimsel analizde araştırma katılımcılarının görüşlerini doğru şekilde aktarabilmek için katılımcıların görüşlerinden doğrudan alıntılar yapılır. Analiz neticesinde tespit edilen bulgular ise düzenlenip yorumlanarak sunulur. İçerik analizinde ise benzer veriler belli kavramlar ile temalar etrafında bir araya getirilir ve okuyucuya yorumlanarak aktarılır (Yıldırım ve Şimşek, 2021).

ARAŞTIRMA BULGULARI

Yöneticiliğe Görevlendirilmek İçin Gerekli Eğitime İlişkin Bulgular

Araştırmaya katılanların yöneticiliğe görevlendirilmek için gerekli eğitim seviyesine ilişkin görüşleri aşağıdaki tabloda gösterilmiştir.

Tablo 1

Yöneticiliğe görevlendirilmek için gerekli eğitimle ilgili görüşler

Tema	Kod	Frekans(f) Öğretmen	Müdür Yardımcısı	Müdür
Eğitim Seviyesi	Lisans	3	2	2
	Yüksek Lisans	6	5	2

Yukarıdaki tablo incelendiğinde, araştırmaya katılan 9 öğretmenden 3'ünün yöneticiliğe görevlendirilebilmek için lisans seviyesinde eğitim görülmüş olmasının yeterli olacağını, 6 öğretmenin ise yöneticiliğin en az yüksek lisans seviyesinde eğitim gerektirdiğini ifade ettiği görülmektedir. Araştırmaya katılan müdür yardımcılarında ise 2 müdür yardımcısı lisans seviyesinde, 5 müdür yardımcısı yüksek lisans düzeyinde eğitim şartı aranması gerektiğini ifade etmişlerdir. Müdürler arasında, 2 okul müdürü lisans eğitiminin yeterli olacağını belirtirken 2 okul müdürü ise en az yüksek lisans eğitiminin gerekli olduğunu belirtmiştir.

Yukarıda özetlenen görüşler birlikte değerlendirildiğinde, gerek öğretmenlerin gerekse de okul yöneticilerinin önemli bir bölümünün (f=13) eğitim kurumları yöneticiliğinin en az yüksek lisans seviyesinde eğitim gerektirdiğini ifade ettikleri görülmektedir. Elde edilen bulgular bu alanda daha önce yapılmış çalışmalarla paralellik göstermektedir (Ulusoy, 2023; Polat ve Kurtgöz, 2022; Öztabak, 2015; Akbaşlı ve Balıkçı, 2013; Özmen ve Kömürlü, 2010; Şen ve Tankutay, 2021; Sezer ve Engin, 2021).

Yöneticiliğe Görevlendirilmek İçin Gerekli Kişisel Özelliklere İlişkin Bulgular

Araştırma katılımcılarının eğitim kurumlarına yönetici olarak görevlendirileceklerin sahip olmaları gereken kişisel özelliklere ilişkin görüşleri aşağıdaki tabloda gösterilmiştir.

Tablo 2

Yöneticiliğe görevlendirilmek için gerekli kişisel özelliklerle ilgili görüşler

Tema	Kod	Frekans(f) Öğretmen	Müdür	Müdür
Kişisel Özellikler	Adalet	8	5	4
	Liderlik	6	6	3
	Etkili İletişim	7	6	2
	Sabır	6	4	2
	Problem Çözme	6	3	3
	Empati	5	4	2
	Özgüven	3	4	3

FULL TEXTS BOOK

Çatışma	3	4	3
Dürüstlük	5	3	1
Ahlaklılık	3	2	1
Demokrat Olma	4	2	-
Cesaret	2	1	2
Kriz Yönetebilme	3	-	1

Tablo incelendiğinde, araştırmaya katılan öğretmenlerin en önemli bulduğu kişisel özelliklerin adalet, etkili iletişim, liderlik, problem çözebilme becerisi, dürüstlük ve empati olduğu görülmektedir. Bu özelliklerin genel olarak iletişim becerileri (etkili iletişim, empati) ve yönetsel tavır ve beceriler (adalet, dürüstlük, liderlik, problem çözme) ile ilgili olduğu; dolayısıyla görevlendirilecek yöneticilerin iletişim ve yönetsel becerilerinin önemli bir nitelik olduğunu düşündükleri söylenebilir. Müdür yardımcıları açısından tablo incelendiğinde, öne çıkan özelliklerin liderlik, etkili iletişim ve adalet olduğu; öğretmen katılımcılarına benzer şekilde iletişim becerilerinin önemli görüldüğü söylenebilir. Araştırma katılımcısı müdürler açısından tabloya bakıldığında, adalet duygusunun ön plana çıktığı, bunun dışında liderlik, özgüven ve problem çözme becerilerinin de önem verilen özellikler arasında bulunduğu dikkati çekmektedir.

Alanyazında yapılmış bazı çalışmalarda da araştırma katılımcılarının dile getirdikleri kişisel özelliklere benzer sonuçlar elde edilmiştir (Yıldız vd., 2022). Akbaşlı ve Diş (2019) tarafından yapılan öğretmenlerin görüşlerine göre lider okul yöneticilerine ilişkin bir çalışmada da adil, güvenilir olma, demokratik, anlayışlı, bütünleştirici olma gibi kişisel özellikler ortaya çıkmıştır.

Yönetmeliğin Doğru Yöneticileri Seçme Başarısına İlişkin Bulgular

Araştırmaya katılanların mevcut yönetmeliğin "doğru" okul yöneticilerinin seçimi hususunda ne kadar başarılı olduğuna ilişkin görüşleri aşağıdaki tabloda gösterilmiştir.

Tablo 3

Yönetmeliğin doğru yöneticileri seçme başarısına ilişkin görüşler

Tema	Kod	Frekans(f) Öğretmen	Müdür Yardımcısı	Müdür
Yönetmeliğin Doğru Yöneticileri Seçme Başarısı	Başarılı	2	3	2
	Kısmen Başarılı	3	3	2
	Başarısız	4	1	-

Katılımcıların cevapları incelendiğinde; katılımcı öğretmenlerin 2'sinin yönetmeliği başarılı, 3'ünün kısmen başarılı ve 4'ünün başarısız bulduğu görülmektedir. Genel olarak bakıldığında; öğretmenlerin yaklaşık yarısı, yönetmelik doğrultusunda yapılan yönetici görevlendirmelerini başarılı ve kısmen başarılı bulduklarını ifade ederken diğer yarısının ise doğru yönetici seçimi hususunda yönetmeliği yetersiz ve başarısız bulduklarını ifade etmişlerdir. Bu oran, araştırma evreni ölçeğinde değerlendirildiğinde, ciddi sayıda öğretmenin mevcut yönetmeliğin en azından uygulanmasından memnun olmadıkları sonucunu ortaya koyar ki bu durum işyeri barışı ve okul iklimi bakımından önemli sorunların doğmasına yol açabilir. Müdür yardımcılarından araştırmaya katılanların görüşlerine bakıldığında ise 3'ünün başarılı, 3'ünün kısmen başarılı ve 1'inin başarısız bulduğunu ifade ettiği görülmektedir. Genel olarak bakıldığında, müdür yardımcılarının büyük çoğunluğunun yönetmeliği başarılı bulduğu dikkati çekmektedir. Ancak, mevcut yönetmelik ile görevlendirilmiş müdür yardımcılarından sadece 3'ü yönetmeliği tamamen başarılı bulduğunu ifade ederken diğer 3'ünün kısmen başarılı, dolayısıyla kısmen de başarısız bulmuş olmaları dikkat çekicidir. Araştırmaya katılan okul müdürlerinin verdiği cevaplar incelendiğinde de benzer bir durum göze çarpmaktadır. Araştırmaya

FULL TEXTS BOOK

katılan 4 okul müdüründen 2'si yönetmeliği başarılı bulduğunu ifade ederken diğer 2'si kısmen başarılı bulduğunu, dolayısıyla kısmen de başarısız bulduklarını belirtmişlerdir. Katılımcı müdürlerin de mevcut yönetmelik ile görevlendirildikleri unutulmamalıdır. Araştırma katılımcılarının bazı görüşlerine aşağıda yer verilmiştir.

Katılımcıların görüşleri birlikte değerlendirildiğinde; halen sürdürülen görevleri farklı olsa da okullarda görev yapan eğitimcilerin önemli bir bölümünün yönetmelikten ya da en azından yönetmeliğin uygulanış biçiminden rahatsız oldukları dikkati çekmektedir. Öyle ki yönetmelikle görevlendirilen okul yöneticilerinin dahi önemli bir bölümü tam anlamıyla yönetmeliği başarılı bulduklarını dile getirmemişlerdir. Hal böyleyken, bakanlık, eğitim sendikaları, üniversiteler, sivil toplum örgütleri gibi eğitimin bütün paydaşlarının üzerinde uzlaşabileceği, aceleye getirilmeyen, kapalı kapılar ardında değil kamuoyu önünde tartışılarak olgunlaştırılan, bütün paydaşların sahip çıkabileceği, dolayısıyla her yıl yenilenmek zorunda kalınmayan bir yönetmelik ihtiyacının bulunduğu aşikârdır.

Üçlü Seçme Sisteminin (Yazılı Sınav – Ek-1 Değerlendirme Formu – Sözlü Sınav) İlk Defa Yönetici Görevlendirilmesinde Liyakatli Yöneticileri Seçme Başarısına İlişkin Bulgular

Araştırma katılımcılarının yazılı sınav, Ek-1 Değerlendirme Formu ve sözlü sınav aşamalarından oluşan üçlü seçim sisteminin ilk defa yönetici görevlendirilmesinde liyakatli yöneticilerin seçimindeki başarısına ilişkin görüşleri aşağıdaki tabloda gösterilmiştir.

Tablo 4
Üçlü seçim sisteminin başarısına ilişkin görüşler

Tema	Kod	Frekans(f) Öğretmen	Müdür	Müdür
Üçlü Seçim Sisteminin Başarısı	Başarılı	-	1	1
	Kısmen Başarılı	2	2	1
	Başarısız	7	4	2

Eğitim kurumlarına ilk defa yönetici görevlendirilmesi için öngörülen yazılı sınav, değerlendirme formu ve sözlü sınavdan oluşan üçlü seçim sisteminin liyakatli yöneticilerin seçiminde ne kadar başarılı olduğuna ilişkin öğretmen görüşleri incelendiğinde; araştırmaya katılan öğretmenlerden 2'sinin kısmen başarılı, 7'sinin ise başarısız olarak değerlendirdiği görülmektedir. Başarılı olarak değerlendiren öğretmen ise bulunmamaktadır. Katılımcı öğretmenlerin görüşlerine bakıldığında, eleştirilerin büyük kısmının sözlü sınav kaynaklı olduğu görülmektedir. Müdür yardımcılarından araştırmaya katılanların görüşlerine bakıldığında ise 4 müdür yardımcısının üçlü seçim sistemini başarısız, 2'sinin kısmen başarılı ve 1'inin başarılı bulduğu görülmektedir. Araştırma katılımcısı müdürlerin ise 2'si bu yöntemi başarısız bulduğunu ifade ederken, 1'i kısmen başarılı ve 1'i başarılı bulduğunu ifade etmiştir.

Araştırma katılımcılarının görüşlerine bütün olarak bakıldığında; üçlü seçim sisteminin yazılı sınav kısmının bütün katılımcılar tarafından olumlu olarak değerlendirildiği dikkati çekmektedir. Farklı görevler üstlenen katılımcıların, yazılı sınavın adil bir seçim yöntemi olduğuna ilişkin fikir birliği içerisinde oldukları, Ek-1 Değerlendirme Formu ile formun öngördüğü puanlama ölçütlerine ilişkin eleştirilerinin bulunduğu, sözlü sınav uygulamasına ilişkin ise katılımcıların çok büyük çoğunluğunun (18/20=% 90) çekinceleri bulunduğu görülmektedir.

Katılımcıların Ek-1 Değerlendirme Formuna ilişkin eleştirileri; yüksek lisans veya doktora eğitimine verilen puanların yetersizliği, ödüllerin adil dağıtılmamasına karşın ödüllere puan verilmesi, öğretmen adaylarının yapacakları öğretmenlik uygulaması kapsamında uygulama öğretmeni olarak görev yapmaya puan verilmesi ve il/ilçe zümre başkanlığına puan verilmesi başlıklarında toplanmıştır. Sözlü sınava ilişkin eleştiriler ise değerlendirmenin objektif yapılmaması, siyasal/sendikal tercihlerin

FULL TEXTS BOOK

belirleyici olması, kayırmacılık yapılması başlıklarında yoğunlaşmıştır. Bu konuda bazı katılımcı görüşleri aşağıda yer almaktadır.

Yönetmelikte öngörülen yazılı sınav – Ek-1 Değerlendirme Formu – sözlü sınav aşamalarından oluşan seçim sistemine ilişkin katılımcı görüşleri, yazılı sınav yapılması gerektiğine ilişkin görüş birliğini ortaya koymaktadır. Bununla birlikte Ek-1 Değerlendirme Formu'na ilişkin, 1 Mart 2024 tarihinde yapılan düzenlemelere rağmen, eleştiriler devam etmektedir. Sözlü sınav hususunda ise farklı görevlerde bulunan birçok katılımcı çekincelerini belirtmiş ve uygulamanın adil olmadığını öne sürmüştür. Alanyazında yapılan birçok çalışmada da (Öztabak, 2015; Şen ve Tankutay, 2021; Sezer ve Engin, 2021) benzer sonuçlara ulaşılmıştır. Bu sonuçlar ışığında, Ek-1 Değerlendirme Formu'nun eğitim paydaşları ile müzakere edilerek güncellenmesi ile sözlü sınav uygulamasının adalet duygusunu zedelemeyecek şekilde, öğretmen atamalarında yapılan düzenlemelere benzer şekilde (Ntv, 2024), yeniden düzenlenmesi ihtiyaçlarının bulunduğu değerlendirilmektedir.

Ek-2 Değerlendirme Formu'nun Yeniden Yönetici Görevlendirilmesinde Liyakatli Yöneticileri Seçme Başarısına İlişkin Bulgular

Yönetmeliğin yeniden yönetici görevlendirilmesinde öngördüğü Ek-2 Değerlendirme Formu'nun liyakatli yöneticileri seçme başarısına ilişkin katılımcı görüşleri aşağıdaki tabloda gösterilmiştir.

Tablo 5

Ek-2 Değerlendirme Formu'nun başarısına ilişkin görüşler

Tema	Kod	Frekans(f)		
		Öğretmen	Müdür Yardımcısı	Müdür
Ek-2 Değerlendirme Formu Başarısı	Başarılı	3	2	1
	Kısmen Başarılı	3	3	2
	Başarısız	3	2	1

Ek-2 Değerlendirme Formu'na ilişkin katılımcı görüşleri incelendiğinde; öğretmen katılımcılarından 3'ünün formu başarılı, 3'ünün kısmen başarılı ve 3'ünün ise başarısız bulduğu görülmektedir. Müdür yardımcıları katılımcılarından formu başarılı bulan sayısı 2 iken, 3 katılımcı kısmen başarılı ve 2 katılımcı ise başarısız olduğunu ifade etmiştir. Müdür olarak görev yapan katılımcılardan ise 1'i formu başarılı olarak değerlendirirken 2'si kısmen başarılı ve 1'i ise başarısız olarak değerlendirmiştir.

Katılımcıların görüşlerine bakıldığında genel olarak eleştirilerin bazı puanlama kriterleri üzerinde yoğunlaştığı görülmektedir. Bu puanlama kriterleri; yüksek lisans ve doktora eğitimine verilen puanların yetersizliği, yapılan son değişiklik (01/03/2024) ile farklı alanlarda yapılan yüksek lisans ve doktora eğitimlerine puan verilmemesi, ödüllerin adil dağıtılmadığından bahisle ödüle puan verilmesi, il/ilçe zümre başkanlığına puan verilmesi ve hizmet içi eğitim faaliyetlerinde eğitim yöneticiliğine puan verilmesi olarak tespit edilmiştir.

Araştırma katılımcılarının görüşleri genel olarak değerlendirildiğinde, katılımcıların yaklaşık 2/3'ünün (14/20=% 70) Ek-2 Değerlendirme Formu'nu başarısız ya da kısmen başarılı olarak niteledikleri görülmektedir. Oranın büyüklüğü göz önüne alındığında, ilgili değerlendirme formunda 1 Mart 2024 tarihinde yapılan düzenlemelerin yetersiz kaldığı, bazı hususlarda yeni rahatsızlıklar oluşturduğu, bu nedenlerle demokratik katılımcı bir yöntemle yeniden düzenlenmesinin uygun olacağı düşünülmektedir.

Yönetici Seçimi İçin Sınav Yapılmasına İlişkin Bulgular

Araştırmaya katılanlara, yönetici seçimi için sınav yapılması gerekip gerekmediği sorulmuştur. Katılımcıların görüşleri aşağıdaki tabloda gösterilmiştir.

FULL TEXTS BOOK

Tablo 6
Yöneticilik için sınav gerekliliğine ilişkin görüşler

Tema	Kod	Frekans(f) Öğretmen	Müdür Yardımcısı	Müdür
Sınav Gerekliliği	Evet, gereklidir.	9	7	3
	Hayır, gerekli değildir.	-	-	1

Tabloda görüldüğü üzere katılımcıların 1'i hariç tamamı yönetici seçimi için sınav yapılmasının gerekli olduğunu ifade etmişlerdir. Sadece 1 katılımcı sınavın gerekli olmadığı şeklinde görüş bildirmiş olup görüşlerinin bir kısmına aşağıda yer verilmiştir.
Katılımcılar, çok büyük oranda (19/20=% 95) yönetici görevlendirilmelerinde sınav yapılması gerektiğini ifade etmişlerdir. Sınavın tarafsızlığı sağlayacağını, sisteme olan güveni artıracağını, adaleti sağlayacağını, adam kayırmayı önleyeceğini, vasıfsız adayları eleyebileceğini görüşlerinde dile getirmişlerdir. Bunun üzerine katılımcılara yapılacak sınavın türü ve niteliği ile ilgili düşünceleri sorulmuştur. Katılımcıların verdiği cevaplar aşağıda gösterilmiştir.

Tablo 7
Yöneticilik için yapılması gereken sınava ilişkin görüşler

Tema	Kod	Frekans(f) Öğretmen	Müdür	Müdür
Sınav Türü ve Niteliği	Yazılı Sınav	6	3	1
	Sözlü Sınav/ Mülakat	-	1	2
	Yazılı Sınav ve Sözlü	3	3	1

Katılımcı öğretmenlerden 6'sı yazılı sınavın yeterli olacağını ifade ederken, 3 öğretmen ise hem yazılı hem de sözlü sınav/mülakat yapılması gerektiğini ifade etmiştir. Müdür yardımcılarından ise 3'ü yazılı sınavın yeterli olacağını belirtirken, 1'i sözlü sınav/mülakatın yeterli olacağını, 3'ü hem yazılı sınav hem de sözlü sınav/mülakat yapılması gerektiğini savunmuştur. Müdür katılımcılarından 1'i yazılı sınav, 2'si sözlü sınav/mülakat ve 1'i de hem yazılı sınav hem de sözlü sınav/mülakat yapılması gerekliliğinden bahsetmişlerdir.
Araştırma katılımcılarının görüşleri bir bütün olarak değerlendirildiğinde, katılımcıların neredeyse tamamının (19/20=% 95) mutabık oldukları nokta sınavın gerekli olduğudur. Katılımcılara sınavın türü ve niteliği ile ilgili görüşleri sorulduğunda ise büyük çoğunluğu (17/20=% 85) yazılı sınav yapılması gerekliliğinden bahsetmiştir. Yazılı sınavın adam kayırmayı önleyen, adil bir seçim mekanizması olduğu hususunda görüş birliğinin var olduğundan bahsedilebilir. 7 katılımcı (7/20= % 35) ise yazılı sınavın tek başına yetersiz olacağından bahisle sözlü sınav/mülakatın da yapılması gerektiğini savunmuşlardır. Sadece 3 katılımcı ise tek başına sözlü sınav/mülakatın yeterli olacağını ifade etmiştir. Alanyazında yapılan çeşitli çalışmalarda da benzer sonuçların ortaya konulduğu görülmektedir (Şen ve Tankutay, 2021; Eğer, 2018; Sezer ve Engin, 2021; Kiraz vd., 2022; Yılmaz vd., 2022; Konan vd., 2017; Arabacı vd., 2015).

Eğitim Kurumları Yöneticilerinin Seçim Yöntemine İlişkin Bulgular
Araştırmaya katılanlara eğitim kurumlarına yönetici seçiminin nasıl yapılması gerektiğine ilişkin görüşleri sorulmuş, alınan cevaplar aşağıdaki tabloda gruplandırılarak gösterilmiştir.

FULL TEXTS BOOK

Tablo 8
Eğitim kurumları yöneticilerinin seçimine ilişkin görüşler

Tema	Kod	Frekans(f) Öğretmen	Müdür	Müdür
Eğitim Kurumu Yöneticilerinin Seçimi	Yazılı Sınav	3	2	-
	Sözlü Sınav/Mülakat	-	1	2
	Yazılı Sınav ve Sözlü	2	1	-
	Yüksek Lisans ve Yazılı Sınav	3	3	1
	Yüksek Lisans, Yazılı Sınav ve Sözlü Sınav/Mülakat	1	-	1

Tablo incelendiğinde, araştırmaya katılan öğretmenlerden 3'ünün yazılı sınav yapılarak yöneticilerin seçilmesi gerektiğini ifade ettiği, 2 öğretmenin yazılı sınav ile birlikte sözlü sınav/mülakatında yapılması gerektiğini, 3 öğretmenin yüksek lisans yapanlar arasında yazılı sınav yapılması gerektiğini, 1 öğretmenin ise yüksek lisans yapanlar arasından yazılı sınav ve sözlü sınav/mülakatla seçim yapılması gerektiğini ifade ettikleri görülmektedir. Katılımcı müdür yardımcılarının verdikleri cevaplar incelendiğinde 2'sinin yazılı sınav ile 1'inin sözlü sınav/mülakat ile 1'inin yazılı sınav ve sözlü sınav/mülakat ile ve 3'ünün yüksek lisans yapanlar arasından yazılı sınav ile seçilmesi gerektiğini beyan ettikleri dikkati çekmektedir. Müdür katılımcılarından 2'si sözlü sınav/mülakatla seçim yapılabileceğini, 1'i yüksek lisans yapanlar arasından yazılı sınavla, 1'i ise yüksek lisans yapan adaylar arasından yazılı sınav ve sözlü sınav/mülakatla seçim yapılması gerektiğini belirtmişlerdir. Bu görüşlerin yanı sıra bazı katılımcılar (f=8) yönetmelik eki Ek-1 Değerlendirme Formu'nun da yönetici seçim sürecinde kullanılabileceğini belirtmişlerdir.

Araştırmaya katılanların görüşleri genel olarak değerlendirildiğinde katılımcıların tamamına yakınının yönetici seçim sürecinde adaletin ancak yazılı sınav yoluyla sağlanabileceği hususunda hemfikir olduğu görülmektedir. Bunun yanı sıra katılımcıların eğitim yönetimi alanında lisansüstü eğitime önem atfettikleri de dikkat çeken bir başka husustur. Bu yaklaşım eğitim yöneticiliğinin uzmanlaşması gerektiğine ilişkin anlayışın yaygınlaşmakta olduğunun bir göstergesi olarak kabul edilebilir. Katılımcıların sözlü sınav/mülakata yaklaşımları genelde olumsuz olmakla birlikte bu olumsuz tutumun sözlü sınav/mülakatı gerçekleştiren komisyonların yanlı seçimlerinden, seçim yeterliliğine sahip olmamalarından kaynaklandığı görülmektedir. Bazı katılımcılar, mesleki tecrübe, eğitim seviyesi ve mesleki başarıların da seçim kriteri olarak değerlendirebileceğini, Ek-1 Değerlendirme Formu'nun bu hususları objektif olarak değerlendirmek üzere kullanılabileceğini ifade etmişlerdir. Alanyazında yapılan farklı çalışmalarda da benzer sonuçlara ulaşıldığı görülmektedir (Altın ve Vatanartıran, 2014; Baş ve Şentürk, 2017; Yılmaz vd., 2022; Türkmenoğlu ve Bülbül, 2015; Sezer ve Engin, 2021).

Yöneticilerin Aynı Kurumdaki Görev Sürelerine İlişkin Bulgular

Araştırma katılımcılarına, eğitim kurumu yöneticilerinin aynı kurumdaki görev sürelerinin sınırlandırılmasına ilişkin düşünceleri ile sınırlandırılması gerektiğini düşünüyorlarsa bu sürenin ne kadar olması gerektiği sorulmuştur. Katılımcıların tamamı aynı kurumdaki yöneticilik süresinin sınırlandırılması gerektiğini ifade etmiştir. Katılımcıların verdikleri cevaplar aşağıdaki tabloda gösterilmiştir.

FULL TEXTS BOOK

Tablo 9
Yöneticilerin aynı kurumdaki görev sürelerine ilişkin görüşler

Tema	Kod	Frekans (f) Öğretmen	Müdür Yardımcısı	Müdür
Aynı Kurumdaki Görev Süresi	4+4 yıl	6	3	2
	5+5 yıl	1	2	2
	Diğer	2	2	-

Tabloya göre, öğretmen katılımcılarının 6'sı mevcut yönetmelikte öngörülen 4+4 yıllık görev süresinin uygun olduğunu ifade ederken 1 öğretmen 5+5 yıl, 1 öğretmen 5 yıl ve 2 öğretmen ise daha farklı sürelerin uygun olacağını ifade etmiştir. Müdür yardımcılarından ise 3'ü 4+4 yıllık sürenin, 2'si 5+5 yıllık sürenin ve 2'si daha farklı sürelerin uygun olacağını belirtmiştir. Müdür katılımcılarından 2'si 4+4 yıllık süreyi uygun görmüş, 2'si ise 5+5 yıllık sürenin yeterli olacağını öne sürmüştür.
Katılımcı görüşleri birlikte değerlendirildiğinde, mevcut yönetmelikte yer alan 4+4 yıllık yöneticilik süresinin katılımcıların çoğunluğu tarafından (f=11) kabul gördüğü dikkati çekmektedir. 5+5 yıllık yöneticilik süresi de katılımcılar tarafından öne sürülen (f=5) bir başka görüştür.
Alanyazındaki farklı çalışmalarda da yöneticilerin aynı kurumdaki görev süreleri ile ilgili benzer sonuçlara ulaşılmıştır. (Yeloğlu, 2008) tarafından yapılan çalışmada yöneticilerin aynı kurumda çalışma süresinin en az 5 en fazla 8 yıl olması görüşü öne çıkmış, (Yıldız vd.,2022) tarafından yapılan diğer bir çalışmada da 4+4 yıllık çalışma süresinin yeterli olduğuna dair görüşler ağırlık kazanmıştır. Her iki çalışma sonuçları bu araştırmanın sonuçlarıyla paralellik göstermektedir.

Yöneticilerin Hizmet Öncesi/Hizmet İçi Eğitim İhtiyacına İlişkin Bulgular
Araştırmaya katılanlara eğitim kurumu yöneticilerinin zorunlu olarak hizmet öncesi/hizmet içi eğitim almasına ilişkin görüşleri sorulmuştur. Katılımcıların tamamı eğitim kurumu yöneticilerinin hem hizmet öncesi hem de hizmet içi eğitim alması gerektiği konusunda görüş bildirmişlerdir. Bunun üzerine katılımcılara hangi konuda/konularda hizmet öncesi/ hizmet içi eğitim verilmesi gerektiği sorulmuş olup katılımcıların görüşleri aşağıda gösterilmiştir.

Tablo 10
Yöneticilerin hizmet öncesi/hizmet içi eğitim ihtiyacına ilişkin görüşler

Tema	Kod	Frekans (f) Öğretmen	Müdür	Müdür
Hizmet Öncesi / Hizmet İçi Eğitim	İletisim	9	6	3
	Liderlik	8	6	2
	Çatışma Yönetimi	7	4	1
	Teknoloji Okuryazarlığı	6	4	2
	Kurum Kültürü/Okul İklimi	4	3	-
	Problem Çözme Becerileri	3	3	-
	Mali Kaynak Yönetimi	-	3	2
	Yönetim Bilişim Sistemleri	-	4	1
	Toplantı Yönetimi	-	2	1
	Stresle Baş Etme	-	2	1
	Denetim	-	-	2
	Soruşturma Teknikleri	-	-	2
	Protokol Kuralları	-	-	2

Tablo incelendiğinde, öğretmen katılımcıların eğitim kurumu yöneticilerine, iletişim, liderlik, çatışma yönetimi, teknoloji okuryazarlığı, kurum kültürü/ olumlu okul iklimi oluşturma ve problem çözme becerileri konularında eğitim verilmesi gerektiğini ifade ettikleri görülmektedir. Müdür yardımcısı katılımcıların ise en çok eğitim düzenlenmesi gerektiğini ifade ettiği konular, iletişim ve liderlik (f=6)

FULL TEXTS BOOK

olmuştur. Bunların yanı sıra çatışma yönetimi, teknoloji okuryazarlığı, kurum kültürü/olumlu okul iklimi oluşturma, problem çözme becerileri, mali kaynak yönetimi, yönetim bilişim sistemleri, toplantı yönetimi ve stresle baş etme eğitim verilmesi önerilen diğer konular arasındadır. Araştırmaya katılan müdürler ise en çok iletişim (f=3) konusunda eğitim düzenlenmesi gerektiğini belirtirken, liderlik, teknoloji okuryazarlığı, mali kaynak yönetimi, denetim, soruşturma teknikleri, protokol kuralları, yönetim bilişim sistemleri, toplantı yönetimi ve stresle baş etme gibi farklı alanlarda geniş bir yelpazede eğitim ihtiyacından bahsetmişlerdir.

Katılımcı görüşleri birlikte değerlendirildiğinde, en çok düzenlenmesi önerilen hizmet öncesi/hizmet içi eğitimlerin iletişim, liderlik, çatışma yönetimi ve teknoloji okuryazarlığı olduğu görülmektedir. Söz konusu dört eğitim, her görevden en az 1 katılımcının düzenlenmesine dair görüş beyanıyla diğer alanlardan ayrılmaktadır.

Araştırma katılımcılarının görüşleri bir bütün olarak değerlendirildiğinde, katılımcıların tamamının hizmet öncesi/ hizmet içi eğitimlere olumlu yaklaştığı görülmektedir. Bütün katılımcılar, eğitim ihtiyaçlarına ilişkin görüşler farklılık gösterse de eğitimlerin zorunlu olarak düzenlenmesini, yöneticilerin bu eğitimlere ihtiyaç duyduğunu ifade etmektedir. Katılımcıların en çok düzenlenmesi gerektiğini ifade ettiği eğitimler, iletişim (f=18), liderlik (f=16), çatışma yönetimi (f=12) ve teknoloji okuryazarlığı (f=12) olmuştur. Okul örgütünün insan temelli bir örgüt olduğu düşünüldüğünde, önerilen eğitimlerin kişilerarası ilişkiler alanında olması şaşırtıcı değildir. Zira insani ilişkilerin en yoğun olduğu örgütlerde görev yapan okul yöneticilerinin başarılı olmasının insani ilişkileri iyi yönetmesine bağlı olduğu muhakkaktır. Alanyazında bu hususta yapılan farklı çalışmalar incelendiğinde, elde edilen sonuçların diğer çalışma sonuçlarına benzediği dikkati çekmektedir (Demirtaş ve Özer, 2014; Kılıç, 2014; Baloğlu, 2007).

Yöneticiliğin İkinci Görev Olarak Yürütülmesine İlişkin Bulgular

Araştırmaya katılanlara eğitim kurumu yöneticilikleri için kadro ihdas edilmeden, yöneticiliğin "ikinci görev" olarak öğretmenler tarafından yürütülmesi hakkındaki düşünceleri sorulmuştur. Katılımcıların verdiği cevaplar aşağıdaki tabloda gösterilmiştir.

Tablo 11

Yöneticiliğin ikinci görev olarak yürütülmesine ilişkin görüşler

Tema	Kod	Frekans (f)		
		Öğretmen	Müdür Yardımcısı	Müdür
Yöneticiliğin İkinci Görev Olarak Yürütülmesi	Olumlu	4	1	-
	Olumsuz	5	6	4

Tabloya bakıldığında, öğretmen katılımcılarından 4'ünün eğitim kurumu yöneticiliğinin ikinci görev kapsamında yürütülmesine olumlu, 5'inin ise olumsuz yaklaştığı görülmektedir. Bu hususta müdür yardımcılarından ise 1'i olumlu görüş bildirmiş, 6'sı ise olumsuz görüş beyan etmiştir. Araştırmaya katılan müdürlerin ise tamamı yöneticiliğin ikinci görev olarak yürütülmesi hususunda olumsuz görüş bildirmişlerdir.

Araştırmaya katılanların görüşleri birlikte değerlendirildiğinde, katılımcıların büyük ölçüde (f=15) yöneticiliğin ikinci görev olarak yürütülmesine ilişkin olumsuz görüş beyan ettiği görülmektedir. Özellikle halen yönetici olarak görev yapmakta olan müdür ve müdür yardımcılarının 1'i dışında tamamı yöneticiliğin ikinci görev olarak yürütülmesinin doğru olmadığını ifade etmişlerdir.

Katılımcı görüşlerinden hareketle, yöneticilik görevinin ikinci görev olarak yürütülmesinin özellikle halen bu görevde bulunan yöneticiler tarafından desteklenmediği söylenebilir. Okul yöneticileri,

FULL TEXTS BOOK

görevlendirme uygulamasının özlük haklarıyla ilgili kayıplarına neden olduğu gibi yarınının belli olmamasının da yöneticiler üzerinde baskı oluşturabileceğini ifade etmişlerdir. Alanyazında yapılan farklı çalışmalarda da eğitim kurumu yöneticiliğinin ikinci görev olarak sürdürülmesinin yöneticiler tarafından olumsuz değerlendirildiğine ilişkin çeşitli araştırma bulguları mevcuttur (Yıldız vd., 2022; Türkmenoğlu ve Bülbül, 2015; Memişoğlu, 2016; Arabacı vd., 2015).

Yöneticiliğin Meslekleşmesine İlişkin Bulgular

Araştırmaya katılanlara eğitim kurumu yöneticiliklerinin öğretmenlikten tamamen ayrılarak ayrı kadroya sahip bir meslek olarak örgütlenmesi hakkında ne düşündükleri sorulmuştur. Katılımcıların cevapları aşağıdaki tabloda gösterilmiştir.

Tablo 12
Yöneticiliğin meslekleşmesine ilişkin görüşler

Tema	Kod	Frekans (f) Öğretmen	Müdür	Müdür
Yöneticiliğin Meslekleşmesi	Olumlu	6	6	4
	Olumsuz	3	1	-

Tablo incelendiğinde, öğretmen katılımcılarından 6'sının yöneticiliğin ayrı kadroya sahip bir meslek olarak örgütlenmesine olumlu baktığı, 3'ünün ise olumsuz yaklaştığı görülmektedir. Müdür yardımcılarından 6'sı olumlu yaklaşırken sadece 1 müdür yardımcısı olumsuz fikir bildirmiştir. Müdür katılımcıların ise tamamı olumlu görüş bildirmiştir.

Katılımcıların görüşleri birlikte değerlendirildiğinde, katılımcıların çok büyük bölümünün (f=16) yöneticiliğin ayrı bir meslek olarak örgütlenmesine olumlu görüş bildirdiği görülmektedir. Halen yöneticilik yapan katılımcılardan sadece 1'i olumsuz görüş bildirirken öğretmen katılımcıların da önemli kısmı (6/9= % 66) bazı çekinceleri olsa da olumlu görüş bildirmiştir.

Genel olarak bakıldığında, öğretmen kökenli olması kaydıyla, katılımcıların çok büyük ölçüde (f=16) eğitim kurumu yöneticiliğinin ayrı kadroya sahip bir meslek olarak örgütlenmesini desteklediği görülmektedir. Alanyazında yapılan birçok çalışmada da bu paralelde sonuçlar elde edildiği görülmektedir (Yıldız vd., 2022; Türkmenoğlu ve Bülbül, 2015; Memişoğlu, 2016; Arabacı vd., 2015).

Öğretmenlik Dışı Alanlardan Yönetici Görevlendirilmesine İlişkin Bulgular

Araştırma katılımcılarına eğitim yöneticiliği ayrı kadroya sahip bir meslek olarak örgütlendiği takdirde, öğretmenlik dışı alanlarda eğitim almış kişilerin eğitim yöneticisi olarak görevlendirilmesi hakkındaki görüşleri sorulmuştur. Katılımcıların soruya verdikleri cevaplar aşağıdaki tabloda gösterilmiştir.

Tablo 13
Öğretmenlik dışı alanlardan yönetici görevlendirilmesine ilişkin görüşler

Tema	Kod	Frekans (f) Öğretmen	Müdür	Müdür
Öğretmenlik Dışı Alanlardan Yönetici Görevlendirilmesi	Olumlu	1	1	-
	Olumsuz	8	6	4

Tablo incelendiğinde, araştırmaya katılan 9 öğretmenden sadece 1'inin olumlu görüş bildirdiği, diğer 8 öğretmen katılımcının ise olumsuz görüş bildirdiği görülmektedir. Aynı şekilde araştırmaya katılan müdür yardımcılarından sadece 1'inin olumlu, diğer 6 katılımcının ise olumsuz görüş beyan ettiği

FULL TEXTS BOOK

görülmektedir. Müdür katılımcılardan ise soruya olumlu görüş bildiren olmamış 4 katılımcının tamamı olumsuz görüş beyan etmiştir.

Katılımcıların görüşleri birlikte değerlendirildiğinde, araştırma grubunda yer alan 20 katılımcıdan sadece 2'sinin öğretmenlik dışı alanlardan yönetici görevlendirilmesine olumlu yaklaştığı, 18 katılımcının ise bu yaklaşıma karşı çıktığı görülmektedir. Katılımcıların, çekinceleri farklı olsa da, öğretmenlik yapmayan kişilerin eğitim kurumlarına yönetici olarak görevlendirilmesine katı şekilde karşı çıkmaları dikkat çekicidir.

Genel olarak değerlendirildiğinde eğitim kurumlarına öğretmenlik dışı alanlardan yönetici görevlendirilmesi katılımcılar tarafından kabul edilebilir bulunmamıştır. Katılımcıların bu konuda, öğretmen olmayanların sınıf içi tecrübesi olmadığı için okul sorunlarına doğru yaklaşamayacağı, olayları, öğretmen ve öğrenci duygularını doğru okuyamayacağı, okulların Taylorist bakışla yönetilemeyeceği gibi çeşitli çekinceleri bulunmaktadır.

SONUÇ, TARTIŞMA VE ÖNERİLER

Araştırma Sonuçları ve Tartışma

Katılımcıların eğitim kurumları yöneticilerinin lisansüstü eğitim görmüş olmasının okul yönetimlerinin niteliğini artıracağına ve lisansüstü eğitimin önemine yönelik olumlu bir tutuma sahip oldukları görülmüştür. Alanyazında da lisansüstü eğitimin yöneticiliğe atanmada bir koşul olması gerektiğine dair çok sayıda çalışma bulunmaktadır (Yıldız vd.,2022; Türkmenoğlu ve Bülbül, 2015; Konan vd., 2017; Akbaşlı ve Balıkçı, 2013; Demirtaş ve Özer, 2014). Araştırma sonucunda elde edilen bulgular, alanyazında daha önce yapılmış çalışma sonuçları ile örtüşmektedir.

Araştırmada elde edilen bir başka sonuç ise yöneticilerin sahip olması beklenen özelliklerin çoğunlukla iletişim ve davranışla ilişkili olduğudur. Katılımcıların çoğunlukla üzerinde durduğu kişisel özelliklere bakıldığında, adalet, liderlik, iletişim ve problem çözme gibi özelliklerin yer aldığı görülmektedir. Kişiler arası ilişkilerin yoğun olduğu örgütler olarak okul örgütü yöneticilerinin iyi birer iletişimci olması, aynı zamanda kişiler arası ilişkileri iyi yönetebilmesi gerekeceği muhakkaktır. Katılımcıların en çok önem verdikleri bir başka özellik ise adalet duygusu olmuştur. Adil bir yönetimin iş barışının ön şartı olduğu tartışılmaz bir gerçektir. Kişisel özellikler arasında dikkat çeken bir başkası ise liderliktir. Günümüzde okul yöneticilerinden beklenen sadece yönetmek değil okul örgütüne her bakımdan liderlik etmeleridir. Ancak mevcut katı merkeziyetçi yapının okul yöneticilerine liderlik yapacak fazla alan bırakmadığı da gözden kaçırılmamalıdır. Alanyazında yapılan farklı çalışmalarda benzer sonuçlara ulaşıldığı görülmektedir. Şen ve Tankutay (2021) tarafından yapılan araştırmada, okul yöneticisinde aranan en önemli özelliğin adalet duygusu olduğu belirlenmiştir. Yıldız vd. (2022), okul yöneticilerinin görevlerini yerine getirirken çoğunlukla iletişim becerisine ihtiyaç duyacağını ifade etmektedir.

Araştırma kapsamında, katılımcılardan mevcut yönetmelikte öngörülen yöntemler ile yapılan görevlendirmelerin ne kadar başarılı olduğunu değerlendirmeleri istenmiştir. Katılımcıların çok büyük bölümü, yazılı sınav yapılmasını doğru ve gerekli olarak tanımlamışlar, yazılı sınavın adil bir seçim yöntemi olduğunu ifade etmişlerdir. Buna karşın katılımcıların önemli bir kısmı mevcut yönetmelik ile yapılan görevlendirmelerin başarılı olmadığı görüşünü savunmuştur. Bu noktada katılımcıların eleştirilerine bakıldığında iki nokta üzerine yoğunlaştığı görülmektedir. İlki sözlü sınav/mülakat uygulamasıdır. Pek çok katılımcı sözlü sınav/mülakat uygulamasını gerekli görmekle birlikte, mevcut uygulama pratiğinin adalet duygusunu zedelediğini, kayırmacılığa yol açtığını, kişisel, siyasal veya sendikal ilişkilerin belirleyici hale gelerek liyakat esasından uzaklaşılmasına neden olduğunu belirtmektedir. Sözlü sınav/mülakat hakkında dile getirilen bir başka sorun ise sözlü sınav/mülakatı gerçekleştiren komisyonların yetersizliği üzerine yoğunlaşmaktadır. Katılımcıların üzerinde durduğu bir diğer nokta ise yönetmelikte öngörülen değerlendirme formları ile ilişkilidir. Birçok katılımcı formlarda yer alan puanlama kriterlerinin adil olmadığını ve yönetici adayları arasında fırsat eşitsizliğine neden olduğunu ifade etmiştir. Her ne kadar 01/03/2024 tarihli yönetmelik değişikliği ile değerlendirme

FULL TEXTS BOOK

formlarında yer alan kriterler değiştirilse de halen bazı ölçütlerle ilgili eleştiriler varlığını sürdürmektedir.

Her iki sorunla ilgili benzer eleştirilere alanyazında yapılmış farklı çalışmalarda da rastlamak mümkündür. Yıldız vd. (2022) çalışmalarında sınav uygulamasının adaletli olduğunu, ancak sözlü sınava ilişkin olumsuz bir algının bulunduğunu, liyakat ilkesinin uygulanmasında eksiklikler bulunduğunu tespit etmişlerdir. Memişoğlu (2016), sözlü sınav şeklindeki düzenlemenin liyakat ilkesini göz ardı ettiğini belirtmektedir. Polat ve Kurtgöz (2022), çalışmalarında yönetmelik eki değerlendirme formlarındaki bazı kriterlerin yönetici adayları için adil olmadığını ve fırsat eşitsizliğine neden olduğunu belirtmişlerdir. Aktepe (2014), eğitimcilerin çoğunun merkezi sınav ile atamayı desteklediğini ifade etmektedir. Öztabak (2015), mülakat sınavının yapılmaması gerektiğini, eğer yapılacaksa da bakanlık ve üniversitelerden oluşturulacak karma komisyonlarca yapılması gerektiğini belirtmektedir.

Araştırmaya katılanlara sorulan bir diğer soru ise yöneticilerin seçimi için nasıl bir model önerdikleridir. Katılımcıların önerileri incelendiğinde temel olarak sınava dayalı bir seçim mekanizması öne sürüldüğü görülmektedir. Hemen hemen tüm katılımcılar adil bir seçim yöntemi olduğunu belirterek yazılı sınav önermişlerdir. Yazılı sınav dışında lisansüstü eğitim, asgari öğretmenlik deneyimi, stajyer yöneticilik, kademeli ilerleme ve sözlü sınav gibi diğer kriter ve yöntemler de öneriler arasında yer almaktadır. Baş ve Şentürk (2017)'ün yaptıkları araştırma sonucu geliştirdikleri modelde, lisans eğitimi mezunları için en az 5 yıl deneyim ve eğitim yönetimi yüksek lisansı, eğitim yönetimi lisans mezunları içinse staj şartı öngörülmüş, devamında yazılı sınav, uzman komisyonda sözlü sınav, yönetici yardımcılığı, en az 5 yıl hizmeti müteakip yöneticilik ve her 5 yılda bir yeterlilik sınavı şartı önerilmiştir.

Altın ve Vatanartıran (2014) ise yaptıkları araştırmaya dayalı olarak üç aşamalı bir model geliştirmişlerdir. Modelin ilk adımında yetiştirme, ikinci adımında seçme ve üçüncü adımında geliştirme aşamaları yer almaktadır.

Her iki modelde de, bu araştırmada katılımcıların önerdiği seçim, yetiştirme ve görevlendirme kriter ve yöntemlerinin benzerlerine yer verildiği dikkati çekmektedir. Yazılı sınav, lisansüstü eğitim, asgari öğretmenlik deneyimi, stajyer yöneticilik gibi hususlar her iki modelde de yer almaktadır.

Araştırmada yer alan bir başka soru ise yöneticilerin hizmet öncesi ya da hizmet içi eğitim ihtiyaçları ile ilgilidir. Alanyazında yöneticilerin yetiştirilmesi için gerek hizmet öncesi gerekse de hizmet içi eğitimlerin önemini vurgulayan birçok çalışma yer almaktadır. Şen ve Tankutay (2021), yönetici adaylarının göreve başlamadan önce iletişim becerileri ve uygulamaya yönelik eğitim yönetimi programı düzenlenmesinin gerekli olduğunu vurgulamaktadır. Sezer ve Engin (2021), yönetici adaylarının tecrübeli müdürler yanında uygulamalı işbaşında eğitim yoluyla yetiştirilebileceğini, ihtiyaç duyulan hizmet içi eğitimlerin uygulamalı olarak yürütülmesinin lider okul yöneticilerinin yetişmesine katkıda bulunacağını ifade etmektedir. Baş ve Şentürk (2017), bir okul yöneticisinin okulunu etkili olarak yönetebilmesi için eğitim almasının kaçınılmaz olduğunu belirtmektedir. Okçu (2011), eğitim yöneticilerinin ciddi bir hizmet içi eğitimden geçmelerini zorunlu görmektedir. Araştırma sonuçları, alanyazındaki diğer çalışmaların sonuçları ile uyumlu şekilde yöneticilerin hizmet öncesi ve hizmet içi eğitim ihtiyaçlarını ortaya koymuştur. Şüphesiz ki öğretmenlik ve yöneticilik farklı beceriler gerektiren mesleklerdir. Dolayısıyla gerek öğretmenlikten yöneticiliğe geçiş gerekse de yöneticilik sürecinde ihtiyaç duyulan becerileri kazandıracak hizmet öncesi ya da hizmet içi eğitimlerin düzenlenmesi bir zarurettir. Ancak mevcut durumda, gerek öğretmenlikten yöneticiliğe geçiş esnasında gerekse de yöneticilik sürecinde herhangi bir eğitim düzenlenmemektedir. Her ne kadar yönetmelikte Eğitim Yönetimi Sertifika Programı'ndan bahsedilmekteyse de bugüne kadar bu konuda düzenlenmiş herhangi bir eğitim bulunmamaktadır.

Araştırma kapsamında cevap aranan bir başka soru ise aynı kurumdaki yöneticilik süresinin ne kadar olması gerektiğidir. Kaya ve Hoşgörür (2024) yaptıkları çalışmada, yöneticilerin dört yıllık çalışma süresinin kurumların gelişimi için yeterli olmadığını, dört yıl sonundaki değerlendirmeyle görev yaptıkları kurumların değişebilme ve yerlerine başka yöneticilerin gelebilme ihtimalinin

FULL TEXTS BOOK

motivasyonlarını olumsuz etkilediğini ortaya koymuştur. Mutlusoy (2019) ise çalışmasında mevcut görev süresinin yetersizliğinden bahisle yöneticilerin kuruma aidiyetlerini zayıflattığını, uzun vadeli plan ve proje üretmelerine engel olduğunu ifade etmektedir. Bir başka çalışmada Seçkin (2019), yöneticilerin dört yıllık sürelerle görevlendirilmelerinin eğitimde istikrar sorununa neden olduğu sonucuna ulaşmıştır. Alanyazında yer alan farklı çalışmalarda ulaşılan sonuçlara benzer şekilde, mevcut araştırmadaki katılımcı görüşleri, 4+4 ve 5+5 yıllık görevlendirme süreleri üzerinde yoğunlaşmıştır. Dört yıllık görevlendirme süresinin kısa oluşuyla ilgili yukarıda zikredilen çalışmalarda yer verilen görüşlere benzer görüşler, bu araştırmada yer alan bazı katılımcılar tarafından da dile getirilmiştir. Gerek bu çalışmada elde edilen bulgular, gerekse de alanyazındaki diğer çalışma sonuçları düşünüldüğünde, yöneticilerin aynı kurumdaki çalışma süresinin 5+5 olarak düzenlenmesinin uygun olacağı değerlendirilmektedir. Birinci beş yıllık görev süresinin sona ermesini müteakip yapılacak değerlendirmenin, objektif şekilde okul gelişimini ölçebilecek kriterler belirlenerek yapılması da yöneticilerin duydukları kaygıyı azaltarak motivasyonlarını artıracaktır.

Araştırma kapsamında son olarak yöneticiliğin meslekleşmesi hakkında katılımcı görüşlerine başvurulmuştur. Katılımcılar, yöneticiliğin ikinci görev olarak yürütülmesine olumsuz yaklaşmakta, yöneticiliğin geçici bir görev olarak nitelenmesine karşı çıkmakta, bunun yerine ayrı kadrosu olan, görev, yetki ve sorumlulukları net olarak tanımlanmış bir meslek olarak düzenlenmesi fikrine olumlu yaklaşmaktadır. Alanyazında yıllardır yapılan birçok çalışmada yöneticiliğin ayrı bir meslek olarak düzenlenmesi önerisi getirilmesine (Akyıldız vd., 2019; Altın ve Vatanartıran, 2014), Milli Eğitim Şuralarında tavsiye kararları alınmasına rağmen bu konuda henüz bir adım atılmış değildir. Türk eğitim sistemindeki hâkim anlayış, "Meslekte esas olan öğretmenliktir." ve "Öğretmenlikte başarılı olan yöneticilikte de başarılı olur." anlayışıdır. Ancak bu anlayış farklı değerleri barındıran öğretmenlik ve yöneticilik rollerinin karışmasına ve eğitim yöneticilerinin yıpranmasına neden olmuştur (Bursalıoğlu, 2003 akt. Akbaşlı ve Balıkçı, 2013). Eğitim yöneticiliği meslekleşemediği için de yetiştirilmesi, görevleri, yetkileri ve sorumlulukları net olarak tanımlanamadığı gibi yöneticilik yeterlilikleri de belirlenmemiştir. Mevcut araştırma bulgularından hareketle, alanyazında yapılan diğer çalışmalara paralel şekilde, eğitim yöneticiliğinin profesyonel bir meslek olarak tanınmasına, yöneticilik için öğretmenlikten ayrı kadro ihdas edilmesine, mesleki yeterliliklerin belirlenerek yetiştirilme programlarının oluşturulmasına, görev-yetki dengesinin sağlanmasına ve özlük haklarının tanımlanmasına ihtiyaç duyulduğu söylenebilir.

Öneriler

Eğitim kurumu yöneticileri, eğitim sisteminin temelini oluşturan okulların etkililiğini belirleyen temel unsurlardan biridir. Bu nedenle "doğru" eğitim kurumu yöneticilerinin seçimi, yetiştirilmesi ve görevlendirilmesi büyük önem arz etmektedir.

Bu araştırma kapsamında, öğretmen ve yöneticilerin görüşleri ışığında eğitim yöneticilerinin seçme, yetiştirilme ve görevlendirilme süreçleri değerlendirilmiştir. Araştırma bulgularından hareketle, eğitim yöneticiliğinin bir meslek olarak tanınması ihtiyacının olduğu, ikinci görev gibi yarı öğretmen-yarı yönetici modelinin başarısız olduğu görülmektedir. Bu nedenle öncelikle, eğitim yöneticiliğinin meslek olarak tanımlanması için gerekli yasal ve idari düzenlemeler, eğitim paydaşlarının da sürece katılması sağlanarak yapılmalıdır. Eğitim yöneticileri, okul yöneticiliğinin meslek olarak kabul edildiği ülkelerde olduğu gibi, eğitim yönetimi alanında lisansüstü eğitim yapan öğretmenler arasından seçilmeli, lisansüstü eğitim bir önkoşul olarak tanımlanmalıdır.

Seçim sürecinde yazılı sınava mutlaka yer verilmeli, ilaveten yetkin komisyonlarca sözlü sınav ya da mülakat uygulamaları yapılmalıdır. Sözlü sınav ya da mülakat uygulamasında, adayların temsil kabiliyeti, algı ve muhakeme yeteneği, psikolojik sağlamlığı, iletişim ve problem çözme becerileri, ikna ve motivasyon kabiliyeti, kişisel gelişimi değerlendirilmelidir. Seçilen adaylar mutlaka hizmet öncesi

FULL TEXTS BOOK

eğitime alınmalı, eğitimi tamamlayanların mentör yöneticilerin yanında belirli bir süre yetişmeleri sağlanmalıdır.

Eğitim yöneticilerinin yetkileri, görev ve sorumluluk dengesine uygun olarak genişletilirken özlük hakları da geliştirilmelidir. Eğitim yöneticiliğinin yeterlilik ve standartları belirlenmeli, yöneticilerin bu yeterlilik ve standartları karşılayabilecek donanıma sahip olmaları hizmet öncesi/hizmet içi eğitimlerle temin edilmelidir.

Yöneticilerin hizmet süresince değerlendirmeleri objektif kriterlerle yapılmalı, adalet duygusu zedelenmemelidir. Yöneticilerin aynı kurumdaki çalışma süreleri, hem yönetsel körlüğe fırsat vermeyecek hem de yöneticilerin projelerini gerçekleştirebileceği sürelerle kısıtlanmalıdır. Mevcut yönetmelikte öngörülen değerlendirme formlarında yer alan ve fırsat eşitsizliğine yol açan hususlar düzeltilmelidir.

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FULL TEXTS BOOK

ADÖLESAN SPORCULARDA MATURASYON DÜZEYİ VE YARALANMA İLİŞKİSİ
RELATIONSHIP BETWEEN MATURATION LEVEL AND INJURY IN ADOLESCENT ATHLETES

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ÖZET

Adölesan dönem; fiziksel, psikolojik ve sosyal yönden büyüme, gelişme ve olgunlaşmayla karakterize ve çocukluk çağından yetişkinlik çağına geçişin başladığı, bebeklik çağından sonraki ikinci hızlı gelişmenin olduğu dönemdir. Biyolojik maturasyon vücut dokularında, organlarda ve sistemlerde meydana gelen olgunlaşmaya verilen isimdir. Zamanlama ve tempo olarak iki komponent olacak şekilde değerlendirilmektedir. Zamanlama, değişimin başlangıcını, tempo değişim oranını anlatmaktadır. Zamanlama; menarş yaşı, büyüme atağı periyodu ve sekonder cinsiyet karakterlerinin görülmeye başladığı zaman gibi değişimin başlangıç zamanını göstermektedir. Zamanlamaya göre biyolojik maturasyon erken, zamanında ve geç şeklinde görülmektedir. Tempo ise; değişimin hızını ve sürecini göstermektedir. Adölesan dönemde biyolojik maturasyon her zaman takvim yaşıyla paralel şekilde ilerlememektedir. Puberte ve biyolojik maturasyon genetik ve çevresel etkenlerden etkilenen dinamik süreçlerdir. Fiziksel aktivite biyolojik maturasyonu etkileyen önemli çevresel faktörlerden biridir.
Biyolojik maturasyon takvim yaşı, boy yaşı, kemik yaşı, büyüme atağı, Tanner evre ve antropometrik ölçümler ile değerlendirilmektedir.
Yapılan çalışmaların sonuçları incelendiğinde Orta Doğu'daki genç erkek elit futbolcularda iskelet olgunluğu ile kas-iskelet sistemi yaralanmaları arasındaki ilişkiyi araştıran çalışmaların yetersiz olduğu gözlenmektedir. Bu literatür derlemesi, Orta Doğu ve Asya'daki elit genç futbolcularda iskelet olgunluğu ile yaralanmalar arasındaki ilişkileri inceleyen ilk epidemiyolojik çalışmadır. Kas-iskelet sistemi yaralanma modelleri ve yaralanma riskleri, oyuncuların iskelet olgunluğuna bağlı olarak değiştiği gözlenmektedir. Erken olgunlaşan oyuncuların en büyük genel sakatlık riskine sahip olduğu kaydedilmiştir.. En sık görülen TLI türlerinin kontüzyonlar, burkulmalar ve büyümeye bağlı yaralanmalar olduğu belirtilmiştir. Analizlere göre, erken olgunlaşan oyuncuların en yüksek sakatlık riskine sahip olduğu vurgulanmıştır. Bilek kısmı iskelet açısından olgun olan oyuncuların alt ekstremite apofiz yaralanması açısından en düşük riske sahip olduğu ancak, pubik apofizin yüksek prevalansını içeren kalça ve pelvis çevresindeki apofiz yaralanmalarına karşı savunmasız olduğu rapor edilmiştir.

FULL TEXTS BOOK

Sonuç olarak, Sporcularda antrenman programları oluşturulurken iskelet olgunluğunun göz önünde bulundurulması, yaralanmaların önlenmesi ve oluşabilecek yaralanmalarda tedavi yönetiminin belirlenmesinde sporcuya katkı sağlayacağı düşünülmektedir.
Anahtar Kelimeler: Adölesan Sporcular, Maturasyon Düzeyi, Yaralanma

ABSTRACT
Adolescence is a period characterized by physical, psychological and social growth, development and maturation and the transition from childhood to adulthood begins, the second period of rapid development after infancy. Biological maturation is the maturation of body tissues, organs and systems. It is evaluated as having two components: timing and tempo. Timing refers to the beginning of the change and tempo refers to the rate of change. Timing indicates the time of onset of change, such as the age of menarche, the period of growth spurt and the time when secondary sex characteristics begin to appear. According to timing, biological maturation is seen as early, on time and late. Tempo shows the speed and process of change. Biological maturation in adolescence does not always progress in parallel with calendar age. Puberty and biological maturation are dynamic processes influenced by genetic and environmental factors. Physical activity is one of the important environmental factors affecting biological maturation.
Biological maturation is evaluated by calendar age, height age, bone age, growth spurt, Tanner stage and anthropometric measurements.
When the results of previous studies are examined, it is observed that there is a lack of studies investigating the relationship between skeletal maturity and musculoskeletal injuries in young male elite soccer players in the Middle East. This literature review is the first epidemiologic study to examine the relationship between skeletal maturity and injuries in elite youth soccer players in the Middle East and Asia. Musculoskeletal injury patterns and injury risks appear to vary depending on the skeletal maturity of players. Early maturing players were noted to have the greatest overall injury risk. The most common types of TLIs were contusions, sprains and growth-related injuries. According to the analysis, it is emphasized that early maturing players have the highest risk of injury. It was reported that skeletally mature players at the wrist had the lowest risk of lower extremity apophysis injury, but were vulnerable to apophysis injuries around the hip and pelvis, including a high prevalence of pubic apophysis.
In conclusion, it is thought that considering skeletal maturity while creating training programs in athletes will contribute to the athlete in preventing injuries and determining the treatment management in injuries that may occur.
Keywords: Adolescent Athletes, Maturation Level, Injury

ADÖLESAN SPORCULARDA MATURASYON DÜZEYİ VE YARALANMA İLİŞKİSİ

1. ADÖLESAN DÖNEM NEDİR?

Adölesan dönem; çocukluk çağından yetişkinlik çağına geçişin başladığıhayat döngüsü içerisinde ikinci hızlı gelişmenin olduğu dönemdir. Sürekli büyüme özelliği çocukları yetişkinlerden ayıran en önemli özelliklerden bir tanesidir. Fiziksel, psikolojik ve sosyal yönden büyüme, gelişme ve olgunlaşmayla karakterize olup yetişkinliğe adımdır. Aktif bir adölesan bireyin günlük ortalama enerji ve besin öğeleri gereksinimi 2300-3000 kkal arasında değişmektedir. Buna göre bireyin, besin ve sıvı ihtiyacı da artmaktadır.(1)

2. ADÖLESANLARDA FİZİKSEL BÜYÜME

Bu dönemde görülen en hızlı değişim fiziksel büyümedir. Bu dönemde adölesan erkek bireylerde vücut ağırlığı 6-12.5kg/yıl artarken kızlarda 5.5-10kg/yıl şeklinde artar. Erkek çocuklarda boy, vücut ağırlığı ve kas parametrelerinde eş zamanlı büyüme gözlenirken kız çocuklarda ilk olarak boy uzaması görülürken ağırlıkta artış ise 6 ay sonra görülmektedir.(2) Yetişkin dönemdeki boy uzunluğunun %20-

FULL TEXTS BOOK

25'i, total kemik kütlenin %37'si ve vücut ağırlığının %50'si bu süreçte kazanılmaktadır.(3) Hem kız hem erkek cinsiyette de adölesan dönemin ilk yıllarında deri altındaki yağ dokusu azalmaktadır.Ancak en az düzeyine büyüme patlaması yaşanılan dönemde ulaşmaktadır.Daha sonra ise kızlarda daha fazla olmak şartıyla her iki cinsiyette de yağ kitlesinde artış gözlemlenmektedir.(3)Erkek bireylerde kas dokusundaki artış kızlardan daha fazla olmakla beraber büyüme hızıyla de eş zamanlı şekilde ilerlemektedir.(3) Adölesan dönemde biyolojik maturasyon her zaman takvim yaşıyla beraber paralel şekilde ilerleme göstermemektedir.

3. BİYOLOJİK MATURASYON

Vücut dokularında,sistemlerinde ve organlarda meydana gelen olgunlaşmaya biyolojik maturasyon denir. "Zamanlama" ve "tempo" olacak şekilde iki komponent olarak değerlendirilmektedir.(4)Değişimin başlangıç zamanını'' zamanlama göstermektedir. Zamanlamaya göre biyolojik maturasyon erken, zamanında ve geç olacak şekilde görülmektedir.Değişimin hızını ve sürecini ise tempo göstermektedir.(5) Biyolojik maturasyon takvim,boy ve kemik yaşı, büyüme atağı, Tanner evre ve antropometrik ölçümlerle değerlendirilmektedir.

Genetik ve çevresel faktörlerden etkilenen dinamik süreçlere puberte ve biyolojik maturasyon denmektedir.Fiziksel aktivite biyolojik maturasyonu etkileyen önemli çevresel etmenlerden biridir.Bazı çalışmalarda fiziksel aktivite düzeyi yetersiz olan erkek adölesan bireylerin erken maturasyon riskinin zamanında maturasyon gösteren yaşıtlarından iki kat daha fazla olduğu (6), bazı çalışmalarda da fiziksel aktivite düzeyi yüksek olan erkek adölesan bireylerin zamanında veya geç matür olan yaşıtlarına nazaran daha erken dönemde matürasyon gösterdiği tespit edilmiştir (7). Bununla beraber; çocuklar ve adölesan bireylerde düzenli aralıklarla yapılan fiziksel aktivite kısa ve uzun vadede kardiyovasküler sistem, kemik, kas ve ruh sağlığı için oldukça faydalıdır. (8)

4. MATURASYON DEĞERLENDİRMESİ

4.1. Takvim Yaşı (Kronolojik yaş)

Hesaplanan zamanda doğum zamanının çıkarılmasıyla sonuç bulunur. Spor bölümleri kronolojik yaşa göre belirlenmektedir.Birbirine eş kronolojik yaştaki grupların farklı ölçülerde biyolojik matürasyon sonuçları olabilir.

4.2. Boy Yaşı

Seçilmiş boydaki bireylerin yaşlarının toplamının kişi sayısına oranına denmektedir.Olması gereken kütleyi hesaplamak için de boy yaşı hesaplanabilir. Boy yaşı bireyin boy uzunluğunun 50p'de ki değerine karşılık gelmekle beraber ve 50p'deki kütle boy yaşının değeri için olması gereken ağırlıktır. Kişinin normal kütlesinin olması gereken kütleye bölünmesi halihazırdakivücut kütlesinin olması gereken kütleye oranını belirtmektedir.

4.3. İdeal Vücut Ağırlığı

Olması gereken vücut ağırlığı,vücut proporsiyonunu ve beslenme durumunu belirten bir yöntemdir.Persentil tablosunda horizontal eksende uzunluğun 50p'ne eşit olan vertikal eksendeki 50p'deki ağırlık oranıdır.Yetişkinlik evresinde olması gereken vücut ağırlığının yaklaşık olarak yarısı adölesan dönemde elde edilir. Erkek adölesan bireylerde puberte zamanında yıllık yaklaşık 9kg. kütle artışıyla beraber puberte dönemindeyse yaklaşık 23,7kg (7-30kg) oranında artış gösterirler (9).

4.4. Ağırlık Yaşı

Kilogram olarak belirtilen vücut kütlesine karşılık olarak gelen ortalama yaşa ''ağırlık yaşı'' denir.Bireyin vücudunun gelişim düzeyini belirtmektedir.(10)

4.5. Kemik Yaşı

Bireyin büyümesini sağlayan en önemli olay iskelet büyümesidir. İskeletin olgunlaşması standartta sol el bileğin radyografik açıdan incelenmesiyle belirlenir.Kemik yaşını hesaplamak için üç yöntem kullanılır.Bunlar Greulich-Pyle (GP) (11) Tanner-Whitehouse (TW)(12) ve Fels (13) olarak adlandırılır.

FULL TEXTS BOOK

Klinikte diğer değerlendirme yöntemlerinden daha çok kullanılan,güvenilirliği yüksek ve uygulaması kolay olan yöntem GP'dir.

Kemik yaşı<Takvim yaşı olması durumu; konstitüsyonel boy kısalığı, malnutrisyon, kronik hastalık durumlarında meydana gelebilir.Kemik yaşı=Takvim yaşı ise ; genetik olarak boy kısalığı ve iskelet displazisini düşündürebilmektedir.Erkeklerde 18 yaş ile beraber epifizlerdeki büyümenin durmasıyla büyüme sonlanır. (14).

4.6. Tanner Evrelemesi

Sekonder cinsiyet özelliklerinin puberte dönemindeki farklılaşmasını gözlemlemek amacıyla oluşturulmuştur. Erkeklerde fallus, skrotum ve testis volümlerinin;kızlarda meme olgunlaşmasını;her iki cinsiyette ise pubik kıllanmayı belirtir. (15),(16) Tanner evreleri biyolojik maturasyonun göstergeleridir.Fiziksel ve laboratuvar olaylarla özel olarak ilişkilendirilir.

Erkeklerde cinsel gelişimin evreleri (Tanner sınıflaması)

4.7. Büyüme Hızı

Büyüme zamanında bireyin boy uzunluğu,düzenli aralıklarla her ay olacak şekilde kontrol edilmelidir.Düzenli boy ölçümü büyüme değerlerini belirtir.Bunun sonucuna büyüme hızına ulaşılır.

İncelenmesi gereken büyüme hızları:

- 2-4yaş <5.5 cm/yıl
- 4-6 yaş <5cm/yıl
- 6yaş-puberte; erkeklerde <4cm/yıl, kızlarda <4.5cm/yıl olmasıdır.

Boyu kısa olan çocuklarda büyüme hızı kesim noktasının üzerindeyse patolojik kaynaklı olmadığı, ailesel veya yapısal sebeplerden dolayı büyüme gecikmesi olduğu düşünülür.Ancak kesim noktasının altında ise patolojik boy kısalığı olduğu kanısına varılır ve araştırılması gerekir (17).

4.8. Büyüme Atağı

En üst düzeyde boy uzamasının görüldüğü dönemdir. Büyüme patlaması olarakta adlandırılır. Hedef boya ulaşana kadar artış gösterir daha sonrasında azalarak ve geç adölesan dönemde son haline ulaşır.Genetik ve çevresel faktörlerden yaş,cinsiyet ve pubertel gelişimden,beslenmeden ve psikososyal faktörlerden etkilenebilmektedir.Büyüme patlaması düzeyinin yüksek veya düşük olması sistemik veya kronik bir rahatsızlığı,yetersiz beslenmeyi ve endokrin sistemde bozukluğu göstermektedir.Klinisyenler için normal büyümeyi,anormal büyümeyi ve pubertal maturasyonu ayırt etme konusunda yardımcı olmaktadır.(18).Büyüme atağı kızlarda ortalama 11- 12 yaş aralığında,erkeklerde ise 13-14 yaş aralığında görülmektedir.Popülasyonlara ve bireylere bağlı olarakta farklılık göstermektedir.(19, 20).

4.9. Hedef Boy

Ulaşılması beklenen erişkin boya hedef boy denmektedir.Bireyin genetiği,somatik büyüme ve biyolojik matürasyon gibi değişik faktörlerden etkilenmektedir. Bayley ve Pinneau metodu, Roche-Wainer-Thissen metodu, Khamis-Roche ve Tanner- Whitehouse metodu gibi farklı metodlar ile de hedef boy hesaplaması yapılabilmektedir.Ancak,kesin bir hedef boy değerine ulaşmamızı sağlayan metod bulunmamaktadır.(21)Bireyin tahmini hedef boyu biyolojik ailesindeki boy uzunluğu,bireyin kendi büyümesi ve iskelet gelişimine bakılarak hesaplanmaktadır.Kız bireylerde,biyolojik babanın boyunun uzunluğundan 13cm çıkartılarak annenin boy uzunluğu ile ortalamasının -+8,5cm değeri,erkek bireylerde annenin boyunun uzunluğuna 13cm eklenip, babanın boy uzunluğu ile ortalamasının -+8,5cm değeri olarak hesaplanır.13cm sabit değer olarak alınmasının sebebi erkek ve kadın bireyler arasındaki 13cmlik boy farkından kaynaklıdır(22).Çocuklar erişkin dönemde hesaplanmış olan hedef boylarının %92'sine ulaşmaktadırlar.Sonuç olarak hedef boyun hesaplanması hem çocuğun o andaki biyolojik maturasyonu hem de büyüme seviyesinin yeterli olup olmadığı hakkında bizlere fikir vermektedir(23).

4.10. Vücut Proporsiyonu

Vücudun üst segmentinin (ÜS) alt segmentine (AS) oranının iki kol arasındaki mesafeye oranına vücut proporsiyonu denir.Üst-alt vücut segment oranı kısa ve uzun boyun bağlı olduğu sebepleri ve disproporsiyonu ayırt etme açısından önem arz etmektedir(24). Üst segment/alt segment oranları:

FULL TEXTS BOOK

Doğumda- 1.7 , 3yaş- 1,33 , 5yaş- 1,17 , 10yaş- 1,0 , >10 yaş - <1,0 ÜS/AL oranının artması rikets, akondroplazi, Turner Sendromu vb. alt segmenti kısa bırakan bozukluklarda;ÜS/AL oranının azalması ise Marfan Sendromu gibi alt segmentin uzun olduğu bozukluklarda gözlemlenir (25).

4.11. Boya Göre Ağırlık

Boya göre ağırlık 2,3-97,7p değer aralığında değişmektedir. 2,3p'in altında olması beslenme düzeyinin yeterli olmadığını, 97,7p'in üzerinde olması ise obeziteyi göstermektedir (26).

4.12. Deri Kıvrım Kalınlığı

Deri kıvrım kalınlığın ölçülmesi bireyin vücut kompozisyonu hakkında bilgi vermektedir. Deri kıvrım kalınlığı kaliper (çap ölçer) kullanarak non-invaziv olarak ölçülmektedir.Bireye sağladığı avantajlarından bir tanesi maliyet açısından uygun olmasıdır(27). Deri kıvrım kalınlığı uzun dönemde vücut kompozisyonunu ve enerji dengesini optimal olarak gösterir(28).Triceps deri kıvrım kalınlığı genel ve periferal obeziteyi; subskapular ve suprailiak deri kıvrım kalınlıkları ise gövde ve santral vücut yağını göstermektedir (29,30)

4.13. Vücut Kitle İndeksi (VKİ)

5th85th persentil normal,85th'den sonrası kilolu,95th sonrası obez olarak sınıflandırılmaktadır (31). VKİ obeziteyi tanımlamak için oldukça spesifik bir parametreyken adipozitenin derecesini tanımlama açısından az sensitiftir.Çocuklarda ve erişkin bireylerde kardiyovasküler hastalıkların risk faktörlerini değerlendirme açısından VKİ önem arz etmektedir(32, 33).

4.14. Biyoelektriksel İmpedans Analiz (BIA)

BIA temeli yağ dokusunun su içermediği ve yağ haricindeki diğer dokularda su miktarının sabit olduğu varsayımına dayanmaktadır.Elektrotlar aracılığıyla dokuya değişik frekanslarda alternatif akım verilmekte ve akımın voltajındaki düşme impedans olarak tespit edilir.Dokunun elektrik akımına gösterdiği dirence impedans denir.Sıvılar elektrik akımına daha az direnç gösterirken yağlar ve kemiklerde bu oran daha fazladır (34).

5. ADÖLESAN DÖNEM VE FİZİKSEL AKTİVİTE

Klinik ve epidemiyolojik açıdan yapılan çalışmalar düzenli aralıklarla yapılan fiziksel aktivitenin bireyin genel sağlığı olumlu anlamda etkilediğini ve kronik hastalıklardan koruduğunu desteklemektedir.Düzenli olarak yapılan fiziksel aktivitenin sağlığa yararı yapılan aktivitenin tipine ve yoğunluğuna bağlı olarak değişiklik göstermektedir.Örneğin; aerobik egzersiz stresi ve depresyonu azaltır,endokrin sistem fonksiyonlarını ve oksijen transport sistemini iyileştirir, kandaki yüksek dansiteli lipoprotein oranını arttırırken düşük dansiteli lipoprotein oranını azaltmaktadır. (35)

Erken adölesan dönem (10-13yaş) fiziksel büyümenin ve motor becerilerin hızlı değişimi ile karakterize olan bir süreçtir.Kas kitlesinin, kuvvet ve kardiyopulmoner dayanıklılıkta artış puberte döneminde diğer yaşlara oranla daha fazladır. Bu dönemde futbol, basketbol ve tenis gibi birden fazla kişinin katılımıyla yapılan sporlara başlamak uygun görülmektedir.(36)Orta adölesan dönemde (14-16yaş) kas kitlesi, kuvvet ve kardiyopulmoner dayanıklılıkta artış devam etmektedir(37). 14-24yaş aralığındaki yarışmacı sporcuların incelendiği bir çalışmada (38); quadriceps kasının dinamik kuvvetinin vücut ağırlığı, koşu yılı, futbol yılı ve haftalık basketbol oynama süresi ile pozitif anlamda ilişkisinin olduğu gösterilmiştir.

6.ÇOCUK VE ADÖLESANLARDA SPOR YARALANMALARI

Günümüzde sporu kazanma odaklı gören,bir yaşam stili olarak kabul eden ve bir spor dalında özelleşerek üst düzey başarıyı amaçlayan adölesanların sayısı giderek artmaktadır.(39-42) Bu amaca ulaşmak için antrenmanların yoğunluğu, süresi ve sıklığı da artmakta; yüksek yoğunlukluktaki antrenmanlar sık aralıklarla yapılmakta ve dinlenme aralıkları kısa süreli tutulmaktadır. Bütün bunların sonucunda adölesan sporcularda spor yaralanmalarının görülme olasılığı da artmaktadır.(39-41)

Gelişme çağındaki (adölesan dönem) sporcularda, akut bir travma ya da aşırı kullanıma bağlı oluşan tekrarlayıcı mikro travmalar spor yaralanmalarına sebebiyet vermektedir. (43,44)

FULL TEXTS BOOK

Tek spor dalında özelleşmeyle beraberinde adölesan sporcularda aşırı kullanıma bağlı yaralanma riski de artmaktadır.Özellikle amatör ve profesyonel düzeydeki sporcularda; antrenman sayısının, süresinin ve yoğunluğunun artmasıyla beraber bu tip yaralanmaların görülme oranıda oldukça sıktır.Adölesan sporcularda aşırı kullanıma bağlı oluşan yaralanmalar özellikle büyüme plağına etki etmektedir.(45)

6.1. Spor Yaralanması Tanımı

Antrenman veya müsabaka neticesinde meydana gelen en az bir gün olacak şekilde spora katılımı engelleyen ve bireyi tıbbi destek almaya ihtiyaç duyuran fiziksel şikayete spor yaralanması denir.(46)Genç sporcu sayısının ve erken yaşlarda sporda özelleşmenin artması ile akut ve aşırı kullanıma bağlı gelişen yaralanmaların sayısınında artış söz konusudur(47). Çocuklarda ve adölesanlarda immatür kas-iskelet sistemi, obezite, antrenman türü gibi yaralanmayı gerçekleşme ihtimalini arttıran faktörler vardır.

6.2. Büyüme Plağının Aşırı Kullanım Yaralanmaları

Osteokondritis Dissekans: 11-14yaş aralığındaki erkek sporcularda sıklıkla diz, ayak bileği ve dirsekte görülmektedir.

Apofizyal bölge yaralanmaları:Tendonun kemiğe yapıştığı apofizyal bölgede inflamasyon meydana gelmesiyle oluşur.

Fiz yaralanmaları: Sheuermann (torakal vertebra) ve Blount (proksimal tibia) önem arz eden fizyal yaralanmalardandır.Fizyal yaralanmalar erken tanı koyulup takip eden süreçte tedavi edilmezlerse bireyde büyüme-gelişme bozukluğuna yol açabilmektedir.

6.3. Üst Ekstremite Yaralanmaları

Stres kırıkları: Tenis, jimnastik, yüzme, voleybol, atıcılık gibi spor dallarında görülür.

Omuzun çok yönlü instabilitesi

Proksimal humerus epifiziti

Medial epikondiler apofizit (Little League Elbow)

Radial epifizit (Jimnastikçi El Bileği): 12-14 yaş aralığındaki jimnastikçilerde sıklıkla görülür.

6.4. Alt Ekstremite Yaralanmaları

Stres kırıkları: Sıklıkla adölesan koşucularda görülmektedir.

Medial tibial stress sendromu

Freiberg hastalığı: Metatars başının osteokondral yaralanmasına denir ve 11- 17 yaş aralığındaki sporcularda ön ayak ağrısına sebebiyet verir.

Osgood-Schlatter: Tibial tüberkülün traksiyon apofizitidir. 8-15 yaş aralığındaki sporcularda görülür.

Sinding-Larsen-Johansson: Traksiyon apofizitidir. 10-13 yaş aralığındaki sporcularda görülür.

Sever Hastalığı: Apofizyal yaralanmadır. 8-12 yaş aralığındaki kız ve 14-15 yaş aralığındaki erkek sporcularda topuk ağrısına sebebiyet verir.

Pelvik apofizitler

Bursitis

6.5. Bel Bölgesi Yaralanmaları

Spondilolizis;Jimnastik,halter ve Amerikan futbolu gibi spor branşlarında sıklıkla görülmektedir.

Skolyoz

7. ADÖLESAN SPORCULARDA MATURASYON DÜZEYİ VE YARALANMA İLİŞKİSİNE DAİR ÖRNEK ÇALIŞMALAR

2023 yılında yapılan bu çalışmada aynı kronolojik yaştaki genç futbolcularda olgunluk evresine göre antropometri, vücut kompozisyonu (BC) ve somatotip farklılıklarının araştırılması amaçlanmıştır. Erken olgunlaşanlar dengeli ektomorflardı, zamanında ve geç olgunlaşanlar ise mezomorf-ektomorf özelliklere sahipmiş. U15 seviyesindeki erkek futbolcuları araştıran bu çalışma, daha dengeli bir ektomorfik somatotip ile ortaya çıkan erken olgunlaşanların daha iyi performans gösterdiği sonucuna varmıştır.(48)

FULL TEXTS BOOK

Elit akademi futbolunda yaralanma modellerini ve iskelet olgunluğuyla ilişkili görülme sıklığını ileriye dönük olarak araştırma amacıyla yapılan bu araştırmada aynı zamanda hem genel olarak hem de alt ekstremite apofiziyle ilgili iskelet olgunluk durumuyla ilişkili yaralanma risklerini belirlemek amacıyla yapılmış.Sonuç olarak kas-iskelet sistemi yaralanma paternleri ve yaralanma riskleri,oyuncuların iskelet olgunluk durumuna bağlı değişmekteymiş.Erken olgunlaşanlar daha fazla yaralanma riskine sahipmiş ve bilek kısmı iskelet açısından olgun olan oyuncular en düşek riske sahipmiş.(49)

Diğer bir çalışmada Erken olgunlaşanlarda, normal olgunlaşanlar ve geç olgunlaşanlara kıyasla anlamlı olmayan daha yüksek yaralanma insidansı bulunmuş. Erken ve normal olgunlaşanlarda tendinopati insidansı ise daha yüksekmiş.Erken olgunlaşan grupta müsabaka esnasında sakatlanma vakalarının en fazla olduğu görülmüş.Biyolojik olgunluk ise durumu önemli ölçüde değiştirmemiş.(50)

Bu çalışmanın amacı: büyüme faktörleri ve maruz kalma süresinin yaralanma riski üzerine etkisini değerlendirmek. U16 yaş grubundaki yaralanma yükü diğer tüm yaş gruplarından daha düşük bulunmuştur. Büyüme hızı (cm/yıl) ile tahmini yaralanma olasılığı arasında doğrusal bir ilişki bulunmuştur.(51)

Bu çalışmanın amacı, adolesan erkek futbolcularda büyüme atağı öncesi, zamanı ve sonrasında biyolojik maturasyonla yaralanma ilişkisini, sağlıklı düzenli spor yapmayan akranlarından farklılıklarını araştırmaktır. Çalışmada yaralanmaların değerlendirilmesinde TFF(Türkiye Futbol Federasyonu) Elit Kulüpler Yaralanma Formu kullanılmış. Futbolcularda yaralanmaların en sık yaralanma olanların olmayanlara göre uzun boylu, kilolu, vücut yağ yüzdesi yüksek ve büyüme hızının daha önde olduğu görüldü. Kontrol grubunda ise yaralanma olanların olmayanlara göre zayıf, kısa boylu ve yağ yüzdesinin daha düşük olduğu bulunmuş (52).

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FULL TEXTS BOOK

TÜRKİYE YÜZYILI MAARİF MODELİ SOSYAL BİLGİLER DERSİ ÖĞRETİM PROGRAMININ VATANDAŞLIK OKURYAZARLIĞI AÇISINDAN İNCELENMESİ

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ÖZET

Araştırmada sosyal bilgiler dersi kapsamında geliştirilmesi amaçlanan vatandaşlık okuryazarlığı becerisine Türkiye'de 2024-2025 eğitim-öğretim yılı itibariyle uygulanması planlanan Türkiye Yüzyılı Maarif Modeli Sosyal Bilgiler Dersi Öğretim Programında (4–7. sınıflar) nasıl yer verildiğinin ortaya konulması hedeflenmiştir. Bu çalışma betimsel türde bir araştırmadır. Çalışmada doküman analizine başvurulmuştur, taslak program doküman olarak incelenmiştir. Araştırma sonucunda 2018 sosyal bilgiler dersi öğretim programında doğrudan yer almayan vatandaşlık okuryazarlığı yeni programda ilk kez farklı başlık altında ve disiplinler üstü bir yapıda her öğrenme alanıyla ilişkilendirilerek ortaya konulmuştur. Bu program kapsamında öğrencilere; cumhuriyet, demokrasi, etkin vatandaşlık, milli egemenlik, katılım, çoğulculuk, hukukun üstünlüğü, demokratik devlet, genel oy ilkesi, hukuk devleti, kuvvetler ayrılığı/birliği, laik devlet, siyasi parti, sosyal devlet, yasama, yürütme ve yargı kavramlarının öğretilmesi hedeflenmiştir. Sıralanan bu kavramlar doğrudan vatandaşlık okuryazarlığının bilişsel temelini oluşturmaktadır. Programın içerik çerçevesi incelendiğinde birlikte yaşamak ve yaşayan demokrasimiz öğrenme alanının doğrudan vatandaşlık okuryazarlığı ile ilişkili olduğu sonucuna ulaşılmıştır. Ayrıca programda vatandaşlık okuryazarlığı ile ilgili kazanımlara yönelik hem sınıf içi hem sınıf dışı öğretim tekniklerine ilişkin etkinlik örnekleri sunulmuştur. Bu becerinin söz konusu etkinlikler yoluyla işlenmesinin öğrencilerin daha çok ilgisini çekebileceği, günlük yaşamla bağlantı kurma deneyimi sağlayabileceği düşünülmektedir. Bu çalışmada sosyal bilgiler öğretim programı vatandaşlık okuryazarlığı ile olan doğrudan ilişkisi bakımından incelenmiştir. Yapılacak ileri araştırmalarda sosyal bilgiler öğretimi programı dolaylı ilişkiler ve ekolojik, dijital, küresel, demokratik ve aktif vatandaşlık gibi vatandaşlık okuryazarlığının bileşenlerine yer verilme durumu açısından da analiz edilebilir. Buna ek olarak araştırma, yalnızca sosyal bilgiler öğretim programının vatandaşlık okuryazarlığı açısından incelenmesi ile sınırlı olduğundan yeni ders kitaplarının vatandaşlık okuryazarlığı açısından incelenmesi de önerilebilir.

Anahtar Kelimeler: Vatandaşlık, Vatandaşlık Okuryazarlığı Becerisi, Türkiye Yüzyılı Maarif Modeli Sosyal Bilgiler Dersi Öğretim Programı.

ABSTRACT

In this study, it is aimed to reveal how the financial literacy skill, which is aimed to be developed within the scope of social studies course, is included in the Social Studies Course Curriculum (4th-7th grades) of the Turkey Century Education Model, which is planned to be implemented as of the 2024-2025 academic year in Turkey. This study is a descriptive research. Document analysis was used in the research, and the draft curriculum was examined as a document. As a result of the research, citizenship literacy, which was not directly included in the 2018 social studies curriculum, was introduced for the first time in the new curriculum under a different title and in a multidisciplinary structure by associating it with each learning area. Within the scope of this program, it is aimed to teach students the concepts of republic, democracy, active citizenship, national sovereignty, participation, pluralism, rule of law, democratic state, universal suffrage principle, rule of law, separation of powers, unity of powers, secular state, political party, social state, legislative, executive and judiciary. These concepts directly constitute the cognitive basis of citizenship literacy. When the content framework of the program was examined, it was concluded that the learning area of living together and our living democracy was directly related to citizenship literacy. In addition, examples of activities related to both in-class and out-of-class

FULL TEXTS BOOK

teaching techniques for the objectives related to citizenship literacy are presented in the curriculum. It is thought that teaching this skill through these activities may attract students' attention more and provide them with the experience of making connections with daily life. In this study, the social studies curriculum was analyzed in terms of its direct relationship with civic literacy. In future research, the social studies curriculum can be analyzed in terms of indirect relationships and the components of citizenship literacy such as ecological, digital, global, democratic and active citizenship. In addition, the study is limited to examining only the social studies curriculum in terms of civic literacy. Therefore, it can be recommended to examine the new textbooks in terms of citizenship literacy.
Keywords: Citizenship, Citizenship Literacy Skills, The Century of Turkey Education Model Social Studies Course Curriculum.

GİRİŞ

Vatandaşlık, genellikle bireyin bir devlete ya da siyasi birime karşı olan üyeliği/bağlılığı şeklinde tanımlanır. Bu tanımda vurgulandığı gibi vatandaşlık bir ulus devlete üyeliğin kazanılmasıyla başlar. Zaman içerisinde vatandaşlık kavramı değişime uğramış, kapsamı genişlemeye devam etmiş ve yeni boyutlar kazanmıştır. Özellikle küreselleşme ve teknolojinin ilerlemesiyle beraber bir ulus devlete olan üyeliğin ötesine geçerek hem ulusal hem uluslararası bir nitelik kazanmıştır. Yaşanan küresel çevresel problemler, dijital okuryazarlığa duyulan ihtiyacın artması, etnik çatışmalar, azınlık hakları konusunda yaşanan sorunlar, savaş tehdidi ve güvenlik risklerinin artması gibi krizler vatandaşlardan beklenen yeterliklerin değişmesine neden olmuştur (Gezer, 2024). Bu anlamda vatandaşlık okuryazarlığı kavramı ileri sürülmüştür.

Karadağ ve Kapusızoğlu'na göre (2022) vatandaşlık okuryazarlığı, bireylerin sahip olduğu bilgileri, eyleme dönüştürebilmesi ve vatandaşlık bağına karşı duyduğu ilgi ile bağın kendisine verdiği hak ve ödevlere sahip çıkabilme yetkisidir. Vatandaşlık okuryazarlığı, demokratik toplumlara katılım için gereken sosyal öğrenmeleri, siyasi ve hukuki temel bilgilere sahip olmayı, bireysel hak ve ödevleri bilmeyi (Faiz, 2018), sosyal adalet kavramını öğrenmeyi ve adil bir toplumun oluşması için kaygı duymayı (Hart, 2006), yaşadığı ülke ile dünyada yaşayan bütün bireylerin/canlıların refahını düşünme ve sorumluğunu üstlenmeyi, yerel, bölgesel ve küresel boyutta çevresel, toplumsal, hukuki sorun ve krizlere karşı farkındalık geliştirmeyi ve bu problemlerin çözümü için harekete geçmeyi, bireysel ve kolektif kimlik oluşturmayı kapsar. Diğer bir anlatımla vatandaşlık okuryazarlığı, bireylerin devletle olan hukuki ve yasal bağı ile toplumla arasındaki ilişkileri kapsar. Bireylerin; sosyal, politik, kültürel haklar ile düşünce konuşma özgürlüğü, demokrasi, eşitlik, adalet gibi temel hakları bilmesi ve bunları doğru biçimde kullanması, hem devlete hem de içinde bulunduğu topluma karşı yükümlülüklerini bilmesi ve gereğini yerine getirmesi, kamu yararını gözetmesi, toplumun refahı için çalışması, devlet, anayasa, hukuk sistemi gibi hukuki ve politik konularla ilgili bilgi sahibi olması, sivil ve siyasi örgütlenmeleri tanıması ve işlevlerini bilmesi, bilinçli ve demokratik yollarla toplumsal sorunların çözümüne aktif katılım sağlaması gibi aktif/etkin vatandaşlık için gereken bilgi, beceri ve davranışlar vatandaşlık okuryazarlığını oluşturur (Silva & Vaz, 2013). Bu tanımlarından da anlaşılacağı üzere vatandaşlık okuryazarlığı esasında ekolojik vatandaşlık, dijital vatandaşlık, küresel vatandaşlık, aktif vatandaşlık ve demokratik vatandaşlık boyutlarının tamamını içerisinde barındıran bir okuryazarlık türüdür.

Vatandaşlık okuryazarlığının öğrencilere kazandırılmasına yönelik stratejilerde öğretim programları ön plana çıkmaktadır. Leahey'e göre (2011) vatandaşlık okuryazarlığının temeli, öğrencilere öğretim programları aracılığıyla öğrenme ortamları, medya ve hakim kültür gruplarında var olan yapıları, şemaları sorgulamayı öğretmekten geçer. Türkiye'de uygulanan öğretim programları vatandaşlık okuryazarlığı gözden geçirildiğinde sosyal bilgiler dersi öğretim programları ön plana çıkmaktadır. Sosyal bilgiler dersi öğretim programında vatandaşlık okuryazarlığı öğrencilere kazandırılması gereken yeterlikler arasında gösterilmiştir. Programda bilgi, dijital, finansal, görsel, kültür, veri,

FULL TEXTS BOOK

sürdürülebilirlik, sanat okuryazarlıkları ile vatandaşlık okuryazarlık becerilerinin geliştirilmesi hedeflenmiştir. İçerik çerçevesinde yer alan *Birlikte Yaşamak* ve *Yaşayan Demokrasimiz* öğrenme alanları doğrudan vatandaşlık okuryazarlığı ile ilişkilendirilebilir. Birlikte yaşamak öğrenme alanında öğrencilerin yaşadıkları toplumsal hayatı tanıması; sosyal bilgiler dersi hakkında fikir sahibi olması; dâhil olduğu ve olacağı grup, rol, hak ve sorumluluklar, etkili iletişim, bireysel ve kültürel farklılıklara saygı, yardımlaşma ve dayanışmanın toplumsal birlik açısından önemi ve Türk toplumunun ulusal konular karşısındaki tutumu hakkında bilgi sahibi olması hedeflenmiştir. Yaşayan demokrasi öğrenme alanında ise Millî Mücadele Dönemi'nde bir lider olarak Mustafa Kemal Atatürk'ün ve Türk milletinin gösterdiği toplumsal dayanışmaya, cumhuriyetin hayatımıza katkıları, cumhuriyet ve demokrasinin temel nitelikleri, demokrasi ve cumhuriyet kavramı arasındaki ilişki, demokratik katılımın önemi, etkin vatandaşın özellikleri, toplumsal sorunlara temel hak ve sorumluluklar çerçevesinde çözüm üretilmesi, toplumsal hayatta karşılaşılabilecek sorunlara, yönetimin karar verme sürecine etki eden faktörlere, toplumsal hayattaki düzenin sürdürülmesinde hakların ve sorumlulukların önemi, dijitalleşme ve teknolojik gelişmelerin vatandaşlık haklarının kullanımına etkileri, Türkiye Cumhuriyeti Devleti'nin yönetim yapısı, ülkemizde demokrasinin geçmişten günümüze gelişimi ve bu süreçte karşılaşılan sorunlara değinilmiştir. Sosyal bilgiler dersi kapsamında geliştirilmesi hedeflenen vatandaşlık okuryazarlık becerisinin Türkiye Yüzyılı Maarif Modeli Sosyal Bilgiler Dersi Öğretim Programında yer verilme durumunun incelenmesi bu araştırmanın motivasyon kaynağı olmuştur. Bu anlamda araştırmada Türkiye'de 2024-2025 eğitim-öğretim yılı itibariyle uygulanması planlanan sosyal bilgiler dersi öğretim programında (4–7. sınıflar) vatandaşlık okuryazarlığı becerisine nasıl yer verildiğinin ortaya çıkarılması hedeflenmiştir.

YÖNTEM

Bu çalışma, herhangi bir müdahale olmaksızın mevcut durumun ortaya konulmasına odaklıdır. Bu yönüyle araştırma betimsel türde bir çalışmadır. Araştırma verilerinin elde edilmesinde doküman analizi kullanılmıştır. Çalışmada 2024-2025 eğitim-öğretim yılı itibariyle uygulanacak olan Türkiye Yüzyılı Maarif Modeli Sosyal Bilgiler Dersi Öğretim Programı doküman olarak incelenmiştir. Söz konusu programın yapısı önceki öğretim programlarından farklı kurgulanmıştır. Programda; *programlar arası bileşenler* (kavramsal beceriler ve alan becerileri, eğilimler, sosyal-duygusal öğrenme becerileri, değerler ve okuryazarlık becerileri), *öğrenme çıktıları* (beceri, tutum ve davranışlar), *öğrenme kanıtları* (ölçme ve değerlendirme araçları), *içerik çerçevesi* (konu başlıkları), *öğrenme-öğretme uygulamaları* (strateji, yöntem ve teknik) ve *farklılaştırma* (alternatif öğrenme uygulamaları) bölümleri yer almaktadır. Çalışmada bu bölümler vatandaşlık okuryazarlığı açısından incelenmiştir.

BULGULAR

Araştırma kapsamında ilk olarak yeni programın temel yaklaşımı ve özel amaçlarına bakılmış ve bilgi, dijital, görsel, kültür, finansal, veri, sürdürülebilirlik, sanat ve ***vatandaşlık okuryazarlığı*** becerilerinin kazandırılmasının hedeflendiği görülmüştür. Ayrıca öğrencilerde; öz farkındalık, öz yansıtma, tarihsel empati, kanıta dayalı sorgulama, araştırma, iletişim, iş birliği, sosyal farkındalık, sosyal katılım, esneklik, açık fikirlilik, sorumlu karar verme, eleştirel düşünme, analitik düşünme becerileri ile adalet, özgürlük, çalışkanlık, vatanseverlik, duyarlılık, yardımseverlik, dürüstlük, saygı, sevgi ve sorumluluk değerlerinin öğretimi hedeflenmiştir. Söz konusu değer ve beceriler vatandaşlık okuryazarlığı ile doğrudan ilişkilidir. Araştırmada ikinci olarak programın içerik çerçevesi vatandaşlık okuryazarlığı bakımından incelenmiş ve programda yer alan *birlikte yaşamak* öğrenme alanının doğrudan vatandaşlık okuryazarlığı ile ilişkili olduğu tespit edilmiş ve bu öğrenme çıktıları Tablo 1'de sunulmuştur.

Tablo 1. 2024 Sosyal Bilgiler Dersi Öğretim Programı Birlikte Yaşamak öğrenme alanında vatandaşlık okuryazarlığı ile ilgili öğrenme çıktıları (MEB, 2024)

FULL TEXTS BOOK

Sınıf Düzeyi	Öğrenme Çıktıları
4. sınıf	SB.4.1.2. Bireysel özelliklere saygı duymanın önemine ilişkin çıkarım yapabilme.
	SB.4.1.3. Toplumsal birliği sürdürmeye yönelik fikir üretebilme.
5. sınıf	SB.5.1.1. Dâhil olduğu gruplar ve bu gruplardaki rolleri arasındaki ilişkileri çözümleyebilme.
	SB.5.1.2. Kültürel özelliklere saygı duymanın birlikte yaşamaya etkisini yorumlayabilme.
	SB.5.1.3. Toplumsal birliği sürdürmeye yönelik yardımlaşma ve dayanışma faaliyetlerine katkı sağlayabilme.
6. sınıf	SB.6.1.1. Dâhil olduğu grupların ve bu gruplardaki rollerinin zaman içerisinde değişebileceğine ilişkin çıkarım yapabilme.
	SB.6.1.2. Kültürel bağlarımızın ve millî değerlerimizin toplumsal birliğe etkisini yorumlayabilme.
	SB.6.1.3. Toplumsal hayatta karşılaşılan sorunlara yönelik çözüm önerilerini müzakere edebilme.
7. sınıf	SB 7.1.1. Dâhil olduğu gruplarda ve sosyal hayatta etkili iletişimin önemini sorgulayabilme.
	SB.7.1.2. Özel gereksinimli bireyler için fırsat eşitliğini sürdürmeye yönelik fikir üretebilme.
	SB.7.1.3. Türk toplumunun millî meseleler karşısında gösterdiği tutum ve davranışlara ilişkin çıkarım yapabilme.

Tablo 1'de görüldüğü gibi birlikte yaşamak öğrenme alanı kapsamında dördüncü sınıfta öğrencilere toplumsal birliktelik, toplum içindeki rollerimizin neler olduğu, belirlenen roller çerçevesinde toplumsal birliği sürdürmek için neler yapılabileceği, üstlendiğimiz rollere ilişkin sorumlulukları yerine getirmenin önemi, birbirine karşı adil olmanın toplum içindeki güven duygusunu arttıracağı ve toplumsal birlikteliği sürdürmeye yönelik katkı sağlayacağı üzerinde durulmuştur. Beşinci sınıfta öğrencilerden yakın çevrede, okulda ve sınıfta dâhil oldukları grupları belirlemesi ve bu gruplardaki rollerin getirdiği hak ve sorumlulukları bilmesi, yardımlaşma ve dayanışmanın toplumsal birliktelik için önemini öğrenmesi ve bunlara katılmasının sağlanması amaçlanmıştır. Altıncı sınıfta zaman içinde değişen gruplar ve roller, kültürel bağlarımızın ve millî değerlerimizin toplumsal birlikteliğe etkisi toplumsal sorunlar ve çözüm önerilerinin neler olduğunun öğretilmesi hedeflenmiştir. Yedinci sınıfta ise gruplarda ve sosyal hayatta iletişimin önemi, özel gereksinimli bireyler için fırsat eşitliği, millî meseleler karşısında Türk toplumunun tutumu ve davranışları konu alınmıştır. Araştırmada 4–7. sınıf düzeyinde *yaşayan demokrasimiz* öğrenme alanının vatandaşlık okuryazarlığı becerisi ile ilişkili olduğu saptanmış ve bu öğrenme çıktıları Tablo 2'de sunulmuştur.

Tablo 2. 2024 Sosyal Bilgiler Dersi Öğretim Programı Yaşayan Demokrasimiz öğrenme alanında vatandaşlık okuryazarlığı ile ilgili öğrenme çıktıları (MEB, 2024)

FULL TEXTS BOOK

Sınıf Düzeyi	Öğrenme Çıktıları
4. sınıf	SB.4.4.1. Cumhuriyetin ilanına giden yolda Mustafa Kemal Atatürk'ün ve Türk milletinin yaptığı fedakârlıkları yorumlayabilme.
	SB.4.4.2. Cumhuriyetin getirdiği değişimlerin hayatımıza katkılarını yorumlayabilme.
	SB.4.4.3. Okulda karar alma ve demokratik katılım süreçlerine ilişkin fikir üretebilme.
5. sınıf	SB.5.4.1. Demokrasi ve cumhuriyet kavramları arasındaki ilişkiyi çözümleyebilme
	SB.5.4.2. Toplum düzenine etkisi bakımından etkin vatandaş olmanın önemine yönelik çıkarımda bulunabilme.
	SB.5.4.3. Temel insan hak ve sorumluluklarının önemini sorgulayabilme.
	SB.5.4.4. Bir ihtiyaç hâlinde veya sorun karşısında başvuru yapılabilecek kurumlar hakkında bilgi toplayabilme.
6. sınıf	SB.6.4.1. Yönetimin karar alma sürecini etkileyen unsurları çözümleyebilme.
	SB.6.4.2. Toplumsal düzenin sürdürülmesinde temel hak ve sorumlulukların önemini yorumlayabilme.
	SB.6.4.3. Vatandaşlık haklarının kullanımında dijitalleşme ve teknolojik gelişmelerin etkilerini sorgulayabilme.
7. sınıf	SB.7.4.1. Türkiye Cumhuriyeti'nin temel niteliklerini özetleyebilme
	SB.7.4.2. Türkiye Cumhuriyeti Devleti'nin yönetim yapısını çözümleyebilme
	SB.7.4.3. Ülkemizdeki demokrasinin gelişimini, demokrasinin temel ilkeleri açısından yorumlayabilme
	SB.7.4.4. Demokrasinin uygulama sürecinde karşılaşılan sorunları özetleyebilme

Tablo 2'den de anlaşılacağı üzere yaşayan demokrasimiz öğrenme alanı kapsamında dördüncü sınıfta Mustafa Kemal Atatürk'ün, diğer kahramanlarımızın ve Türk milletinin gösterdiği toplumsal dayanışma, cumhuriyetin hayatımıza katkıları konusuna vurgu yapılmış, öğrencilerin demokratik katılım ve karar alma süreçlerinin önemine ilişkin farkındalığının artırılması amaçlanmıştır. Beşinci sınıfta öğrencilere cumhuriyet, demokrasi, etkin vatandaşlık, milli egemenlik, katılım, çoğulculuk, hukukun üstünlüğü kavramlarının öğretimi hedeflenmiştir. Bu doğrultuda demokrasi ve cumhuriyet kavramının temel nitelikleri, etkin vatandaşın özellikleri ve önemi, temel haklar, sorumluluklar ve önemi, ihtiyaç durumunda veya sorunların çözümünde başvurulabilecek kurumların neler olduğu bilgisinin kazandırılması beklenmektedir. Altıncı sınıfta yönetimin karar alma sürecini etkileyen unsurlar, temel hak ve sorumlulukların toplumsal düzenin sürdürülmesindeki önemi, pasif ve aktif vatandaşın özellikleri, sorumlulukları yerine getirmenin önemi, dijitalleşme ve teknolojik gelişmelerin vatandaşlık hak ve sorumluluklarına etkileri (vatandaşlık haklarının kullanımında dijitalleşme ve teknolojik gelişmelerin olumlu ve olumsuz yönleri) ele alınmıştır. Yedinci sınıfta ise demokratik devlet, genel oy ilkesi, hukuk devleti, kuvvetler ayrılığı, kuvvetler birliği, laik devlet, siyasi parti, sosyal devlet, yasama, yürütme ve yargı kavramlarının öğretilmesi hedeflenmiş olup Türkiye Cumhuriyeti'nin nitelikleri, Türkiye Cumhuriyeti'nin yönetim yapısı ülkemizde demokrasinin gelişimi, demokrasinin uygulanma sürecinde karşılaşılan sorunlar işlenmiştir.

TARTIŞMA VE SONUÇ

Araştırma sonucunda yeni programda vatandaşlık okuryazarlığı becerisine ilk kez farklı başlık altında ve disiplinler üstü bir yapıda her öğrenme alanıyla ilişkilendirilerek yer verildiği görülmüştür. Okuryazarlık becerileri, sosyal bilgiler öğretim programında ilk olarak 2015 programında yer almıştır. Ancak hem 2015 hem 2018 programında okuryazarlık becerilerine özel bir alan ayrılmamış, beceriler bünyesinde yer verilmiştir. Yeni programdan, 2018 programında olan medya, harita ve politik okuryazarlık becerileri çıkartılmış yerine sanat, veri, görsel ve vatandaşlık okuryazarlığı gibi yeni beceriler eklenmiştir (Yıldırım & Çalışkan, 2024). Böylelikle vatandaşlık okuryazarlığı doğrudan programda karşılık bulmuştur. Nitekim Çiydem ve Kaymakcı (2021) sosyal bilgiler dersi öğretim programının 21. yüzyılın öngördüğü demokratik yaşama becerilerine sahip insan tipini yetiştirmeye

FULL TEXTS BOOK

yönelik düzenlenmesi ihtiyacına işaret etmiş ve içerik ile okuryazarlıkların beceri ve değer temelli kurgulanması gerekliliğini vurgulamıştır.

Yeni programda öğrencilere; cumhuriyet, demokrasi, etkin vatandaşlık, milli egemenlik, katılım, çoğulculuk, hukukun üstünlüğü, demokratik devlet, genel oy ilkesi, hukuk devleti, kuvvetler ayrılığı, kuvvetler birliği, laik devlet, siyasi parti, sosyal devlet, yasama, yürütme ve yargı kavramlarının öğretilmesi amaçlanmıştır. Bu kavramlar doğrudan vatandaşlık okuryazarlığının bilişsel temelini oluşturmaktadır. Programın içerik çerçevesi incelendiğinde birlikte yaşamak ve yaşayan demokrasimiz öğrenme alanının doğrudan vatandaşlık okuryazarlığı ile ilişkili olduğu sonucuna ulaşılmıştır. Ayrıca programda vatandaşlık okuryazarlığı ile ilgili kazanımlara yönelik hem sınıf içi hem sınıf dışı öğretim tekniklerine ilişkin etkinlik örnekleri sunulmuştur. Bu becerinin söz konusu etkinlikler yoluyla işlenmesinin öğrencilerin daha çok ilgisini çekebileceği, günlük yaşamla bağlantı kurma deneyimi sağlayabileceği düşünülmektedir. Bu çalışmada sosyal bilgiler öğretim programı vatandaşlık okuryazarlığı ile olan doğrudan ilişkisi bakımından incelenmiştir. Yapılacak ileri araştırmalarda sosyal bilgiler öğretimi programı dolaylı ilişkiler ve ekolojik, dijital, küresel, demokratik ve aktif vatandaşlık gibi vatandaşlık okuryazarlığının bileşenlerine yer verilme durumu açısından da analiz edilebilir. Buna ek olarak araştırma, yalnızca sosyal bilgiler öğretim programının vatandaşlık okuryazarlığı açısından incelenmesi ile sınırlıdır. Dolayısıyla yeni ders kitaplarının vatandaşlık okuryazarlığı açısından incelenmesi önerilebilir.

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FULL TEXTS BOOK

LEVENT VADİSİ JEOPARKI MİRAS ENVANTERİNİN ÇIKARILMASI VE KORUMA, SÜRDÜRÜLEBİLİRİLİK, TANITIM STRATEJİLERİ İLE JEOPARK YÖNETİM PLANI HAZIRLANMASI VE VADİNİN ESTETİK İMKANLARININ SORGULANMASI[1]

RELEASE OF LEVENT VALLEY GEOPARK HERITAGE INVENTORY AND PREPARATION OF CONSERVATION, SUSTAINABILITY, PROMOTION STRATEGIES AND GEOPARK MANAGEMENT PLAN AND QUESTIONING THE AESTHETIC POSSIBILITIES OF THE VALLEY

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ÖZET
Levent Vadisi, Malatya'nın Akçadağ ilçesi sınırları içinde bulunan çok sayıda jeosit, kültürel yapı ve somut olmayan kültürel miras unsuru barındıran nadir güzellikte bir doğal alandır. Ayrıca vadinin sahip olduğu jeomorfolojik değerler sıra dışı bir estetik içermektedir. Bu çalışma, insanlık için önemli olduğunu düşündüğümüz bu vadinin doğal miras, kültürel miras envanterlerini çıkarmak, koruma, sürdürülebilirlik, tanıtım stratejilerini belirlemek ve bir jeopark yönetim planı önerisi hazırlayarak Levent Vadisi'nin UNESCO Küresel jeoparkları ağına dahil edilmesine katkı sağlamak amacıyla yapılmıştır. Bu amaçla alanı ilgilendiren farklı disiplinlerde bir çalışma ekibi oluşturulmuştur. Çalışma ekibinin alanda yaptığı ortak amaca dönük çalışmalar bir araya getirilmiştir. Levent Vadisi için sürdürülebilir koruma, kalkınma ve tanıtım stratejileri oluşturulmuş ayrıca kamu yararı gözetilerek çok ortaklı, şeffaf, evrensel değerlere uygun bir yönetim planı taslağı üretilmiştir. Bu kılavuz belgenin Levent Vadisi Jeopark önerisinin örnek ve lider jeoparklardan biri olması için bilimsel sürdürülebilirliğin ilke ve stratejileri de oluşturulmuştur. Tüm bunların yanı sıra bu çalışma, jeoloji ve sanat ilişkisini jeo-estetik kavramı üzerinden tartışmakta ve bir jeopark projesi için kritik öneme sahip olan koruma farkındalığı ve sahiplenme kavramlarına sanat disiplininin yapacağı katkıları sorgulamaktadır. Çalışma alanının içerdiği çok yönlü miras değerlerinin planlı şekilde gelecek kuşaklara aktarılması oldukça önemlidir. Sonuç olarak Levent Vadisi'nin mutlak korunması gerek bir insanlık mirası olduğu düşünülmektedir.
Anahtar Kelimeler: Levent Vadisi, Jeopark, Sanat.

ABSTRACT
Levent Valley is a rare beauty natural area located within the borders of Akçadağ district of Malatya, containing numerous geosites, cultural structures and intangible cultural heritage elements. In addition, the geomorphological values of the valley include an extraordinary aesthetic. This study was conducted to create natural heritage and cultural heritage inventories of this valley, which we believe is important for humanity, to determine protection, sustainability and promotion strategies and to contribute to the

[1] Bu çalışma, İnönü Üniversitesi, Bilimsel Araştırma Projeleri birimi tarafından desteklenen 3250 ID numarasıyla güdümlü proje türünde desteklenen "Levent Vadisi Jeoparkı Miras Envanterinin Çıkarılması ve Koruma, Sürdürülebilirlik, Tanıtım Stratejileri ile Jeopark Yönetim Planı Hazırlanması" isimli Bilimsel Araştırma Projesi kapsamında hazırlanmıştır.

inclusion of Levent Valley in the UNESCO Global Geoparks network by preparing a geopark management plan proposal. For this purpose, a working team from different disciplines related to the field was formed. The common purpose studies of the working team in the field were brought together. Sustainable protection, development and promotion strategies were created for Levent Valley and a multi-partner, transparent and universal value-compliant management plan draft was produced considering the public interest. In order for the Levent Valley Geopark proposal of this guide document to be one of the exemplary and leading geoparks, the principles and strategies of scientific sustainability were also created. In addition to all these, this study discusses the relationship between geology and art through the concept of geo-aesthetics and questions the contributions of the art discipline to the concepts of conservation awareness and ownership, which are of critical importance for a geopark project. It is very important to transfer the multifaceted heritage values contained in the study area to future generations in a planned manner. As a result, it is thought that Levent Valley is a human heritage that absolutely needs to be protected.
Key Words: Levent Valley, Geopark, art.

GİRİŞ

Bu çalışmanın ana amacı hem jeolojik ve kültürel değerleri hem de sıra dışı estetik değerleri ile Türkiye'de UNESCO'nun küresel jeopark ağına aday, önemli doğal alanlardan biri olan Levent Vadisi'nin korunmasına ve yönetilmesine katkı sağlayacak stratejik belgeleri akademik bir yaklaşımla ortaya koymaktır. Bu amaca yönelik en etkili sonucun konuyla ilgili bilimsel disiplinlerin bir araya getirilerek alınabileceği düşünülmüş bu nedenle sanat, jeoloji, coğrafya, arkeoloji, sanat tarihi disiplinlerinde, Levent Vadisi ile ilgili deneyim sahibi akademisyenlerden oluşan bir çalışma ekibi oluşturulmuştur. Çalışma ekibi sahada birlikte araştırmalar yürütmüş ve bu araştırmaların sonuçları düzenli aralıklar ile tartışılarak amaca uygun bilimsel çıktılara dönüştürülmeye çalışılmıştır.

Levent Vadisi ve çevresinde, Üst Kretase-Pliyosen yaş aralığında çeşitli litostratigrafik birimler yüzeylenmektedir. Levent Vadisi içinde, çoğunlukla killi kireçtaşı litolojisine sahip kayaçlarda bulunan mağaraların ilk oluşumları jeolojik süreçler sonucunda meydana gelmiştir. Vadiyi kesen ana fay hattına dik yönde gelişen faylar üzerindeki çatlak sistemleri üzerinde küçüklü büyüklü çok sayıda mağara bulunmaktadır. Çalışma süresince mağaralar, fosil yatakları, volkanik birimler ve çeşitli jeolojik nedenlerle meydana gelmiş jeomorfolojik yapılardan oluşan nadir güzelliğe sahip çok sayıda jeosit tanımlanmıştır. Ayrıca yine çok sayıda arkeolojik alan ile kültürel yapı incelenmiş ve değerlendirilmiştir. Levent Vadisi'nde yer alan mahallelerde devam eden yaşamın somut olmayan kültürel miras değerleri incelenmiş ve değerlendirilmiştir. Çalışma içerisinde Levent Vadisi'nin, hidrografya, klimatoloji, biyocoğrafya açısından değerlendirilmesi devam etmektedir.

Ayrıca çalışma kapsamında çalışma ekibi tarafından, halkın koruma bilincinin gelişmesi, sahiplenme, aidiyet duygularının pekişmesi ve alanın estetik değerlerinin görünürlüğünün artırılması amacıyla çeşitli eğitimler verilmiştir. Tüm bu sonuçlar dikkate alındığında Levent Vadisi'nin oldukça yüksek bir jeoturizm potansiyelinin olduğu söylenebilir. Son yıllarda dünyada jeoturizm ve ekoturizm alanlarında yaşanan talep yoğunluğu göz önünde bulundurulduğunda bu çalışmanın sonuçları itibariyle bölgede kültürel ve sosyal kalkınmanın yanı sıra ekonomik kalkınmaya da katkı sağlayacağı söylenebilir.

Levent Vadisi'nin barındırdığı doğal ve beşerî unsurlar, çalışmanın sanat disiplinindeki bileşenleri tarafından ele alınmış bu nadir güzellikteki doğa parçasının mağaralara resimler yapan üst Paleolitik çağ sanatçılarının kullandıkları sanat yaratma zeminlerine benzerliği özellikle değerlendirilmiştir. Doğa ve insan arasında ve de elbette insanoğlunun en kadim etkinliği olan sanat arasında çok güçlü bağlar olduğu bilinen bir gerçektir. Doğanın kendine özgü estetiği insan zihninde kendine güçlü temeller yaratırken insan zihninin bir ürünü olarak sanat, doğadakine alternatif bir estetik evreni meydana getirmektedir. Buradan hareketle Levent Vadisi'nin sıra dışı jeomorfolojisi ile estetik rezervinin; her iki estetik evren arasındaki bağları tanımlamak ve güçlendirmek için son derece elverişli bir zemin yarattığı sonucuna

FULL TEXTS BOOK

varılmıştır. Alandaki jeolojik oluşumların plastiğinin yeni estetik yaklaşımlar yaratma konusunda ilham verici bir kaynak olduğu söylenebilir. Ayrıca insan, jeoloji ilişkisinin nadide örneklerini sergileyen vadi halkının kendine özgü yaşamı ve bu yaşamın ürünleri güncel sanat pratikleri açısından oldukça önemli bir birikim olarak değerlendirilmektedir.

Disiplinler arası iş birliği ile yürütülen bu çalışma sonucunda Levent Vadisi'nin, barındırdığı bütün değerler ve bileşenleri ile çok güçlü bir jeopark potansiyeli taşıdığı, her şartta korunması ve yaşatılması gereken önemli bir Dünya Mirası olabileceği (olduğu) kanısına varılmıştır.

Levent Vadisi'nin Jeolojik İmkanları

Levent Vadisi Türkiye'nin Doğu Anadolu bölgesinde, Malatya ilinin Akçadağ ilçesi sınırları içerisinde yer almaktadır. Levent Vadisi'nin Anadolu'da oluşu Türkiye'nin genel jeolojik özelliklerini sergilediği anlamına gelmektedir. Günümüzden yaklaşık 300 milyon yıl kadar önce Avrupa ortalarından Asya'nın içlerine kadar uzanan Tetis denizi bu günkü Anadolu kara parçasını da örtmekteydi. Jeolojik süreçte meydana gelen tektonik olaylar sonucu, karaların yükselmesi ile Tetis denizi çekilmiştir. Anadolu kara parçasının temelini bu denize ait sedimentlerin oluşturduğu, bundan sonra jeolojik devirler boyunca, Anadolu yarımadasının jeolojik erozyon ve sedimentasyon olayları sonucu günümüzdeki jeolojik yapısını kazandığı bilinmektedir (Sönmez v.d. 2016). Elbette vadi kendine has biricik jeolojk özellikleri ile öne çıkmaktadır. Genel jeolojik yapısını Toros Orojenik kuşağı ve kenar kıvrımlarına ait birimlerin oluşturduğu Levent Vadisi'nde Üst Kretase yaşlı birimler Derinboğaz köyü çevresi, Ozan Kanyonu ve Dipsiz kanyonu kuzeydoğusunda yüzeylenir. Vadide Üst-Orta Eosen yaşlı birimler içinde çalkantılı sığ denizel ve sakin derin self alanı ortamında çökelmiş bol nummulitli (bozuk para şeklindeki fosiller) kireçtaşlarına ve Yalınkaya Köyünün 1 km kuzeybatısında deniz kabuğu fosillerine rastlanır (Eren ve Önal, 2003: 29; Akbulut&Ünsal, 2013: 330) ve bu birimin üzerine Alt Miyosen yaşlı fliş karakterli kumtaşı, kiltaşı, marn ve kireçtaşı ardalanması gelir (MTA, 2008: 3). Üst Miyosen yaşlı volkanik birimler ve Pliyosen birimler Alt Miyosen birimleri yer yer örter. Sahanın en birimleri ise Kuvaterner yaşlı alüvyonlardır (Akbulut&Ünsal, 2012). Levent Vadisi ve civarında Üst Kretase- Piliyosen (65 Milyon yıl ile 2 milyon yıl arasında) yaşlı kayaçlar yüzeylenmektedir. En altta Üst Kretase (Meastrihtiyen) yaşlı Ulupınar Formasyonu yer almaktadır. Ulupınar Formasyonunun üzerine Eosen (Lütesiyen) yaşlı, iki farklı üyeden oluşan Tohma Formasyonu gelmektedir. Üst Oligosen yaşlı Çavuş Formasyonu ve iki üyeden oluşan Alt Miyosen Yaşlı Ansurçay formasyonu bu istifin en üstündeki Sedimanter kayaçlardır. Tüm bunların üzerine ise Pliyosen yaşlı, iki üyeden oluşan Yamadağ Volkanitleri gelmektedir. Tektonik Kontrollü açılmış bir kanyon vadidir. Vadi, Akçadağ ilçesine bağlı Develi köyünün kuzeyinden başlayıp, Kuzeyde Tohma Çayı ile birleşmektedir. Proje alanındaki önemli yerleşim yerleri, Develi, Levent, Bağköy, Kırıklar, Yanıklar, Taşyapı, Kozalak, Kolköy ve Küçükkürne köyledir. Bu ana vadiye dik gelen derin yarılmış vadiler ve bu vadileri çevreleyen yüksek zirveler vadinin gelen morfolojik görüntüsünü oluşturmaktadır. Yığılıçakıl Tepe (1927 m.), Huk Tepe (1950 m.) Aygörmez Dağı (2015 m.), Kandil tepe (1822 m.), Kalecik Kayası (1429 m.), Çay Tepe (1505 m. Ağaçlı Dağı ((1789 m) ve Kale Tepe (1746 m) bölgedeki önemli yükseltilerdir. Yapılan saha çalışmalarında 27 adet jeosit tanımlanmıştır (Güngör vd., 2012). Jeosit, jeoparklarda bulunan, yer kabuğunun oluşumu veya evrimi sırasındaki bir olayı, bir süreci veya bir oluşumu ortaya koyan kayaç-mineral-fosil topluluğu, istif, yer şekli, jeolojik yapı, doku türünden, bilimsel belge niteliği, bazı durumlarda görsel güzelliği bulunan doğal varlıklardır (Kazancı vd. 2015). Bu jeositler kendilerine has nitelikleri ile dünyanın jeolojik mirası açısından oldukça dikkat çekici özelliklere sahiplerdir. Bunlar, farklı jeolojik süreçlerde oluşmuş irili ufaklı mağaralar, mikro-makro karstik şekiller, volkanik birimler, fosil yataklarıdır. Ayrıca Levent Vadisi sahip olduğu zengin kültürel rezervi, mikro klimatik özellikleri kendine has fauna ve florası ile küresel jeopark olma özelliğine sahip ender alanlardan birisidir. (Akbulut, 2014)

FULL TEXTS BOOK



Levent Vadisi'nin Kültürel İmkanları

Malatya Yukarı Fırat Kültür havzasının önemli bir parçasıdır. Malatya Coğrafi konum itibariyle tabii yollar üzerinde bulunmaktadır. Malatya'nın tarihi geçmişi hakkında kapsamlı bir araştırma yapılmamış olunmakla beraber ön tarihinin Paleolitik çağa kadar indiği, Ansır (buzluk) ve İn Deresi mevkiinde bulunan mağaralardan anlaşılmıştır. Karakaya Baraj Gölü kurtarma kazıları kapsamında Cafer Höyük ve Pirot Höyükte yapılan çalışmalarda neolitik izlere rastlanılmış ve bu bölgenin yerleşik yaşamının en eski örneklerinin bu bölgede yer aldığı düşünülmüştür. Bu ilk yerleşimlerin insan kaynağının Levent Vadisi'nden söz konusu ovaya geldiği öngörülmektedir. Akçadağ ilçesi sınırları içerisinde kalan Levent Vadisi Jeopark alanı kültür katmanları açısından oldukça zengindir. Bu alan özellikle sarp kayalık alanları ve mağara sistemleri ile erken dönem yerleşimleri için güvenlik bakımından ideal niteliktedir. Üst Paleolitik çağda ve devamında su kaynakları açısından bugünkünden daha zengin olduğu düşünülmektedir. Bunların yanı sıra Jeopark alanı içerisinde tarıma elverişli toprakların varlığı neolitik dönem ve sonrası için bölgeyi cazip hale getirmiş olmalıdır. Üst Paleolitik ile demir çağı arasındaki zaman aralığına ilişkin incelemeler devam etmekle birlikte "2020 Yılı Malatya İli Bronz Çağı ve Demir Çağı Yüzey Araştırması: Akçadağ Yüzey Araştırması'nın yayınlanmış sonuçlarına göre (Dönmez, 2022; 43); Akçadağ-Nurhak Dağlarında yapılan araştırmalarda neredeyse tamamı savunma merkezi özelliğine sahip Demir Çağı yerleşimlerinin çoğu sarp kayalık alanların üzerinde, taş duvarların sarp kayalarla birleştirilmesiyle oluşturulmuş yerleşimlerdir. Akçadağ'da, höyük ve kale yerleşimlerinin çoğunda, özellikle Kuzeydoğu Anadolu etkisini taşıyan seramik materyalin yoğunluğu, bölgenin kuzey-güney yönünden en önemli geçiş güzergâhı olduğuna işaret etmektedir. Yüksek bölgelerdeki kale yerleşimlerinde ele geçen ve Geç Bronz Çağı II- Erken Demir Çağı özelliği taşıyan seramikler, bölgede Orta Anadolu etkisinin devam ettiğini göstermektedir. Akçadağ-Nurhak Dağlarında bulunan seramik örneklerin büyük bir kısmı elde yapılmış, saman ve mineral katkılı yüksek yayla kültürlerine ait parçalardan oluşmaktadır. Bu kapsamlı araştırma sürecinde bölgede çok sayıda arkeolojik buluntu envantere dahil edilmiştir. Ayrıca bölgedeki medeniyet izlerine dair güçlü ipuçları da bu araştırma içerisinde yayınlanmıştır. Örneğin jeopark alanı ile komşu Sultansuyu Havzası içerisinde Erken Demir Çağı seramikleri bulunmuş ve buradan hareketle bölgenin Kuzeydoğu Anadolu ve Yukarı Dicle Havzası'ndaki yüksek yayla kültürlerinin önemli bir kültürel etkileşim sahasını oluşturduğu aynı zamanda Sultansuyu Havzası içerisinde Assur etkili seramik materyallerin saptanması, bölgenin geçiş

FULL TEXTS BOOK

güzergâhı ve demir madeni kaynakları açısından Assur için önemine işaret ettiği sonucuna varılmıştır (Dönmez, 2022; 43).

Ansır mağaraları ve İnderesi mağaraları yanında, Levent Vadisinde bulunan doğal ve sonradan insan eliyle şekillendirilen mağaraların kapladığı geniş alan ve tarihi yerleşimler kıyas edilemeyecek derecede büyüktür. Yapılan alan çalışmalarında Paleolitik izlerin yanısıra vadide yaşamın neolitik sonrasında da devam ettiği, vadi boyunca çok sayıda somut örnekleri tespit edilen Hitit, Roma ve Bizans dönemlerine ait kültürel izlerden anlaşılmaktadır. Ayrıca selçuklu dönemine ait yerleşim alanlarında çok sayıda seramik serpintisi tespit edilmiştir. Geç Osmanlı dönemine ait kültür katmanlarının somut izlerini de vadi boyunca görmek mümkündür. Bu döneme ait olduğu tespit edilen çok sayıda mezar taşının yanı sıra sivil mimari örneklerinde de Osmanlı izleri açıkça görülmektedir. Günümüzde araştırma alanı içerisinde çok sayıda mahallenin varlığı göz önünde bulundurulduğunda Levent Vadisi'nin binlerce yıldır kesintisiz bir yaşam alanı olduğu söylenebilir. Araştırma sürecinde vadide devam eden yaşamdan kaynaklı olarak Somut olmayan kültürel miras öğelerinin de oldukça zengin olduğu tespit edilmiştir. Gelenekler, görenekler, halk söylenceleri bu zenginliğin önemli öğelerini oluşturmaktadır. Bölgeye has bir dokuma türü olarak Akçadağ halısı yapım bilgisi ve içerdiği biçimsel değerlerle Coğrafi işaret belgeli önemli bir somut olmayan kültürel miras öğesidir. Vadi gastronomi açısından da önemli unsurlar barındırmaktadır. Yine coğrafi İşaret belgeli Akçadağ Pilavı ve Akçadağ kömbesi bu unsurlara örnek olarak verilebilir. Tüm bu unsurlar araştırma ekibi tarafından kayıt altına alınmış ve envantere dahil edilmiştir.

Levent Vadisi'nin Estetik İmkanları

Doğa ve insan arasında aracısız bir bağ vardır, aslında. Bu insanın içine doğduğu doğayı içinde var olduğu yaşamı zihni ile yeni bir gerçeklik zeminine taşıyana kadar böyledir. Ancak insan için, doğayı kendisi olarak görebilmek var olduğu ve zihinsel akışın başladığı andan itibaren imkânsız hale gelmektedir. Zihin kendisi için yeni bir gerçeklik yaratmaya ve doğayı öteki olarak algılamaya başlamaktadır. İnsan, en hassas zihinsel dokusundan sanatın diliyle öteki olarak tanımladığı doğaya alternatif bir estetik evren inşa etmektedir. Bu sezgilerle şekillenmiş yeni bir dildir ve bilhassa insanın kendisi ile kurduğu iletişimde kullanılır. Bu estetiğin yeni zihinsel gerçeklikle bağları çok güçlüdür. Söz konusu estetik dilin doğayla bağı ne kadar zayıflar ise o kadar güçlü hale geldiği söylenebilir. Bu yoğun bir yaratıcı zihinsel sürecin sonucu gerçekleşebilir. İşte insanı doğadan ayıran ve ayrı kalmasına neden olan bu gücün adı soyutlamadır. Bu ayrılık insanı doğa karşısında bir gözlemci haline getirir ve yarattığı her şeyi oraya nasıl dahil edeceğini tasarlayıp duran bir varlığa dönüştürür. İnsan bunu yaparak muhtemelen ya varoluşu için bir kanıt bulmak istemektedir ya da varoluşun kendiliğindenliğine baş kaldırmak istemektedir. Bernard Shaw'ın dediği gibi, "Sanat var olmasaydı, gerçeğin kabalığı dünyayı katlanılmaz kılardı." Sanatçılar çoğu zaman, insanın zaman, amaç ve varlık hakkındaki sorularına temel cevaplar verebilmek ve doğayı anlamak için, gözlemci ve yorumcu rollerini kullanmışlardır (Matilsky, 1992). Doğanın estetiğinin ilham verici olduğu sıkça kullanılan bir argümandır. Ancak anlaşılması gereken şey bu argümanın, doğayı algılayan insan zihninin onu yeni bir gerçeklik yaratırken kendinden ayrı tutmasından kaynaklanan bir illüzyon olduğudur. Bir ağaç ve ürettiği oksijen nasıl doğanın ayrılmaz bir parçası ise insan ve yarattığı gerçeklik te doğanın bir parçasıdır. Bu olguyu anlamımızın önündeki en büyük engel sanattır. Çünkü insan soyutlama yetisini kullanarak yarattığı sanat eserinde gerçekten de doğadan ayrı duran bir evreni bizimle paylaşmaktadır ve bu oldukça ikna edicidir. Çünkü sanat eserinde insan gerçeğe kendini ve kendinde olan her şeyi de dahil etmiştir. Hegel bu durumu doğadan tine yükselme çabası olarak açıklar ve ideal olanın arayışında sorgulamaktadır. Hegel mutlağın en yüksek tanımının tin olduğunu ve tinin özünün de kavramda olduğunu Güzel Sanatlar Üzerine Dersler adlı yapıtında sık sık dile getirmiş, doğa güzelliğini sanatsal güzellikten yani ideal olan güzellikten aşağı görmüştür (Dilmaç, 2019; 117). Hegel gibi birçok düşünür farklı yorumlar yapsa da bu çalışma insanın doğaya dahil olduğu savını sürdürmek istemektedir. Çünkü insan doğayı kendinden ayrı gördükçe

FULL TEXTS BOOK

kendini doğanın üzerinde bir yere yerleştirdikçe onu hükmedilmesi gereken ve hatta aşılması gereken bir zemin olarak algıladıkça doğaya ve kendisine zarar vermeyi de sürdürecektir. Bu çalışmanın nihai amacı koruma bilinci geliştirmek ve doğa insana hizmet etmek onun ihtiyaçlarını gidermek için vardır fikrinin aksine; yaşamı ve yüzbinlerce yıllık birlikteliğimizi nasıl sürdürülebilir hale getirebiliriz sorusuna cevap aramaktır. Bu amaca dönük olarak irdelediğimiz jeoloji insan ilişkisini estetik birikim ve sanatsal algı ile ilişkilendiren bir tartışmayı daha sonra geliştirilmek üzere başlatmakta fayda görüyoruz.

Doğa ve sanat arasındaki estetik ilişki, felsefi düşüncenin önemli bir alanını oluşturmaktadır. Doğanın estetiği, insan müdahalesi olmaksızın ortaya çıkan ve kendiliğinden var olan güzellikleri kapsamaktadır. Bu unsurlar varoluşundan beri insan zihninde, doğrudan ve derin bir estetik deneyim yaratmıştır. İnsan için yeryüzü alabildiğine büyük bir zemin iken insan zihni birçok evreni bünyesinde barındırabilecek kadar güçlüdür. Belki de bu tezatlıktan dolayı insan için doğa hem anlamlandırmaya çalıştığı yaşamın zemini hem de anlaşılması zor bir öteki olarak aşılması gereken bir zemindir. Yüce, güzel ama kavranmadığında ürkütücü, anlaşılmadığında korku veren bir zemin. Hatta Kant ve Edmund Burke'de, doğanın estetiği üzerine düşünürken onu yüce ve güzel kavramları üzerinden ele almıştır. Doğanın büyüklüğünün ve görkeminin insan üzerinde hayranlık ve saygı uyandıran bir etki yarattığını belirtmişlerdir. Kant için yüce, ussal bir kavramın sergilenişinde kendini göstermekte ve vardığı nokta itibariyle koşulsuz bir haz sunmaktadır. Kant, yücenin uyandırdığı hazzın, ciddi ve güçlü olanın duygusu olarak kimi zaman doğada kimi zaman akılda kimi zaman ise hayal gücünde bulunduğunu ifade etmektedir (Koşar, 2021). Kant'ın yücesi, Burke'te olduğu gibi, doğadaki sınırsız büyüklüğü ve alt edilemez gücü değerlendiren yargılar üzerinden tin duygusu ile ilişkilenmektedir. O, yüceyi her ne kadar tinsellik duygusuyla tarif etse de güzel gibi estetik bir kategori olarak konumlandırmış ve yüce duygusunun insanın zihin bütünlüğü içindeki gerekli ve genel temelini araştırmıştır (Altuğ, 2007, den aktaran, Koşar, 2021;153). Levent Vadisi tamda bu iki düşünürün bahsettiği yüce kavramıyla özdeşleşen görünümleri ve varlık haliyle haz duygusu yaratmaya elverişli estetik deneyimler sunmaktadır. Jeoloji bilgisiyle bu görünümleri algıladığınızda ve vadi tabanından itibaren yaklaşık 150 metre yüksekliğindeki milyar yıllık kaya duvarlarına, milyon yıllık mağara oluşumlarına ve milyon yıl öncesi biyolojik yaşamın kanıtları olan fosillere insan ömrünün sınırlılıkları ile baktığınızda zihninizde oluşan yüce duygusunun, estetik yargılarınızdaki gelişmenin Kant'ı ve Burke'yi doğrular nitelikte olduğu söylenebilir.

Sanatın estetiği ise, insan yaratıcılığının ve ifade gücünün bir yansımasıdır. Sanat eserleri, sanatçının bilinçli bir şekilde oluşturduğu ve estetik bir deneyim yaratmayı amaçladığı çalışmalardır. Sanatın estetik deneyimi, genellikle sanatçının niyeti, kullanılan malzemeler ve eserin izleyici üzerindeki etkisi gibi unsurlar üzerinden değerlendirilir. Sanat eserleri, estetik algıyı yönlendirir ve izleyicinin duygusal ve düşünsel tepkilerini şekillendirir. Immanuel Kant, sanatın estetiği üzerine düşüncelerinde, estetik yargının öznelliğini ve güzellik deneyiminin bireyselliğini vurgulamıştır. Kant fenomenal nedensellik dünyası ile numenal özgürlük dünyası arasındaki boşluğu, zorunluluğu ve özgürlüğü aynı anda içeren estetik deneyimle kapatmaya çalışmıştır (Bowie, 2003'den aktaran, Güngör, 2018; 72). Beğeni yargısı estetiktir, bununla da beğeni yargısının belirlenim zemininin sadece öznel olduğunu anlarız (Kant 2011, s. 53). Ancak, doğanın estetiği ve sanatın estetiği arasındaki bu ayrım, birbirlerini dışlayan kategoriler olarak görülmemelidir. Aksine, doğa ve sanat, estetik deneyimlerin zenginliğini ve çeşitliliğini ortaya koyan iki temel alan olarak algılanmalıdır.

Sanat yoluyla kendi iç dünyası ile ilişkilerini geliştiren ve haz duygusu üzerinden bir estetik inşa eden insanın ilk birikimleri bizzat parçası olduğu doğaya aittir, denilebilir. Aslında sanat ve jeoloji arasındaki ilişki sanatın ilk var olduğu an kadar eskidir. Sanatın ilk var edildiği zemin milyonlarca yılda oluşan yer yer marn ve kumtaşları içermesine rağmen, egemen litolojisi Killi kireçtaşı ve resifal kireçtaşı olan mağaraların duvarları olmuştur. Bunlar kendine özgü estetik değeri olan son derece özgür yüzeylerdir. Mağara resimlerini kendinden sonraki tüm sanatlardan ayıran tarafı ile bu jeolojik yüzeyler bir sınır ya

FULL TEXTS BOOK

da çerçeve içermezler. Sanatta bu devrim niteliğindeki başlangıçların ardından sanayi devrimine kadar her geçen zaman aralığında insan, zamana ve zemine uygun olarak estetik değerler yaratmıştır. Ancak Sanayi devrimi ile beraber insan, modern bir dünyayı son 300 yıl içerisinde inşa ederken ait olduğu doğadan kendi fiziksel varlığını koparmaya başlamıştır. Modern dünya binlerce yıldır devam eden tarıma dayalı sistemleri ve toprağa bağlı yaşam tarzını ortadan kaldırarak insanlık için yeni bir ekonomik sitem, yeni yönetme yönetilme biçimleri, yeni bilimsel paradigmalar, yeni teknolojiler ve yeni felsefi düşünüşler önermekteydi. Ancak başlarda doğanın sınırsız bir kaynak olmadığı fikri egemen değildi. Bugünkü yaklaşımına ve eylemlerine bakıldığında; insanın ancak 20. Yüzyılda ve 21. yüzyılın ilk çeyreğinde kendisine ve doğaya nasıl hoyratça yaklaştığını anlayabildiği ya da anlamaya başladığı söylenebilir. Bu süreçte, sanat sınırsız bir kaynak olarak bu sorun karşısında yeni estetik yaklaşımlarla insanın ruh dünyası için yeni biçimsel değerler yaratmaya başlamıştır. 20. yüzyılın estetik ve plastik yargısında özellikle devrim niteliğinde üç eğilimin ön plana çıktığını görmekteyiz. Soyut sanat, hazır nesne, kavramsal sanat. Bu üç yaratıcı eğilimin çağdaş sanatın doğasında da oldukça etkin olduğu söylenilebilir. Özellikle iki büyük dünya savaşının yıkıcı etkilerinin ardından sanatta bir öze dönüş hareketini gözlemlemek mümkündür. Doğa ve içindeki ile yeniden iş birliği yapmanın önemini kavrayan insan bu barışı sağlamanın estetik yollarını aramaya başlamıştır. 1960 sonrasında dönemin sosyal yapısında meydana gelen değişimle beraber, galeri ve kurumlar için sergi nesneleri üretmeyi reddetmek amacıyla ortaya çıkan sanatsal hareketlerin devamında sanat-doğa arasındaki ilişki de farklı bir boyut kazanmaya başlamıştır. Açık alanlarda yapılan çalışmalar, amaçlarına göre "Yer Sanatı", "Arazi Sanatı", "Yeryüzü Sanatı", "Çevresel Sanat", "Ekosanat", "Ekolojik Sanat" gibi üst başlıklar altında tanımlanmıştır. Bu başlıklar, doğada açık alanları kullanmaktan, doğal materyallerin kullanımına, çevresel farkındalığı arttırmaya, restorasyon, geri dönüşüm, yenilenme, mekâna özgü projelere kadar farklı uygulamaları içermektedir (Aydın vd. 2013; 53). Tüm bu çabaların 20. Yüzyıl boyunca sanat algısında ve estetik yargılarda devrim niteliğinde değişimler meydana getirmesi gayet doğal bir sonuç olarak değerlendirilmektedir. Bu değişimlerin etkisi güncel sanat anlayışı içerisinde de görülmektedir. Doğa ve insan arasındaki estetik ilişkinin irdelendiği bu özetten sonra yaklaşık 28 km uzunluğunda tektonik bir vadi olan Levent Vadisi'nin güncel sanat için oldukça elverişli bir zemin olduğunu söylemek mümkündür. Jeomorfolojik olarak yatay yüzeylenen kayalık alanların oldukça estetik ve biricik bir görünüme sahip olması vadiyi çekici kılan başlıca özelliklerinden birisidir. Jeo-estetik değerler açısından son derece zengin bu alan içerisinde doğa ve sanat arasında yeni ve güçlü bağların kurulabileceği sanatsal eylemler planlanmıştır. Ayrıca, bildirinin yazarları tarafından sürdürülen "Çizginin Arkeolojisi ve Levent Vadisi Mağaralarında Güncel Sanata Yönelik Sezgisel Algoritmalar" başlıklı bir sanatta yeterlik tezi hazırlanmaktadır. Bu tezin içeriğinin de yapılan bu araştırmalara katkı sağlayacağı öngörülmektedir. Bu bağlamda, Levent Vadisi'nin Land Art, video art, enstalasyon ve benzeri güncel sanat uygulamaları için benzersiz bir mekân haline gelebileceği düşünülmektedir. Vadinin doğal ve tarihi yapısı, sanatçılara eserlerini sunma ve ifade etme biçimlerinde yeni perspektifler sunması beklenmektedir. Özellikle, mağaraların tarihi dokusu ve doğal akustiği, ses ve ışık tabanlı sanat eserleri için ideal bir ortam sağlayabilir. Ayrıca, projenin müzik alanındaki bileşenleri tarafından vadinin kümülatif estetiğinden beslenen oda müziği eserleri formunda trio ve Quartet olarak bestelenmektedir. Vadinin sanat uygulamaları ile daha geniş bir kitleye tanıtılabileceği ve sürdürülebilir turizme katkı sağlayabileceği öngörülmektedir.

SONUÇ

İçerdiği değerlerin çeşitliliği bakımından Levent Vadisi İçin çok yönlü bir koruma stratejisi üzerinde durmak gerekmektedir. Levent Vadisi Jeopark projesi kapsamında korunacak alan, sadece jeolojik oluşumların değil, aynı zamanda biyolojik çeşitliliğin, kültürel mirasın ve toplumsal yapının da sürdürülebilir bir şekilde korunması anlamına gelmektedir. Levent Vadisi benzersiz jeolojik özellikleri ile doğanın milyonlarca yıllık tarihini gözler önüne seren nadir güzellikte bir doğal alandır. Alan,

FULL TEXTS BOOK

tektonik yapılanmalar, fosil yatakları, volkanik yapılar, karstik oluşumlar ve mineral yatakları gibi çeşitli jeolojik miras unsurlarını barındırmaktadır. Jeolojik süreçlerin anlaşılması ve bu süreçlerin insan yaşamı üzerindeki etkilerinin farkındalığının artırılması, korunma stratejimizin temel amaçlarındandır. Ayrıca vadinin çok zengin arkeolojik ve kültürel mirası süregiden insan yaşamı dikkate alındığında bu alandaki koruma tedbirlerinin önemi daha çok artmaktadır. Levent Vadisi aynı zamanda ekolojik açıdan da büyük bir öneme sahiptir. Bu alan, nadir bitki ve hayvan türlerine ev sahipliği yapmaktadır. Biyolojik çeşitliliği korunması bu anlamda önemlidir. Levent Vadisi'nin biyolojik çeşitliğinin korunmasının, ekosistemlerin dengeli bir şekilde devam etmesine olanak tanıyacağı ve iklim değişikliği gibi küresel çevresel sorunlarla mücadelede kritik bir rol oynayacağı düşünülmektedir. Koruma alanlarına ilişkin literatürde çeşitli tanım ve bu tanımlar çevresinde sınıflandırılmalar yapılmışsa da kabul görmüş ve uluslararası geçerliliği olan tanımlar IUCN'a aittir. Bununla birlikte devletler yönetsel açıdan kendi konjonktürel yapılarına göre çeşitli sınıflandırmalara gidebilmektedirler. Söz konusu tanım ve sınıflandırmalar Dünya Doğa ve Doğal Kaynakları Koruma Birliği (IUCN) tarafından ilk kez 1962'de Seattle'da yapılan kongre ile gündeme gelmiştir (Koç vd. 2020: 90). 1978'de ve son olarak 1994 yılında üzerinde fikir birliğine varılan koruma alanı tanımı şu şekildedir: "Uzun vadede doğanın ve onunla ilişkili olarak ekosistem kaynakları ile kültürel değerlerin, yasal ve etkili bir şekilde korunduğu, açıkça bilinen ve özel olarak yönetilen coğrafi (karasal ve/veya denizel) mekânlardır (IUCN, 2012'den aktaran, Koç vd. 2020).

Levent Vadisi Jeopark projesi kapsamında ayrıntılı bir doğal miras ve kültürel miras envanteri çıkarılmış ve arkeolojik alanlar belirlenmiştir. Öncelikli olarak korunması gereken 27 adet jeosit belirlenmiş ve koruma çerçeveleri proje içerisinde belirtilmiştir. Kültürel miras öğeleri ve arkeolojik alanlar içinde tescilli olmayanları tescile önerilmiştir. Koruma bağlamında yasal prosedürleri takip etmenin dışında alanın farkındalığı yüksek insan unsuru ile daha güçlü korunacağı fikrinden hareketle eğitimler planlanmış ve bir kısmı uygulanmış bir kısmı ise takvime bağlanmıştır. Ayrıca bu eğitimlerin bir uzantısı olarak alan içerisindeki tüm değerlere ilişkin görünürlük çalışmaları kapsamında bilgi ve yön levhaları ile basılı materyaller için özetlenmiş sadeleştirilmiş bilgi notları hazırlanmıştır. Levent Vadisi'nin eko turizm potansiyeli ele alınmış ve koruma kullanma dengesi başlığı altında yönetim planı içerisinde bir alt başlık olarak ziyaretçi yönetimi ele alınmış ayrıntılı şekilde irdelenmiştir. Biyo-çeşitliliğin korunması ve sürdürülebilir doğal yaşam için gerekli tedbirlere de yönetim planında yer verilmiştir. Levent Vadisi'nin estetik rezervinin ise ancak sanatçı zihniyle teması ve onların üreteceği sanat eserleri ile korunabileceği düşünülmüş bu doğrultuda sıra dışı bir sanat mekânı olarak vadide sanatsal aktiviteler planlanmıştır. Bu konu aynı zamanda tanıtım stratejilerinin de önemli bir bileşeni olarak düşünülmüş ve vadinin diğer değerleri ile eşdeğer olarak stratejiler geliştirilmiştir.

İyi bir yönetim planı bu alanların korunmasında ve sürdürülebilir kalkınmasında kritik öneme sahiptir. "Sürdürülebilir Kalkınma" kavramı, 1983 yılında Birleşmiş Milletler Dünya Çevre ve Kalkınma Komisyonu'nun oluşturulması ve 1987 yılında Brundtland Raporu olarak bilinen "Ortak Geleceğimiz" adlı raporu yayınlamasıyla küresel ölçekte popüler olmuştur. Sürdürülebilirlik "Günümüz gereksinimini karşılarken; mevcut kaynakları, gelecek nesillerin kendi gereksinimini karşılamasını engellemeden, tüketilmeden kullanılmasını sağlayan bir gelişmedir" şeklinde tanımlanmaktadır (İbiş, 2018). Sürdürülebilir Kalkınma, insan yaşamının gereksinimleri ve doğal kaynakların sürdürülebilirliği arasında bir denge kurularak ekonomik, çevresel ve toplumsal boyutlarıyla bugünden geleceğe uyumlu bir planlama yapılmasını amaçlayan bütünsel bir yaklaşımdır (Ulaş 2019: 133). Bölgenin kalkınmaya dönük iki ana ekseni olarak turizm ve tarım belirlenmiştir. Birbirine tezat ilkeler içeren bu ekonomik kavramlar Levent Vadisi özelinde ele alınmış multi-disipliner yaklaşımın olumlu katkısıyla dengeli bir ekonomik kalkınma stratejik planı hazırlanmıştır. Yönetim planının önemli bir diğer çıktısı da sürdürülebilirlik ilkeleri başlığı altındaki bilimsel araştırmaların sürekliliği ve izleme programları şeklinde belirlenmiştir. İzleme, gerektiğinde stratejilerin revize edilmesine olanak tanıyacak izleme faaliyetlerini, alanın durumunun sürekli bilimsel kriterle izlenerek ve koruma stratejilerinin etkinliğinin değerlendirilmesini temel alan bilimsel uygulamalar olarak tanımlanmıştır. Bu başlık altındaki

FULL TEXTS BOOK

eylemlerin sürdürülebilirliği için disiplinler arası bir bilim kurulunun yönetim içerisinde yer alması önerilmiştir. Son olarak tüm bu hedeflerin gerçekleştirilmesi için Yerel toplulukların bu alanların korunmasına aktif olarak katılmasının teşvik edilmesi gerekmektedir. Toplulukların Levent Vadisi ile ilgili sahiplik duygusu geliştirmesi, koruma çabalarının sürdürülebilir olmasına katkı sağlayacağı düşünülmektedir.

İnsan ve doğa arasındaki ilişki, birçok düşünürün insanlık tarihi boyunca üzerinde durduğu derin ve karmaşık bir konudur. Doğayı, insandan ayrı ve öteki bir varlık olarak algılamak, doğru bir ontolojik tanımlama yapamamak insanın en kadim düşünme özürlerinden biridir. Bu algı, düş ve gerçeklik alanları arasında bir bölünme yaratarak, insanın kendisini doğanın üstünde bir konuma yerleştirmesiyle sonuçlanmıştır. Bu hiyerarşik düzen, insanın kendisini özne, doğayı ise insana hizmet eden bir nesne olarak görmesiyle pekişmiştir. Bu durum, tarih boyunca doğaya karşı geliştirilen aşağılayıcı ve düşmanca tavırların normal, hatta ideal ve haklı olarak kabul edilmesine yol açmış olabilir. Bu kibirli yaklaşım, günümüzde karşı karşıya olduğumuz ekolojik krizlerin temel nedenlerinden biridir. İnsan, bilhassa son 150 yılda kendisini de içinde barındıran aslında ontolojik bir ayrılmazlık içinde olduğu doğaya ve imkanlarına oldukça hoyrat davranmış, böylelikle yaşam alanlarında kendisi için hayati öneme sahip birçok unsura ciddi zararlar vermeye başlamıştır. Bu durum, insanın doğa ile olan ilişkisinde derin bir yarılma yaratmıştır. Bu yarılma, insanın kendisini keşfetme sürecini olumsuz etkilemiştir. Yaşamı anlama ve anlamlandırmada ki gecikme ve yanılsamaların yol açtığı bu zihinsel ayrılık fikri de git gide derinleşmiştir. İnsanın sormakta geciktiği temel soru; bu ayrımın, ontolojik bir zorunluluk mu, yoksa tarihsel süreçte gelişen bir yanılsama mı? olduğudur. İnsanın doğa ile olan ilişkisini yeniden düşünmesi gerektiği açıktır. Doğa ile insan arasındaki ayrım, tarihsel bir sürecin ve insan merkezli bir bakış açısının sonucudur. Bu ayrımın zorunlu olup olmadığı sorusu, insanın kendisini ve doğayı nasıl algıladığını yeniden değerlendirme gerekliliğini ortaya koymaktadır. İnsanın bu düşünüşte sanatın yaratıcı argümanlarından faydalanması çözüm olanaklarını zenginleştirecektir. Yaşamın zeminin yaratan jeolojinin estetik imkanları yaratıcı zihinler için çok önemli bir kaynak olarak görülmektedir. Bu projenin temel amacı doğayı insanın olumsuz etkilerinden korurken nasıl insanlık için daha yararlı hale getirebileceğimize cevaplar aramaktır. Bu ironik arayışta farklı bilimsel disiplinlerin bilgi evreninden faydalanılmaya çalışılmıştır. İnsanın doğa ile olan ilişkisini yeniden tanımlaması, doğayı kendisinin bir parçası olarak görmesi ve doğa ile uyum içinde yaşaması, sürdürülebilir bir geleceğin inşası için hayati öneme sahiptir. Jeolojik değerlerin korunması yaşamın iyileştirilmesi insan ve jeoloji arasında sürdürülebilir ve uyumlu bir ilişkinin geliştirilebilmesi ile mümkündür. İnsanın doğa ile kuracağı yeni ilişki biçimi, gelecekteki ekolojik krizlerin önlenmesi ve sürdürülebilir bir yaşam biçiminin inşası için temel bir adım olacaktır.

Bu proje, istisnai değere sahip doğal miras alanı olarak Levent Vadisi'nin sunumu, erişimi ve bu alanı olumsuz etkileyen doğal riskler, insana bağlı riskler yanlış arazi kullanımı ve yağmacılık gibi tehditler karşısına bütünleşik koruma ve yönetim tedbirlerini tasarlamak için hayata geçirilmiştir. Alan yönetimi bir veya mekânsal ilişkili birden fazla alanın tekil bir yönetim sistemi altında ele alınmasıdır. Miras alanı olarak Levent Vadisi'nin yönetilmesini gerektiren temel sebeplerden biri bu alanın korunarak gelecek kuşaklara aktarılmasını temin etmek bir diğeri ise dünya ekonomisinin önemli bir parçası olan turizmdir. Ayrıca Levent Vadisi'nin jeolojik, arkeolojik ve kültürel açıdan içerdiği evrensel bilgi değeri ve estetik imkanları da bu alanın korunması için önemli unsurlardır. Önerilen yönetim planı evrensel değerler ve doğa insan ilişkisi dengesinde insan odaklı bir anlayışta tasarlanmaktadır. Somut olmayan kültürel miras açısından bu alanda yerleşik yaşam sürdüren insan guruplarının ve geçici olarak alanın yaşamsal değerlerini deneyimlemek isteyen insanların Levent Vadisi'ndeki tüm değerler birikiminin bir parçası olduğu, olacağı fikrinden hareketle projenin bilimsel çıktıları, Levent Vadisi'ne ilişkin ulusal ve uluslar arası farkındalıkları artırmak bir evrensel değer olarak insan odaklı yönetim yaklaşımıyla uluslararası toplumda karşılıklı değerbilirliği sağlamak ve güçlendirmek hedefiyle oluşturulmaya çalışılmıştır. Kamu yararı gözetilerek hazırlanan yönetim planı taslağı, üniversiteler, yerel yönetimler, kamu

FULL TEXTS BOOK

kurumları, sivil toplum örgütleri ve sektörel öğeleri arasında uzlaşma ve iş birliğine dayalı yapısıyla paydaşların belirleyeceği ilkeler çerçevesinde sürekliliği olan özgün yapısıyla öne çıkacağı beklenen kılavuz belge niteliğindedir. Söz konusu kılavuz belgede jeopark alanının ekonomik, sosyal, kültürel ve eğitsel amaçlı nasıl kullanılacağına dair özgün ip uçlarına yer verilmiştir. Bölgenin sınırlarının tarihi, sosyal, kültürel, coğrafi, doğal ve sanatsal bir bütünlük içinde geçiş alanları ve bu unsurlarla ilişkili bağlantı noktaları bağlamında değerlendirilmesi, bölgenin korunması, geliştirilmesi ve değerlendirilmesi açısından doğru şekilde belirlenmesi için multidisipliner bir anlayışla yürütülen bilimsel çalışmaların sonuçları titizlikle harmanlanmıştır. Özellikle ziyaretçi yönetimi, finansman, sunum ve yorum konusunda yapılan önerilerin hayata geçirilmesi alanın değerlerini yükseltme ve yaşatma konusunda kritik öneme sahiptir. Önerilen bu plan taslağı UNESCO'nun Dünya miras alanları için geliştirdiği yönetim planı normlarına uygun olarak tasarlanmıştır. Tüm araştırma çıktıları Levent Vadisi'nin Evrensel belleğimizin önemli bir parçası olarak Küresel Jeopark ağının içinde yer alması gerektiğini düşündürtmektedir.

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FULL TEXTS BOOK

AN EFFICIENT SOCIAL COOPERATIVE IN HUNGARY

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ABSTRACT
Since 1 July 2006, it has been possible to set up social cooperatives in Hungary. A social cooperative is a special form of social enterprise. A common feature of social enterprises is that their activities are aimed at addressing and solving a social need or problem, and their business objectives are linked to these primary objectives. In 2013, the Bébic Food Production, Service and Trade Start Social Cooperative was launched in the municipality of Ukk, Hungary, to make the agricultural project of the public employment Start Work model programme of the municipality self-sustainable. With a population of just under 300 people, the social cooperative is a key element in the operation of the village. The social cooperative processes the raw materials grown on the sea buckthorn, raspberry and beetroot plantations in the municipal areas into high quality jams and drinks. In the long term, the cooperative supports the local population through gradual improvements and job creation, with a view to a healthy lifestyle and environmental awareness. It will describe the circumstances of the establishment and operation of the cooperative using the field research method.

Introduction

In order to reduce unemployment, the economic actors cannot be expected to provide effective help, so it is reasonable to rely on non-profit organisations to find more perspective solutions than the current ones (Neamtan, 2002). One way to do this could be to support the employment initiatives of non-profit organisations, i.e. to create jobs outside the mainstream of the labour market. In the most common economic model today, three economic sectors coexist. The third sector, the so-called social economy, is dominated by social enterprises and cooperatives (Moulaert-Ailenei, 2005; Csoba, 2007). The conceptual scope and definitions are often blurred, with the French and Italian literature suggesting that the core values are solidarity, equity and dialogue (Birkhölzer, 2000, Borzaga - Defourny, 2001; Borzaga et al, 2008; Allard et al, 2008; Monzón - Chaves, 2008). Social enterprises serve the community and their aim is not to maximise profit but to solve existing social problems (G. Fekete, 2007).
In Hungary, it has been possible to establish social cooperatives since 2006 (Ferencz, 2015). More and more municipalities are setting up social cooperatives, which take over the management and organisation of public employment from the municipality and are thus able to sell the products produced by the public employees (Finta - Póla, 2020). The law on cooperatives in Hungary was amended in July 2019. After the amendment, a distinction was made between social cooperatives established on the basis of public employment and traditional cooperatives. The former should be called "start social cooperative". A social cooperative requires a minimum of seven founding members, of which at least one must be a local or national government or an association of such a government with legal personality. Social cooperatives operate on a profit-oriented basis and their main decision-making body, the general assembly, decides to distribute the profits among the members (Birkhölzer, 2000; Defourney - Nyssens, 2010). In all cases, a social cooperative must have a registered office, a name that refers to the main activity of the social cooperative and includes the designation 'social cooperative'. Each social cooperative must have a statute setting out its objectives, the main rules governing its operation and the principles on which it is based.

FULL TEXTS BOOK

Presentation of the socio-economic background of the municipality of Ukk

The large cities of the Central Transdanubian region, with their favourable transport connections and outstanding endowments, play an important role in the socio-economic space of Hungary. One of the most important spatial characteristics of the region is that, due to its proximity to Budapest and the historical characteristics of the urban network and the northern part of the Transdanubian region, it does not have a single growth pole of national importance or with multi-regional implications. Its urban population has a balanced structure and is one of the most urbanised areas in the country. It is the most densely populated and most populous region in Hungary. Its dominant industries are computer and communications equipment, vehicle and vehicle parts manufacturing, in which foreign capital investment has played a major role. Tourism is also of particular importance in the region. It is the third most developed region in the country.

The economic development of Veszprém County owes much to the fact that its infrastructure background is of a higher standard than that of the country. The county is characterised by a dense network of roads connecting important industrial hubs and tourist resorts.

The municipality of Ukk is a small village in Veszprém County, the main activities of the population being agriculture and livestock breeding. The municipality covers an area of 13.87 km2 and its population has been decreasing over the last 22 years, reaching 284 inhabitants at the end of 2022. The change in the permanent population is illustrated in the graph below:

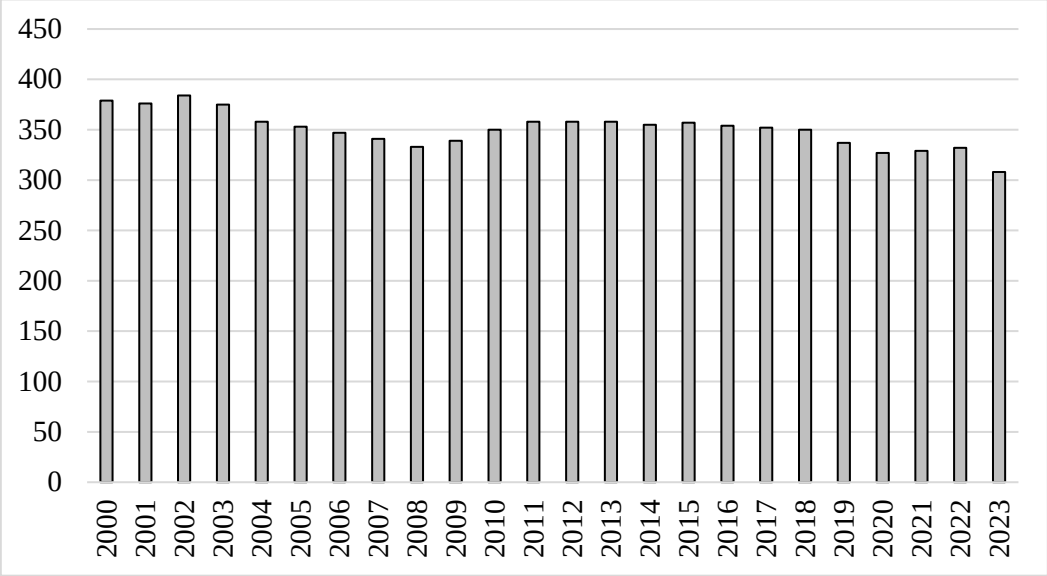


Figure 1. Change in the permanent population of Ukk (2000-2023)
Source: Own editing based on Hungarian Statistical Office's data

The factors influencing the permanent population are the number of births, the number of emigrants, the number of deaths and the number of emigrations (Figure 1). During the period under review, there was a slight increase in the population between 2010 and 2018, due to an increase in the number of emigrants. The change in the population is not the result of natural factors but rather of migration. The reasons for the changes in population are summarised in Figure 2.

FULL TEXTS BOOK

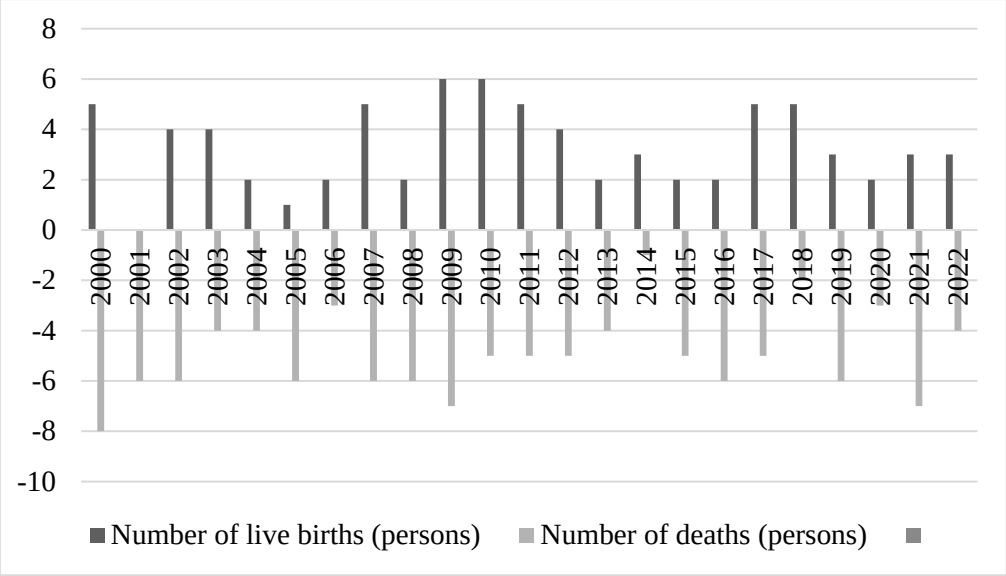


Figure 2. Number of live births and deaths in the municipality of Ukk
Source: Own editing based on Hungarian Statistical Office's data

Despite the overall decline in the population of the municipality, the fact that the proportion of working-age people remains unchanged is certainly positive. An analysis of the dependency ratio shows that, in line with the trend in Hungary, the number of elderly people (65 and over) is increasing, with a parallel decrease in the number of young people (0-14 years old). Unfortunately, this has a negative impact on the future of the municipality.
In relation to the working age population, the number of jobseekers and long-term unemployed increased significantly after the economic crisis of 2008 (Figure 3). After the crisis, a steady decline was observed until the period of the coronavirus epidemic.

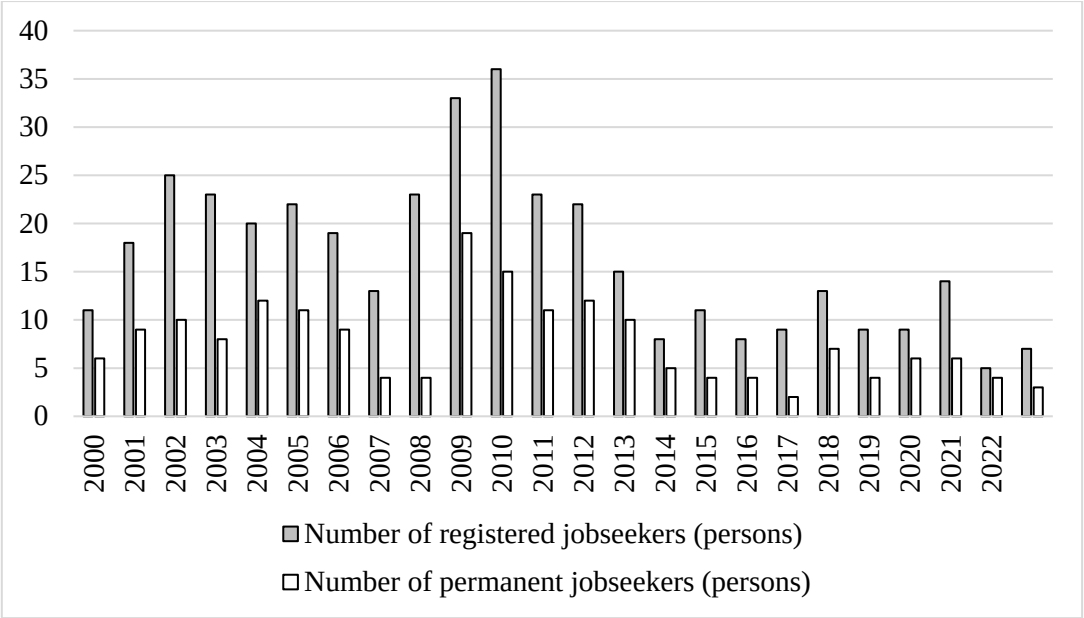


Figure 3. Number of registered job seekers and long-term job seekers in the municipality of Ukk
Source: Own editing based on Hungarian Statistical Office's data

FULL TEXTS BOOK

40% of the school-educated population have completed at most the 8th grade of primary school, 28% have completed secondary education without a school leaving certificate and 24% have passed a school leaving certificate. The share of residents with tertiary education is 8%. The data suggest that the resident population is predominantly undereducated.

Public employment in Ukk in the framework of the Bébic Social Cooperative

The centuries-old public employment system in Hungary has undergone a major overhaul since 1 January 2011. Public employment has been brought under the policy remit of the Ministry of the Interior. The available resources have increased significantly and the budget for public employment has become open from the top. Municipalities received, on average, more funding for public employment than for public assistance. One change was the virtual disappearance of part-time public employment from 2011, the average duration of public employment contracts was extended and employment became more evenly spread over time, while remuneration was exempted from the general regulation. Refusal to accept the offer of public employment entailed the loss of entitlement to the replacement employment allowance, so that its acceptance was essentially compulsory. The municipality of Ukk has been participating in public employment programmes since the beginning, in 2012, thus providing the community with continuous job opportunities and infrastructure improvements.

The number of people employed in the different types of public employment schemes is shown in the table below:

	Longer-term public employment	National public employment	Total district programmes	Total public employment, persons
2013	4	0	9	**13**
2014	3	1	11	**15**
2015	1	2	9	**12**
2016	4	2	4	**10**
2017	2	3	5	**11**
2018	1	3	5	**8**
2019	4	2	1	**6**
2020	1	2	3	**6**
2021	1	2	3	**6**
2022	2	3	2	**6**

Table 1. Number of public employment between 2013 and 2022 by type of programme in the municipality of Ukk

Source: Own editing based on Ministry of Interior data

Over the past three years, the environment of the buildings that provide the main services of the municipality has been improved and its value, the national wealth, has been significantly increased through investments made with the support of the district's Start Work model programme and from own resources. On average, 6 public employees have been involved in cleaning green areas and agricultural roads owned by the municipality. In terms of construction works, from 2019, the accident-prone pavement alongside the main road 84 was renovated, a safety barrier was built and the pavement of the bus stop in the centre of the village was rebuilt, ensuring safe pedestrian and barrier-free transport for the population. This was followed by the paving and accessibility of the car park adjacent to the multi-purpose building of the Mayor's Office and the paving of the grass/grass area adjacent to the social facilities for public employees and the community square. Building on the success of previous years,

FULL TEXTS BOOK

the 2022 programme of construction and renovation work has been continued with a focus on health promotion and pre-school education.

The Multifunctional Health Centre of the municipality serves not only the population of Ukk village but also the needs of the surrounding villages with GP and nurse services, which has resulted in a significant number of cars parked on the roadside, making road traffic difficult. To address this problem, the programme has provided parking for 8 cars and a bench for waiting passengers.

In connection with the completion of the work begun in the previous year on the multi-purpose building of the Mayor's Office, the steps leading to the entrances of the building were paved. In the centre of the town, along the road, stands the 18th century Baroque Szalay Mansion, which currently hosts the Kindergarten and outdoor events organised by the municipality, and plays an important role in the recreation of the inhabitants of the town. The fence on the street front was missing a gate, the material and labour for which was built at the direct cost of the public employment programme, primarily for the safety of the children and to prevent unauthorised access to the courtyard.

The gravel, uneven (accident-prone) area between the new playground in the courtyard and the building was paved with Barabás bricks, purchased by the municipality and provided by the public employment programme, to match the building's patina.

Infrastructural improvements through tenders, own resources and the possibilities offered by the District Start Work model programme are helping to increase the population retention capacity of the municipality. As well as creating tangible value for the municipality through their public employment programmes, they are proud of the experience they have gained through this work, which helps to integrate the municipality's public employees into the competitive sector.

Bébic Social Cooperative

The Bébic Social Cooperative was founded in 2013 in the municipality of Ukk, of which the local government is a member. On 27 September 2014, the fruit and vegetable processing plant of the municipality of Ukk was completed, which was built, mechanised and equipped within the framework of the agricultural project of the Start Work model programme in 2013 and 2014. The social cooperative processes the raw materials grown on the municipal areas' sea buckthorn, raspberry, black cherry, beetroot and other vegetable plantations into high-quality jams and drinks. The high quality of its products is certified by compliance with the regulations of the Quality of the Countryside - for the Balaton Highlands. The right to use the Quality of the Countryside - Protecting the Lake Balaton Highlands Trademark has also increased its market access opportunities.

Further activities and objectives:

- Encouraging local farmers and families to grow fruit and develop horticulture.
- Organising conferences and camps to showcase the successes of public employment and social cooperatives in Ukk, while promoting healthy lifestyles and local products.
- Launching training courses to promote the integration of disadvantaged people and entrepreneurship.
- To support the marketing activities of trademark producers and promote the high quality products of the Lake Balaton region.
- To establish national cooperation between social cooperatives engaged in similar activities in order to promote more efficient operation.

The Co-operative's philosophy has a social mission in addition to its economic objectives, and so public welfare activities are of paramount importance, with a particular focus on helping disadvantaged people into work and promoting the integration of people of different ethnicities. At the same time, it carries out its activities and services in full harmony with nature, in the hope of preserving and protecting the environment and health, and of promoting alternative energy sources to as many people as possible,

FULL TEXTS BOOK

while ensuring that its members can work continuously and with equal workloads, providing security and a secure future for their members and families.

At the end of 2013, the cooperative was set up to make the agricultural project of the municipality's public employment Start Work model programme self-sustaining. The founding members are the Municipality of Ukk and three public employees. The Social Cooperative was founded with 13 members, and on 28 February 2020 it had 18 members. On 15 September 2014, the first lease contract was signed with the local municipality, which provided the material basis for the cooperative's operation. In 2014, the Bébic Social Cooperative produced sample products (raspberry juice, tomato juice, beetroot juice) from raw materials produced in the municipal areas. The cooperative has been promoted in several forums in order to gain access to the market.

On 26 January 2015, the members of the Social Cooperative for the Development of Ukk and the Bébic Social Cooperative decided in an extraordinary general meeting that the Social Cooperative for the Development of Ukk will merge with the Bébic Social Cooperative. The Veszprém County Court registered the merger on 2 July 2015. In September 2015, a new lease loan contract was signed with the Municipality of Ukk, which transferred the products of the investment (warehouse renovation, shelving system, furniture, pasteurisation equipment, Opel Combo used truck, stove, dryer, tanks) for use to the cooperative within the framework of the Start-up Work Model Programme 2015. The contract expired on 30 September 2017. The third lease contract was signed on March 8, 2018, in which the assets included in the second lease contract, a truck and real estate, were transferred again.

In 2017, the Co-operative submitted the FOCUS application, which was successful. The tender was implemented from 01.11.2017 to 31.10.2020. The continued employment obligation was fulfilled for 8 persons during the period 01.11.2020 - 30.04.2020. The main objective of the tender was to build sales and market access. Currently 9 people are employed.

In 2018, the cooperative added a new activity, poultry farming, by renting a poultry house in Dabas and keeping geese on a leased basis. The necessary permits, registrations and notifications were obtained at the end of 2017. In 2019, the Bébic Social Cooperative opened a shop in Budapest, where its own and other social cooperatives' products are sold.

The main goal is to create a multi-legged profit-oriented enterprise with the help of the municipality's membership in the Start Work model programme, the real estate provided by the municipality and by taking advantage of the opportunities for tenders. In the long term, it can be expanded through gradual development and job creation, with a focus on healthy living and environmental awareness. The production of fruit and vegetable products remains the main profile, but the long-term profit-oriented operation should be based on trade with a self-run product shop in Budapest.

The employment will be spread between Ukk and its surroundings and Budapest. Rural employees are mainly involved in product production, while employees in Budapest are involved in marketing and running the Budapest store.

Summary

Bébic Social Cooperative is located in the third most developed region of the country. Agriculture is still the main source of livelihood for the inhabitants of Ukk, a municipality with a centuries-old history. Its population has declined by almost 25% over the last 20 years, but the working age population has not declined in proportion. In terms of education, the population is considered under-educated, with 40% of the population self-reporting primary education. This is why public employment is so important in the life of the municipality.

In the last 10 years, the municipality has seen employment in almost all types of public employment programmes, with several pillars of longer-term, national and district start model programmes. The number of people in public employment has been decreasing year by year, mainly due to the decrease in the population. In implementing the public employment programmes, the municipality has placed

FULL TEXTS BOOK

great emphasis on value-added work, and in order to facilitate this, the municipality has supplemented the resources used in the programmes with its own resources in all cases. Thanks to this outstanding approach, the municipal leaders have succeeded in transforming the municipality into a small, vibrant and picturesque community of exemplary value.

The Bébic Social Cooperative was founded in 2013 with the membership of the municipality. An important objective for the Cooperative is to produce its products using healthy ingredients grown on municipal land using its own resources. The Cooperative is growing year by year, with new areas being added to the production process and new tools being acquired for the production of the products. By promoting environmental awareness and healthy eating, they are not only targeting people in the region, but thanks to their webshop, their products are now accessible to everyone. Their products have won numerous awards and recognitions. In the long term, the cooperative plans to serve the local population through gradual improvements and job creation, with a focus on healthy living and environmental awareness.

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FULL TEXTS BOOK

FORMATION OF PEDAGOGICAL COMMUNICATION STYLE OF MODERN UNIVERSITY TEACHERS

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ABSTRACT

Communication is the main form of human existence. Communication, which is a form of social existence, exists in and accompanies all types of human activity. However, there are a number of professions where communication becomes a professionally important category in the nature of the profession. Such professions include the teaching profession. At this time, communication is not seen as a common form of human interaction, but as a functional category. Pedagogical communication is a multifaceted process of organization, construction and development of communication, mutual understanding and interaction between teachers and students, which is created by the goals and content of their joint activities. Communicative (information exchange between communication parties), interactive (organization of mutual activity) and perceptive (perception of each other by communication partners and establishment of mutual understanding) sides are implemented in pedagogical communication. The article deals with the formation of the correct communication style of university teachers. Because pedagogical communication plays a leading role in the professional activity of a university teacher, as it is the main form of social interaction between people. The analysis of the modern university experience shows that the success of the pedagogical activity of professors and teaching staff and the educational activity of students mostly depends on the efficiency of the pedagogical communication process between teachers and students. The goals and objectives of the educational process aimed at training high-quality specialists in universities and, ultimately, the transfer of professional experience. İt is done due to proper communication process between teacher and students. Teachers with effective pedagogical communication style not only convey a certain amount of information to students, but also shape their professional and moral position and bring their experience to a high level of development. High demands are placed on the psychological climate of the department, faculty, and the university as a whole, which is realized in daily pedagogical communication in the higher school. The formation of a personal communication style with students is associated with the development of the creative individuality of professors, associate professors and teachers. The exchange of scientific traditions and scientific information is carried out in the most effective way thanks to the establishment of close relations between teachers and students, and active cooperation according to their interests. At the same time, the article also clarified the negative trends that lead to a decrease in the effectiveness of pedagogical communication in modern conditions. At the same time, attention was drawn to the results of university students' neglect of acquiring knowledge in the direction of their profession. Thus, without the concept of partnership in the activities of university students, it is difficult to involve students in independent work, to instill in them professional taste, and to educate the professional direction of the individual as a whole. The most productive process of university education and training is provided by a system of relations established reliably at the university level. The article also includes the essence, content and functions of the formation process of the university teacher's communication style, the factors of the pedagogical communication process, the role of the pedagogical communication style in increasing the efficiency of the pedagogical activity, and the issues of pedagogical interaction of educational subjects. All this indicates the necessity of organizing the process of formation of pedagogical communication style among university teachers in the interests of increasing the efficiency of the specialist training process. Thus, the subject of the research is the essence

FULL TEXTS BOOK

and content of the process of formation of pedagogical communication style among university teachers, as well as ways of increasing its efficiency. The purpose of the research is to justify the essence, content and characteristics of the formation of the pedagogical communication style among university teachers based on the results of the theoretical analysis and pedagogical experiment, and to determine the ways of the formation of the pedagogical communication style in modern conditions. Thus, it is possible to increase the efficiency of the process of formation of pedagogical communication style by increasing the level of psychological and pedagogical training of professors and teachers of higher education institutions, by improving the pedagogical technique of higher school teachers, and by strengthening the moral-aesthetic component.
Keywords: Pedagogical communication, teacher, university, student, style.

Pedagogical communication is a special form of communication that has its own characteristics and at the same time is subject to the general psychological laws inherent in communication as a form of interaction between people, including communicative, interactive and perceptual components. Pedagogical communication is a set of tools and methods that ensure the realization of the goals and tasks of education and training, and determine the nature of interaction between the teacher and students. The problem of communication, along with individual and group problems, is one of the main problems of social pedagogy and psychology in its various aspects. It is interdisciplinary in nature. Furthermore, from a modern human perspective, communication is a concept used in various aspects of human life. The main goal of every university is to form the future professional personality of students. Teacher-student communication should also serve this purpose. In this communication, cooperative relations between teacher and student are very important. Because without the concept of cooperation, it is difficult to involve students in independent work and increase their interest in their profession. A productive learning process at a university depends on well-established relationships. Teacher-student relations gradually develop depending on the personal life, knowledge level, worldview, social experience, activity of the faculty, the department, and the professionalism of the university teacher. The university teacher is the initiator and organizer of the communication process. Pedagogical communication is a creative process. Because in this process, educational problems are solved or relationships are organized. A modern university teacher includes four people: 1. The teacher - transfers knowledge to students, stimulates student activity, forms knowledge and skills in students. 2. Educators take care of comprehensive development of personality of students, form professional and psychological qualities in students. 3. A scientist conducts scientific research in the field of the subject he teaches. 4. The manager organizes the audience, stimulates and supervises the independent work of students. According to thinkers, an ideal teacher should be patient, loving students, kind and fair, sympathetic to his profession and responsible. At the same time, he should be demanding and diligent. But above all, he must have a high moral quality. In addition, the teacher should be optimistic and have a sense of humor. The teacher's communication style plays a very important role in the teaching process. The communication style depends on the features of the teacher's communication capabilities, as well as the characteristics of the student body. The communication style embodies the social and ethical attitudes of the society and the university. It also reflects the personal and pedagogical level of the teacher, his emotional and psychological characteristics. A communication style is, in essence, a set of repeated, fixed ways of carrying out the communication process itself. Each person's various communicative attitudes, knowledge, skills, and habits form a relatively stable unity through which one person's communication differs from another's. It is more correct to separate the styles according to the types of contact in communication. It is necessary to emphasize the personal, cognitive, emotional and action characteristics of the communication style. In terms of content, communication style usually means a form of communication based on one or other methods of influencing the interlocutor. According to this definition, two types of communication are noted: authoritarian and democratic based on subjective

FULL TEXTS BOOK

communication. The subjective style of pedagogical communication creates positive emotional reactions without any effort on the part of the teacher, while the authoritarian style of communication creates tension and causes the manifestation of negative emotional states. Of course, emotional states affect teachers and students differently. The style of pedagogical communication in the university is determined not only by the individual typological characteristics of the teachers, but also by the requirements of the situation. In this regard, three communication styles are distinguished according to the degree of readiness of teachers for a certain situation: 1. Ritual - the main task of partners in this communication is to maintain relations with society, to strengthen their opinion about themselves as a member of society. In such communication, the individual characteristics and wishes of the partner are not taken into account. Ritual communication is just a prologue to manipulative communication. 2. Manipulative communication style - this is a communication in which the partner is perceived as a means to achieve a goal beyond him. In such communication, it is important to demonstrate knowledge of the conditions and factors that will help the interlocutor to achieve the desired goal. 3. Humanistic communication style - this communication is aimed at meeting the needs of understanding, sympathy and empathy. As it can be seen, pedagogical communication is a very subtle type of interaction that affects the intentions and desires of students due to the teacher's communication style. The individual characteristics of the style reflect the manifestations of the socio-psychological or individual pedagogical characteristics of the teacher's personality. Depending on the purpose, parties, process and result of communication, many style options arise. So, some contrasting styles can be noted; truthful or deceptive style, business or casual style, formal or informal style, masculine or feminine style, etc. some of these styles, especially formal, sly, arrogant, indifferent, etc., styles are unacceptable in the communication environment. Others are adequate in some communication environments and inadequate in others. Meanwhile, it is appropriate to emphasize the individual characteristics of pedagogical communication styles. Thus, cognitive characteristics reflect his evaluations in terms of information richness, completeness, accessibility, relevance of presentation, adequacy of using communication tools. In this sense, we can call understandable and incomprehensible, undeveloped, detailed, clear and foggy, semi-literate and literate, abstract and concrete business communication styles. Ambiguous, incomprehensible styles are unacceptable among them. Various forms, techniques, and methods of communication developed by experts serve, first of all, to provide adequate information and also to achieve normal cognitive contacts between teachers and students. Cognitive contact is a common understanding between communication partners about the phenomena of nature, society and mental activity that constitute the subject area of the direct communication act. This type of communication reflects what is important in communication, especially its content side, and consists in removing semantic barriers in relation to the subject area of communication, the means of transmitting this content, and the cognitive capabilities of the communication partner. Each type of semantic barriers has its own characteristics, because the levels of understanding of the field and means of communication, as well as the possibilities of this understanding, may be different for different communication partners. The emotional features of the communication style are its emotional intensity, emotional tone, emotional positions, etc. reflect assessments. For example: emotional-calm, unbalanced-balanced, insincere-sincere, angry-friendly, serious-non-serious, etc. communication styles can be listed. According to the methods of influencing the student's consciousness and will, according to the assessment of the communication style, according to his practical activity, the characteristics of the teacher's activity are noted, especially convincing and commanding, diplomatic and honest, mild and categorical, hesitant and decisive styles are noted. A comparison of different characteristics of communication style allows to note that some of them have stable positive ratings, for example, styles that are interesting, understandable, sincere, honest, respectful, persuasive and regulatory, etc. Comparing the individual style of pedagogical communication with the generally accepted style allows us to distinguish three types of their relationship. 1. An individual style characterized by a contradiction to generally accepted

FULL TEXTS BOOK

style norms. Typical features of this communication style are; excessive originality, grammatical and logical "fallacy", indifference and disrespect for a specific communication partner. 2. The speed extraction style, which reflects the mechanical assimilation of generally accepted normative standards of communication by an individual. Often this style occurs in the activities of inexperienced teachers. This style has a standard and formal character. 3. The optimal style that manifests itself within the norms of generally accepted behavioral norms of an individual. The most acceptable is the optimal style because it is social and individual at the same time. (Egides A.P. Psychological correction of conflict communication // Psychological journal. 1984. No. 5. P.52-62.). It is clear that the optimal pedagogical communication style of a university teacher cannot be considered as something frozen and unchanging. Of course, the communication style is constantly changing and improving due to experience, training, and self-improvement. The ability of a university teacher to master communication tools is important. A number of expressions are often encountered, especially during pedagogical communication. for example: "I didn't express myself like that", "I didn't mean it like that", "You misunderstood me", "I really meant it", etc. these expressions reflect semantics. In general, it is conditionally possible to distinguish ideal and realistic levels of skills in commonly accepted means of communication. The level of practical skills in communication tools is usually divided into high, medium and low. Discrepancies at these levels usually lead to semantic barriers, which are sometimes called language or linguistic barriers. The most important regulatory requirements for the correct construction of the teacher's speech, determined by the laws of students' cognitive processes, are the intelligibility, comprehensibility, meaningfulness, accuracy and regularity of expressions. The understanding of expressions is characterized by the selection of sensory means in accordance with the laws of perception, memory, thinking, speech, and imagination. The use of sufficient voice power, the presence of pauses, intonations and logical accents prevent phonetic barriers in perception. The content of the teacher's speech is also important here. When students are repeatedly told about topics they already know by heart, the student's attention is distracted. Including confused, unsystematic speech also causes a decrease in students' cognitive activity. The ambiguity of expressions leads to a kind of sophistry barrier that prevents understanding the content of the speech itself and its direction. It should also be noted that the distorted presentation of thoughts causes a kind of chaos barrier, which disrupts all cognitive activities of students and leads to the disruption of cognitive contacts. In the process of pedagogical communication, there are barriers of laconism and expressiveness that prevent mutual understanding between teachers and students. When any of the obstacles that we have listed arise, in order to achieve a more successful pedagogical communication, there is a need to restructure the communication, and at this time special methods are applied. In these cases, clarifications, clarifications, paraphrases, repetitions, explanations, and direct appeals to the interlocutor are used more in terms of the form or essence of information presentation. Special difficulties in pedagogical communication are caused by the individual, gender and age characteristics of students, especially the type of memory, mentality, type of perception, type of speech. It is not always possible to predict these features, therefore, during pedagogical communication, if necessary, it is possible to determine the individual-typical features of the cognitive activity of the communication partner and make appropriate adjustments in time during the conversation. Experts note that there cannot be complete communication between the teacher and students without emotional contact. The search for truth has never been and cannot be without human emotions. Neither personal nor cognitive connection occurs without some emotional basis. In some cases, the student's emotional state can be predicted in advance based on knowledge of stable personality traits, in particular, his outlook, beliefs, ideals, tendencies, needs, interests, habits, will, temperament, and character traits. When dealing with a strong, determined, emotionally balanced person, the content of the conversation comes first, and emotional subtleties can be ignored beforehand. If the person being taught is indecisive, emotional and easily excited, then the teacher will first of all have to think about how to influence his will, prevent emotional outbursts, how to keep him under the influence of the

FULL TEXTS BOOK

content of the conversation. Also, in the process of pedagogical communication, in addition to taking into account stable characteristics, it is recommended to the teacher to study the student's emotional relationships, his mood, and his state of health caused by a number of events. It often happens that due to some events in the family, school or work, the student may not want to talk about the discussed topic, under these circumstances, for this purpose, with this teacher. In general, the process of forming the pedagogical communication style of a university teacher is a complex set of techniques and methods of the teacher in order to establish personal, cognitive, emotional and action relationships simultaneously or sequentially, as well as to study the requirements. At this time, external and psychological factors affecting pedagogical communication should be taken into account. All these techniques and methods are not born, but are formed on the basis of pedagogical communication experience and in certain social conditions. The nature of the teacher's pedagogical communication style is dual. On the one hand, the style is determined by the characteristics of pedagogical activity, on the other hand, by the personal qualities of the teacher.Since the teacher's pedagogical communication style is determined by the conditions of pedagogical activity and personal qualities, it is formed by pedagogical tools that give direction, purposefulness, control and systematicity to the formation process. In the process of forming the pedagogical communication style of a university teacher, it is necessary to develop the teacher's pedagogical skills, personal qualities, communicative behavior habits, value orientations, and the motivation field of personality. The process of formation of the pedagogical communication style of the university teacher takes place under the influence of a number of factors. For example: the level of development of general psychology and pedagogic science; Opinions of the heads of higher educational institutions on the training and staffing of professors and teachers; the state of university education and universities' need for teachers with certain levels, profiles and preparatory qualifications; the level of development of the theory and practice of teacher education in the country; High-quality composition of teachers who prepare students for pedagogical activity in universities, etc. note that in some cases teachers try to solve problems themselves during interaction with students and only after failure turn to more experienced colleagues or management; In most cases, various difficulties in pedagogical communication between teachers are solved by trial and error; There are a number of contradictions in the formation of the pedagogical communication style of the university teacher: 1. the contradiction between the increasing demands for teacher training and the lowering of the level of scientific and pedagogical potential of universities; 2. the contradiction between the need for fundamental pedagogical training of teachers and the lack of scientific-theoretical bases for its organization; 3. the contradiction between the radical reform of the education system as a whole and the incomplete measures in the reconstruction of its most important subsystem - psychological-pedagogical retraining of teachers; 4. The contradiction between the integration of higher education into the multi-level educational structure adopted in the country and the invariant approach to the organization of teaching staff training, etc. The work of managing the process of formation of pedagogical communication style of a university teacher is based on special principles. 1. activity and initiative of teachers in the teaching process of the univ3. diagnostic - the teacher's actions are based on the results of observing the students' educational activities; 4. division of teaching material into organizational and content teaching units that are suitable for students' capabilities; 5. consideration of students' perceptual characteristics in the teaching process; 6. Using various forms of group and individual work; 7. The responsibility of teachers in the teaching process of the university; 8. Development of self-esteem, personal and cultural identity of teachers in the teaching process, etc. It defines the methods by which the university teacher can achieve the development of the most optimal style of pedagogical communication in the process of formation of the pedagogical communication style: 1. general didactic methods (lecture method; independent work method; discussion of teaching material in seminars, class-group and practical exercises; demonstration; exercises; research method and practical work method); 2. active methods (Socratic method, ("brainstorming"), analysis of specific situations, solving pedagogical problems, discussion of content,

FULL TEXTS BOOK

professional games, organizational and action games, learning by research, round table method, "intellectual exchange", etc.); 3. psychological training methods (exercises (debates, discussions), participation in classes, trial lectures, development of didactic materials, development of personal methods, development of pedagogical technologies). The aspect that reveals the objective difficulties of the pedagogical communication process is of great importance for the optimal course of the process of formation of the pedagogical communication style of the university teacher. Considering this aspect is important for the teacher's self-esteem. These difficulties are: 1. inability to communicate with students; 2. misunderstanding of the student's position; 3. difficulties in managing communication during training; 4. Lack of ability to build and rebuild relationships depending on pedagogical tasks; 5. Difficulties in conveying one's attitude to the presented educational material; 6. Difficulties in controlling one's emotions in communication. The structure of the university teacher's pedagogical communication style formation process consists of the dialectic unity of the following components: motivational component; stable personal experience; orientation in the conditions of the situation of pedagogical communication; non-verbal means of pedagogical communication; executive actions; control and evaluation of actions; activity correction.ersity; 2. Dialogic pedagogical communication, that is, cooperation with requirements.

Conclusion: The process of forming the pedagogical communication style of a university teacher is a contradictory and multi-factorial pedagogical process that develops the teacher's pedagogical skills, personal qualities, communicative behavior habits, value orientations, and the sphere of personal motivation. In the university, the teacher is the person who provides the conditions of pedagogical activity in the most adequate way. The analysis of higher schools shows that in the process of forming the pedagogical communication style of teachers, it is possible to form a pedagogically appropriate communication style that increases the efficiency of their teaching process. However, the formation of pedagogical communication style among university teachers today has not been fully reflected as a problem in scientific research. However, this is one of the most important issues in modern society. Because we already have a youth living dependent on various social networks and internet platforms, and they are more inclined to virtual communication. Therefore, effective pedagogical communication process in higher education institutions faces many obstacles. Attention should be paid to the formation of pedagogical communication style of university teachers. Serious steps should be taken in this direction. So, to improve the professionalism of university teachers, work should be done to organize improvement courses.

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FULL TEXTS BOOK

TRANSLANGUAGING AS A BILINGUAL EDUCATION PEDAGOGY IN THE EARLY YEARS: A META-SYNTHESIS APPROACH

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ABSTRACT
Translanguaging pedagogies have become an alternative pedagogy to the traditional bilingual education, emphasizing that emergent bilinguals possess a single, unified linguistic repertoire rather than two distinct language systems (Garcia & Wei, 2014). Consequently, teaching pedagogies should be revised to reflect this understanding. This meta-synthesis study aims to explore the how the implementation of translanguaging pedagogy at early childhood education affects children. To achieve this, twelve (N=12) peer-reviewed full-length articles published between 2014 and 2023 were included from a search of three electronic databases: Web of Science, ERIC, and SCOPUS. The synthesis of these articles revealed that the use of this bilingual pedagogy in both multilingual and monolingual preschool contexts have enabled teachers to design a more inclusive and conducive learning environment. Additionally, the studies provide some evidence for the development of children in different aspects. Specifically, translanguaging practices were found to enhance students' problem-solving strategies and metalinguistic awareness, enabled them to make cross-cultural comparisons, and increase their emotional development.
Key Words: Translanguaging, Bilingual Education, Multilingual Education, Meta-synthesis

INTRODUCTION

Translanguaging, as an emerging and alternative pedagogy for multilingual and bilingual education, refers to flexible instruction strategies where students and emergent bilinguals are asked to use their full linguistic repertoire to make meaning (Wei, 2011). Coined by Wales (1994, as cited in Baker, 2003) and later extended by Garcia (2009), the term 'translanguaging' emphasizes a bilingual education approach in which languages are integrated rather than kept separate. Within the context of early childhood education (ECE), it can be claimed that it has generally followed traditional approaches to English language learning, ignoring the importance of real-world interactions and language use in fostering exposure to the language to the point where children may pick it up gradually. On the other hand, translanguaging allows children to use of multiple languages in more authentic and meaningful contexts, which poses a challenge to the traditional language education in ECE. In terms of the potentials of translanguaging pedagogy in this context, Garcia, Johnson, and Seltzer (2017) suggest that it strengthens the home-school links, supports children's bilingual identity, and helps children comprehend academic contents better.

The purpose of this study is to explore and determine the impact of translanguaging as a pedagogical practice on emergent bilingual children at various pre-school contexts by following a qualitative meta-synthesis approach. The findings of this study can be used to increase clarity about how the teachers' use of translanguaging as a pedagogical possibility play a role in the development of children at early childhood education.

FULL TEXTS BOOK

METHODOLOGY

This study follows a qualitative meta-synthesis approach which aims to combine the results of twelve (n=12) individual translanguaging studies to draw a general picture about the effects of this pedagogy on preschoolers. As Rosenthal and DiMatteo (2001) state, meta-synthesis studies "allow researchers to arrive at conclusions that are more accurate and more credible than can be presented in any one primary study" (p. 61). A qualitative meta-synthesis approach was chosen for the present study as it allows for a comprehensive synthesis of qualitative findings of multiple research, giving a deeper understanding in what ways translanguaging pedagogy has effected emergent bilinguals at various bilingual preschool contexts. According to Levitt (2018), the synthesis of findings from qualitative studies:

'can assist researchers in meeting a variety of goals such as developing broadly-based theoretical understandings, cataloging sets of findings, developing measures, conducting comprehensive assessments of the state of a body of literature, forming principles to guide in-session practice, o examining the methods and methodologies employed within a field (p. 367).

In this sense, a qualitative meta-synthesis study comprises of some components which are the hypothesis suggested by researcher, the researcher's inclusion and exclusion criteria, a data collection process, analysis of the emerging themes, and a report on the findings (Borenstein et al., 2009; Levitt, 2018; Lipsey & Wilson, 2001).

Hypotheses

- The study hypotheses that the translanguaging pedagogies in these bilingual preschool settings affect emerging bilingual preschoolers positively because these pedagogies activate children's entire linguistic repertoire, creating a more supportive and inclusive learning environment.
- The study also hypotheses that the translanguaging pedagogies in early childhood years foster children's intercultural awareness because they encourage students to understand and appreciate diverse culture.
- Another hypothesis suggested by the study is that translanguaging practices also contribute to the preschoolers' identity construction because they affirm the children's culture coming from diverse ethnic background. In this sense, the researchers are interested in to see in what ways translanguaging practices have a role in shaping identity in early childhood years.

Eligibility Criteria

In parallel to the aim of this meta-synthesis study, search string was generated by the related key terms: TITLE-ABS-KEY ("translanguaging" OR "bilingual education") AND ("preschool" OR "pre-school" OR "kindergarten" OR "early childhood"). As for the databases for the query, Web of Science, The Education Resources Information Center (ERIC), and SCOPUS were chosen. Lastly, the pre-defined eligibility criteria determined the relevant studies for analysis. The following table shows the inclusion and exclusion criteria before starting to the investigation:

Table 1. Eligibility Criteria

Inclusion Criteria	Exclusion Criteria
● articles published in the last ten years	● articles published before 2014
● articles published in English	● articles published in other languages
● peer-reviewed full-length primary research articles	● secondary research articles including proceedings, unpublished dissertations, reviews, chapters, *etc*.
● translanguaging in preschool contexts	● translanguaging in other education levels
● emergent bilingual speakers	● non-emergent bilingual speakers

FULL TEXTS BOOK

After the process of eligibility criteria, the final twelve (n=12) studies are shown in the following table:

Table 2. The Included Studies

Author(s)	Year	Geography	Research Design
Alamillo, Yun & Bennet	2017	The U.S.A	Qualitative
Arreguin-Anderson, Salinas-Gonzales & Alanis	2018	The U.S.A	Qualitative
Axelrod	2017	The U.S.A	Qualitative
Axelrod & Cole	2018	The U.S.A	Qualitative
Bauer, Presiado & Colomer	2017	The U.S.A	Qualitative
Bengochea & Gort	2022	The U.S.A	Qualitative
Bengochea, Sembiante & Gort	2018	The U.S.A	Qualitative
Escamilla, Alanis & Meier	2023	The U.S.A	Qualitative
Flynn, Hoy, Lea & Garcia	2021	The U.S.A	Qualitative
Leung	2019	China	Qualitative
Garrity, Aquino-Sterling & Day	2015	The U.S.A	Qualitative
Sembiante, Bengochea & Gort	2020	The USA	Qualitative

FINDINGS AND DISCUSSION

As shown in table 2, all but one of the twelve studies were conducted in the USA, which comes from the multicultural reality of this country. This linguistic and cultural diversity creates a rich environment for researchers to explore how translanguaging can be implemented and what outcomes it produces. The table also demonstrates that all studies followed a qualitative research design. Studies on translanguaging pedagogy are still a new area of research, especially when it comes to early childhood education. Qualitative research is a well-suited design for exploratory studies with the intention of gaining comprehensive insights into a phenomenon (Creswell, 2007). For this reason, to investigate how translanguaging is experienced in the classroom, the researchers probably employed qualitative methodologies.

As for the impacts of translanguaging pedagogy on the development of children at preschool period, the meta-synthesis analysis of the studies suggests that it contributes to children's cultural and bilingual identity constructs as translanguaging is a way to affirm the multiple languages and cultural backgrounds present in a child's life, fostering a sense of pride and confidence in their multilingual abilities (Alamillo, Yun & Bennet, 2017; Arreguin-Anderson, Salinas-Gonzales & Alanis, 2018; Bengochea & Gort, 2022; Bengochea, Sembiante & Gort, 2020; Escamilla, Alanis & Meier, 2023; Gort & Sembiante, 2015). For example, children were invited to tell their personal stories on their home lives by bringing some photos or drawings in the study of Escamilla, Alanis, and Meier (2023). The study suggests that these kinds of activities which allow emergent bilingual preschoolers to express their stories in their mother tongue create a sense of pride in their bilingual identities. Some further studies should be conducted to explore the long-term effects of such translanguaging practices on children's academic performance, social integration, and emotional well-being.

The impacts of translanguaging pedagogy on preschoolers were also discussed from cognitive perspectives in the reviewed articles. To illustrate, some articles indicate that translanguaging pedagogies were successful in encouraging young learners to intentionally compare syntactic, semantic, and phonological features across languages, which increases their metalinguistic awareness (e.g., Axelrod & Cole, 2018). Similarly, Dikilitaş, Bahrami & Erbakan (2023) state in their study that improving metalinguistic awareness is difficult at an early age because they are still in the process of

FULL TEXTS BOOK

developing their cognitive skills. However, they suggest that translanguaging practices enable emergent bilingual children to develop this skill.

The meta-synthesis analysis also shows that children develop a language-based agency as they are allowed to switch between the languages at preschool period. In this sense, it is claimed that emergent children benefit from flexibility in language switching because it makes them more strategic language users who can adapt their language to fit the situation and their interlocutors (e.g. Axelrod, 2014; Garrity, Aquino-Sterling & Day, 2015; Sembiante, Bengochea & Gort; 2020).

CONCLUSION

In conclusion, the meta-synthesis study of research on this subject reveals that preschoolers' development is significantly benefited by translanguaging pedagogy. Translanguaging practices support children's bilingual identity, their cognitive development, and their language-based agency. Overall, it can be suggested that translanguaging pedagogy is a useful strategy to nurture the holistic development of bilingual preschool children.

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FULL TEXTS BOOK

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FULL TEXTS BOOK

DOSIMETRIC USAGE OF SiO_2 MATERIAL VIA WELL-KNOWN LUMINESCENCE TECHNIQUES

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ABSTRACT

This study aims to investigate the structural, morphological, and luminescence properties of the SiO_2 compound, commonly known as sand, and its potential application in passive radiation dosimetry. SiO_2 powder samples were prepared in powder form and morphological characterization of the powder surfaces was conducted using Scanning Electron Microscope (SEM) analysis, revealing homogeneous structures at the micro surface level. The luminescence properties were examined using Thermoluminescence (TL) and Optically Stimulated Luminescence (OSL) methods. The results indicated that the luminescence signals were adequate for dosimetric purposes. Among the five TL peaks identified at 100°C, 200°C, 300°C, 400°C, and 500°C, the peaks at 100°C and 300°C were found to be responsible for the OSL signals. The reusability of the OSL signals, combined with a near-linear dose-response over a wide range, suggests that SiO_2 is a promising candidate for OSL dosimetry applications. These findings highlight the potential of SiO_2 materials for effective and reliable passive radiation dosimetry, offering a cost-effective and accessible option for radiation measurement and monitoring.

Keywords: Thermoluminescence, SiO_2, Passive Dosimetry, Radiation Measurements, Optically Stimulated Luminescence

INTRODUCTION

Using radiation-sensitive materials to measure the radiation dose exposure of people working with or exposed to radiation and to perform retrospective dose estimation after a nuclear or radiological emergency fall into the field of passive dosimetry and is a very common research subject. These types of materials are called dosimetric materials and are desirable to find easily, abundantly and cheaply. Especially in accident dosimetry, dose measurements from easily accessible samples will save significant time for security forces and accelerate the measures to be taken after the accident. Sand is a natural material that meets these conditions and is easily accessible. Although the natural composition of sand varies depending on environmental conditions, its main component, SiO_2, is very important to investigate using Thermoluminescence (TL) and Optically Stimulated Luminescence (OSL) methods in the fields of environmental dosimetry, retrospective dosimetry and dating. Revealing the luminescence identity of this material will also reveal its dosimetric properties.

In TL and OSL methods, the process begins with the valence electrons gaining energy after radiation exposure of the materials and trapping them in the defects in the material structure. An external excitation source is needed for the electrons to be released from the traps. In the TL method, luminescence is obtained as a result of heat stimulation, and in OSL, light stimulation. In a simple approach, information about the radiation dose can be obtained by measuring the luminescence efficiency (Bøtter-Jensen, McKeever, & Wintle, 2003; S. McKeever & Chen, 1997; S. W. S. McKeever, 2001; Yukihara & McKeever, 2011).

Although there are a few studies on the luminescence of SiO_2 in the literature, these generally include the luminescence properties of the new formation obtained as a result of doping the material with rare earth elements or transition metals in the laboratory environment (Barve, Patil, Moharil, Bhatt, & Kulkarni, 2016; Okada, Kasap, & Yanagida, 2016; Patil, Barve, Moharil, Kulkarni, & Bhatt, 2014;

FULL TEXTS BOOK

Wintle & Adamiec, 2017). Although the processing of natural sand minerals and their luminescence for dosimetric purposes have been carried out in a few studies (Afouxenidis et al., 2007; Aydaş & Aydın, 2015; Preusser et al., 2009), they generally focused on the TL properties of the material.
In this study, the morphological, TL and OSL properties of Sand (i.e. SiO_2) powders purchased from Sigma Aldrich were examined in detail and their trap structures were revealed. Moreover, some important dosimetric properties, dose response and reusability, were also studied.

MATERIAL AND METHODS

Sand Powders and Structure

In this study, white quartz (Sand, Silicon dioxide, SiO_2) with a particle size of 50 - 70 mesh, numbered CAS:14808-60-7, was purchased from Sigma-Aldrich. Morphological and luminescence measurements were carried out directly without exposing the samples to any heat treatment. The silicon atom is coordinated tetrahedrally with four oxygen atoms surrounding a central Si atom. In SiO2, each silicon atom is covalently bonded to four oxygen atoms, forming a three-dimensional network solid.

Morphological Analysis

The surface morphology and grain sizes of the SiO_2 powder materials were examined by the Scanning Electron Microscope (SEM) analysis. For this purpose, Zeiss Supra 55 FE-SEM (Field Emission Scanning Electron Microscope) was used. Micrographic images were obtained by FE-SEM with a spectral slit width of 1.5 nm at room temperature. The presented micrographic images were taken at 5000x direct magnifications, 20 kV, and 2.5 dot size.

Luminescence Techniques

Thermoluminescence (TL) and Optical Stimulated Luminescence (OSL) techniques, which are well-known passive dosimetry methods, were used to perform luminescence characterizations of the material. Irradiations were carried out using a ^{90}Sr-^{90}Y beta radiation source, and a bialkaline model 9235 QA photomultiplier tube (PMT) was used to obtain luminescence signals. Blue LED ($\lambda \sim 470$ nm) is used for Light Stimulation and the system is known as DA-20 model Risø TL/OSL reader system. Hoya U-340 nm filter was used for measurements in the UV region. In OSL measurements, SiO2 powders were irradiated with beta doses of 1 Gy and preheated at 120 °C for 10 seconds. OSL readings were generally made using 100-second blue light stimulations. TL measurements were made by heating 1 Gy irradiated samples from room temperature to 650 °C with a heating rate of 3 °C/s without preheating.

RESULTS AND DISCUSSIONS

Morphological Study

In order to investigate surface morphology of the sand powder samples, SEM micrograph was obtained and presented in Figure 1. In the figure, spherical particles with a homogeneous small size distribution were observed in the SEM photograph, and the average particle size was observed in the range of 300-500 nm. It is evident from the OSL signals that the homogeneous distribution of the surface has a positive effect on the luminescence efficiency (discussed later).

FULL TEXTS BOOK

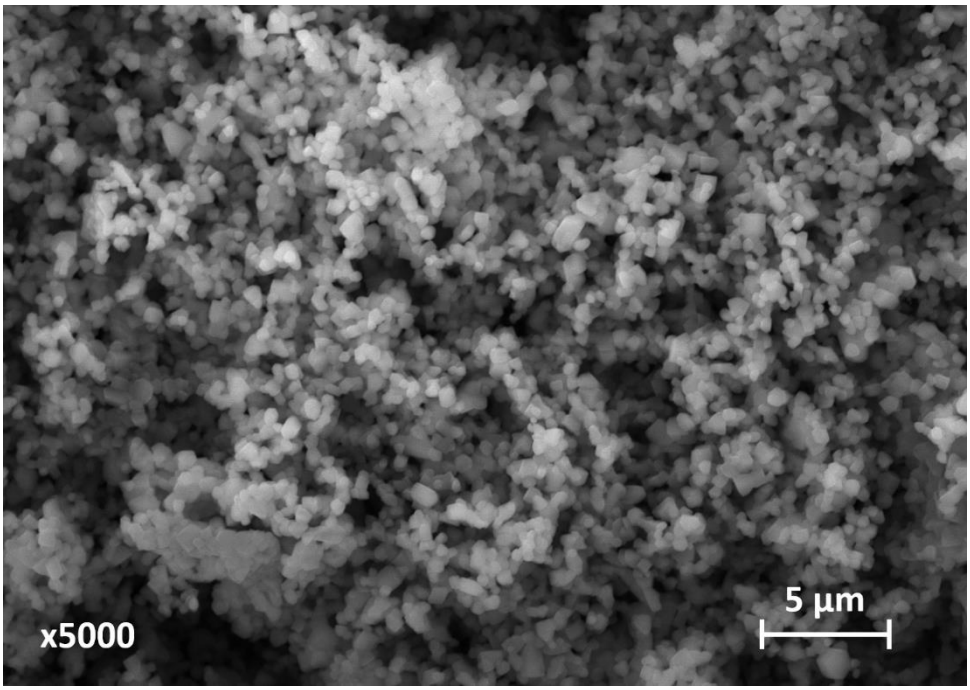


Figure 1. SEM photograph of SiO_2 powders at x5000 magnification.

Luminescence Study

Figure 2 shows the simple TL glow curve obtained by heating samples exposed to 1 Gy of beta radiation to 650 °C. As can be seen from the figure, while the TL glow curve of SiO_2 is dominated by a very sensitive low temperature peak, there are 4 different trap regions located around 75, 175, 350 and 475 °C in the TL glow curve drawn on the logarithmic axis given in the inset figure. In general terms, it can be said that TL trap structures are suitable for dosimetric use in terms of sensitivity and temperature. It should be noted that the results are similar to the findings in the literature.

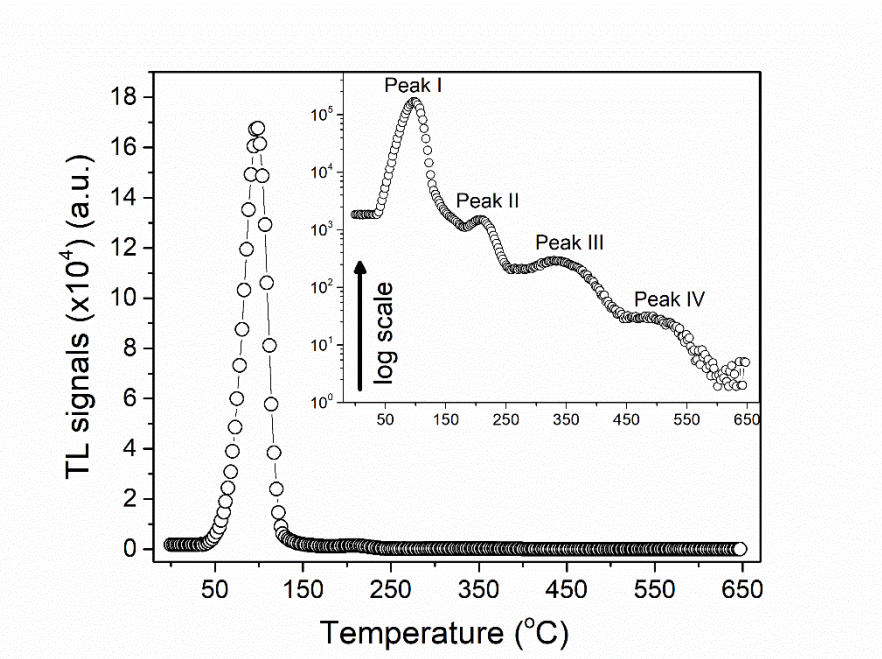


Figure 2. TL glow curve of SiO_2 powders previously irradiated with 1 Gy beta-radiation. The inset figure represents a logarithmic representation of the TL sensitivity scale for better representation of deep traps.

FULL TEXTS BOOK

On the other hand, to check whether the OSL signals of the sample were suitable for dosimetric use, OSL signals were obtained with 100 s of blue light LED stimulation after a radiation dose of 1 Gy and are presented in Figure 3. As can be seen from the figure, OSL signals fall to the background level and are exhausted in approximately 2-3 seconds. This indicates that OSL signals generally originate from shallow traps that fall in the low temperature region of the TL glow curve and have low lifetimes.

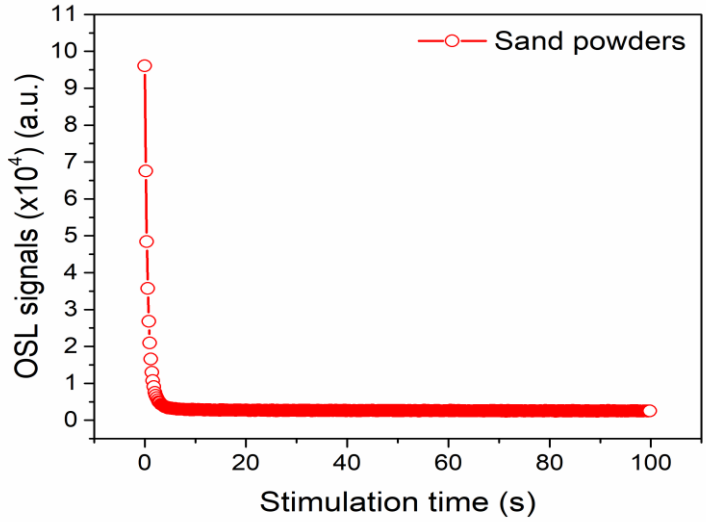


Figure 3. OSL decay curve of SiO_2 powders previously irradiated with 1 Gy beta-radiation.

In order to see this closely, OSL signals were well fitted to the combination of two time-decreasing exponential components based on the first-order kinetics approach in the Origin program and are presented in Figure 4. This Fit method was given with model equations in our previous studies (Altunal, Guckan, & Yegingil, 2023; Altunal, Jain, Hayat, Guckan, & Yegingil, 2022). As can be seen from the figure, OSL signals are well represented by two-time decay functions, and it can be concluded that there are two trap regions responsible for OSL traps in SiO_2. To prove this, TL after OSL and Step annealing experiments were carried out, which provide detailed information about the relationship between TL and OSL traps.

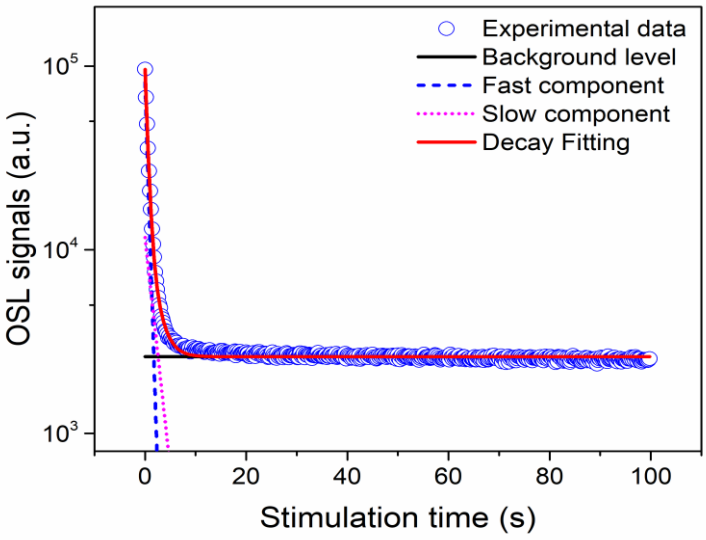


Figure 4. OSL decay components of SiO_2 powders previously irradiated with 1 Gy beta-radiation.

FULL TEXTS BOOK

To take a closer look at the relationship between TL and OSL traps, after taking the TL curves (Direct TL) of the SiO_2 samples after a 1 Gy radiation dose, the samples were reset and exposed to the same dose again. Then, the sample was exposed to 100 s of blue light stimulation and TL curves were obtained again after OSL stimulation (TL after OSL). The aim here is to reveal the TL trap areas affected by light. Basically, OSL traps are emptied with OSL stimulation and the remaining TL signals are examined. Figure 5 shows the TL glow curve obtained from the samples, the "TL after OSL curve" and the Bleached TL (i.e. Residual TL) curve obtained by calculating the difference between these two curves. As can be seen from the figure, each peak observed in the residual TL curve shows the TL trap regions affected by light, and three peaks are observed around 75, 175 and 325 °C. These three peaks can be considered as trap regions responsible for OSL signals in SiO2, but to prove this, OSL trap levels affected by temperature must also be examined in detail. In this context, OSL signals were obtained from samples exposed to preheating conditions at different temperatures after a 1 Gy radiation dose. Preheating conditions were carried out in 10-degree increments from 50 °C to 200 °C, and in 20 °C increments from 200 °C to 560 °C, and OSL signals were obtained after each preheating process. In Figure 6, the step annealing curve obtained from SiO_2 samples and the residual curve obtained in the TL after OSL experiment are presented. As can be seen from the figure, OSL signals initially decreased sharply up to 100 °C, then remained stable until approximately 270 °C, and after this temperature, they decreased again and faded at 350 °C. While the first decrease occurred with the discharge of the 75 °C TL peak, called the shallow trap, the second decrease occurred with the discharge of the 350 °C TL traps. The results proved that 75 °C and 350 °C TL traps were responsible for the OSL traps of SiO_2, and TL and OSL traps had the same recombination process.

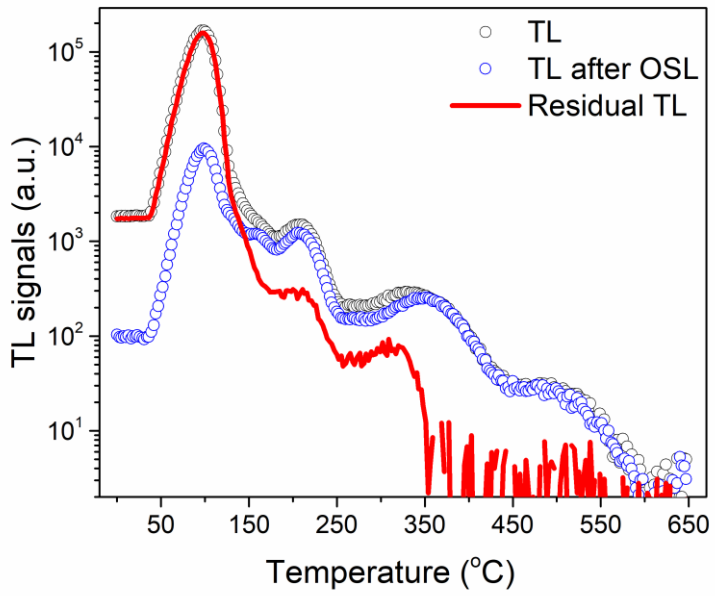


Figure 5. TL, TL after OSL, and Residual TL curves of the SiO2 powder samples after 1 Gy irradiation.

FULL TEXTS BOOK

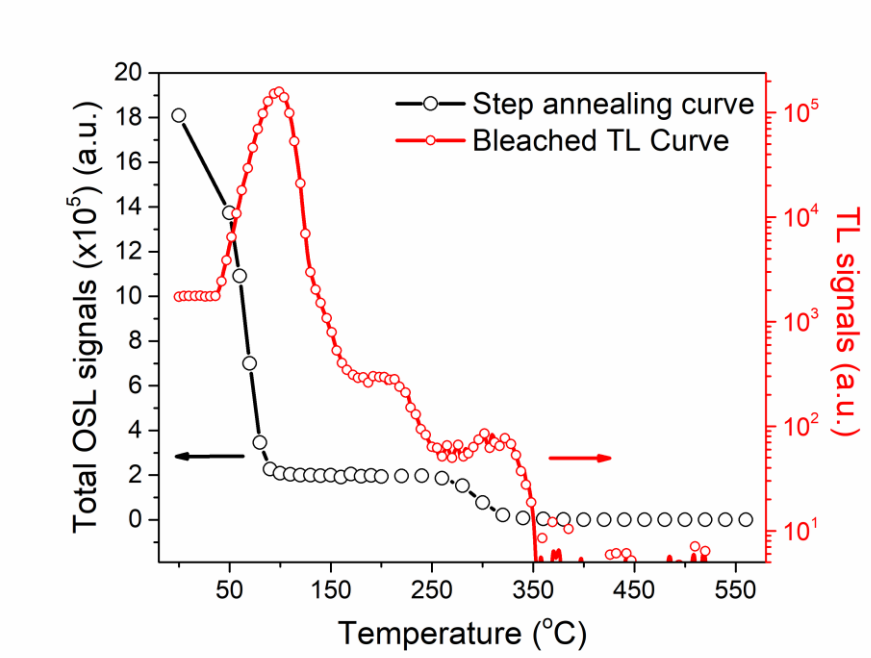


Figure 6. Step annealing and Residual TL curves of the SiO2 powder samples after 1 Gy irradiation. Arrows represent axes.

Dosimetric Study

In order to take a closer look at whether the OSL signals obtained from the material are suitable for dosimetric use, reusability and dose-response experiments, which are well-known dosimetric methods, were carried out. In order for luminescence signals of luminescent emitting materials to be used in dosimetric applications, it is desirable for the signals to exhibit similar sensitivity under repeated conditions. In this study, OSL signals were obtained from three fresh samples after a 1 Gy radiation dose and a 10 s preheating treatment at 120 °C. After each measurement, possible residual doses were erased with TL readings, and OSL readings were performed in 10 repeating experimental cycles. The total values of the OSL signals obtained as a result of the experiments were calculated and the deviations compared to the first reading were examined. Figure 7 shows the variation of total OSL signals across experimental cycles. As can be seen from the figure, OSL signals have deviated from the acceptable limits of maximum + 4.1% compared to the first reading.

FULL TEXTS BOOK

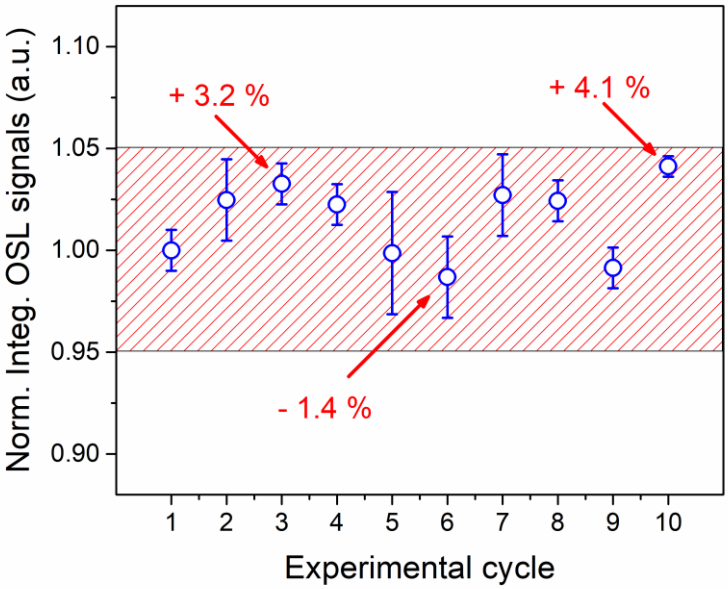


Figure 7. Total OSL signal variation against the repeated experimental cycles.

On the other hand, having a linear dose response of luminescence signals is important for radiation dose calculations and application areas. For this reason, three fresh samples were taken and OSL signals were examined at increasing doses. After irradiation, preheating was selected for 10 s at 120 °C, while OSL signals were obtained with 50 s of light stimulation. In Figure 8, the total OSL signals obtained between 0.1 Gy and 20 Gy were well fitted to a linear function, and the slope value was found to be 0.941. The fact that the slope value is below 1 indicates that the material exhibits sublinear characteristics in this range.

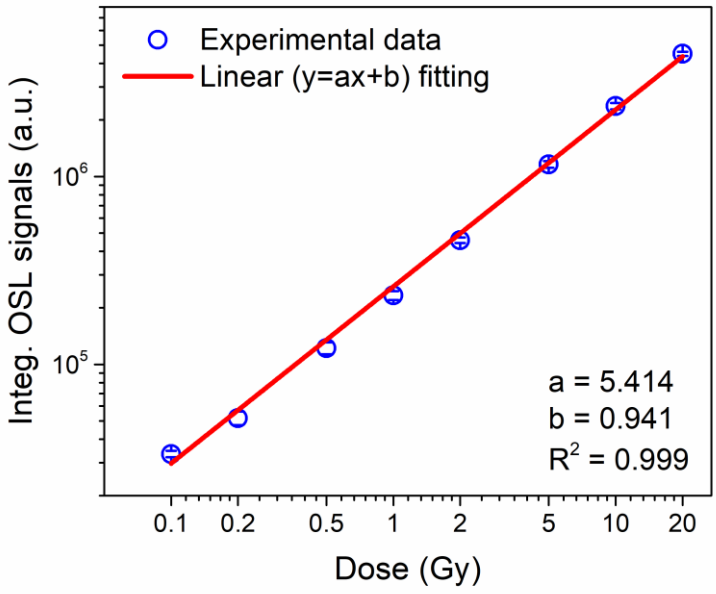


Figure 8. Total OSL signal variation against increasing radiation doses.

FULL TEXTS BOOK

CONCLUSION

In this study, the morphological, thermoluminescence (TL), optically stimulated luminescence (OSL), and dosimetric properties of SiO_2 (sand), a readily accessible material for accident dosimetry, were comprehensively examined. The results indicate that SiO_2 holds potential for use in accident dosimetry; however, it is premature to make definitive recommendations at this stage. It is essential that OSL signals undergo further rigorous dosimetric evaluation, including studies on signal fading, light effects, and energy response. The current research highlights the promising dosimetric characteristics of SiO_2's OSL signals, warranting detailed and thorough analysis.

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FULL TEXTS BOOK

MODEL FOR THE PREDİCTİON OF FEDERAL GOVERNMENT'S EXPENDITURE AND REVENUE IN NIGERIA

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ABSTRACT

This project analyzed the financial data of the Nigerian Federal Government between 2000 and 2020, focusing on the relationship between revenue and expenditure. It found a significant connection, with revenue playing a crucial role in influencing government spending. The study revealed that, on average, government expenditure consistently exceeded revenue during this period, a critical insight for budgeting and financial planning. A regression analysis provided a statistical equation demonstrating the positive impact of total revenue on total expenditure, highlighting the importance of revenue management. Moreover, there was a moderate positive correlation (0.60) between expenditure and revenue, indicating that as spending increased, revenue tended to rise as well. The trend of rising expenditure, sometimes surpassing revenue, could be attributed to financial challenges and unexpected events like the 2019-2021 pandemic. Recommendations included stricter budgeting, diversified revenue sources, and the establishment of a contingency fund to align government finances and enhance economic stability.

Keywords: Total expenditure, Economic stability and Financial planning.

1.0 Introduction

The connection between government spending and revenue is a crucial aspect of a nation's financial well-being. Nigeria's significance in Africa's economic landscape adds intrigue to this relationship. This project, "Analyzing Federal Government Expenditure and Revenue in Nigeria (2000-2020) using Simple Linear Regression," aims to unveil insights into Nigeria's economic journey over two decades. Adeleke and Salawu (2017) research underscores the importance of looking closely at sectors and revenue sources, essential for understanding Nigeria's financial complexities. However, research conducted by Olofin and Emmanuel (2016) highlighted how government spending affects Nigeria's economic growth, providing insights into effective fiscal policies. Meanwhile Anyanwu and Erhijakpor (2014) accentuates the relevance of understanding financial dynamics within African contexts, which aligns with the focus of this project. Their study provides insights into the impact of international remittances on poverty and emphasizes the importance of contextual factors. This echoes the significance of studying government expenditure and revenue in Nigeria's unique fiscal landscape to gain comprehensive insights into economic dynamics. This study's importance lies in its potential to inform policies, guide economists, and contribute to fiscal policy discussions. By meticulously analyzing Nigeria's government spending and revenue from 2000 to 2020, the research aims to shed light on the connections between these aspects, unveiling factors that have shaped Nigeria's fiscal performance.

2.0 Literature Review

The relationship between a government's expenditure and revenue is a crucial area of study in economics and public finance. The application of simple linear regression in analyzing the connection between the Federal Government's expenditure and revenue in Nigeria from 2000 to 2020 offers valuable insights into fiscal policies and economic stability. One of the earliest studies in this context is the work of Iyoha and Oriakhi (2004), who examined the relationship between government expenditure and revenue in Nigeria using time series data. Their findings indicated a positive correlation between these two variables, suggesting that as government revenue increased, expenditure also tended to rise. However, the study also highlighted the need for efficient fiscal management to ensure sustainable economic

FULL TEXTS BOOK

growth. In a similar vein, Agbaeze and Nwani (2016) explored the determinants of Nigeria's government revenue and expenditure dynamics. Their research incorporated variables such as oil prices, exchange rates, and inflation. The study utilized a regression model to analyze the impact of these factors on government finances. The findings emphasized the vulnerability of Nigeria's economy to fluctuations in global oil prices, underscoring the importance of diversification to reduce dependency on oil revenue. An examination of fiscal discipline and its influence on the relationship between government expenditure and revenue was conducted by Ogbulu and Okafor (2018). Their study delved into the period from 1980 to 2016 and revealed that strict adherence to fiscal discipline was essential for maintaining a sustainable balance between expenditure and revenue. The study advocated for effective budgetary controls and transparent financial management to ensure optimal allocation of resources. Furthermore, the study by Olabisi and Omisakin (2019) assessed the impact of government revenue on economic growth in Nigeria. While not directly focused on the linear regression of expenditure and revenue, their findings showcased the significant role of revenue generation in stimulating economic development. The study highlighted the importance of efficient revenue collection mechanisms to support government expenditure on critical sectors like infrastructure and social services.

3.0 Methodology

3.1 Source of data

Secondary data was used in this study. The relevant data for this study have been obtained from the Central Bank of Nigeria Statistical Bulletins of various years, Central Bank of Nigeria (CBN) Annual Report and Statement of Accounts.

3.2 Simple linear regression

The simple linear regression model involves a single predictor variable and is written as

$$Y = \beta_0 + \beta_1 X_1 + \varepsilon \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.1)$$

Where Y is the response, X is the predictor variable, β_0 and β_1 are unknown parameters, and ε is an error term. The model parameters or regression coefficients β_0 and β_1 have a physical interpretation as the intercept and slope of a straight line, respectively.

3.3 Measure of linear correlation

For a quantitative measurement of the degree of correlation between the variable say X and Y we use a parameter which is called the correlation coefficient donated by Greek letter ρ. For which X and Y will be represented as ρ_{xy} and its sample estimate is r_{xy} .

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n\sum x^2 - (\sum x)^2}\sqrt{n\sum y^2 - (\sum y)^2}} = \frac{S_{xy}}{\sqrt{S_{xx}}\sqrt{S_{yy}}} \quad \ldots\ldots\ldots\ldots\ldots (3.15)$$

when $X_1 = \bar{X}$ and $Y_1 = \bar{Y}$ the formula can be computed as

$$r_{(x,y)} = \frac{\sum_{i=1}^{n} x_i y_i}{\sqrt{\sum_{i=1}^{n} x_i^2}\sqrt{\sum_{i=1}^{n} y_i^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.16)$$

3.4 Coefficient of multiple determination (R^2)

The coefficient of multiple determinations is similar to the coefficient of determination used in the case of simple linear regression. It is defined as:

$$R^2 = 1 - \frac{SS_E}{SS_T} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.21)$$

FULL TEXTS BOOK

R^2 Indicates the amount of total variability explained by the regression model. The positive square root of R^2 is called the multiple correlation coefficient and measures the linear association between Y and the predictor variables, $x_1, x_2, \ldots, x_k$.

3.5 Discussion of the result

Table 3.1 Descriptive Statistics

	Minimum	Maximum	Mean	Std. Dev	Variance
Total Expenditure	1731.84	11116.85	6732.52	3100.73	9614496.80
Total Revenue	701.06	9714.84	3895.70	2421.94	5865773.85

Table 3.1 Summarized key financial statistics for Total Expenditure and Total Revenue. It revealed substantial variability in both metrics, with expenditure exceeding revenue on average. These insights are vital for budgeting, financial planning, and risk assessment.

Table 3.2 Results of Computation and Significance Test of Individual Regression Parameters.

Model	B	Std. Error	t	$p-value$
Constant	2882.427	850.774	3.388	.003
Total Revenue	.988	.187	5.293	.000

Table 3.2 presented the estimates of regression parameters using ordinary least squares method. The result reveled that Total Revenue's coefficient (0.988) is statistically significant ($p < 0.05$). however, the results suggested that Total Revenue has a positive and significant impact on the Total Expenditure. The estimate regression equation can therefore be fitted as follows.

$$Y(\text{Total Expenditure}) = 2882.427 + 0.988(\text{Total Revenue})$$

Table 3.3 Results of Computation of Simple Correlation Coefficients and Coefficient of Determination Between the Total Expenditure and Total Revenue

		Total Expenditure	Total Revenue	R^2
Total Expenditure	Pearson Correlation	1		
	Sig. (2-tailed)			0.60
Total Revenue	Pearson Correlation	0.772	1	
	Sig. (2-tailed)	0.000		

The table displays correlation coefficients between Total Expenditure and Total Revenue. It reveals a moderate positive correlation (0.60), indicating that as Total Expenditure increases, Total Revenue tends to increase as well.

FULL TEXTS BOOK

Figure 3.1 Trend of Total Expenditure and Total Revenue in Nigeria from 2000 to 2020.

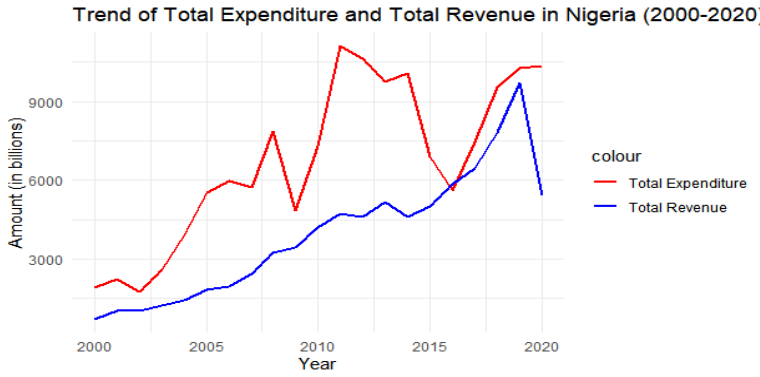


Figure 3.1 shows the trend of total expenditure and total revenue in Nigeria from 2000 to 2020. The trend indicated that spending increased significantly after 2010, sometimes surpassing income, suggesting financial difficulties and responses to global events

4.0 Conclusion

This project investigated the relationship between the Federal Government's expenditure and revenue in Nigeria over the period from 2000 to 2020. The study revealed that there is significant variability, with expenditures consistently exceeding revenue on average. These statistics are essential for budgeting, financial planning, and risk assessment. The regression analysis reveals the importance of total revenue, as it has a statistically significant positive impact on total expenditure, as indicated by the regression equation provided. Additionally, a moderate positive correlation of 0.60 is observed between total expenditure and total revenue, suggesting that as expenditure increases, revenue tends to rise as well. Over the years, there has been a noticeable trend of increasing expenditure, occasionally surpassing revenue, possibly due to financial challenges and the 2019, 2020 and 2021 pandemic. Moreso, the estimated regression equation can therefore be fitted as: $Y(\text{Total Expenditure}) = 2882.427 + 0.988(\text{Total Revenue})$.

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FULL TEXTS BOOK

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FULL TEXTS BOOK

MOTİVATİON OF FOREİGN LANGUAGE ADULT LEARNERS OF TODAY

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ABSTRACT
The way we live, work and learn has been drastically transformed over the past years. Technology and the new inventions have influenced our lives and this ever-changing globalizing world in which we live. Socio-economic factors and health problems offer new challenges. All these have had an impact on learners and we, professional educators have noticed that learners of today have changed. In a time when learning languages is no longer only for the privileged, but essential for all, they seem less focused, more stressed and less motivated. Why do our students seem less motivated? How can educators keep their motivation high? What do we have to keep in focus and change in the way we deliver learning of foreign languages in order to motivate them more and longer? In this study we will try to answer these questions and provide insights into improving learners' motivation in this 21st century.
Key words: motivation, adult learner, lack of motivation, foreign language learners, 21st century

1. Introduction

Life in the 21st century has brought lots of challenges for us. The way we live, work and learn has been drastically transformed over the past years. Having lots of insecurities, our lives are characterized by fear of the future. Year 2024 has started "against a backdrop of unprecedented devastation, division, and instability as 27 regions experience massive violence and political insecurity"[2] War in Ukraine started two years ago, in early 2022 following Russia's annexation of Crimea in early 2014. And ever since the world has been under eminent threat of a nuclear war. After that the Palestinian militant group Hamas launched a surprise land, sea, and air attack on Israel on 7 October, 2023 which led to Israel declaring war on the Gaza Strip. "The world's eyes are again sharply focused on what might come next."[3]

Climate change is another concern we are facing that has a tremendous effect on our lives and our economies. What scientists had long predicted is now happening: we are facing intense heat waves and temperatures will continue to increase due to human-made greenhouse gases. High temperatures are causing glaciers to melt, sea level to rise, periods of draughts, wildfires and extreme rainfall. "2023 experienced extreme weather conditions, including the hottest summer on record since 1880 leading to devastating wildfires, floods, and draughts worldwide. These events have direct economic impacts, such damage to infrastructure, agriculture, and livelihoods. Studies have predicted substantial losses to the global economy due to climate change."[4]

World economy in its turn goes on facing multiple crises. "Tight financial conditions also pose increasing risks to global trade and industrial production."[5] Global GDP growth is expected to slow down to 2.4% in 2024 from 2.7 % on 2023. While global inflation has been a concern of crucial importance over the past two years. All world's countries, but especially developing economies are still

[2] https://unfoundation.org/blog/post/5-global-issues-to-watch-in-2024/?gad_source=1&gclid=CjwKCAjwy8i0BhAkEiwAdFaeGMAlJsZkFdZ0A_yp2vc05FxgrobJqOCPnJXPH3Hb9zzaQlmcG2spiBoCLmMQAvD_BwE
[3] https://www.aljazeera.com/news/2023/10/9/whats-the-israel-palestine-conflict-about-a-simple-guide
[4] https://www.un.org/sustainabledevelopment/blog/2024/01/overview-world-economic-situation-and-prospects-2024/
[5] https://www.un.org/sustainabledevelopment/blog/2024/01/overview-world-economic-situation-and-prospects-2024/

FULL TEXTS BOOK

fighting to recover from losses caused by the Covid-19 pandemic, many of which are facing with high debt and slowdown in investment growth.

Apart from economic consequences the Covid-19 pandemic has had shocking health and social consequences as well. People have been suffering from the illness and loss of life of their dear ones. Social distancing measures and lockdowns have had a great impact on individuals, families, and businesses. Vaccination was found from a study of more than 99 million people from different countries to have side effects. There were links between Pfizer and Modena vaccines and the rare side effects of myocarditis and pericarditis. While Guillain-Barré syndrome and cerebral venous sinus thrombosis are rare side effects linked to AstraZeneca, together with acute disseminated encephalomyelitis.[6]

Technology and the new inventions have influenced our lives and this ever-changing globalizing world in which we live. Apart from all the positive effects people are also experiencing some negative emotions connected with these inventions. From the 1980s we have had "computerphobia", "computer anxiety" and "technostress". Now with the rapid growth of AI technology people are concerned about the fact how it will influence their career, privacy or their safety. Some are even experiencing what is called AI-nxiety, feelings of uncertainty about AI's potential.[7]

All these issues mentioned above have had an impact on learners and professional educators have noticed that learners of today have changed. In a time when learning languages is no longer only for the privileged, but essential for all, they seem less focused, more stressed and less motivated.

2. Literature Review

"Knowledge is the theoretical paradigm, the what to do and the why. Skill is the how to do. And desire is the motivation, the want to do."[8] Motivation is the driving force of every human activity. It is what makes us to get up to start the day and continue throughout it. And it is one of the most important factors that determines our success in life, in school or when learning new things. "Without sufficient motivation, even individuals with the most remarkable abilities cannot accomplish long-term goals, and neither are appropriate curricula and good teaching enough on their own to ensure student achievement."[9] However it is difficult to find an agreed definition of what motivation is. The very fact that we in essence are trying to explain why humans behave as they do makes it complicated because different psychological views on human behavior are connected with a different theory of motivation. And when considering motivation in foreign language learning it becomes more complicated due to the nature and roles of language itself.[10] According to different theories of learning, motivation is seen differently: behaviorists consider motivation as the anticipation of reward and our acts are seen as a response to external factors; from a cognitive perspective motivation is influenced by underlying needs (need for exploration, manipulation, activity, stimulation, knowledge and ego enhancement[11]) or drives or forces such as instinct or will; constructivists say each person is motivated differently and acts uniquely with his actions being influenced by the cultural and social context in which they happen.[12] Whereas current cognitive approaches regard motivation as individual's thoughts, beliefs and emotions

[6] https://www.theguardian.com/australia-news/2024/feb/23/two-very-rare-covid-vaccine-side-effects-detected-in-global-study-of-99-million

[7] https://unu.edu/article/worried-about-ai-you-might-have-ai-nxiety-heres-how-cope

[8] Covey, S., R. (1989) The 7 habits of highly effective people, Free Press

[9] Dörnyei, Z. Conceptualizing motivation in Foreign Language Learning. Language Learning/Volume 31/Issue 03/July 1998, pp 117-135

[10] Dörnyei, Z. Conceptualizing motivation in Foreign Language Learning. Language Learning/Volume 31/Issue 03/July 1998, pp 117-135

[11] Ausubel (1986:368-379) as cited in Brown, D., H. (2000) Principles of Language Learning and Teaching, Addison Wesley Longman, Inc.

[12] Brown, D., H. (2000) Principles of Language Learning and Teaching, Addison Wesley Longman, Inc.

FULL TEXTS BOOK

that are transformed into action. Dörnyei argues that none of the above theories could provide a complete definition of motivation which he himself sees as "a process whereby a certain amount of investigation force arises, initiates action, and persists as long as no other force comes into play to weaken it and thereby terminate action, or until the planned outcome has been reached."[13]

Rod Ellis on the other hand tells us that it is not clear how motivation affects learning and we do not know if it is motivation that produces successful learning, or successful learning increases motivation.[14]

In social psychology two theories prevail: the theory of reasoned action by Ajzen and Fishbein (1980) and the theory of planned behavior by Ajzen (1988). In the first one the actions of a person are driven by his/her intention to perform a particular behavior and the latter is connected with how the person perceives the social pressure exerted on him/her to perform the behavior at issue. Whereas in motivational psychology we find three influential theories: expectancy-value theories, goal theories and self-determination theory. Expectancy-value theories maintain that motivation to perform various tasks derives from individual's expectancy of success of a given task and the value that he/she connects to success in that task. According to goal theories it is the goal that leads to action. But goals have to be possible and important so as to commit people to action. And self-determination theory maintains that the action of engaging in an activity with the desire to do so and full agreement is crucial to intrinsic motivation.[15]

3. Students' motivation

Motivation is a multifaceted factor and there is no theory available to cover it in its total complexity. In an unpredictable world, uncertainty can feel overwhelming and this can lead to confusion, anxiety or lack of motivation. As educators we need to change our ways of teaching and behaving in order to fuel their motivation in a world full of concerns and distractions. We have to shift into the new 21st century holistic educator. Such an educator needs to have knowledge on professional coaching, neuroscience, heart science, neuroeducation, emotional intelligence, psychology, language and communication and the science of empathy and compassion.

Why do our students seem less motivated? How can educators keep their motivation high? What do we have to keep in focus and change in the way we deliver learning of foreign languages in order to motivate them more and longer?

3.1. Knowledge on the brain

Our brain is very important; it is the hardware of our very essence as human beings. The way our brain works dictates our well-being. Thus, we can start with this very important information with our students. We have to explain to them that "your brain patterns help you (or hurt you) with your marriage, parenting, skills, work, and religious beliefs, along with your experiences of pleasure and pain."[16] Some of the problems such as being anxious, depressed, prone to anger, having difficulties to concentrate or being easily distracted are not always psychological. Research has shown that they are related to the physiology of the brain and that physiology can be changed. These studies have been made possible by the use of SPECT (single photon emission computed tomography) and information from research has shown that without optimal brain function it is difficult to be successful in any aspect of life, schooling included. Our brain patterns influence if we will fail in school or have the ambition to reach our goals.

[13] Dörnyei, Z. Conceptualizing motivation in Foreign Language Learning. Language Learning/Volume 31/Issue 03/July 1998, pp 117-135

[14] Rod, E. (1986) Understanding second language acquisition, Oxford University Press

[15] Dörnyei, Z. Conceptualizing motivation in Foreign Language Learning. Language Learning/Volume 31/Issue 03/July 1998, pp 117-135

[16] Amen, G., A. (2000) Change your brain change your life, New York: Three Rivers Press

The part of the brain that modulates motivation (as well as sets the tone of the mind, stores highly charged emotional memories, promotes bonding, processes the sense of smell, etc.) is the deep limbic system. It is this system that makes us get out of bed in the morning and get going through the day. When deep limbic system is less active, we have a general positive and hopeful state of mind. When it is overactive, negativity predominates and we experience a lowered motivation and drive. The limbic system is where our emotions are stored and the emotional tone of our mind is determined based on the sum of our positive or negative experience. Sleep and appetite are also controlled in this area. Thus, in order to have a positive outlook on the world, feel good and be motivated we have to take care of our limbic system.

3.2. Languages and the brain

Information that might motivate learners is knowing that learning languages helps keeping the brain healthy. With brain degenerative illnesses being increased in incidence this is very beneficial. Studies have found out that bilingualism is linked to an increase of the gray matter density in certain areas of the brain and this was bigger in learners who started earlier (before the age of five) compared to those who started late in their lives. Learning languages is found to be connected to "changes in cortical thickness in those brain areas linked to language, as well as changes in the architecture of the white matter tracts that interconnect them."[17] These changes happen in adults as well, even if they trained in language learning for shorter periods of time. However, once they stopped learning the brain returned to its previous state. Learning a second language has also neuroprotective effects and may reduce the risk of Alzheimer's disease and other neurodegenerative conditions even when learning happens later in life. Another benefit that comes from learning languages is that they exercise executive functions such as reasoning, problem solving, task switching because bilingualism requires switching from one language to another all the time.[18] Whereas Patsy Lighbrown and Nina Spade refer to other studies to assert that "developmental psychologists have found convincing evidence that bilingualism can have positive effects on abilities that are related to academic success, such as metalingustic awareness."[19]

3.3. Neuroscience

"Current neuroscientific theory tells us that the brain is organized to reflect everything we know in our environment. All the information we have been exposed to throughout our lives, in the form of knowledge and experiences, is stored in the brain's synaptic connections."[20] But neuroscience has also proven that we can change our brain (which means our behaviors, attitudes, and beliefs) just by thinking in a different way.[21] "Through mental rehearsal (repeatedly imagining performing an action), the circuits in the brain can recognize themselves to reflect our objectives. We can make our thoughts so real that the brain changes to look like the event has already become a physical reality. We can change it to be ahead of any actual experience in our external world."[22] This is information we need to know and transmit to our students if they appear unmotivated because of prior experience. Thus, student's prior experience of learning in general and that of learning languages is stored in their brains and in their bodies (in the form of emotions and feelings). If this memory is not a positive one due to different factors, such as material overload, teacher's inexperience etc. and they feel unmotivated, we have to work with these beliefs and make students rewire their brains. They have to think and feel in a different way.

[17] Costandi (1916) Neuroplasticity, Massachusetts Institute of Technology
[18] Costandi (1916) Neuroplasticity, Massachusetts Institute of Technology
[19] Lightbrown, P., M., Spada, N. (2006) How languages are learned, Oxford University Press
[20] Dispenza, J. (2012) Breaking the habit of being yourself, Hay House, p.41
[21] Dispenza, J. (2007) Evolve your brain, Health Communications, Inc.
[22] Dispenza, J. (2012) Breaking the habit of being yourself, Hay House

FULL TEXTS BOOK

Neuroscience can be incorporated in the learning process in different ways, but enhancing metacognition is what is connected directly to motivation. Paling mentions a study of the 2019 where teaching metacognition at schools "involved self-regulated learning, thinking skills and learning to learn and benefitted primary to university students as well as disadvantaged and struggling learners. The results demonstrated better performance, improved outcomes and a positive motivation cycle – "greater motivation leads to improved metacognition which leads to greater motivation"."[23]

It seems like today we have learners with busy brains. Technology is greatly contributing to keeping our brains busy; we are always reachable through phones, always influenced by the beeping sound of a message or notification. Educators strive to win and keep their attention as phones are kept near even during classes. Apart from that learners today live in a world where everything is instant or ready-made and we want instant fixes like our communicative technology. But neuroscience equips us with the knowledge that the brain learns through creation of new pathways and repetition which helps consolidate those pathways over time.[24]

3.4. Neurolanguage coaching

Considering all the turmoil in the world, all the insecurities, fear and uncertainty people are now living in stress. When faced with the profusion and confusion of stimuli that the external world causes, we retreat into survival mode and produce the chemicals of stress. Those stress reactions act like disruptors for the brain and scramble the brain's signals.[25] Apart from stress in the outer world, learners face stress in the classroom as well. The same process happens, the same chemicals of stress are produced and the learner puts himself in a "fight or flight mode". This information is what neurolanguage coaching is based on. "Neurolanguage coaching is the efficient and fast transfer of language knowledge and skills from the Language Coach to the Language Coachee with sustainable effects facilitated by brain-based coaching and coaching principles and neuroscience"[26]

Studies say that: teachers can motivate students into the lesson by making the right remarks about the forthcoming activities at the opening stages of the lesson; varying activities, tasks, and materials increases students' interest levels instead of routines which decrease attention and motivation[27]; goals and goal setting helps student's motivation to achieve long-term goals by focusing on short-term goals, easy to achieve so as they are motivated to achieve long-term goals; the learning environment has to be inspiring and decorated with visual materials, use of music, position of furniture so as to be motivating.[28]

Now, this is what exactly neurolanguage coaching does: the teaching session is opened with a set of questions where you must discover as much as possible about the learner and design a unique roadmap. Empowered with the individual's characteristics the coach then sets up the goals, activities, and the way of learning. Based on the belief that not two brains are the same and that our brains change throughout our lifetime through experience, the neuro-educators assist the learners to discover how their brains like to learn.[29] "Coaching conversations leave clients invigorated, inspired, and ready for action."[30]

Motivation is a very important element in neurolanguage coaching. In this approach the learner is helped

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FULL TEXTS BOOK

to connect with their inner motivation and keep it high from the beginning to the end, assisting the learner in their own independent learning which in turn leads them to faster and successful benefits.[31]
"Physiological research has demonstrated that when people find their own goals, they are more likely to achieve them. That is the essence of coaching."[32]

3.5. Holistic education

Our educational model is now moving from a scientific-industrial paradigm to a paradigm that works based on the holistic vision. In the holistic vision the reality is comprehended as a function of an undivided whole, it is not fragmented. Their vision is based on the fact that everything is interconnected and "we are united with all the others and with the non-human forms surrounding us in a complex network of life."[33] Among a lot of beneficial knowledge connected to education being revised in this holistic approach, (such as children cannot learn on their own and as a result teachers should assume a leading role, deciding what and how children should learn- leading to passive human beings; or all children learn in the same way and same pace which kills the child's individuality and creative differences) we can distinguish comparison which "destroys the love of learning"[34] In holistic education comparison is not practiced as a concept with the purpose of creating a culture where everyone is a winner.[35]
Students seem to be less motivated when they are ridiculed for their mistakes, when their performance goes unnoticed, when they are weary of being compared or when they are over preoccupied with personal problems.

3.6. Working with yourself

We have to show interest for our students. As Adler has said "It is the individual who is not interested in his fellow men who has the greatest difficulties in life and provides the greatest injury to others."[36] If you want to be successful with people, you have to be interested in people. If you want them to love your classes, if you want them to enjoy coming to your classes, you have to have a genuine interest in them. You have to love your audience; you have to love your students. You can "win the attention and time and cooperation of …people by becoming genuinely interested in them."[37]
Teachers should be able to provide positive bonding. The attitude of others is contagious and they can influence us a lot. Thus be a person who can instill confidence in your students, uplift them and encourage them with their plans and dreams. Use a positive way of speaking avoiding words such as never, always, labeling or blaming which would damage their self-esteem and their motivation.
Among the list of what people want more you can find "a feeling of importance". They need to be appreciated for their work, their efforts, and their achievements. Nothing kills their ambitions more than criticism from their superiors. Appreciation has to be sincere and from the heart, so as not to be confused with flattery.[38]
Be someone your students like. Research in cognitive neuroscience at Lund University has shown that our brains are wired to learn more from people we like and less from those we don't like. "We are more

[31] Paling, R. (2012) Neurolanguage coaching process (Compilation of Rachel's articles 2012-2020) https://rachelpaling.com/wp-content/uploads/2021/12/Compilation-RP-articles-2012-2020_NLC-Process-1.pdf
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[36] Carnegie, D., (1936) How to win friends and influence people p.66
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[38]

FULL TEXTS BOOK

inclined to form new connections and update knowledge from information presented by groups we favor."[39]

3.7. Motivating teachers

Being a teacher in this 21st century is an exceptionally challenging task. Besides school work such as daily teaching, checking and grading class work and homework, educators also work to further qualify themselves, to keep up to date with new theories and inventions, to manage student behaviors, family issues and a lot of other concerns. Therefore sometimes it is difficult even for teachers to keep themselves motivated. But a motivated teacher means motivated students. Thus, teachers have to work to keep themselves motivated as well. "Culture is how employees' hearts and stomachs feel about Monday morning on a Saturday night."[40] This is also connected with the institution's policy which has to consider keeping the teaching staff motivated as a crucial task.

4. Conclusion

To sum up, this study looks at motivation and ways of motivating learners from another perspective, one which is in line with life in the 21st century. Not all learners come with strong motivation or are able to keep it for extended periods of time. Teacher's attitude and behavior are very important in this respect. Although they cannot control all aspects of motivation, they are a key factor in the process. Employing a holistic view of the world and education can bring about changes that will benefit people as human beings, as well as learners. We have to consider incorporating holistic education, neuroscience, coaching and neurolanguage coaching concepts in our schools and educational institutions as they offer us exceptional tools of motivating our learners.

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FULL TEXTS BOOK

ORGANIZATIONAL CONFLICTS AND THEIR MANAGEMENT
ÖRGÜTSEL ÇATIŞMALAR VE ONLARIN YÖNETİMİ

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ABSTRACT
The article is devoted to the study of the main features of organizational conflicts that arise against the background of the struggle for the expansion of personal opportunities, the clash of different interests, interests, thoughts, and views among people operating in an organization governed by different principles. In the article, the specific characteristics of organizational conflicts, the possibilities of influencing the development of the enterprise, various scientific approaches to it, its source, causes, stages of development, typology, solution methods, and tools are extensively analyzed. In modern organizations, the importance of analyzing and studying conflicts for the organization, its positive and negative sides, the importance of conflict resolution for the organization, and the assessment of their role are very important and relevant. Conflicts in organizations are an indispensable element of organizational life. Because each of the people in organizations are people who grew up in different environments and cultures, have different personalities and characters, different goals and interests. Organizational conflict has several specific characteristics. Among them, the following can be mentioned: although the conflict may appear as a disagreement between individuals or groups in the organization at the previous stage, it may manifest itself in the form of hostility in the advancing stages; conflict can originate from both inside and outside the organization; Conflict in organizations can be resolved through persuasion or problem-solving, or political or bargaining techniques. There are different scientific approaches to organizational conflict. Among them, one can distinguish the approaches of the theorists of the Scientific management and administrative school, the faces of the "Human Relations" school, and modern points of view that differ radically from them. The main causes of the conflict are based on the limitation of resources and their distribution. A broader classification of the causes of conflicts was presented by M. Meskon, M. Albert, and F. Kheduori. According to the obtained results, organizational conflicts are related to the renewal of human relations in the production enterprise, the expansion and strengthening of their competitive opportunities, the development of new decisions, etc. has a great role in solving issues. If the conflicts in the organization are not properly managed, they can worsen the human relations in the organization, and the socio-psychological environment, and lead to the loss of people's position.
Keywords: organizational conflict, deficit resource, causes of organizational conflict, organizational conflict solution

ÖZET
Makale, kişisel fırsatların genişletilmesi mücadelesinin arka planında ortaya çıkan örgütsel çatışmaların temel özelliklerinin, farklı yönetimler tarafından yönetilen bir kuruluşta faaliyet gösteren insanlar arasındaki farklı çıkarların, çıkarların, düşüncelerin ve görüşlerin çatışmasının incelenmesine ayrılmıştır. prensipler. Makalede örgütsel çatışmaların kendine özgü özellikleri, işletmenin gelişimini etkileme olasılıkları, buna yönelik çeşitli bilimsel yaklaşımlar, kaynağı, nedenleri, gelişim aşamaları,

FULL TEXTS BOOK

tipolojisi, çözüm yöntemleri ve araçları kapsamlı bir şekilde analiz edilmektedir. Modern organizasyonlarda çatışmaları analiz etmenin ve çalışmanın organizasyon için önemi, olumlu ve olumsuz yönleri, çatışma çözümünün organizasyon için önemi ve rollerinin değerlendirilmesi çok önemli ve konuyla ilgilidir. Örgütlerdeki çatışmalar örgütsel yaşamın vazgeçilmez bir unsurudur. Çünkü örgütlerdeki kişilerin her biri farklı çevre ve kültürlerde büyümüş, farklı kişilik ve karaktere sahip, farklı amaç ve ilgi alanlarına sahip kişilerdir. Örgütsel çatışmanın çeşitli spesifik özellikleri vardır. Bunlar arasında şunlar sayılabilir: Çatışma, önceki aşamada örgütteki kişi veya gruplar arasında bir anlaşmazlık olarak görünse de, ilerleyen aşamalarda düşmanlık şeklinde kendini gösterebilir; Çatışma örgütün hem içinden hem de dışından kaynaklanabilir; Örgütlerdeki çatışmalar ikna, problem çözme, politik veya pazarlık teknikleri yoluyla çözülebilir. Örgütsel çatışmaya farklı bilimsel yaklaşımlar vardır. Bunlar arasında Bilimsel yönetim ve yönetim ekolü teorisyenlerinin yaklaşımları, "İnsan İlişkileri" ekolünün yüzleri ve onlardan kökten farklılaşan modern bakış açıları ayırt edilebilir. Çatışmanın temel nedenleri kaynakların sınırlılığı ve dağılımına dayanmaktadır. Çatışmaların nedenlerine ilişkin daha geniş bir sınıflandırma M. Meskon, M. Albert ve F. Kheduori tarafından sunulmuştur. Elde edilen sonuçlara göre örgütsel çatışmalar, üretim işletmesinde insan ilişkilerinin yenilenmesi, rekabet olanaklarının genişletilmesi ve güçlenmesi, yeni kararların geliştirilmesi vb. konularla ilgili sorunların çözümünde büyük rol oynamaktadır. Örgütteki çatışmalar doğru yönetilmediği takdirde örgütteki insan ilişkilerini, sosyo-psikolojik ortamı kötüleştirebilir, kişilerin konum kaybına yol açabilir.
Anahtar Kelimeler: örgütsel çatışma, kaynak açığı, örgütsel çatışmanın nedenleri, örgütsel çatışma çözümü

INTRODUCTION

Struggle for expansion of personal opportunities, and conflict of different interests, interests, thoughts, and views among people operating in an organization governed by different principles is inevitable, a real reality. These contradictions develop over time and manifest themselves in the form of organizational conflicts.

In modern organizations, the importance of analyzing and studying conflicts for the organization, its positive and negative sides, the importance of conflict resolution for the organization, and the assessment of their role are very important and relevant.

Organizational conflicts are the conflict between subjects (employees) and groups operating in the organization as a result of differences of opinion in the struggle for obtaining and maintaining resources, a clash of their goals, interests, or positions.

MAIN DIRECTIONS OF RESEARCH

Conflicts in organizations are an indispensable element of organizational life. Because each of the people in organizations are people who grew up in different environments and cultures, have different personalities and characters, different goals and interests. The object and subject of organizational conflicts are quite complex and broad, like other social conflicts. The object of organizational conflicts is the social reality that both attracts the attention of social subjects and causes them to come to conflicting relations (conflict) by setting them against each other. The object of organizational conflicts can include all elements in the material world and social reality that specifically affect the interests of the individual, collective, or management. The object of conflict is considered a deficit resource when viewed from both sides. Indeed, compensation for the deficit resource may resolve the dispute. However, lack of resources does not always become the object of conflict. This object may also be a problem of wealth belonging to one or another group. In some cases, the conflict may not have a visible object, which is called a false conflict. The subject of the organizational conflict is the conflict itself, which the subjects entered into the conflict and tried to resolve. In this case, the subject of organizational conflict

FULL TEXTS BOOK

may be the struggle for resources (position), the desire to have this or that material value, and an attempt at primacy and equality. (Abbasbeyli and others, 2006)

The analysis of social conflicts and their solutions, the importance of investigating and studying social conflicts in modern organizations for the organization, their effective and negative aspects, the necessity of conflict resolution for the organization, and the evaluation of their role are of great importance.

The main characteristics of organizational conflict

Organizational conflict has several specific characteristics. Among them, the following can be noted:

- although the conflict may appear as a disagreement between individuals or groups in the organization at the previous stage, it may manifest itself in the form of hostility in the advancing stages;
- conflict can originate from both inside and outside the organization;
- conflict in organizations can be resolved through persuasion problem-solving methods, or political or bargaining techniques. (Shahbazov and others, 2014)

Several factors have a special effect on the development of organizational conflict. Among them, the following are considered the most important factors:

❖ socio-cultural values and norms of the external environment;

❖ the state of the organization's internal environment;

❖ the presence of mediators, and their interest in mitigating or aggravating the conflict. (Shahbazov and others, 2005)

Different scientific approaches to organizational conflict

Organizational conflict has been interpreted in different ways in the history of management thought, and it has been considered in different prisms.

The theorists of the scientific management school and the administrative school (Taylor, Weber, etc.) considered the conflict as an unpleasant event for the organization. According to those authors, it is necessary to try to avoid conflict in the organization or to solve it without delay. It was believed that these types of mechanisms mainly eliminate the conditions that lead to the emergence of conflict and can be used to solve the problems that have arisen.

The members of the "Human Relations" school also believed that conflict should be avoided. They accepted the conflicts that occurred within the organization, but they considered the conflict to be an element of the ineffective functioning of the organization or a negative management system. According to the school leaders, the improvement of mutual relations in the organization can prevent the emergence of conflict.

The modern point of view is that such conflicts are possible and even necessary and desirable in terms of development in organizations with an effective management system. This is due to the paradox of the organization itself. On the one hand, the organization should be instrumental due to its structure, and on the other hand, all its management tools are not clearly defined and all aspects of its activity are not formalized. The guidelines do not and cannot cover everything that happens in the organization. In addition, trying to put everything in order leads to a decrease in work efficiency. Regulation is replaced by subjective characteristics and attitudes. Within each organization, some sections have instrumental and subjective properties (for example, the activity of the author during the educational process is limited by the educational guidelines of the Higher School). Therefore, the organization has departments whose mutual activity conflicts with each other. (Aksenova, 2009)

Of course, conflict is not always positive. In some cases, it can create an obstacle to meeting the needs of a particular person or achieving the goals of the organization in general. Sometimes the collective has to agree to what a person says, making a wrong decision in advance to avoid unpleasant events and to calm the conflicted person.

FULL TEXTS BOOK

Sources and causes of organizational conflict

Conflicts between formal and informal relationships, instrumentality, and subjectivity are indicated in the scientific literature as the main sources of organizational conflicts.

Every conflict in an organization has several causes. The main causes of the conflict are based on the limitation of resources and their distribution. A broader classification of the causes of conflicts was presented by M. Meskon, M. Albert, and F. Kheduori. They mention the following factors among the causes of conflicts in the organization: allocation of resources; interdependence of duties; differences in goals; differences in life experience and behavior; improper transmission of information; unsatisfactory communication etc.

According to the opinion of some conflict experts, in the most general case, the conflicts that arise in the organization can arise from these three groups of reasons:

- Related to labor process;
- Regarding the psychological characteristics of people's mutual relations; sympathies and antipathies, cultural and ethical differences of people, with the activity of the leader;
- Related to personal qualities of group members; for example, inability to control one's emotional state, aggressiveness, impoliteness, and inability to communicate. (Zaxarov, 2006)

Stages of conflict development

To facilitate the theoretical analysis of the conflict, its development stages are usually noted. It is noted in the literature that the dynamics of organizational conflict, as in other social conflicts, consists of three stages:

- pre-conflict stage;
- conflict stage;
- post-conflict stage.

The formula for any conflict is as follows

Conflict situation+incident= Conflict

The conflict situation is the superimposed contradictions that contain the real cause of the conflict.

An incident is the creation of circumstances that are a pretext for a conflict.

Conflict is an open conflict arising from a clash of interests and positions. (Svetlov and others, 2005)

Typology of conflicts in organizations

The typology of conflicts plays not only a methodological but also a practical role. In our modern era, there are many typologies and classifications of organizational conflicts. All these express the views and positions of different authors. All conflicts occurring in the organization are divided into two types according to their communicative direction: vertical and horizontal conflicts.

Horizontal conflicts - occur when employees are not subordinate to each other (coordinating relations). Vertical conflicts are more common in organizations (up to about 70-80% according to studies). Conflicts of this type occur based on power relations. Employees of the organization are subordinate to the authorities. There is a form of coercive relationship in the relations of every manager-subordinate employee pair. On the one hand, the existence of potential coercion indicates that the goals of the manager and the employee do not coincide, and on the other hand, it creates a conflict situation.

Researchers indicate two types of conflict according to the possibilities of adjustment in the organization:

- Agonist (prone to reconciliation);
- Antagonist (irreconcilable).

Sociologists have identified 5 main types of conflict in the organization:

a) conflicts between groups;

b) conflicts between a person and a group;

FULL TEXTS BOOK

c) conflicts between individuals;
d) personal conflicts of a person;
e) linear-hierarchical conflicts between employer and employee (intrapersonal). (Çağlayan, 2006)

Directions of conflict regulation and resolution in organizations

Conflict management in organizations goes through four stages:

- Institutionalization;
- Legitimation;
- Structuring;
- Reduction.

The institutionalization of the conflict means the elimination of disorganization and the application of certain principles and rules to the course of the event. This makes the development of the conflict predictable. Legitimization of the conflict (legitimization) makes it possible to voluntarily choose the proposed solution method. Determining the structure of groups in conflict, that is, structuring conflicts is an important step in their management. Reduction is based on the further weakening of the conflict during the transition to another stage.

There are several effective methods of conflict management in an organization. They can be divided into two groups. These are structural and interpersonal methods.

Structural methods. There are four structural methods of conflict resolution:

1. clarifying the need for work;
2. using coordinated and integrated methods;
3. using organizational complex goals;
4. Using the reward system.

Methods of solving interpersonal conflicts. It should be noted that the methods of solving interpersonal conflicts are compatible with the style of behavior of people in conflict. These are Refusal or conflict avoidance, accommodation, coercion, confrontation, compromise, cooperation, and problem-solving.

CONCLUSION

Renewal of human relations in the production enterprise of organizational conflicts, expansion, and strengthening of their competitive opportunities, development of new decisions, consideration of socio-psychological factors, application of modern standards in the organization, an increase of labor productivity, management's attention to the initiatives of subordinates, an increase of literacy level of personnel, etc. have a great role in solving issues. If the conflicts in the organization are not properly managed, they can worsen the human relations in the organization, and the socio-psychological environment, and lead to the loss of people's position.

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FULL TEXTS BOOK

REMOVAL OF OIL&GREASE BY A NEW GENERATION MICROBUBBLE PUMP DISSOLVED AIR FLOTATION SYSTEMS

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ABSTRACT

Flotation is a well-known and reliable process used to separate the light particles and oils from wastewater. There are various configurations of air flotation systems, such as induced, dissolved, electrical air floatation, depending on the microbubble formation and equipment used in the process. Among the various flotation technologies, Dissolved Air Flotation (DAF) is one of the most widely used techniques for removing oils and dissolved organic matter from wastewater in the world. It works by dissolving air under pressure and then releasing fine air bubbles into the water at atmospheric pressure. Dissolved air bubbles adhere to suspended solids and float to the surface for skimming. Small diameter microbubbles are particularly preferred to increase contact area and maximize collision probability between microbubbles and oil droplets. Therefore, in the new generation of DAF flotation units, a microbubble generating pump is used to generate microbubbles of 20 to 50 µm in size. A compressor, a saturation vehicle, various control systems can also be eliminated in the new generation of DAF systems, which makes the system modest, compact, and economic.

There are several studies on classical and new generation DAF systems in the literature. However, most of the studies have been carried out in a laboratory scale and operated synthetically prepared wastewater. In the presented study, a pilot scale experimental set-up was used to remove oil & grease from dairy industry wastewater. The volume of the polypropylene pilot scale DAF unit was about 1.5 m^3. It consisted of contact, flotation, and sedimentation sections, and was operated as both a classical pump DAF (CP-DAF) and a microbubble pump DAF (MB-DAF) using appropriate piping and equipment to compare performance. The effects of inflow, pump type and pressure were investigated in the experiments. The results showed that the CP-DAF system had lower oil and grease removal efficiency than the MB-DAF systems. It was found that the optimum operating pressure in both systems was 4 bar, and the highest performance was obtained at 1m^3/h. The results showed that the DAF systems were particularly effective at removing dissolved oils. The appropriate operating pressure was determined to be 4 bar, and it was found that the treatment efficiency decreased at pressures above 4 bar. The treatment efficiency of the CP-DAF system was found to be lower than that of the MB-DAF systems. At optimum operating conditions (4 bar pressure), the MB-DAF systems showed approximately 15% higher performance.

Keywords: Dissolved Air Flotation, Industrial wastewater, Removal efficiency, Microbubble pump, Wastewater treatment, Oil&grease removal, Dairy wastewater.

INTRODUCTION

Air flotation is widely used and recommended as an effective pre-treatment alternative for oily wastewater generating from petroleum refineries, metal finishing and coating processes, ships (bilge and ballast wastes), slaughterhouses, dairy industries, paper mills, etc. (Ng et al. 2022; Han et al. 2021; Thorat et al. 2022; Falletti et al. 2015; Kim et al. 2015; Liu et al. 2010). There are two basic methods to disperse air bubbles in waste streams: induced air flotation (IAF) and dissolved air flotation (DAF). In

FULL TEXTS BOOK

IAF, the air is either dispersed mechanically in the liquid or sparged through a distributor into the separation vessel yielding relatively large bubbles (typically 1000 μm). The IAF units can be characterized by a high liquid flow with low retention times (4- 10 min) in comparison to the DAF unit which has a high retention time (15-30 min) (Hanafy & Nabih, 2007). In DAF technique, air is pressurized and dissolved in the effluent stream. The air solubility decreases as the pressure is released by the waste entering the tank through an orifice. As a result, microscopic air bubbles are formed and air/oil bubbles rise and collide with oil droplets, accelerating their recovery at the surface. The size of the bubbles produced can vary from 10 to 120 microns in size. These bubbles are effective in removing even smaller oil droplets, but require a long residence time of 20 to 30 minutes for efficient separation. It has been shown that the bubble size plays an important role in the flotation efficiency. As the bubble size decreases the probability of particle-bubble collision (and hence flotation separation) increases (Matis and Peleka, 2010). Therefore, in recent years, it has been observed that traditional DAF systems have begun to be replaced by a new generation of flotation systems that produce microbubbles. The new generation DAF systems are more efficient in removing oil&grease as they produce a high quantity of smaller size bubbles (Al-Dulaimi and Al-Yaqoobi 2021; Khuntia et al. 2012). There is no pressure tank and no compressor in the new generation of DAF systems. A pressurized water-air mixture is delivered to the system by a single pump (microbubble pump). This pump circulates 30-40% of the treated water to the system, while mixing the wastewater with air taken from the atmosphere, producing microbubbles of 20-50 microns in size (Özdemir et al., 2024). Since it consumes less energy and equipment, operational costs are reduced (Muñoz-Alegría et al. 2021; Xiao et al. 2019); and depending on generating microbubbles, oil&grease removal is increased.

In the present study, conventional and microbubble generating DAF technologies were used to remove oil from dairy (milk production) wastewater. The effects of operating parameters such as flow rate and pressure on the efficiency were investigated using both classical and microbubble DAF systems on a pilot scale. Dairy wastewater was obtained from a dairy industry located in Foca, Izmir, for 12 months in 2022/2023. Treatment performances of each systems were evaluated by the oil&grease parameter.

METHODOLOGY

In this study, a pilot scale DAF unit made of polypropylene material was constructed to investigate the performance of DAF with conventional pump and DAF with microbubble pump. The dimensions of the pilot scale DAF unit are 100-150-155 cm (width-length-height), and it has a volume of about 1.5m^3. The pilot unit shown in Figure 1 consists of contacting, floating and precipitating sections. The unit has sampling taps at the inlet and outlet. To discharge sludge that accumulates on the bottom over time, there is a sludge removal valve.

FULL TEXTS BOOK



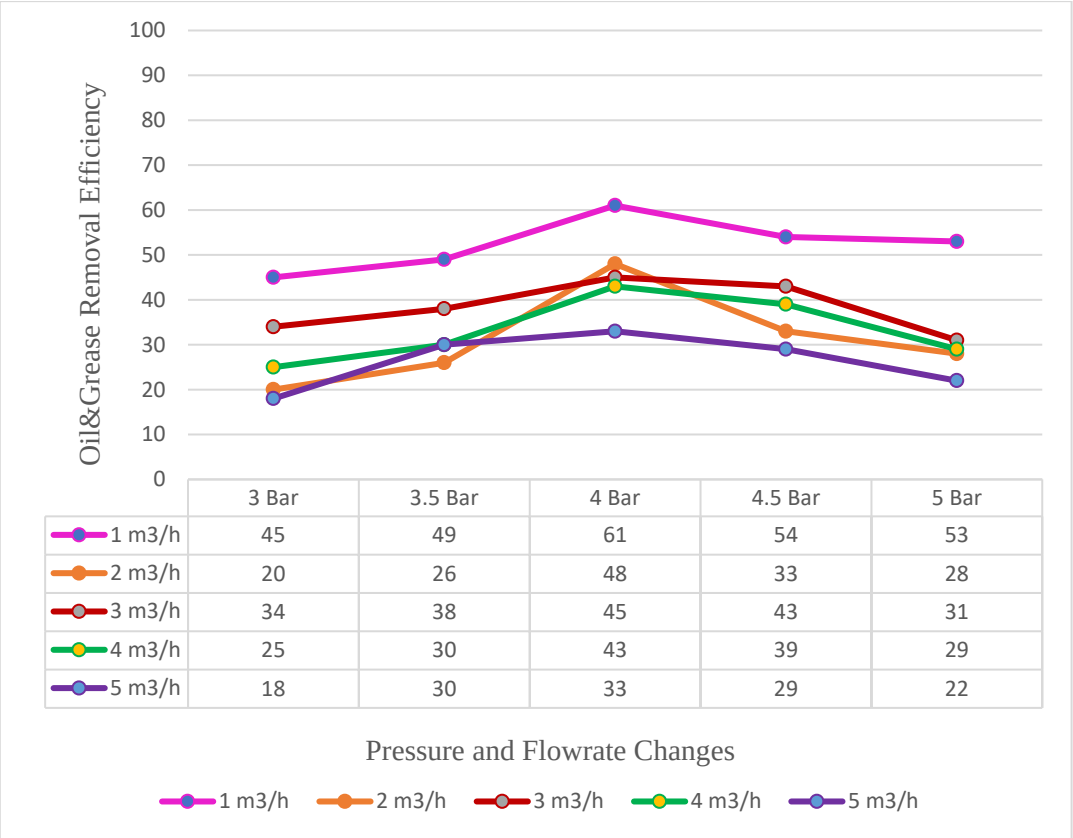
Figure 1. Pilot DAF Unit

During the study, the pilot DAF was used as a conventional (CP-DAF) and microbubble pump (MB-DAF) with appropriate piping and instrumentation. After installing each DAF unit, the system was run at by clean water as first to check the piping and instrumentation. The flow rate of each unit was measured with a flow meter, and the pressure adjustments were also made with a monometer. After checking the system, the experimental studies were started using dairy wastewater. The inlet flow rates were varied between 1 and 5 m^3/h. The pressures were varied between 3 and 5 bar. The performance of each system was determined by oil&grease, suspended solids, and COD analyses. Temperature and pH were measured for control purposes. Inlet and effluent samples were collected from the M-01 and M-02 water taps. CP-DAF and MB-DAF systems were operated at five different inflow rates (1-2-3-4-5 m^3/h) and five different pressures (3-3.5-4-4.5-5bar). Effects of variables on treatment performance were determined separately.

CONCLUSION AND DISCUSSION

In the experiments where the pilot CP-DAF system was operated with dairy wastewater, the pH of the influent was between 7.3 and 8.5 whereas the temperatures varied between 26.6-32C^o. The solid particle concentrations varied from 485 mg/L to 1.350 mg/L. The concentration of the oil&grease ranged from 262 mg/L to 102 mg/L

FULL TEXTS BOOK



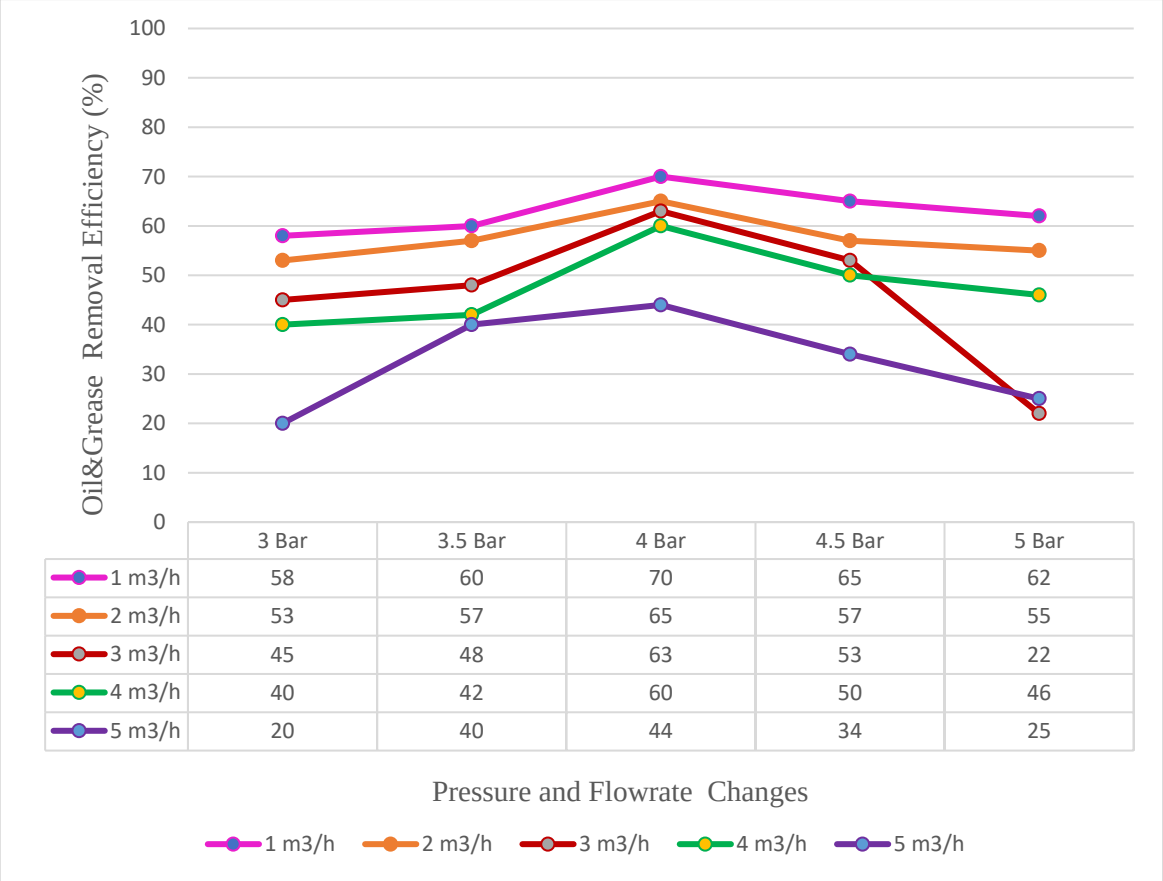
	3 Bar	3.5 Bar	4 Bar	4.5 Bar	5 Bar
1 m3/h	45	49	61	54	53
2 m3/h	20	26	48	33	28
3 m3/h	34	38	45	43	31
4 m3/h	25	30	43	39	29
5 m3/h	18	30	33	29	22

Figure 2. Effect of pressure and flow rate on the efficiency of oil&grease removal in CP-DAF System

At 1 m^3/h flow rate, 45-61% oil&grease removal was achieved. The effluent concentration of the oil&grease ranged from 262 mg/L to 102 mg/L The highest oil removal was obtained at 4 bar pressure. (see Figure 2). At a flow rate of 2 m^3/h, oil removal was 20-48%. Maximum removal was obtained at 4 bar where concentration was decreased from 114 mg/L to 75 mg/L. A decrease in oil removal was observed at higher or lower pressure conditions. Increasing flow rates generally caused a decrease in efficiency. At a flow rate of 3 m^3/h, the oil&grease removal efficiency was 31-45%. The maximum efficiency was obtained at 4 bar and the oil/grease content decreased from 114 to 79 mg/L. Oil&grease was removed by 25 to 43% and maximum efficiency was obtained at 4 bars. At higher or lower pressures, the efficiency decreased. The lowest performance was achieved at 5m^3/h (removal efficiency ~ 18-33 %). The maximum efficiency was obtained at 4 bar and the efficiency decreased with increasing and decreasing pressures.

In the experiments carried out by MB-DAF system, inflow pH varied from 7.11 to 8.75 whereas temperature changed from 23.5 to 30.7°C. Suspended solid (SS) concentrations were between 500mg/L to 1.200mg/L. The oil&grease content was ranged from 110 to 676 mg/L. At low flow rate (1m^3/h) 58-70% of the oil&grease was removed. The highest efficiency was obtained at 4 bar pressure. At 4 bar pressure, the oil&grease content decreased from 196 to 59mg/L. At a flow rate of 2 m^3/h, there was a slight decrease in oil removal, and 53-65% of oil was removed. At pressures higher or lower than 4 bar, oil removal decreased. Increasing flow rates caused a decrease in the removal of both oil&grease and SS parameters (see Figures 3)

FULL TEXTS BOOK



	3 Bar	3.5 Bar	4 Bar	4.5 Bar	5 Bar
1 m3/h	58	60	70	65	62
2 m3/h	53	57	65	57	55
3 m3/h	45	48	63	53	22
4 m3/h	40	42	60	50	46
5 m3/h	20	40	44	34	25

Figure 3. Effect of pressure and flow rate on the efficiency of oil&grease removal in MB-DAF system

At flow rate of 3 m^3/h, the oil concentration was reduced from 176 mg/L to 66 mg/L, resulting in 63% removal; and maximum efficiency was achieved at 4 bars. When the flow rate was increased to 4 m^3/h, 40 to 60% of the oil was treated. The lowest performance was at 5m^3/h, removing only 20-44% of the oil.

Consequently, the results have shown that new generation DAF systems were more efficient than classic pumped DAF systems for oil-grease removal from milk and dairy products wastewater. Besides that, although the investment costs of the new generation DAF system are higher than traditional DAF systems, its' operating costs is lower due to lesser energy consumption. It has been reported that approximately 50% less energy is consumed when a microbubble pump is used. On the other hand, in traditional DAF systems, especially the electricity consumption of the pump and compressor is high. Therefore, when the new generation DAF Systems are used, the total electrical energy consumption for unit volume of treated wastewater is lower which is resulted a decrease in operating costs. Considering these advantages, it has been expected to use widely as an effective pre-treatment alternative before the biological treatment stage especially for industrial wastewater containing oil-grease, SS and organic pollutants.

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FULL TEXTS BOOK

THE ROLE OF CITY ADMINISTRATIONS IN SOLVING GLOBAL CLIMATE CHANGE PROBLEMS

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ABSTRACT
Global climate change is one of the most important problems on the agenda of governments and international organizations. Thanks to international meetings and negotiations, the level of knowledge and awareness about the climate change problem is gradually increasing. As the importance of the issue is understood, the number of states and international actors supporting climate change convention decisions is increasing. However, it will not be enough for actions and practices to minimize the negative effects of climate change to remain only at the international level. These policies need to be adopted at the national and local levels, and especially local action plans need to be put into effect.
This problem, which is described as global because it affects the whole world, is essentially closely related to local factors. The amount of production and consumption increases in crowded residential areas where human and economic activities are intense. More intensive use of resources leads to an increase in both environmental pollution and greenhouse gas emissions.
This study aims to reveal the role and importance of cities in the emergence of the global climate change problem and in solving the problems. In the study, firstly, a brief theoretical framework for the global climate change problem is presented. Information is provided about meetings held by states and other international actors to discuss climate change issues. Finally, the role and importance of city governments in the emergence and solution of climate change problems are analysed. It is emphasized that this issue should be addressed on a local/urban scale and local policies regarding climate change should be developed.
Keywords: Environment, Cities, City Administrations, Global Climate Change

INTRODUCTION

As it is known, one of the most important problems on the agenda of governments and international organizations is global warming and climate change. The problem of climate change is one of the critical issues discussed at international meetings, like other environmental problems. As the issue's importance is understood, the number of states and other international actors supporting climate change convention decisions is increasing.
However, it does not seem sufficient for actions and policies to mitigate the negative effects of climate change to remain only at the international level. These policies need to be adopted at the national and local levels, and especially local/urban policies and action plans need to be produced. This problem, which is often called global because it affects the entire planet, is essentially closely related to local/urban factors.
The amount of production and consumption increases in crowded urban areas where human and economic activities are intense. More intensive use of resources leads to an increase in both environmental pollution and greenhouse gas emissions. This study emphasizes the role of cities in revealing the negative effects of global climate change and reducing these effects.

1. GLOBAL CLIMATE CHANGE

Climate is generally defined as the average weather in a particular location, including temperature, precipitation, humidity, and wind. In a more specific definition, climate refers to the average status and variability of these features over a long period of time. Both definitions accept that the weather is constantly changing due to an unstable atmosphere. Climate change here is the periodic change of the

FULL TEXTS BOOK

Earth's climate as a consequence of interactions between the atmosphere and chemical, biological, geological, and geographical factors in the Earth's system, and changes in the atmosphere. The climate, resulting from the physical properties and movement of the atmosphere, changes at every conceivable time scale (Rafferty, 2011). The change referred to here are changes in the state, mean, and characteristics of the climate over decades and can be identified using statistical tests. That is, climate change can result from external forcings such as volcanic eruptions, modulations of solar cycles, and permanent anthropogenic (human-induced) changes in the composition of the atmosphere or land use, or from natural internal processes. Climate change, which has turned into a global environmental problem and needs to be taken care of, indicates changes arising from factors other than natural causes (IPCC, 2022). In the United Nations Framework Convention on Climate Change (UNFCCC, Article 1), climate change means a climatic change that is directly or indirectly attributed to human activities that alter the composition of the atmosphere, besides natural climate variability observed over comparable timeframes (UN FCCC, 1992).

The problem of global climate change has been discussed in the international meetings of the UN since the late 1980s. The first of these meetings is the Intergovernmental Panel on Climate Change (IPCC) (UNEP and WMA, 1988). At the Rio Earth Summit held in 1992, the UN FCCC was opened for signature. The Kyoto Protocol was adopted in 1997 (UN FCCC, 1997). There were two important developments in 2015. The first is the announcement of the UN 2030 Agenda and the Sustainable Development Goals (UN, 2015). The other is the Paris Climate Agreement (UN FCCC, 2015).

The European Union has included principles on climate change in its environmental action programs since 1973. On May 2, 2022, the 8th Environment Action Program entered into force. This program is the legally accepted common agenda of the EU for environmental policy until 2030 (T.C. Dış İşleri Bakanlığı, 2022). The European Green Deal, announced by the European Commission, is a new growth strategy. It aims to make Europe the first climate-neutral continent in the world, where greenhouse gas emissions (compared to 1990) are reduced by 55% by 2030 and are net zero until 2050 (European Commission, 2019; European Commission, 2022).

International conferences and talks are gradually expanding and deepening[1]. As the importance of the problem is understood, national and international actors supporting the climate change convention are increasing. However, it will not be enough to keep the actions and practices that will minimize the negative effects of climate change at the international level. These policies should be adopted at the regional, national, and local levels, and especially local action plans should be put into effect.

The threat of global climate change has become one of the most important scientific and political problem areas of our time. With the onset of the 1990s, the need to take action to reduce greenhouse gas emissions came to the fore. The relative responsibilities of different countries, the measures to be taken, how to act and the tools to be used have been the subject of fierce debate. Due to the global nature of the problem, the answers to these questions have been sought in the negotiation processes between governments. However, it is becoming increasingly clear that governments cannot meet their international commitments to climate change unless they take responsibility more explicitly through sub-national action. As it is known, greenhouse gas emissions arise from human activities and production processes carried out in certain places. It is increasingly argued that the local is the most appropriate political jurisdiction to achieve the necessary reduction in these emissions. Many local governments have significant powers over land use planning and waste management. It can play an important role in transport problems and energy consumption. In addition, local governments are working to achieve the policy objectives determined in the national and international arena; they also

[1] It is beyond the scope of this study to describe in detail the international efforts on global climate change. For detailed information, see Tuğaç, 2019.

FULL TEXTS BOOK

try new policies by taking the initiative. This shows that they represent a critical area for the governance of global environmental issues (Betsill and Bulkeley, 2006).

2. THE ROLE OF CITIES IN SOLVING CLIMATE CHANGE PROBLEMS

Human mobility due to social, economic, and political reasons (international and internal migration) constantly changes the center of gravity of the world in favor of cities (UN ECOSOC, 2018). It can be said that the future of the world is urban, it is shaped by cities. The proportion of people living in cities in the world's total population is increasing. According to the United Nations, while 55% of the world's population lived in cities in 2018, it is estimated that this rate will exceed 60% in 2030 and 68% in 2050 (UN DESA, 2019). In terms of reducing the negative effects of climate change, cities stand out for the following reasons (IFC, 2018):

- Today, there is an age of cities, where more than half of the population lives in urban areas. Cities are also significant actors in the global economy. They contribute more than 80% of the global gross domestic product (GDP). Cities are centers of innovation and prosperity. As with the problems of inadequate infrastructure, population growth, environmental pollution, and social and economic inequality, the solution to climate change will be with cities.
- Cities are hotspots on the issue of climate change. While they consume about 70% of the world's energy, they generate more than 70% of global carbon emissions. In addition, as 90% of the world's urban areas are located on coastlines, cities face devastating climate risks such as rising sea levels and mega-storms on the coasts.
- Limiting global warming to a certain degree will require rapid and far-reaching transitions and investments in energy, soil, urban, infrastructure, and industrial systems. Cities also have a spate of policy options (such as green buildings and infrastructure, green transportation, sustainable land, water, and waste management) they can use to mitigate risks to health, livelihoods, living space, food, water, and economic growth in urban areas.
- Decisions taken by city administrations are effective on more people. It can have a more direct and rapid impact than national or international policies.
- The essential urban services that make cities attractive and valuable are increasingly at risk from climate disasters.
- An ever-increasing urban population will place additional demands on resources and services, especially in large cities that lack essential services and are increasingly facing climate risks and disasters. The situation is getting worse, especially in underdeveloped countries with growing cities, where the unregistered settlement population is gradually increasing.
- Approximately 60% of the areas expected to be urbanized by 2030 in the World are waiting to be built. Cities, especially in developing countries, will do more to meet the needs of their growing populations and tackle challenges such as air pollution, population density and energy access. However, they can take a historic step towards urbanization by diverting their scarce resources to clean transportation, zero-carbon buildings, and educating people to provide green infrastructure. It is of great importance to provide an integrated approach to city planning and to invest in smart city projects in terms of climate.

If the source of global climate change problems is human activities, the solution to the problem should also start from the settlements where the population is concentrated. In solving this problem, which has global consequences, local causes should not be ignored. For this reason, cities where the majority of the world's population lives are of great importance as the places where the problem begins and where the solution should begin.

City administrations are authorized and responsible for the implementation of regulations regarding spatial planning, public transportation, construction, and production. This provides great efficiency and advantage in implementing policies and programs aimed at reducing climate change problems. City

FULL TEXTS BOOK

administrations can also set quite ambitious targets for reducing greenhouse gas emissions. The concentration of human and economic activities and therefore the population in cities brings cost and innovation advantages related to smart city systems, integrated waste management, water management, public transportation and joint heating systems, and energy production. This concentration seen in big cities provides an opportunity for the rapid spread of new ideas in technical, social, and behavioral solutions. In addition, cities are quite suitable for research and development studies carried out to develop new technologies. In recent years, studies have been carried out to find smart and practical solutions that are as environmentally friendly and sustainable as they are smart to reduce the negative consequences of climate change. Efforts to reduce greenhouse gas emissions in cities bring other urban benefits and advantages such as environmentally and climate-friendly transportation. This reduces air pollution, reduces costs, and is safe and healthy for pedestrians while reducing traffic congestion (Dodman, 2009).

The idea of including city governments in global, regional, and national efforts to reduce greenhouse gas emissions is increasingly expressed day by day. It should be noted here that cities follow different paths to develop and, of course, they develop at different levels. Likewise, cities contribute to global warming at different levels. Carbon emissions per capita in cities in low- and middle-income countries are very small compared to rich urban areas. In this respect, the priority of city governments regarding the environment is not just about reducing carbon emissions. However, it is unacceptable for urban areas with low carbon emissions to take a passive stance towards this global concern. On the contrary, they need to plan with climate change motivation to promote sustainable city models and urbanization strategies. They need to make consumer goods, public services, and energy-efficient means of production accessible to more people without endangering people's livelihoods, natural resources, and ecosystems at local, national, and global levels (Romero Lankao, 2007).

CONCLUSION

In the last three or four decades, the world has been experiencing much more intense urbanization than in previous periods. This phenomenon, which has led cities to develop and seek new paths, has also brought about social and economic change. The urban development path adopted by cities also determines energy needs, preferences, and measures. This is also an important factor that determines local air pollutants and greenhouse gas emissions and affects urban carbon sinks. Urban development paths also determine whether cities are sensitive or resistant to climate problems. In this respect, the relationship between climate change and cities is not simple. In order to find appropriate solutions to the problems, it is necessary to explain the factors that explain such paths. Cities primarily focus on local issues. For this reason, it is very difficult for cities to take precautions against climate change and produce policies to reduce its effects (Dhakal, 2008).

Climate change is causing many factors such as temperature increases, sea level rise, extreme weather events, and ecosystem changes worldwide. Climate change, one of the most urgent environmental and social problems of our day, directly affects urban areas. These effects are especially more pronounced in urban areas that are densely populated and the center of economic activity.

Climate change, whose effects are becoming more visible, poses an increasingly greater threat to our planet and humanity. This requires re-evaluating policies and strategies, development programs and action plans to be developed at global, national and local levels. In order to solve climate problems, in addition to global and national policies aimed at reducing greenhouse gas emissions, local policies aimed at eliminating the root causes of climate change are also important. Cities have a leadership role in solving climate problems, which have now become the subject of spatial planning, not just urban policy (Galderisi and Colucci, 2018).

FULL TEXTS BOOK

Urban administrations, which are of vital importance in combating climate change, play a critical role in mitigating and adapting to these effects. The role of cities in solving climate change problems can be summarized under three headings:

- Cities are a significant source of greenhouse gas emissions. City administrations can develop various strategies to reduce emissions. Increasing energy efficiency, using renewable energy, and ensuring sustainability in transportation systems are among these strategies. For example, developing and encouraging urban public transportation systems can reduce carbon emissions by reducing individual vehicle use.
- City administrations can make cities more resilient by developing strategies to adapt to climate change. Applications such as increasing green areas, infrastructure improvements, sustainable water management, and flood risk reduction projects can be evaluated within this scope. For example, applications such as green roofs and vertical gardens in cities can mitigate the effects of temperature increases.
- City administrations play an important role in informing the public about climate change and encouraging participation. Education programs, awareness campaigns, and involving local people in decision-making processes can help increase social support in the fight against climate change.

City administrations play a central role in mitigating and adapting to the effects of climate change. Policies and projects in areas such as energy efficiency, renewable energy, sustainable infrastructure, and public awareness will help cities become more resilient to climate change. The development and implementation of effective strategies by city administrations for climate change will create a butterfly effect not only at the local level but also at the national and global levels.

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FULL TEXTS BOOK

AKADEMİSYEN BAKIŞ AÇISIYLA ÖRGÜTSEL DNA ÖZELLİKLERİ: KARABÜK ÜNİVERSİTESİ'NDE BİR ARAŞTIRMA

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ÖZET
Bu araştırma akademisyenlerin bakış açılarına göre Karabük Üniversitesi'nin örgütsel DNA özelliklerini ortaya çıkarmak amacıyla gerçekleştirilmiştir. Analizlerde kullanılan veri, örgüt DNA'sı ölçeği kullanılarak anket yoluyla 198 akademisyenden sağlanmıştır. Verilerin analizinde t-testi ve ANOVA analizi gerçekleştirilmiştir. Analizler sonucunda, katılımcılara göre Karabük Üniversitesi'nin DNA özelliklerinden en yüksek ortalamaya sahip olanın rastgele örgüt olduğu, en düşük ortalamaya sahip olanın ise tam-zamanında örgüt olduğu tespit edilmiştir. Bununla birlikte, demografik özellikler açısından örgütsel DNA'nın farklı boyutları incelendiğinde, cinsiyet, yaş, medeni durum, unvan, eğitim seviyesi ve kurumda çalışma süresi açısından farklılıklar bulunduğu belirlenmiştir. Araştırma bulgularının, Karabük Üniversitesi çalışanlarına ve yöneticilerine yol göstermesi açısından önemli olduğu düşünülmektedir.
Anahtar Kelimeler: Örgütsel DNA, Akademisyen, Karabük Üniversitesi.

ABSTRACT
This study aims to reveal the organizational DNA characteristics of Karabük University from the perspectives of its academicians. The data used in the analyses was obtained through a survey from 198 academics using the organizational DNA scale. Data were analysed using t-tests and ANOVA analyses. The analysis results indicated that, according to the participants, the characteristic with the highest average for Karabük University's DNA was an fits and starts organization, while the characteristic with the lowest average was just-in-time organization. Furthermore, when examining the different dimensions of organizational DNA in terms of demographic characteristics, differences were found based on gender, age, marital status, position, educational status and tenure. The findings of this research are considered important for guiding Karabük University's employees and administrators.
Keywords: Organizational DNA, Academician, Karabük University.

GİRİŞ

Örgütsel DNA kavramı; örgütleri yaşayan birer canlı gibi değerlendirir ve bu yaklaşımla örgütlerin de canlılar gibi eşsiz kimlik, kişilik ve karaktere sahip olduğunu benimser. Bu yapı örgüt kültüründen değerlerine, liderlik özellikleri ve yönetim tarzlarına kadar birçok unsuru da kapsamaktadır. Örgütler bu özellikleri sayesinde diğer örgütlerden ayrılmaktadır. Örgütsel DNA'nın analizi, örgütün güçlü ve zayıf yönlerini, fırsatlarını ve tehditlerini daha iyi anlamaya yardımcı olabilir ve böylece stratejik yönetim süreçlerinde örgütlerin daha bilinçli kararlar alınmasında farkındalık yaratabilir.

Bu kapsamda bu araştırma, Karabük Üniversitesi'nde çalışmakta olan akademisyenlerin çalıştıkları kurumun örgütsel DNA özelliklerine bakış açılarını değerlendirmektedir. Çalışmanın amacı, akademisyenlerin örgütsel DNA algılarının demografik değişkenler açısından farklılaşıp farklılaşmadığını belirleyebilmektir.

FULL TEXTS BOOK

KAVRAMSAL ÇERÇEVE

Örgütsel DNA

Çetin ve Döş (2014) canlıların DNA'sı farklı olsa da canlının tüm parçaları aynı DNA'yı taşır fikrinden yola çıkarak her örgüt, farklı örgütsel DNA'ya sahip olsa da aynı örgütte çalışan bireylerin aynı örgüt DNA'sını paylaştığını belirtmiştir.

Baskin (1998), varlığını uzun yıllardır sürdüren başarılı işletme örnekleri incelendiğinde, bu örgütlerin çağımızın gerekliliklerine uygun şekilde ekonomik ve sosyal koşullara canlı bir varlık gibi uyum sağladıklarını ve kendilerine özel genetik özelliklerinin olduğu, bu örgütlerin özelliklerinin de kendilerinin DNA'sında bulunduğunu ifade etmiştir.

Örgütsel DNA; örgütler hakkında bir analiz, ideoloji, imaj, kimlik ve düşünme yöntemini ifade etmektedir.

Örgütsel DNA Boyutları

Booz Allen Hamilton tarafından 2003 yılında geliştirilen "Org DNA Profiler" adlı anket aracılığıyla örgütsel DNA özellikleri için 7 alt boyut belirlenmiştir.

Esnek Örgüt, bir örgütün zorluklar, beklenmedik durumlar ve çatışmalar karşısında hızla yeni duruma uyum sağlama, toparlanma ve devam edebilme yeteneğini ifade etmektedir. Esnek örgütler, stratejilerini koruyarak, karşılaştıkları engeller karşısında daha akılcı ve çözüm odaklı tepkiler verebilirler. Bu tepkiler, örgütün iç yapısının daha da sağlıklı ve güçlü olmasına olanak sağlar. Bu örgüt türü, belirsizliklere ve değişimlere karşı dayanıklılığıyla öne çıkar ve genellikle en sağlıklı örgüt yapısı olarak kabul edilir (Çetin ve Döş, 2014, s.563).

Askeri Örgüt, genellikle daha küçük ve uzmanlaşmış bir ekip tarafından yönetilen işletmeleri ifade eder. Bu tür organizasyonlarda, başarıya ulaşmak için üst yönetimin etkin bir yürütme yeteneği ve işleyiş modeline sahip olması gerekmektedir. Askeri yapılı organizasyonlarda herkes kendi görevlerini bilir ve bu görevleri dikkatli bir şekilde uygulayarak tutarlı yürütme etkisi gösterebilir. Bu örgüt tipinin belirgin özelliği, yüksek düzeyde hiyerarşi ve kontrollü bir yönetim modeline sahip olmasıdır (Onay ve Ergüden, 2012, s.207).

Tam-Zamanlı Örgüt, işletmenin bütünüyle dış çevredeki ani değişimlere hızlı ve etkili bir şekilde yanıt verebilen bir yapıya sahiptir. Bu tür organizasyonlarda çalışan kişiler motive olmuş ve yetenekli kişilerdir. Örgüt içinde çalışanlar, genellikle şirketlerinden aldıkları değer ve gururla daha fazla motive olduklarını düşünürler. Aynı zamanda, bu tarz örgütler çalışanlar için öğrenmeye ve gelişmeye uygun iş ortamları sunar (Telli ve Özdaşlı, 2020, s.969).

Rastgele Çalışan Örgüt, zeki, motivasyonu yüksek ve yetenekli çalışanlardan oluşan, ancak bu çalışanların ortak bir amaç için bir araya gelemedikleri bir örgüt yapısını ifade eder. Bu tür organizasyonlardaki temel sorun ise, çalışanların aynı anda aynı yöne bakamaması ve birlikte ortak bir amaç için hareket edememesidir. Üst yönetim tarafından güçlü bir yönlendirmenin olmaması sonucu kontrol zorlaşır, organizasyon disiplinden uzak bir yapıya bürünür (Bostancı vd., 2017, s. 5695)

Yönetim Ağırlıklı Örgüt, diğer örgütlere göre nispeten yavaş ve tepkisel davrandıkları, fırsatları geç fark etmekte ya da rakiplerine göre daha az enerjik takip ettikleri gözlenmektedir. Gereğinden fazla yönetim ağırlıklı örgütlerde, boşa harcanan çok fazla çaba ve gereksiz bilgi bulunmaktadır.

Pasif-Saldırgan Örgüt; örgüte dışarıdan bakıldığında herkesin birbiriyle iyi anlaştığı ve çatışmaların yaşanmadığı ancak içeride birtakım uyuşmazlıkların olduğu örgüt tipidir. Değişimleri uygulamak zordur. Bu örgütün çalışanları merkezden gelen talimatlara uymama eğilimindedir. En sık rastlanan örgüt tipidir.

Fazla büyümüş Örgüt; Örgüt, küçük bir üst yönetim grubuyla yönetilemeyecek kadar çok geniş ve karmaşık bir yapıdadır ve yönetimini demokrasiden uzaktır. Güç; tepe ve tepeye yakın yerlerde tutulduğundan, fazla büyümüş örgüt pazardaki gelişmelere yavaş tepki vermeye meyillidir ve genellikle kendi yolunun dışına çıkamamaktadır.

FULL TEXTS BOOK

METODOLOJİ

Bu bölümde araştırmanın hipotezlerine, evren ve örneklemine, veri toplama ve analiz yöntemine ilişkin bilgilere yer verilmektedir.

Hipotezler

Bu araştırma Karabük Üniversitesi'nde çalışan akademisyenlerin bakış açılarına göre çalıştıkları kurumun örgütsel DNA özelliklerini ortaya çıkarmak amacıyla gerçekleştirilmiştir. Bu amaç için aşağıdaki sorulara cevap aranmıştır.

1. Akademisyenlerin bakış açılarına göre Karabük Üniversitesi'nin örgütsel DNA özellikleri nasıldır?
2. Akademisyenlerin bakış açılarına göre Karabük Üniversitesi'nin örgütsel DNA özellikleri akademisyenlerin demografik özelliklerine (cinsiyet, yaş, medeni durum, unvan, eğitim seviyesi, kurumda çalışma süresi) göre anlamlı bir farklılık göstermekte midir?

Bu sorulara yönelik oluşturulan hipotezler şu şekildedir:

- H1: Karabük Üniversitesi DNA özellikleri (H1a: esnek örgüt, H1b: askeri örgüt, H1c: tam-zamanında örgüt, H1d: rastgele örgüt, H1e: yönetim ağırlıklı örgüt, H1f: pasif-saldırgan örgüt) cinsiyete göre farklılaşır.
- H2: Karabük Üniversitesi DNA özellikleri (H2a: esnek örgüt, H2b: askeri örgüt, H2c: tam-zamanında örgüt, H2d: rastgele örgüt, H2e: yönetim ağırlıklı örgüt, H2f: pasif-saldırgan örgüt) yaşa göre farklılaşır.
- H3: Karabük Üniversitesi DNA özellikleri (H3a: esnek örgüt, H3b: askeri örgüt, H3c: tam-zamanında örgüt, H3d: rastgele örgüt, H3e: yönetim ağırlıklı örgüt, H3f: pasif-saldırgan örgüt) medeni duruma göre farklılaşır.
- H4: Karabük Üniversitesi DNA özellikleri (H4a: esnek örgüt, H4b: askeri örgüt, H4c: tam-zamanında örgüt, H4d: rastgele örgüt, H4e: yönetim ağırlıklı örgüt, H4f: pasif-saldırgan örgüt) unvana göre farklılaşır.
- H5: Karabük Üniversitesi DNA özellikleri (H5a: esnek örgüt, H5b: askeri örgüt, H5c: tam-zamanında örgüt, H5d: rastgele örgüt, H5e: yönetim ağırlıklı örgüt, H5f: pasif-saldırgan örgüt) eğitim seviyesine göre farklılaşır.
- H6: Karabük Üniversitesi DNA özellikleri (H6a: esnek örgüt, H6b: askeri örgüt, H6c: tam-zamanında örgüt, H6d: rastgele örgüt, H6e: yönetim ağırlıklı örgüt, H6f: pasif-saldırgan örgüt) çalışma süresine göre farklılaşır.

Evren, Örneklem ve Ölçüm Aracı

Araştırmanın evreni 2023-2024 eğitim öğretim yılında Karabük Üniversitesi'nde tam zamanlı çalışan 1167 akademisyendir. Anketlerin uygulanması için Karabük Üniversitesi Sosyal ve Beşeri Araştırmaları Etik Kurulu'ndan 29.05.2024 tarih ve 2024/06 sayılı etik kurul izni alınmıştır. Araştırmada evrenin tamamına tam sayım yöntemiyle anketler online olarak gönderilmiş ve Google forms üzerinden hazırlanan ankete katılımları istenmiştir. Toplamda 198 akademisyen araştırmaya katılmış ve dolayısıyla araştırmanın örneklemini 198 akademisyen oluşturmaktadır. Veri toplama süreci 1-30 Haziran 2024 tarihleri arasında gerçekleştirilmiştir. Verilerin analizinde t-testi ve ANOVA analizi gerçekleştirilmiştir.

Örneklemin demografik dağılıma ilişkin bulguları Tablo 1'de gösterilmiştir.

Tablo 1. Örneklemin demografik özellikleri

Değişkenler	Kategori	Frekans	Yüzde
Cinsiyet	Erkek	115	41,9
	Kadın	83	58,1
Yaş	30 Yaş ve Altı	47	23,7
	31-40 Yaş	94	47,5
	41 Yaş ve Üstü	57	28,8

FULL TEXTS BOOK

Medeni Durum	Bekar	70	35,4
	Evli	128	64,6
Unvan	Arş. Gör.	52	26,3
	Öğr. Gör.	29	14,6
	Dr. Öğr. Üyesi	68	34,3
	Doçent	28	14,1
	Profesör	21	10,6
Eğitim Seviyesi	Lisans	21	10,6
	Yüksek Lisans	47	23,7
	Doktora	130	65,7
Kurumda Çalışma Süresi	1 Yıldan Az	22	11,1
	1-5 Yıl	54	27,3
	6-10 Yıl	49	24,7
	11-20 Yıl	56	28,3
	21 Yıl ve Üzeri	17	8,6

Tablo 1'e göre araştırmaya katılan akademisyenlerin %58,1'i kadın ve %41,9'u erkektir. Yaş dağılımı incelendiğinde; katılımcıların %23,7'si 30 yaş ve altı, %47,5'i 31-40 yaş arası ve %28,8'i 41 yaş ve üstüdür. Araştırmaya katılan akademisyenlerin %35,4'ü bekar, %64,6'sı evlidir. Katılımcıların %26,3'ü Araştırma Görevlisi, %14,6'sı Öğretim Görevlisi, %34,3'ü Dr. Öğretim Üyesi, %14,1'i Doçent ve %10,6'ı Profesör'dür. Katılımların eğitim seviyeleri incelendiğinde çoğunluğun Doktora mezunu olduğu görülmektedir (%65,7). Karabük Üniversitesi'ndeki akademisyenlerin kurumda çalışma sürelerine bakıldığında; %11,1'inin 1 yıldan az, % 27,3'ünün 1-5 Yıl arası, %24,7'sinin 6-10 yıl arası, %28,3'ünün 11-20 yıl arası ve %8,6'sının 21 yıldan fazla olduğu görülmektedir.

Çalışmada kullanılan örgüt DNA'sı ölçeği, Booz Allan Hamilton Co. (2003) tarafından geliştirilmiş, Çetin ve Döş (2014) tarafından Türkçe'ye uyarlanmıştır ve 28 sorudan oluşmaktadır. Örgüt DNA'sı ölçeğinde 6 alt boyut bulunmaktadır. Değerlendirme ölçeğinde esnek örgüt profili için 4 madde, askeri örgüt profili için 4 madde, tam zamanında örgüt için 4 madde, rastgele örgüt profili için 6 madde, yönetim ağırlıklı örgüt için 6 madde, pasif saldırgan için örgüt için 4 madde bulunmaktadır. Örgüt DNA'sı ölçeğinin ifadeleri 1=Kesinlikle Katılmıyorum, 2=Katılmıyorum, 3=Kararsızım, 4=Katılıyorum, 5=Kesinlikle Katılıyorum şeklinde oluşan 5'li likert tipi sorulardır.

BULGULAR

Araştırmanın bulguları kapsamında öncelikle tanımlayıcı istatistikler incelenmekte, daha sonra ise güvenilirlik analizi ve hipotez testlerine yer verilmektedir.

Tanımlayıcı İstatistikler

Tanımlayıcı istatistikler, analiz verisinin özet şekilde yorumlanmasına imkan vererek verinin daha iyi ve kolay anlaşılmasını sağlamaktadır. Tanımlayıcı istatistikler kapsamında araştırma değişkenlerine ilişkin ortalama ve standart sapma değerlerine yer verilmektedir.

Örgütsel DNA özellikleri kapsamında elde edilen ortalama ve standart sapma değerleri Tablo 2'de gösterilmiştir.

Tablo 2. Ortalama ve Standart Sapma Değerleri

Değişkenler	Ortalama	Std. Sapma
Rastgele Örgüt	3,189	1,021

FULL TEXTS BOOK

Askeri Örgüt	3,158	0,835
Yönetim Ağırlıklı Örgüt	3,064	1,073
Pasif-Saldırgan Örgüt	3,011	1,060
Esnek Örgüt	2,990	1,108
Tam-Zamanında Örgüt	2,865	1,089
ÖRGÜTSEL DNA (GENEL)	3,058	0,385

Tablo 2'ye göre katılımcılar Karabük Üniversitesi'nin en fazla rastgele örgüt profiline sahip olduğunu düşünmektedir (Ort=3,189). Bununla birlikte sırasıyla askeri örgüt (Ort=3,158), yönetim ağırlıklı örgüt (Ort=3,064), pasif saldırgan örgüt (Ort=3,011), esnek örgüt (Ort=2,990) yapısına sahip olduğunu belirtmekte, en az olarak da tam zamanında örgüt (Ort=2,865) yapısına sahip olduğunu ifade etmektedir.

Güvenilirlik Analizi

Araştırmada hipotez testleri öncesinde kullanılan ölçeklerin güvenilirlikleri araştırılmıştır. Bu çerçevede, örgütsel DNA boyutlarını oluşturan esnek örgüt, askeri örgüt, tam-zamanında örgüt, rastgele örgüt, yöntemi ağırlıklı örgüt, pasif-saldırgan örgüt ve genel olarak örgütsel DNA değişkenlerinin Cronbach Alfa (α) değerleri hesaplanmıştır. Sonuçlar Tablo 3'te gösterilmektedir.

Tablo 3. Ölçeklerin Güvenilirlik Değerleri

Değişkenler	**İfade Sayısı**	**Cronbach Alfa (α) Değeri**
Esnek Örgüt	4	0,930
Askeri Örgüt	4	0,733
Tam-Zamanında Örgüt	4	0,921
Rastgele Örgüt	6	0,923
Yönetim Ağırlıklı Örgüt	6	0,932
Pasif-Saldırgan Örgüt	4	0,894
ÖRGÜTSEL DNA (GENEL)	28	0,715

Güvenilirlik analizi sonucunda örgütsel DNA ölçeğinin Cronbach Alfa değerleri; esnek örgüt boyutu için 0,930, askeri örgüt boyutu için 0,733, tam-zamanında örgüt boyutu için 0,921, rastgele örgüt boyutu için 0,923, yönetim ağırlıklı örgüt boyutu için 0,932 ve pasif-saldırgan örgüt boyutu için 0,894 olarak hesaplanmıştır. Ayrıca genel olarak örgütsel DNA değişkeni için hesaplanan Cronbach alfa değeri 0,715 şeklindedir. Elde edilen bulgu, Örgütsel DNA ölçeği ve alt boyutları için hesaplanan güvenilirlik değerlerinin 0,70'in üzerinde olduğu ve dolayısıyla ölçeklerinin güvenilir ölçekler olduğu anlamına gelmektedir (Nunnally ve Bernstein, 1994, s. 265).

Hipotez Testleri

Hipotez testleri çerçevesinde, araştırmaya katılan akademisyenlerin örgütsel DNA algılarının ve alt boyutlarının demografik faktörler açısından farklılaşıp farklılaşmadığı araştırılmaktadır. Bu amaçla T-testi ve ANOVA analizinden yararlanılmıştır.

İlk hipotez, akademisyenlerin örgütsel DNA algılarının cinsiyete göre farklılaşıp farklılaşmadığını belirlemeye yöneliktir. Gerçekleştirilen t-testi sonuçları Tablo 4'te gösterilmektedir.

FULL TEXTS BOOK

Tablo 4. Cinsiyete Göre Örgütsel DNA Algısı

Değişken	Cinsiyet	Ort.	Std. Sapma	t-değeri	Sig. (p)
Esnek Örgüt	Kadın	2,768	1,022	-2,421	**0,016***
	Erkek	3,150	1,144		
Askeri Örgüt	Kadın	3,367	0,820	3,064	**0,002****
	Erkek	3,007	0,816		
Tam-Zamanında Örgüt	Kadın	2,602	0,985	-2,935	**0,004****
	Erkek	3,054	1,125		
Rastgele Örgüt	Kadın	3,363	1,015	2,055	**0,041***
	Erkek	3,064	1,010		
Yönetim Ağırlıklı Örgüt	Kadın	3,257	1,017	2,172	**0,031***
	Erkek	2,925	1,093		
Pasif-Saldırgan Örgüt	Kadın	3,157	0,979	1,645	0,102
	Erkek	2,906	1,107		
ÖRGÜTSEL DNA (GENEL)	Kadın	3,118	0,392	1,883	0,061
	Erkek	3,014	0,374		

* p<0,05; ** p<0,01; N=Kadın:83, Erkek:115

Araştırmanın ilk hipotezi kapsamında akademisyenlerin bakış açılarına göre genel olarak Karabük Üniversitesi'nin örgütsel DNA özelliklerinde cinsiyete göre farklılık bulunmamaktadır. Ancak örgütsel DNA'nın alt boyutlarına bakıldığında; esnek örgüt, askeri örgüt, tam zamanında örgüt, rastgele örgüt, yönetim ağırlıklı örgüt cinsiyete göre farklılık göstermektedir. Analiz bulguları kapsamında; kadın akademisyenlere göre Karabük Üniversitesi'nin askeri örgüt boyutu diğer alt boyutlara göre daha yüksektir. Erkek akademisyenlere göre ise esnek örgüt boyutu diğer alt boyutlara göre daha yüksektir. Bu durumda H1a, H1b, H1c, H1d, H1e kabul edilirken H1f reddedilmiştir.

İkinci hipotez, akademisyenlerin örgütsel DNA algılarının yaşa göre farklılaşıp farklılaşmadığını belirlemeye yöneliktir. Gerçekleştirilen ANOVA analizi sonuçları Tablo 5'te gösterilmektedir.

FULL TEXTS BOOK

Tablo 5. Yaşa Göre Örgütsel DNA Algısı

Değişkenler	Yaş	Ort.	Std. Sapma	F değeri	Sig. (p)	Post-Hoc. (Tukey)
Esnek Örgüt	30 yaş ve altı[1]	2,548	1,132	8,636	**0,001****	1-3, p=0,001**
	31-40 yaş arası[2]	2,952	1,037			2-3, p=0,028*
	41 yaş ve üstü[3]	3,417	1,064			
Askeri Örgüt	30 yaş ve altı[1]	3,559	0,697	9,434	**0,001****	1-2, p=0,008**
	31-40 yaş arası[2]	3,128	0,854			1-3, p=0,001**
	41 yaş ve üstü[3]	2,877	0,789			
Tam-Zamanında Örgüt	30 yaş ve altı[1]	2,569	0,969	4,941	**0,008****	1-3, p=0,007**
	31-40 yaş arası[2]	2,803	1,068			
	41 yaş ve üstü[3]	3,211	1,143			
Rastgele Örgüt	30 yaş ve altı[1]	3,567	0,990	7,073	**0,001****	1-3, p=0,001**
	31-40 yaş arası[2]	3,215	0,936			
	41 yaş ve üstü[3]	2,836	1,074			
Yönetim Ağırlıklı Örgüt	30 yaş ve altı[1]	3,422	1,050	5,528	**0,005****	1-3, p=0,003**
	31-40 yaş arası[2]	3,083	1,057			
	41 yaş ve üstü[3]	2,737	1,032			
Pasif-Saldırgan Örgüt	30 yaş ve altı[1]	3,527	0,978	10,908	**0,001****	1-2, p=0,012*
	31-40 yaş arası[2]	3,005	1,051			1-3, p=0,001**
	41 yaş ve üstü[3]	2,597	0,966			2-3, p=0,044*
ÖRGÜTSEL DNA (GENEL)	30 yaş ve altı[1]	3,241	0,327	9,640	**0,001****	1-2, p=0,011*
	31-40 yaş arası[2]	3,048	0,405			1-3, p=0,001**
	41 yaş ve üstü[3]	2,923	0,335			

* p<0,05; ** p<0,01; N=30 yaş ve altı:47, 31-40 yaş arası:94, 41 yaş ve üstü:57

Tablo 5 incelendiğinde Karabük Üniversitesi'nin hem örgütsel DNA alt boyutlarında hem de genel olarak yaşa göre farklılık bulunmaktadır. Örgütsel DNA'nın alt boyutlarına bakıldığında; esnek örgüt, askeri örgüt, tam zamanında örgüt, rastgele örgüt, yönetim ağırlıklı örgüt, pasif- saldırgan örgüt yaşa göre farklılık göstermektedir. 30 yaş altı ve 31-40 yaş arası akademisyenler, Karabük Üniversitesi'nin örgütsel DNA profilinde rastgele alt boyutunun en yüksek olduğunu ifade etmektedir. 41 yaş üzerinde olan akademisyenler ise esnek örgüt olduğunu düşünmektedir. Analiz bulgularına göre; H2a, H2b, H2c, H2d, H2e ve H2f kabul edilmiştir.

Üçüncü hipotez, akademisyenlerin örgütsel DNA algılarının medeni duruma göre farklılaşıp farklılaşmadığını belirlemeye yöneliktir. Gerçekleştirilen t-testi sonuçları Tablo 6'da gösterilmektedir.

FULL TEXTS BOOK

Tablo 6. Medeni Duruma Göre Örgütsel DNA Algısı

Değişken	Medeni Durum	Ort.	Std. Sapma	t-değeri	Sig. (p)
Esnek Örgüt	Bekar	2,543	1,046	-4,386	**0,001****
	Evli	3,234	1,068		
Askeri Örgüt	Bekar	3,454	0,832	3,809	**0,001****
	Evli	2,996	0,794		
Tam-Zamanında Örgüt	Bekar	2,604	1,039	-2,530	**0,012***
	Evli	3,008	1,093		
Rastgele Örgüt	Bekar	3,345	0,979	1,595	0,112
	Evli	3,104	1,036		
Yönetim Ağırlıklı Örgüt	Bekar	3,345	1,025	2,775	**0,006****
	Evli	2,910	1,070		
Pasif-Saldırgan Örgüt	Bekar	3,450	0,989	4,511	**0,001****
	Evli	2,772	1,023		
ÖRGÜTSEL DNA (GENEL)	Bekar	3,155	0,390	2,676	**0,008****
	Evli	3,005	0,371		

* p<0,05; ** p<0,01; N=Bekar:70, Evli:128

Tablo 6'ya bakıldığında; akademisyenlerin bakış açısına göre Karabük Üniversitesi'nin örgütsel DNA özellikleri genel olarak medeni duruma göre farklılık göstermektedir. Örgütsel DNA'nın alt boyutlarına bakıldığında; esnek örgüt, askeri örgüt, tam zamanında örgüt, yönetim ağırlıklı örgüt, pasif-saldırgan örgüt medeni duruma göre farklılık göstermektedir. Buna karşılık rastgele örgüt medeni duruma göre farklılık göstermemektedir. Evli akademisyenlerde esnek örgüt daha yüksek ortalamaya sahipken, bekar akademisyenlerde askeri örgüt profili daha yüksek ortalamaya sahiptir. Analiz bulgularına göre; H3a, H3b, H3c, H3e, H3f kabul edilirken H3d reddedilmiştir.

Dördüncü hipotez, akademisyenlerin örgütsel DNA algılarının unvana göre farklılaşıp farklılaşmadığını belirlemeye yöneliktir. Gerçekleştirilen ANOVA analizi sonuçları Tablo 7'de gösterilmektedir.

FULL TEXTS BOOK

Tablo 7. Unvana Göre Örgütsel DNA Algısı

Değişkenler	Unvan	Ort.	Std. Sapma	F değeri	Sig. (p)	Post-Hoc. (Tukey)
Esnek Örgüt	Arş.Gör.[1]	2,582	1,178	2,997	**0,020***	1-2, p=0,041* 2-3, p=0,028*
	Öğr.Gör[2]	3,293	1,020			
	Dr.Öğr.Üyesi[3]	3,000	1,015			
	Doçent[4]	3,241	1,147			
	Profesör[5]	3,214	1,079			
Askeri Örgüt	Arş.Gör.[1]	3,548	0,678	5,086	**0,001****	1-2, p=0,004** 1-4, p=0,008** 1-5, p=0,022*
	Öğr.Gör[2]	2,879	0,760			
	Dr.Öğr.Üyesi[3]	3,154	0,963			
	Doçent[4]	2,911	0,720			
	Profesör[5]	2,917	0,643			
Tam-Zamanında Örgüt	Arş.Gör.[1]	2,707	0,986	1,572	0,183	
	Öğr.Gör[2]	2,862	1,063			
	Dr.Öğr.Üyesi[3]	2,772	1,143			
	Doçent[4]	3,295	1,056			
	Profesör[5]	2,988	1,171			
Rastgele Örgüt	Arş.Gör.[1]	3,603	0,935	4,876	**0,001****	1-4, p=0,001** 1-5, p=0,030*
	Öğr.Gör[2]	3,040	0,892			
	Dr.Öğr.Üyesi[3]	3,243	0,935			
	Doçent[4]	2,696	1,217			
	Profesör[5]	2,857	1,022			
Yönetim Ağırlıklı Örgüt	Arş.Gör.[1]	3,436	1,000	3,158	**0,015***	1-4, p=0,046**
	Öğr.Gör[2]	2,822	1,139			
	Dr.Öğr.Üyesi[3]	3,110	1,055			
	Doçent[4]	2,750	0,933			
	Profesör[5]	2,746	1,166			
Pasif-Saldırgan Örgüt	Arş.Gör.[1]	3,447	1,066	3,799	**0,005****	1-4, p=0,006**
	Öğr.Gör[2]	2,948	0,879			
	Dr.Öğr.Üyesi[3]	2,952	1,099			
	Doçent[4]	2,616	0,929			
	Profesör[5]	2,738	1,032			
ÖRGÜTSEL DNA (GENEL)	Arş.Gör.[1]	3,263	0,321	7,170	**0,001****	1-2, p=0,005** 1-3, p=0,021* 1-4, p=0,001** 1-5, p=0,001**
	Öğr.Gör[2]	2,968	0,341			
	Dr.Öğr.Üyesi[3]	3,058	0,391			
	Doçent[4]	2,890	0,376			
	Profesör[5]	2,895	0,369			

FULL TEXTS BOOK

* p<0,05; ** p<0,01; N=Arş.Gör:52, Öğr.Gör:29, Dr.Öğr.Üyesi:68, Doçent:28, Profesör:21

Tablo 7'de akademisyenlere göre Karabük Üniversitesi'nin örgütsel DNA özelliklerinde tam zamanında örgüt alt boyutu dışındaki örgütsel DNA boyutlarında hem de genel olarak unvana göre farklılık bulunmaktadır. Örgütsel DNA'nın alt boyutlarına bakıldığında; esnek örgüt, askeri örgüt, rastgele örgüt, yönetim ağırlıklı örgüt, pasif- saldırgan örgüt unvana göre farklılık göstermektedir. Akademik unvanlar açısından bakıldığında araştırma görevlilerinde ve doktor öğretim üyelerinde rastgele örgüt, öğretim görevlileri ve profesörlerde esnek örgüt, doçentlerde tam zamanında örgüt en yüksek ortalamaya sahiptir. Analiz bulgularına göre; H4a, H4b, H4d, H4e ve H4f kabul edilmiştir, H4c ise reddedilmiştir. Beşinci hipotez, akademisyenlerin örgütsel DNA algılarının eğitim seviyesine göre farklılaşıp farklılaşmadığını belirlemeye yöneliktir. Gerçekleştirilen ANOVA analizi sonuçları Tablo 8'de gösterilmektedir.

Tablo 8. Eğitim Seviyesine Göre Örgütsel DNA Algısı

Değişkenler	Eğitim Seviyesi	Ort.	Std. Sapma	F değeri	Sig. (p)	Post-Hoc. (Tukey)
Esnek Örgüt	Lisans[1]	2,476	1,267	3,333	**0,038***	1-3, p=0,038*
	Yüksek Lisans[2]	2,883	1,165			
	Doktora[3]	3,112	1,039			
Askeri Örgüt	Lisans[1]	3,667	0,743	4,909	**0,008****	1-3, p=0,006**
	Yüksek Lisans[2]	3,186	0,823			
	Doktora[3]	3,065	0,828			
Tam-Zamanında Örgüt	Lisans[1]	2,798	0,886	0,415	0,661	1-3, p=0,007**
	Yüksek Lisans[2]	2,755	1,094			
	Doktora[3]	2,915	1,120			
Rastgele Örgüt	Lisans[1]	3,595	0,998	1,575	0,191	
	Yüksek Lisans[2]	3,372	0,975			
	Doktora[3]	3,058	1,020			
Yönetim Ağırlıklı Örgüt	Lisans[1]	3,246	1,083	1,290	0,278	
	Yüksek Lisans[2]	3,227	1,174			
	Doktora[3]	2,976	1,029			
Pasif-Saldırgan Örgüt	Lisans[1]	3,560	1,021	4,525	**0,012***	1-3, p=0,015*
	Yüksek Lisans[2]	3,154	0,996			
	Doktora[3]	2,871	1,060			
ÖRGÜTSEL DNA (GENEL)	Lisans[1]	3,252	0,358	4,959	**0,008****	1-3, p=0,014*
	Yüksek Lisans[2]	3,125	0,358			
	Doktora[3]	3,002	0,386			

* p<0,05; ** p<0,01; N=Lisans:21, Yüksek Lisans:47, Doktora:130

Tablo 8 incelendiğinde Karabük Üniversitesi'nin örgütsel DNA özellikleri genel olarak eğitim seviyesine göre farklılık göstermektedir. Örgütsel DNA'nın alt boyutlarına bakıldığında; esnek örgüt, askeri örgüt, pasif- saldırgan örgüt eğitim seviyesine göre farklılık göstermektedir. Buna karşılık tam zamanında örgüt, esinlenmeler- başlamalar örgüt, yönetim ağırlıklı örgüt farklılık göstermemektedir. Karabük Üniversitesi'nin örgütsel DNA özelliklerini lisans mezunu akademisyenler askeri örgüt,

FULL TEXTS BOOK

yüksek lisans mezunu olanlar rastgele örgüt, doktora mezunları ise esnek örgüt olduğunu belirtmektedir. Analiz bulguları kapsamında; H5a, H5b ve H5f kabul edilmiştir. H5c, H5d, H5e ise reddedilmiştir.

Altıncı hipotez, akademisyenlerin örgütsel DNA algılarının çalışma süresine göre farklılaşıp farklılaşmadığını belirlemeye yöneliktir. Gerçekleştirilen ANOVA analizi sonuçları Tablo 9'da gösterilmektedir.

Tablo 9. Çalışma Süresine Göre Örgütsel DNA Algısı

Değişkenler	Çalışma Süresi	Ort.	Std. Sapma	F değeri	Sig. (p)	Post-Hoc. (Tukey)
Esnek Örgüt	1 yıldan az[1]	3,239	1,264	6,798	**0,001****	1-2, p=0,042*
	1-5 yıl arası[2]	2,491	1,053			2-4, p=0,001**
	6-10 yıl arası[3]	2,801	1,032			2-5, p=0,004**
	11-20 yıl arası[4]	3,371	0,943			3-4, p=0,047*
	21 yıl ve fazla[5]	3,544	1,108			
Askeri Örgüt	1 yıldan az[1]	3,511	0,749	8,120	**0,001****	1-4, p=0,002**
	1-5 yıl arası[2]	3,398	0,858			1-5, p=0,010*
	6-10 yıl arası[3]	3,342	0,717			2-4, p=0,001**
	11-20 yıl arası[4]	2,772	0,718			2-5, p=0,009**
	21 yıl ve fazla[5]	2,677	0,921			
Tam-Zamanında Örgüt	1 yıldan az[1]	3,136	1,084	3,971	**0,04****	2-4, p=0,039*
	1-5 yıl arası[2]	2,449	0,876			2-5, p=0,009**
	6-10 yıl arası[3]	2,827	1,067			
	11-20 yıl arası[4]	3,022	1,123			
	21 yıl ve fazla[5]	3,427	1,289			
Rastgele Örgüt	1 yıldan az[1]	3,015	0,874	4,250	**0,003****	2-4, p=0,005**
	1-5 yıl arası[2]	3,528	1,033			
	6-10 yıl arası[3]	3,384	0,984			
	11-20 yıl arası[4]	2,869	0,995			
	21 yıl ve fazla[5]	2,833	0,964			
Yönetim Ağırlıklı Örgüt	1 yıldan az[1]	2,841	1,216	4,873	**0,001****	2-4, p=0,003**
	1-5 yıl arası[2]	3,519	0,926			2-5, p=0,010*
	6-10 yıl arası[3]	3,143	0,986			
	11-20 yıl arası[4]	2,795	1,074			
	21 yıl ve fazla[5]	2,569	1,089			
Pasif-Saldırgan Örgüt	1 yıldan az[1]	3,011	1,132	3,652	**0,001****	2-4, p=0,008**
	1-5 yıl arası[2]	3,384	1,084			2-5, p=0,048*
	6-10 yıl arası[3]	3,082	1,017			
	11-20 yıl arası[4]	2,719	0,960			
	21 yıl ve fazla[5]	2,588	1,007			
ÖRGÜTSEL DNA (GENEL)	1 yıldan az[1]	3,097	0,338	4,905	**0,001****	2-4, p=0,001**
	1-5 yıl arası[2]	3,185	0,396			3-4, p=0,035*
	6-10 yıl arası[3]	3,120	0,356			
	11-20 yıl arası[4]	2,911	0,385			
	21 yıl ve fazla[5]	2,906	0,301			

* p<0,05; ** p<0,01; N=1 yıldan az:22, 1-5 yıl arası:54, 6-10 yıl arası:49, 11-20 yıl arası:56, 21 yıl ve üstü:17

Tablo 9'daki verilere göre Karabük Üniversitesi'nin örgütsel DNA özellikleri genel olarak kurumda çalışma süresine göre farklılık göstermektedir. Bununla birlikte Örgütsel DNA'nın tüm alt boyutları da çalışma süresine farklılık göstermektedir. Karabük Üniversitesi'nde 1 yıldan az süredir çalışanlar çalıştıkları kurumun örgütsel DNA özelliklerini askeri örgüt, 1-5 yıl arası ve 6-10 yıl arası çalışanlar

FULL TEXTS BOOK

rastgele örgüt, 11-20 yıl arası ve 21 yıl ve üzeri çalışanlar esnek örgüt olarak belirtmişlerdir. Analize göre; H6a, H6b, H6c, H6d, H6e ve H6f kabul edilmiştir.

SONUÇ VE TARIŞMA

Analizler sonucunda, katılımcılara göre Karabük Üniversitesi'nin DNA özelliklerinden en yüksek ortalamaya sahip olanın rastgele örgüt olduğu, en düşük ortalamaya sahip olanın ise tam zamanlı örgüt olduğu tespit edilmiştir. Bununla birlikte, demografik özellikler açısından örgütsel DNA'nın farklı boyutları incelendiğinde, cinsiyet, yaş, medeni durum, unvan, eğitim seviyesi ve kurumda çalışma süresi açısından farklılıklar bulunduğu belirlenmiştir.

Araştırma bulgularına göre; Karabük Üniversitesi'nde zeki, yetenekli ve girişimci akademisyenlerin bulunduğu ancak yönetimin akademisyenleri ortak bir amaç ve örgütsel değerler altında birlikte hareket etmelerini sağlamakla zorlandığı, üst yönetimde koordinasyon eksikliği olduğu ortaya çıkmıştır. Bu bulguların; Karabük Üniversitesi çalışanlarına ve yöneticilerine yol göstermesi açısından önemli olduğu düşünülmektedir.

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FULL TEXTS BOOK

ÖRGÜTSEL SESSİZLİĞİN NEDENLERİNE İLİŞKİN ÖĞRETMEN GÖRÜŞLERİ
TEACHERS' OPINIONS ON THE REASONS OF ORGANIZATIONAL SILENCE

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ÖZET
Bu çalışmanın amacı; öğretmenlerdeki örgütsel sessizliğe sebep olan bireysel, örgütsel ve yönetsel nedenlerin neler olduğunu belirlemektir. Bu amaç gözetilerek yapılan araştırmada tarama modeli kullanılmış olup nitel veri toplama yöntemlerinden görüşme tekniği kullanılmıştır. Araştırmanın çalışma grubunu, Isparta İli Eğirdir İlçesinde İlkokullarda çalışan 20 İlkokul öğretmeni oluşturmuştur. Araştırmacı tarafından hazırlanan, dokuz sorudan oluşan görüşme formu, çalışma grubundaki öğretmenlere uygulanarak gerekli bulgular elde edilmiştir. Toplanan verilerden içerik analizi yapılarak bulgular başlıklar halinde belirtilmiş, her başlık bulgulardan yararlanarak yorumlanmıştır. Yapılan araştırma sonucunda öğretmenlerin kendilerini korumak amacıyla bilinçli olarak sessizlik davranışında bulundukları tespit edilmiştir. Öğretmenlerde sıklıkla oluşan örgütsel sessizlik davranışını ortaya çıkaran sebepler bireysel nedenler, örgütsel nedenler ve yönetsel nedenler olarak ortaya çıkmış olup; bireysel nedenler, korku, güvensizlik, iletişim kuramama ve içe kapanma olarak belirlenmiştir. Örgütsel sessizliğe neden örgütsel sebepler; örgüt kültürü, adaletsizlik, sendikal sebepler, takdir edilmeme olarak belirlenmiştir. Yönetsel nedenler ise; katı hiyerarşik yapı, yöneticilere güvenmeme, liyakatsizlik, zorlayıcı güç olarak belirlenmiştir. Örgütsel Sessizliğin önüne geçmek için örgütlerde çalışanların güvende hissedeceği ve fikirlerini özgürce ifade edebileceği çalışma ortamları oluşturulmalı, okul yöneticileri her çalışana adil davranarak eşitlik ilkesinden ayrılmamalıdır. Çalışanlar da üzerine düşen görev sorumlulukları zamanında yerine getirerek örgütün amaçlarını gerçekleştirmek, verimliliği arttırmak için düşüncelerini dile getirmekten çekinmemelidir.
Anahtar Kelimeler: Örgüt, örgütsel sessizlik, öğretmen, yönetici

ABSTRACT
The purpose of this study is to determine the individual, organizational and administrative reasons that cause organizational silence in teachers. In the research conducted with this purpose in mind, the scanning model was used and the interview technique, which is one of the qualitative data collection methods, was used. The study group of the research consists of 20 primary school teachers working in primary schools in Eğirdir district of Isparta province. The interview form consisting of nine questions prepared by the researcher was applied to the teachers in the study group and the necessary findings were obtained. Content analysis was performed on the collected data and the findings were stated under headings, and each heading was interpreted using the findings. As a result of the research, it was determined that teachers consciously exhibit silence behavior in order to protect themselves. The reasons that frequently occur in teachers' organizational silence behavior were revealed as individual reasons, organizational reasons and administrative reasons; individual reasons were determined as fear, insecurity, inability to communicate and introversion. The organizational reasons causing organizational silence were determined as organizational culture, injustice, union reasons and not being appreciated. The administrative reasons were determined as rigid hierarchical structure, lack of trust in managers, incompetence and coercive power. In order to prevent organizational silence, working environments should be created in organizations where employees feel safe and can express their ideas freely, school

FULL TEXTS BOOK

administrators should treat each employee fairly and not depart from the principle of equality. Employees should not hesitate to express their opinions in order to fulfill their duties and responsibilities on time and to achieve the organization's goals and increase efficiency.
Keywords: Organization, organizational silence, teacher, manager

GİRİŞ

Örgütler ortak bir amacı gerçekleştirmek amacıyla çalışan, birlikte hareket eden insanlardan oluşmuş bir yapıdır. Ortak bir amaca ulaşırken örgütte bulunan herkesin bu amacı benimsemesi ve işbirliği yapması gerekir. Örgütler belli bir düzende çalışmalarını sürdürebilmek için belli normlar, kurallar ve sorumluluklar, liderlik şekilleri meydana getirirler. (Lusthaus, Adrien, Anderson, Carden ve Montalvan, 2002) çalışmalarında da ortaya koyduğu üzere örgüt yapısı itibariyle insan ilişkilerinin önemli olduğu bir düzene sahiptir. Çalışmaların verimli olması için çalışanlar iletişim içinde olmalıdır. Örgütlerin sahip oldukları kültür, değer yargıları, başarılı olmak için uyguladığı politika ve örgüt çalışanlarına karşı gösterdiği tutum aynı zamanda çalışanlarında örgüte karşı bağlılığını ve örgüte karşı davranışlarını da şekillendirir.

Bir örgütteki en önemli unsur çalışanlardır. Örgüt çalışanları ne kadar işbirliği içinde olursa, karar alma süreçlerine dâhil olarak duygu ve düşüncelerini rahatça ifade edebilme fırsatı bulursa örgüt çalışmaları da o kadar verimli olur. Çalışanların gerekli dayanışmayı sağlamasının sonucunda örgütsel bağlılığın oluşması ve örgütte verimliliğin arttırılması beklenir(Lepak ve Snell, 1998).

Çok çeşitli örgüt türleri vardır. Fakat bunlar için de eğitim öğretim örgütü olan okulların yeri çok ayrıdır. Okullar bulundukları toplumun kültürel etkilerinden ve küresel gelişmelerden, değişikliklerden de oldukça hızlı etkilenir. Okullar toplumları şekillendiren geleceğe yön veren bir görev yüklenir. Okul örgütü içinde meydana gelecek tüm olumsuz etkilerin topluma yansıması da kaliteyi düşürücü etki yaratacaktır. Bu bağlamda ele alacak olursak okul içinde verimi düşürecek çalışanların motivasyonunu düşürecek tüm engeller olabildiğince ortadan kaldırılmalıdır. Özellikle alan yazında da oldukça yer edinen örgüt çalışanlarının sessizliğe bürünmesine neden olacak yanlış uygulamaların önüne geçilmeli, ifade özgürlüğü sağlayacak çalışma ortamları oluşturulmalıdır.

KAVRAMSAL ÇERÇEVE

Örgütsel Sessizlik Nedir?

(Morrison ve Millliken, 2000; 2003; Henriksen ve Dayton, 2006; Fletcher ve Watson, 2007; Zheng ve diğerleri, 2008) yaptıkları çalışmalar sonucunda örgütsel sessizliği iş görenlerin çalıştıkları örgütün verimini arttırmaya yönelik fikirlerini bilinçli olarak gizlemesi şeklinde tanımlamıştır. Pinder ve Harlos (2001) çalışmalarına bakıldığında sessiz kalma davranışı iş görenlerin çalıştıkları örgütle ilgili bilgi, duygu ve düşüncelerini örgüt yöneticisine ifade etmemesidir. Sessizlik türlerinin hepsi edilgin bir davranış olarak ifade edilemez. (Scott, 1993). Bu nedenle yapılan açıklamalarda örgütsel sessizlik bilerek, bilinçli olarak, isteyerek yapılan sessiz kalma davranışı olarak karşımıza çıkar (Bogosian, 2012). Tanımlardan yola çıkarak sessizlik davranışı bilinçli olarak gerçekleştirilen ve çalışanın sahip olduğu bilgiyi paylaşmaması, farklı fikirlerin ortaya çıkması sürecinde pasif rol oynayarak gelişimin önünde engel yaratması olarak kendini göstermektedir.

Sessizlik Türleri Nelerdir?

Örgütsel Sessizlik türleri araştırıldığında Kabullenici Sessizlik, Savunmacı (Koruma Amaçlı) Sessizlik ve Örgüt Yararına Sessizlik/Koruma Amacıyla (Prososyal) Sessizlik şeklinde üç tür literatürde sıkça geçmektedir.

Kabullenici Sessizlik

Sessizliğin ilk türü kabullenici sessizliktir. Bu sessizlik türünde çalışanların ilgisiz olması, olaylara karşı kayıtsız görünmesi ve kabullenici tavırlarından dolayı sahip oldukları bilgileri, hissettiği duyguları

FULL TEXTS BOOK

kimseyle paylaşmak istemezler. Pasif,durgun ve çekingen davranışlar sergiledikleri gözlemlenmiştir (Pinder ve Harlos, 2001). Bu anlayıştaki kişiler çevrelerinde olan olaylar karşısında hiçbir fikir belirtmez ve olumsuz bir durumla karşılaşsa bile durumu olduğu gibi kabul ederler. Sorunlarla ilgili konuşmakta ilgisiz ve bilinçli olarak pasif davranırlar. Çalışanların sessiz kalmasının nedeni ‘’konuşsam ne olur konuşmasam ne’’ şeklinde düşündükleri için olabilir (Çakıcı, 2010). Kabullenici sessizlik davranışı sergileyen insanlar gözlemlendiğinde; söylediklerinin fark yaratmayacağı, dikkate alınmayacağı ya da iş arkadaşları tarafından alay edileceği düşüncesiyle çalışma ortamında sorunların çözümüne ilişkin gördüğü farklı çözüm yollarını kimseyle paylaşmak istemez, her zaman pasif kalır ve çoğunlukla bulunduğu kurumdan ayrılmak ve yer değiştirmek için tayin isteme görülür. Çalışanların bu sessizlik davranışlarının kaynağı gelişmelere, çevresindeki değişen şartlara karşı tepki göstermemesidir (Kulualp ve Çakmak, 2016).

Kabullenici sessizlik örgüt hayatında "boş yere konuşup durma değişen bir şey yok" " boşuna uğraşma" Çeneni boşa yorma" gibi ifadelerle ortaya konulmaktadır (Çakıcı, 2010: 33).

Savunmacı (Korunma Amaçlı) Sessizlik

Sessizliğin diğer türü de Savunmacı Sessizlik olarak karşımıza çıkmaktadır. Van Dyne ve diğerlerinin görüşlerine göre korunmacı sessizlik çalışanların kendilerini çevreden gelecek olumsuz durumlara karşı korumak amacıyla korkudan kaynaklı olarak fikirlerini, duygularını sahip oldukları bilgi ve görüşlerini esirgemesidir diye ifade edilmiştir (Durak, 2012: 56). Kişilerin söylediklerinin sonucunda oluşacak olumsuz durumlardan kaçınmak amacıyla bilinçli olarak sessizliği seçmesi şeklinde savunmacı sessizliği ifade etmiştir (Pinder ve Harlos 2001). Korunma amaçlı sessizlik, çalışanın kendisini çevreden gelebilecek tehditlerden (korkudan kaynaklanarak) savunmak amacıyla fikirlerini, görüşlerini paylaşmak istememesi şeklinde belirtilmektedir. Savunmacı sessizliğe bürünen kişilerde problemlere karşı gözlerini kapatma yaptıkları yanlışları saklama ve düşündüklerini gizleme davranışı görülür (Çakıcı, 2010). Çalışanlar fikirlerini yöneticileriyle paylaşırken özellikle olumsuz durumlarla ilgili konularla ilgili bilgi paylaşımında bulunurken bu durumun kendisine faydadan çok zarar getireceği düşüncesine girmektedir. Örgütle ilgili ortaya çıkan problemleri ve ya aksaklıkları anlatırken ifadelerindeki olumsuz kavramları olabildiğince azaltmaya çalışmakta konunun yaratacağı olumsuz etkileri de en aza indirmeye çalışmaktadır. Sessizliğin bu boyutuyla alakalı yapılan araştırmalarda da çalışanların yöneticilerine bilgi verirken olumsuz bilgiyi asgari düzeye indirgeyerek konuyu farklılaştırdıkları gözlemlenmiştir (Karacaoğlu ve Cingöz, 2008).

Bu şekilde davranış sergilemenin en önemli nedeni de çalışan paylaştığı olumsuz bilgilerden dolayı kendisinin sorumlu tutulacağını düşünerek kendince önlem almakta ve çevresindekilerin suçlayıcı tutumlarından dolayı korunacağını düşünmektedir.

Örgüt Yararına Sessizlik/Koruma Amaçlı (Prososyal) Sessizlik

Diğer bir sessizlik türü de Örgüt Yararına Sessizlik /Korunma Amaçlı (Prososyal) sessizliktir. Bu sessizlik türünde çalışanlar bildiklerini, gördüklerini ya da duyduklarını iş arkadaşlarının, çalıştığı örgütün olumsuz etkileneceğini düşündüğü için onların faydasını gözeterek paylaşmamaktadır. Savunmacı Sessizlik anlayışından farklı olarak Koruma Amaçlı sessizlikte korkudan ziyade başkalarını korumak ve örgütün yararını gözetmek esastır (Taşkıran, 2011). Prososyal Sessizlik çalışanın başkalarını korumak amacıyla bilinçli ve istekli olarak bilgi ve görüşlerini paylaşmaması olarak tanımlanmaktadır.

Prososyal Sessizlikte önemli olan kişinin örgütün ve iş arkadaşlarının faydasını düşünmesi, bu amaçla diğerleriyle işbirliği içinde bulunması ve fedakârlık davranışı göstermesi beklenmektedir. Kişinin kendini feda ederek başkalarını koruması bu anlayışın temelidir. Savunma amacıyla sessizlik davranışında görüldüğü üzere açık açık konuşmaktan kaynaklanan sorunlardan korunmaktan ziyade

FULL TEXTS BOOK

örgüt yararına sessizlikte kendinden başkalarının iyi olması amaçlanmaktadır. Planlı ve isteyerek yapılan sessizlik davranışıdır (Çakıcı, 2010).

Örgütsel Sessizlik İle İlgili Yapılan Araştırmalar

Morrison ve Milliken (2000)' nın yaptıkları çalışmalarda gösteriyor ki Örgütsel Sessizlik çalışanlar üzerinde stres, aidiyet kuramama ve güvensizlik yarattığı gibi işten ayrılmaların artması sonucu sürekli personel değişimi olmaktadır.

Çakıcı (2007) araştırmalarına göre yöneticiler kaygılarını ya da yaşadığı sorunları anlatan çalışanlarını samimiyetle dinleyerek desteklediğini gösterirse çalışan için güvenli bir çalışma ortamı sağlayabilirler.

Tangirala ve Ramanujam (2008) 'ın araştırmalarına göre bilinçli olarak sessiz kalan çalışanların stres düzeyleri artacak ve psikolojileri bozulacaktır.

Poopanit (2008) yaptığı araştırmaya göre çalışanların örgüt içinde mutlu olabilmesinin en önemli etkeni çalışanlar arasındaki ilişkinin iyi olmasıdır. Çalışanların mutluluğunu sağlamanın yolu sağlıklı iletişimden geçmektedir.

Bildik (2009) da yaptığı çalışmalar sonucunda Örgütsel Sessizliğin nedenlerini örgütsel nedenler ve yönetsel nedenler olarak belirlemiştir.

Liu, Wu ve Ma (2009)' nın yaptıkları çalışmalar sonucunda ''yöneticilerin örgüt çalışanlarının düşüncelerini açıklaması için nasıl cesaretlendireceğini ve çalışanlardaki sessizliğe bürünme davranışlarının nasıl önleneceğini'' belirlemeye yönelik kamu çalışanları üzerinde yapılan araştırma sonucunda, çalışanlar arasında etkili iletişimi arttırmakla birlikte kişisel ve psikolojik yönlerini geliştirmeye yönelik çalışmalar yapmanın etkili olacağı belirtilmiştir. Farklı liderlik yaklaşımlarının da sessizlik davranışını gösteren çalışanları olumlu yönde düşünmeye sevk edeceği ifade edilmiştir.

Gül ve Özcan (2011) yaptıkları araştırma da örgütsel sessizliğin sebeplerini çalışma arkadaşlarıyla aralarındaki ilişkinin bozulacağı korkusu, güvensizlik, örgütte dışlanacaklarına dair oluşan yargılar şeklinde belirtmişlerdir.

Alioğulları (2012) yaptığı çalışmalar sonucu eğitim düzeyi yükselen kişilerin sahip oldukları tecrübelerin artması sonucu sessizliklerinin azaldığı sonucuna ulaşmıştır.

Cinsiyet değişkeni üzerinde yapılan araştırmalara da bakıldığında farklı sektörlerde farklı sonuçlara ulaşıldığı dikkat çekmektedir. Şehitoğlu (2010) ve Kılınç (2012) yaptıkları çalışmalar sonucunda kadınların erkeklere oranla daha çok sessizlik davranışı gösterdikleri sonucuna ulaşırken, Kolay (2012) ve Kutlay (2012) Eğitim sektöründe çalışanlar üzerinde yaptıkları çalışmalar sonucunda erkeklerin kadınlara kıyasla sessizlik davranışını daha çok gösterdikleri sonucuna ulaşmışlardır.

Samadi ve diğerleri (2013) yaptıkları araştırmada çalışanların örgütsel öğrenme konusundaki bilgileri arttıkça örgütsel sessizlik davranışında azalma olacağını sonucuna varmışlardır. Örgüt üyelerinin ortak bir amaca ulaşmak için işbirliği içinde öğrenmeyi gerçekleştirmesi aralarındaki iletişime de katkıda bulunacaktır.

Moaşa (2013) yaptığı çalışmalar sonucunda örgütün sahip olduğu özelliklerin örgüt çalışanlarının sessizlik davranışı gösterip göstermemesinde etkili olduğu sonucuna ulaşmıştır. Eğer örgütte sessizlik davranışı daha çok onay görüyorsa çalışanlar sessiz kalabilir, farklı fikirleri destekleyerek yeniliklere açık bir yapı gösterirse çalışanlarda düşüncelerini özgürce dile getirebilir.

Demir (2014)'in yaptığı araştırmada sessiz kalmanın kariyerle ilgili yapılan planların da oldukça etkilendiği sonucuna varmıştır. Sessizlik davranışını benimseyen çalışanlar zamanla durağanlığa düşerek gelişimlerini destekleyecek faaliyetlerin dışında kalacak, yeni fikirler üretme çabasında da bulunmayacaktır.

Yaman ve Ruçlar (2014) yaptıkları araştırmanın sonucunda sık sık konuşarak yaşanılan problemleri ifade eden çalışanların ''her şeyden şikâyetçi'' şeklinde etiketlenmesi, çalışma arkadaşlarıyla ilişkilerinin bozulmasına, işini kaybetme korkusu oluşmasına, güvensizlik duygusuna yol açtığı sonucuna ulaşmışlardır.

FULL TEXTS BOOK

Ayduğ, Himmetoğlu ve Turhan (2017) yaptığı araştırmada sessizliğin yayılmacı bir yapı gösterdiğini zamanla örgütte bulunan çalışanların çoğunu etkileme gücüne sahip olduğu için giderek tüm örgütü kontrol edebileceğini belirlemiştir.

Ege (2018) tarafından yapılan çalışmalarda sessizlik davranışı ve mutlu olmak arasındaki ilişkiyi belirlemeye yönelik çalışmalar yapmıştır. Yaptığı araştırmalar sonunda sessizlik ve mutluluk arasında negatif bir korelasyon olduğunu belirlemiştir. Bu da gösteriyor ki örgüt içinde iletişim arttıkça mutluluk düzeyi de buna bağlı olarak artış gösterecektir.

Hashımı (2019) yaptığı araştırma da göstermektedir ki okullarda öğretmenler arasında bireysel iletişim oldukça önemlidir. Sessizlik davranışının ortaya çıkması bireyler arası ilişkileri olumsuz etkileyeceği gibi örgüt verimini de düşürebilir.

Başka bir araştırma da (Amah ve Okafor, 2008, s.1) tarafından gerçekleştirilmiş, örgütlerde çalışanların sessiz kalmaları nedenlerinin ifade ettikleri düşüncelerinin çalışma arkadaşları tarafından beğenilmediği ve ya değer verilmediği düşüncesi olduğu gibi fikirlerini ifade ettiğinde olumsuz bir eleştiriyle karşılaşacağını düşünmesi olarak belirtilmiştir.

YÖNTEM

Araştırmada; Isparta İli Eğirdir İlçesi İlkokullarda görev yapan öğretmenlerde örgütsel sessizliğe neden olan bireysel, örgütsel ve yönetsel faktörler belirlenmeye çalışılmıştır. Bu araştırmada tarama modeli kullanılmış nitel bir araştırma olup, nitel araştırma tekniklerinden görüşme tekniği kullanılmıştır. Nitel araştırma olayları bütün olarak ele alan ve yapılan araştırmaya konu olan problemi olağan ortamında yorumlamayı esas alan bir yöntem olarak bilinir. Bu yaklaşım, araştırma konusunu herhangi bir değişiklik yapmadan, değişenlerden etkilenmeden açıklamaya çalışır. (Karasar, 2014)

Çalışma Grubu

Araştırmada elde edilen veriler ve ulaşılan sonuçlardan genelleme yapılarak çalışmanın evreni, 2023-2024 eğitim ve öğretim yılında Isparta ili Eğirdir İlçesi ilkokullarında çalışan öğretmenlerden oluşturulmuştur. Araştırmalarda sık sık evren değerine ulaşılmanın zor olması, çalışma evreninden örneklem grubunun seçilmesini gerektirir. Çalışma evrenindeki tüm üyelere erişimin zor olması sebebiyle evreni temsil edecek yeterlilikteki yine evrenden seçilmiş daha küçük grup örneklemi oluşturur (Karasar, 2014). Araştırmaya katılan iki katılımcının hizmet süresi 0-5 yıl arası, beş katılımcı 6-10 yıl arası, yedi katılımcının 11-15 yıl arası, altı katılımcının ise 16 yıl ve üzeridir. Katılımcıların tamamı ilkokulda görev yapmaktadır. Görüşme Formundaki soruları yanıtlayan İlkokulda görev yapan öğretmenlerin demografik bilgileri Tablo.1 de gösterilmektedir.

Tablo **1**:İlkokul Öğretmenlerine Ait Demografi

Kod	Cinsiyet	Kıdem	Öğrenim Durumu
Ö1	K	0-5 yıl	Lisans
Ö2	K	6-10 yıl	Lisans
Ö3	E	0-5 yıl	Lisans
Ö4	K	11-15 yıl	Yüksek Lisans
Ö5	K	11-15 yıl	Yüksek Lisans
Ö6	E	11-15 yıl	Lisans
Ö7	K	6-10 yıl	Lisans
Ö8	K	0-5 yıl	Lisans
Ö9	K	16 yıl ve üzeri	Yüksek Lisans
Ö10	E	16 yıl ve üzeri	Lisans
Ö11	K	11-15 yıl	Lisans

FULL TEXTS BOOK

Ö12	K	16 yıl ve üzeri	Lisans
Ö13	E	6-10 yıl	Lisans
Ö14	K	11-15 yıl	Lisans
Ö15	K	11-15 yıl	Yüksek Lisans
Ö16	E	16 yıl ve üzeri	Lisans
Ö17	K	16 yıl ve üzeri	Lisans
Ö18	K	6-10 yıl	Lisans
Ö19	E	11-15 yıl	Lisans
Ö20	K	16 yıl ve üzeri	Lisans

Veri Toplama Aracı

Yapılan çalışmada araştırmayı yapan tarafından geliştirilen "İlkokullarda görev yapan öğretmenlerin örgütsel sessizlik nedenlerine ilişkin görüşleri'' başlıklı yarı yapılandırılmış görüşme formu kullanılmıştır. Veri toplama aracını oluştururken alan yazın incelemesi yapılmış olup önceki çalışmalarda kullanılan ölçekler incelenmiştir. Soru ifadelerinin açık ve anlaşılır olmasına ve kesin ve net ifadelerden oluşmasına dikkat edilmiştir. Görüşme formundaki birinci bölümde görüşme formunu dolduracak katılımcılara ait kişisel bilgilerin (cinsiyet, kıdem, öğrenim durumu) olduğu bölüm bulunmaktadır. Görüşme formunun ikinci bölümünü ise katılımcılara sorulan sorular bulunmaktadır.

Verilerin Analizi ve Yorumu

Verilerden güvenilirliği ve geçerliliği yüksek sonuçlara ulaşabilmek için elde edilen verilerin analizi yapılmıştır. Bu kısımda elde edilen veriler muhtemel sınırlar dâhilinde olma durumu incelenmiştir ve verilerin uygulanan tekniklerle varsayımların değerlendirmesi yapılmıştır. Değerlendirmeye alınan veriler analiz edilerek yorumlaması yapılmıştır.

ARAŞTIRMA VE BULGULAR

Birinci Alt Probleme Yönelik Bulgular

Tablo 2: Örgütsel Sessizliğe Sebep Olan Bireysel Faktörlere İlişkin Katılımcı Görüşleri

Alt Problem	Elde Edilen Bulgular	Kişi Sayısı	Katılımcılar(Ö)
Bireysel Faktörler	Korku	4	Ö5, Ö7, Ö11, Ö14
	Güvensizlik	4	Ö1, Ö3, Ö8, Ö20
	İletişim Kuramama	6	Ö2, Ö4, Ö10, Ö15, Ö17, Ö19
	İçe Kapanma	6	Ö6, Ö9, Ö12, Ö13, Ö16, Ö18

Tablo 2 incelendiğinde katılımcılardan 4 kişinin Korku, 4 kişinin Güvensizlik, 6 kişinin İletişim Kuramama, 6 kişinin de İçe Kapanma gibi duygular yaşadığı görülmüştür. Örgütsel Sessizliğe neden olan Bireysel Faktörlere bakıldığında katılımcıların tamamının olumsuz düşüncelerini ifade ettiği, bu durumun oluşmasının nedeni ise kişisel özellikleri ile çevrelerindekilerle ve yaşadıkları olaylarla ilgili olumsuz tutumları olabilir.

Tablo 2 incelendiğinde 4 katılımcının sessizliğin nedeni olarak korku yanıtını verdiği görülmüştür. Bu durumun oluşmasına bulunduğu örgütte dışlanma korkusu, ilişkilerinin zarar görmesi korkusu, işini kaybedeceği korkusu, herhangi bir disiplin cezası alacağına dair yaşadığı korku neden olmuş olabilir. Örgütsel sessizliğe neden olarak korku yönünde görüş bildiren **Ö5, Ö7, Ö11, Ö14** şunları belirtti; ''Uzun yıllar farklı okullarda çalışma imkânı buldum. İnsanlar kendileriyle aynı görüşleri paylaşmayan, farklı fikirler sunan kişilere karşı ön yargılı olabiliyor. Zamanla örgütten dışlanmaktan,

FULL TEXTS BOOK

yalnızlaşmaktan korktuğum için toplantılarda düşüncelerimiz sorulduğunda sessiz kalmaya çalıştım''(Ö5 Görüşü)

''15 Temmuz darbe girişiminden sonra yapılan görevden almalar beni oldukça etkiledi. Birlikte çalıştığımız arkadaşlardan, komşulardan ihraç edilenler, açığa alınanlar oldu. Bu durum ister istemez yanlış mı anlaşılırım, bana da bir şey olur mu, işimden alınır mıyım gibi korkular oluşturduğu. Her adımımı daha da düşünerek atmaya, her düşündüğümü açıklamamaya başladım. Artık bir konuyla ilgili fikrim sorulduğunda sessiz kalmayı tercih ettim.''(Ö11 Görüşü)

'' Artık sınıf içinde düzeni sağlamaya yönelik öğretmenlerin hiçbir yaptırımı kalmadı. Velisi tarafından şımartılan öğrenciler herhangi bir olumsuz söz duyduğunda olayları abartarak ailesine anlatıyor. Veli de öğretmeni dinlemeden çocuğunun sözüyle ya okul idaresine ya da daha da ileriye giderek CİMER e şikâyet ediyor. Sonucunda disiplin cezası ile karşılaşan arkadaşlarımız bile oldu.''(Ö7 Görüşü)

Tablo 2 incelendiğinde 4 katılımcının örgütsel sessizliğin bireysel nedenlerinden olarak Güvensizliği belirttiği görülmektedir. Öğretmenlerin diğer meslektaşlarıyla ilişkilerinde yaşadığı olumsuz deneyimler ya da okul yöneticilerine karşı gelişen güven problemi bu durumun ortaya çıkmasına sebep olabilir. Güvensizlik konusunda görüş bildiren (Ö3 ve Ö8 şunları söylemiştir:

'' Dersten çıktığımızda öğrencilerle alakalı bir problem olduğunda, velilerle ya da okul yöneticileriyle alakalı sorunla karşılaşınca, ya da özel hayatımızla ilgili iş arkadaşımızla dertleşme ihtiyacımız oluyor. İçimizi dökmek istiyoruz. Güven problemi yaşayınca tüm iş arkadaşlarımıza karşı da tereddüt oluşuyor. Kimseye bir şey anlatmak hiçbir şeyimi paylaşmak istemiyorum. Dersten teneffüse çıkınca fotokopi işleri sınıfla ilgili yapılacakları tamamlayıp kimseyle fazla sohbet etmeden derse giriyorum.''(Ö3 Görüşü)

'' Geçen yıl müdür bey okul aidatlarıyla ilgili velilere duyuru yapmamızı istedi. Bazı veliler bunun zorunlu olmadığını gerekirse şikâyet edecekleri belirttiler. Konuyu konuşmak üzere Okul Müdürüne gittiklerinde benim haberim yok öğretmen kendisi söylemiş, diyerek konuyu inkâr edince okul yönetimine karşı güvensizlik yaşadım. Artık hiçbir konu da fikrimi söylemiyorum ve mümkün olduğu kadar işimi tamamlayıp etkinliklerden ve diğer organizasyonlardan uzak durmaya çalışıyorum.''(Ö8 Görüşü)

Tablo 2 incelendiğinde örgütsel sessizliğe neden olarak 6 katılımcının (Ö2, Ö4, Ö10, Ö17, Ö19) iletişim kuramama görüşünü belirttikleri görülmüştür. Buna sert tutumlu, liyakatsiz yöneticilerin, kendini diğer öğretmenlerden daha üstün gören egosu yüksek öğretmenler, farklı sendikalarda olduğu için görüş farklılıklarından meydana gelen çatışmalar neden olabilir. Bu konuda görüş bildiren katılımcılar Ö2 ve Ö10 şöyle demiştir:

''Yaşadığım yere 90 km uzaklıkta bir okulda çalışıyordum.2 otobüs değiştirerek okula gidip geliyordum.7 aylık da bebeğim var. Müdür bey Sene Başı toplantısı yapılacağını duyurdu. Akşamüstü geç çıkacağımdan eve dönüşüm 9 u bulacaktı. Sabahta 6.30 da evden çıkmıştım. Durumu müdür beye anlatarak bebeğin emdiğini toplantıdan biraz erken çıksam olur mu diye izin almaya çalıştım. Gayet sert bir üslupla '' Hocam bebek başının çaresine baksın bugün ''dedi. Böyle bir idareciyle iletişim kurulamayacağını anladığımdan hiçbir düşüncemi dile getirmemeye özen gösterdim.''

Tablo 2 incelendiğinde örgütsel sessizliğin bireysel nedeni olarak 6 katılımcının İçe Kapanmayı (Ö6,Ö9,Ö12,Ö13,Ö15,Ö16) belirttiği görülmüştür. Bu duruma kişilerdeki özgüven eksikliği, yanlış anlaşılma korkusu, geçmiş yaşantılardan edindiği olumsuz izlenimler neden olmuş olabilir. Bu konuda görüş bildiren katılımcı (Ö9) şunları söylemiştir:

'' Okulda beraber çalıştığım bir öğretmen arkadaşım var. Teneffüs olduğunda öğretmenler odasına gelir fakat kimseyle konuşmaz, hiçbir şey paylaşmaz sürekli boş zamanlarını telefonla geçirerek tamamlar ve

FULL TEXTS BOOK

dersine girer. Hep içine kapanıktır. Okulla ilgili yapılacak etkinliklerde görev almak istemez, fikri sorulduğunda genelde sessiz kalır. Kendine güvenmez. İçe kapanıktır.'' Ö9 görüşü

İkinci Alt Probleme Yönelik Bulgular

Tablo 3 Örgütsel Sessizliğe Sebep Olan Örgütsel Faktörlere İlişkin Katılımcı Görüşleri

Alt Problem	Elde Edilen Bulgular	Kişi Sayısı	Katılımcılar
Örgütsel Faktörler	Örgüt Kültürü	3	Ö3, Ö5, Ö9
	Adaletsizlik	5	Ö6, Ö12, Ö15, Ö18, Ö20
	Sendikal	4	Ö7, Ö10, Ö14, Ö19
	Sebepler	3	Ö8, Ö11, Ö16
	Onay/Takdir Edilmeme		

Tablo 3 incelendiğinde Öğretmenlerin Örgütsel Sessizliğin oluşmasına sebep olan örgütsel faktörlere ilişkin 3 katılımcının örgüt kültürü, 5 katılımcının adaletsizliği, 4 katılımcının Sendikal sebepleri ve 3 katılımcının da onay/takdir edilmeme şeklinde görüşlerini belirttiği görülmektedir. Bu görüşlerin oluşmasında öğretmenlerin çalıştıkları kurumlarda kendilerini rahat ifade edememeleri, farklı sendikalara üye olan kişiler arasında fikir ayrılıklarından kaynaklanan çatışmalar, sürekli aktif olup çeşitli etkinlikler yapan öğretmenlerin çalışmalarının görülmeyip, desteklenmemesi olabilir.

Tablo 3 incelendiğinde Örgütsel sessizliğe neden olan örgütsel nedenlere ilişkin 3 katılımcının Örgüt Kültürünün etkili olduğu yönünde görüş belitmiş olduğu görülmektedir. Bu durumun oluşmasına: Örgütün sahip olduğu kültürel yapı, hiyerarşik katı kurallar, sessizlik davranışı kabul görmüş bir kurum kültürü, okul yöneticilerinin çalışanlara karşı ilgisiz olması ve dinlememesi sebep olmuş olabilir. Örgüt kültürünü neden olarak gösteren katılımcılar Ö3 ve Ö5 şunları söylemiştir;

''Daha önce çalışmış olduğum kurumda Öğretmenler Kurulu Toplantısında okulla ilgili kararlar alınacağında hevesle söz alıp fikrimi söylerdim hemen diğer arkadaşlar tarafından eleştiri yağmuruna tutulurdum. Müdür bey ortaya fikir atıp kabul edenler etmeyenler diye sorar, çoğunluk kabul etse dahi kabul edilmemiştir diyerek, geçiştirirdi'' Ö3 görüş

''Bazen çok fazla paylaşmak istediğim fikirlerim oluyor. Ama toplantı başlamadan arkadaşlarım kendi aralarında hiç kimse yorum yapmasın, erken bitirip gidelim, diyorlar. Hal böyle olunca çoğunluğa uymak ve çıkıntılık yapmamak için mecburen susuyorum.''Ö5 görüşü

Tablo 3 incelendiğinde 5 katılımcının örgütsel sessizliğin örgütsel nedenlerine ilişkin adaletsizlik olarak görüş bildirdiği görülmüştür. Bu duruma sebep olarak yoğun rekabet ortamının oluşması, farklı gruplaşmalar, adaletsiz uygulamalara çoğu kez şahit olunmuş deneyimler gösterilebilir. Adaletsizlik görüşünü ortaya atan katılımcı Ö6,Ö15 şunları söyledi.

''Değerler Eğitimi kapsamında her ay bir değerle ilgili farklı ve özgün etkinlikler tasarlıyorduk. İlçe Milli Eğitim Müdürlüğü de bu konuda titiz çalışıyor oluşturduğu denetim ekibi her ay etkinliklerimizi gözlemlemek için okulu ziyaret ediyordu. Okulda yapılan çoğu etkinlik beğenilmiş İlçe Milli Eğitim Müdürü Başarı Belgesi vermek için okul müdürümüzden iki öğretmenin ismini bildirmesini istedi. Müdür bey etkinliklerle hiç ilgisi olmayan hiçbir çalışmaya katılmamış özel eğitim ve İngilizce Öğretmeninin ismini vermiş bizlere de açıklama olarak kimseye haksızlık olmasın diye onları söyledim demişti. Bu şekilde emeği geçen herkese daha çok Adaletsizlik yapıldığını anlatamadık. '' Ö6 Görüşü

''Okul dışındaki hayatıyla okul hayatını birbirine karıştırmamak gerek. Okul müdürümüz bizim okuldaki bir bayan öğretmen ve başka okulda görev yapan eşiyle ailecek haftada 3 gün görüşüyorlar.

FULL TEXTS BOOK

Sıkı bir dostluk ilişkisi var. Ama okul içinde de bunu göstermekten geri durmuyor. O öğretmen arkadaş tarafından önerilen her fikri kabul edip bizleri yapmamız yönünde zorluyor. Fikrimiz dahi sorulmuyor.'' Ö15 Görüşü

Tablo 3 incelendiğinde Örgütsel Sessizliğin oluşmasına sendikal sebepleri neden olarak gösteren 4 katılımcının olduğu görülmüştür. Bu görüşün ortaya çıkmasında sendika yöneticilerinin sık sık kurum ziyaretlerinde bulunarak sendikası olmayan veya farklı sendikalara üye olan öğretmenlere fazla ısrarcı olmaları olabilir. Öğretmenler odasında gerçekleştirilen sohbetlerde farklı sendikalara üye olan öğretmenler arasında fikir çatışmaları yaşanması ve sonucunda oluşan tartışmalar, sosyal medyada sendikal konulara ilişkin öğretmenleri kışkırtan söylemlere çok sık yer verilmesi, okul yöneticilerinin kendi sendikalarından olanlara karşı daha olumlu yaklaşması neden olabilir. Sendikal sebepleri görüş olarak bildiren katılımcı Ö7, Ö19 şunları söylemiştir:

'' Uzun zamandır hiçbir sendikaya üyeliğim yok. Okul müdürü sürekli kendi sendikasına geçmem için ısrar ediyor fakat kabul etmeyince de davranışlarının değiştiğini fark ediyorum.''Ö7 görüşü
'' Üyesi olduğum sendikanın zamanla görüşlerime uymadığını fark ettiğim ve yanlış uygulamalarına da şahit olduğum için tepki olarak üyelikten çekildim. Bu durum çalışma arkadaşlarımın tepkisine neden oldu. Günlük konuşmalarımızda doğal olarak mesleki sorunlara değindiğimiz oluyor. Hemen eleştirmeye başlıyorlar sendikanı sattın, yarı yolda bıraktın diye. Görüşler zamanla değişebilir herkesle aynı fikirde olmak mümkün değil. Ama her görüşe saygı duymak lazım.'' Ö19 görüşü

Tablo 3 incelendiğinde örgütsel sessizliğe neden olan örgütsel nedenlere ilişkin 3 katılımcının onay/takdir edilmeme şeklinde görüş belirttiği görülmektedir. Bu duruma önemsenmeme, destek görememe, rekabet ortamının yoğunluğu, kendini gösterememe sebep olabilir. Takdir edilmemeyi sebep olarak gösteren Ö11 şunları söylemiştir.

'' Elbette yaptığım çalışmaları birileri beni görsün ödül versin diye yapmıyorum. Hangi çalışma öğrencilerime ne fayda sağlar diyerek günlük etkinlik hazırlıyorum. Bu çalışmaları bazen sınıfta bazen de okul genelinde sergiliyorum. Doğal olarak iyi veya kötü yorum yapılması kendimi geliştirmek için katkı sağlayacağı gibi olumlu yorumlar da motivasyonumu daha da arttıracak. Hiçbir şekilde ne idarecilerimiz ne de çalışma arkadaşlarım emeğimi görmüyor. Şevkimin kırıldığını artık yorulmaya başladığımı hissediyorum.'' Ö11 görüşü

Tablo 4 Örgütsel Sessizliğe Neden Olan Yönetsel Faktörlere İlişkin Katılımcı Görüşleri

Alt Problem	Elde Edilen Bulgular	Kişi Sayısı	Katılımcılar(Ö)
Yönetsel Faktörler	Katı Hiyerarşik Yapı	6	Ö1, Ö3, Ö8, Ö12, Ö15, Ö19
	Yöneticilere Güvenmeme	5	Ö4, Ö6, Ö10, Ö11, Ö14
	Liyakatsizlik	5	Ö2, Ö7, Ö16, Ö18, Ö20
	Zorlayıcı Güç Kaynağı	4	Ö5, Ö9, Ö13, Ö17

Tablo 4 incelendiğinde, örgütsel sessizliğe neden olan yönetsel faktörler konusunda görüş bildiren 6 katılımcının (Ö1, Ö3, Ö8, Ö12, Ö15, Ö19) katı hiyerarşik yapı cevabını verdikleri görülmüştür. 5 katılımcının (Ö4, Ö6, Ö10, Ö11, Ö14**)** yöneticilere güvenmeme, 5 katılımcın (Ö2, Ö7, Ö16, Ö18, Ö20) liyakatsizlik, 4 katılımcının da (Ö5, Ö9, Ö13, Ö17) zorlayıcı güç kaynağı şeklinde cevap verdikleri görülmektedir. Tablo 4 incelendiğinde öğretmenlerin demokratik bir okul ortamı istedikleri, fikirlerini, düşüncelerini özgürce ifade edemedikleri, disiplin yaptırımı, belki de mobingge uğrama korkusuyla istemedikleri çalışmaları yapmak zorunda kaldıkları için sessizlik davranışı göstermiş olabilir.

FULL TEXTS BOOK

Tablo 4 incelendiğinde 6 katılımcının Örgütsel Sessizliğin Yönetsel nedeni olarak katı hiyerarşik yapı görüşünü ortaya attığı görülmüştür. Bu durumun oluşmasında öğretmenlerin iletişim konusunda okul yöneticilerine yeteri kadar yakın mesafeye yaklaşamaması, kendilerini ifade etme özgürlüğü tanınmaması olabilir. Katı Hiyerarşik Yapı görüşünü dile getiren katılımcı Ö1,Ö3,Ö15 şunları söylemiştir:

'' Evrak işleriyle ilgilenmekten konuları yetiştirmeye ders öncesi hazırlık yapmaya fırsatım kalmıyor. Haftada en az 3 kere İlçe Milli Eğitim tarafından raporlaştırmayla ilgili bir yazı geliyor. Zaten hazırlamak zorunda olduğumuz zümreler, veli toplantıları, yılsonu dönem sonu işleri, rehberlikle alakalı evraklar, BEP'li öğrencilerin dosyaları derken mesleğime odaklanamıyorum.'' Ö1 görüşü

'' Okulumuz konumu itibariyle Kaymakamlığa, Milli Eğitime ve diğer resmi kurumlara çok yakın. Protokole de oldukça önem veriliyor. Sık sık ziyarete gelen amirler ve diğer ziyaretçiler olduğunda tek tek dersten çağrılıyoruz. Öğrenciler kontrolsüz kalıyor, ders dağılıyor. Tekrar toparlamakta zorlanıyoruz.''Ö3 görüşü

'' Resmi törenleri kutlama görevi okullara her sene başında dağıtılıyor. Zamanla bu kutlamalar kim daha iyi yapacak yarışına döndüğü için aylar öncesinden hem öğrenciler hem de biz çalışmalar yüzünden hem geriliyoruz hem de stres yüzünden meslektaşlarımızla tartışmalar yaşıyoruz. Okul içinde hep bir huzursuzluk hâkim oluyor. Amirler katıldığı törenleri beğendiğinde tebriklerini dile getiriyor ama beğenmediğinde hiçbir şey demeden gidiyorlar. Görevli olduğumuz tören günü yaklaşınca inanılmaz gerginlik hissediyorum.'' Ö15 görüşü

Tablo 4 incelendiğinde 5 katılımcının Örgütsel Sessizliğe Neden olan Yönetsel faktörlere sebep olarak Yöneticilere Güvenmeme görüşünü ortaya atmıştır. Bu duruma öğretmenlerin yaşadığı geçmiş tecrübeler, yöneticilerin öğretmenlere eşit davranmadığı düşüncesi sebep olmuş olabilir. Yöneticilere Güvenmeme görüşünü dile getiren katılımcı Ö6,Ö11 şunları söylemiştir:
'' Okulda iki müdür yardımcısıyız. Birimiz ilkokulla ilgili işlemleri takip ederken diğeri ortaokul işleriyle ilgileniyor. Bunun dışında her iki kademenin de ortak yapması gerekenler var. Okul aile birliği işleri, Taşımalı Eğitimle ilgili puantajlar, yoklamalar denetimler vs. nöbet, sivil savunma işlemleri, faturalar gibi. Müdürün eşit davranıp iş bölümünü adil yapması gerekirken tüm ortak işlerin sorumluluğunu bana bırakıyor. Haksızlığa uğradığımı biliyor ama bir şey yapamıyorum.''Ö6 görüşü

''Önceki yıllarda 4.sınıfları okuturken her ders için sınav yapıyorum. Öğrencim Din Kültürü sınavından çok düşük almış. Diğer dersleri de yüksek değildi zaten. Veli ile görüş farklılıklarımız olduğu için öğrenciye haksızlık yaptığımı belirterek okul yönetimiyle konuşmak istedi. Sınav kâğıtlarını çıkardık durumu anlattık. Hiçbir haksız işlem olmadığı anlaşıldığı halde Müdür Bey özür dilememi bu veliye çok değer verdiğini ifade etti. Tabi karşı çıktım kendimi savunmak istedim. Okul yönetimiyle karşı karşıya geldik ve mobingge uğradım. Bilgim olmadan e okul sisteminden öğrenci notları da değiştirilmiş. En iyiyi hiçbir şeye karşı çıkmadan bu düzene uymak yoksa sıkıntı yaşıyorum.''Ö11 görüşü

Tablo 4 incelendiğinde Örgütsel Sessizliğin Yönetsel Faktörlerine sebep olarak 5 katılımcının Liyakatsizlik şeklinde görüş belirttiği görülmüştür. Bu duruma yapılacak işlerin sekteye uğraması, öğretmenlerin uygulamaya dönük sorularına tatmin edici cevaplar alamaması, egosu yüksekokul yöneticileri sebep olabilir. Yapacağı işin gerektirdiği donanıma sahip olmayan yöneticiler örgütte düzen ve verimli bir çalışma ortamı sağlayamadığından öğretmenlerde zamanla boş vermiş bir tutum içine

FULL TEXTS BOOK

girebilir ve sessizliğe bürünebilirler. Liyakatsizlik görüşünü ortaya atan katılımcı Ö7, Ö16 şunları söylemiştir:

‘‘Önceki çalıştığım okulda yeni atanan idareci bir milletvekilinin yakınıydı. Kadrosu farklı bir yerde olmasına rağmen idareci olarak okulumuza atanmış. İlk geldiği haftalarda akşam 20:00 da okul aile birliği toplantısı yapacağını söyledi. Herkes çocukları bırakacak yeri olmadığını saatin biraz öne alınmasını istedi. Fakat Müdür Bey katılımın zorunlu olduğunu, gelmeyenlerle alakalı tutanak tutacağını söyledi. Mecburen 1 kişi hariç hepimiz katıldık. Gelmeyen arkadaşımızla ilgili tutanak tutarak bizleri de imzalamaya zorladı. Bu olaydan sonra arkasının da sağlam olduğunu bildiğimiz için hak aramaya kalkamadık olan bize olurdu. Mecburen gördüğümüzü görmezden. Duyduğumuzu duymazdan geldik.’’Ö7 görüşü

‘’ Okul yöneticileri aynı zamanda iyi bir lider ve yol gösterici olmalıdır. Bilimsel yaklaşımlardan haberi olmayan pedagojik bilgisi eksik kişiler okul yöneticisi yapılmamalıdır. Aksi halde okullarda eğitimin kalitesi düşüyor, okul kültürü de bu durumdan olumsuz etkileniyor.’’ Ö16 görüşü

Tablo 4 incelendiğinde Örgütsel Sessizliğin Yönetsel Faktörlerine sebep olarak 4 katılımcının Zorlayıcı Güç görüşünü ifade ettiği görülmüştür. Bu duruma sahip olduğu yetkiyi kullanarak baskıcı bir yönetim anlayışı oluşturulması sebep olabilir. Böyle bir çalışma ortamında kişiler arası ilişkiler olumsuz etkilenebilir ve işbirliği sağlamak zorlaşır. Zorlayıcı Gücü sebep olarak gösteren Ö5,Ö13 şunları söylemiştir.

‘’ Okul bahçesinde bir öğretmen arkadaşımla tartışma yaşadık. Olayın hemen üzerine Okul Müdürü ikimizi de odasına çağırarak konuşup çözmemizi istedi. İkimizde hala çok sinirliydik. Öğretmen arkadaş parmağını sallayarak konuşmaya başlayınca sinirim iyice zıpladı ve birbirimizin üzerine yürüdük. Sesler dışarıya çıkınca gelenler oldu ve bizi ayırdılar. Böyle bir duruma düşürüleceğimize sakinleşmemizi bekleseydi zaten konuşup orta yolu bulurduk. Şimdi ipler iyice koptu.’’

‘’ Okul resmi bir kurum olduğu için tabi ki belli normlara kurallara uyulması gerekir. Aksi takdirde düzen bozulur ve herkes kafasına göre iş yapar. Ama bazı okul yöneticileri sahip olduğu yetkiyi kendi istediklerini yaptırmak için kullanıp diğer fikirleri hiçe sayıyor.’’ Ö13 görüşü

TARTIŞMA VE SONUÇ

Bu araştırmanın amacı İlkokullarda Örgütsel Sessizliğe neden olan bireysel, örgütsel ve yönetsel faktörlerin sebeplerini ortaya koymaktır. Araştırmanın amacına ulaşmak amacıyla İlkokullarda görev yapan 20 öğretmene daha önce hazırlanmış görüşme soruları sorulmuş ve alınan cevaplar analiz edilerek sonuca ulaşılmıştır.

Araştırmanın sonucunda öğretmenlerin kendilerini korumak amacıyla isteyerek yani bilinçli olarak sessizlik davranışı gösterdiği anlaşılmaktadır. Öğretmenlerde sık görülen sessizlik davranışının bireysel nedenlerine bakıldığında ilişkilerin zarar göreceğine dair oluşan korku, iş arkadaşlarına karşı oluşan güvensizlik, iletişim kuramama olarak ortaya çıkmaktadır. Örgütsel nedenlere bakıldığında örgüt kültüründen kaynaklanan nedenler, sendikal sebepler, adaletsizlik ve takdir edilmeme şeklinde ortaya çıkmaktadır. Yönetsel nedenlere gelince liyakatsizlik, yöneticilere karşı güvensizlik, katı hiyerarşik yapı ve zorlayıcı güç karşımıza çıkmaktadır. Özgan ve Külekçi’ nin (2012) araştırma sonuçlarına bakıldığında; örgütsel sessizliğe sebep olarak bireysel, yönetsel ve örgütsel nedenlerden kaynaklandığını bu durumun çalışanlar açısından olduğu kadar örgüt açısından da sorunlara neden olacağını belirtmesi araştırma sonuçlarıyla örtüşmektedir.

FULL TEXTS BOOK

Araştırmadan elde edilen sonuçlardan öğretmenlerin bireysel olarak çalışma arkadaşlarıyla uyumlu olmak, sorun çıkaran olarak görünmemek için, kendilerini korumaya yönelik sessizlik davranışı gösterdikleri söylenebilir. Yaşadıkları olumsuz tecrübelerde iş arkadaşlarına karşı güven problemi yaşamalarına sebep olmuş, kendilerini rahatça ve özgürce ifade etme konusunda baskı altında hissettikleri görülmüştür. Araştırmanın sonucunda bireysel nedenlere bütün olarak bakıldığında öğretmenlerin konuştuklarında olumsuz bir durumla karşılaşmaktan korktukları ve kendilerini korumak amacıyla sessizliği tercih ettikleri görülmüştür. Yalçın ve Baykal (2012) yaptıkları araştırmanın sonucunda, öğretmenlerin sessizlik davranışlarının nedenlerinde ilk sırayı konuştuklarında hiçbir şey fark etmeyeceğini düşünmeleriyle birlikte bireysel açıdan örgütte sorunlar oluşmasına yönelik korkular geliştirdikleri ifade edilmiş, bu durum araştırmanın sonucuyla örtüşmektedir. (Kahveci 2010) yaptığı araştırmanın sonuçlarına bakıldığında da öğretmenlerdeki örgütsel sessizliği algılama düzeylerinin yüksek, örgütsel bağlılıkla ilgili algılama düzeyleri orta düzey olduğunu belirlemesi, öğretmenlerinde açıkça konuşmaktan çekindikleri bundan dolayı sessiz kalmayı tercih ettikleri sonucuna ulaşması, araştırmanın sonucuyla örtüşmektedir.

Araştırmanın örgütsel nedenlerden kaynaklanan sonuçlarına bakıldığında örgüt kültürünün sessizlik davranışının üzerinde etkili olduğu görülmektedir. Bazı örgütlerde sessizlik davranışı kabul görmekte sürekli kendini ifade etmeye çalışan olumlu ve ya olumsuz durumlara karşı sahip olduğu fikirleri savunmaya çalışan öğretmenlerin o örgütte kabul edilmediği ve uzak durulmaya çalışıldığı anlaşılmaktadır. (Runge ve Hames, 2004: 412) yaptığı araştırma sonucunda, Örgüt içinde hakim olan kültür, sert ve baskıcı bir yapıya sahipse sessiz kalma davranışı kabul görecektir. Şayet örgütte herkesin katılımı teşvik ediliyor karar alma süreçlerinde tüm çalışanların fikirleri değer görüyorsa sessizlik iklimi önemini yitirecektir, sonucuna ulaşması araştırmanın sonucuyla benzeşmektedir.

Öğretmenlerin çalıştıkları kurumda adil bir yönetim anlayışının olmadığını düşünmesi verimliliğin düşmesine neden olacaktır. Eşit şartlarda eşit işleri yapan çalışanlar arasında herhangi bir ayrımcılığa yer verilmemeli herkese eşit yaklaşılmalıdır. Yapılan araştırma sonucu öğretmenlerin örgütteki adalet anlayışı ile örgüte karşı geliştirdikleri sessizlik davranışı arasında doğru orantı olduğunu ortaya koymuştur. Örgütteki adaletsizlik yaklaşımı iş görenlerin sessiz kalmalarına sebep olan önemli bir etkendir (Karacaoğlu ve Cingöz, 2009; Pillai, Schriesheim ve Williams, 1999; Greenberg, 2001; Pinder ve Harlos, 2001) sonucuna ulaşılmıştır. Yöneticilerin olumlu dönüt vermesi, öğretmenleri desteklemesi önemlidir. Yaptıkları çalışmaların görüldüğünü, onaylandığını hisseden bir öğretmen kendini daha değerli hissedeceğinden örgüte olan bağlılığı da özgüveni de daha da artacaktır. (Premeaux ve Bedeian, 2003, s.1537) yapmış oldukları araştırmanın sonucunda, çalışanların sessiz kalma kararını vermeleri algılanan örgütsel destekten önemli sayılabilecek ölçüde etkilenmektedir, şeklinde ulaşmış oldukları sonuç araştırmanın sonucuyla benzeşmektedir.

Öğretmenlerin ve okul yöneticilerinin karşılıklı olarak birbirlerine güvenmeleri gerekir. Okul yöneticileri herkese eşit mesafede durabilmeli, yapılan çalışmalarda ödüllendirmeye gidileceğinde herkesin emeğini gözetebilmeli, veli-öğretmen ilişkileri arasında köprü vazifesi görürken meslektaşını ezdirmemeye çalışmalıdır. Siyasi ya da sendikal sebepler adam kayırmacılığa sebep olmamalıdır. Aksi halde öğretmenler haksızlığa uğradığını yönetici tarafından korunmadığını, dikkate alınmadığını hissettiğinde güvensizlik yaşayabilir. Aynı şekilde öğretmen de dersine geç girdiğinde, verilen nöbet görevini gerektiği gibi tutmadığında, okulla ilgili kendine verilen sorumlulukları yerine getirmediğinde de yönetici tarafından güvensizlik oluşabilir. Güvensizlik iki tarafta da yaşanabilir. Sonucunda da okul kültürü bu durumdan olumsuz etkilenebilir ve okula olan bağlılık azalır çalışmalar verimsizleşir. (Morrıson ve Mıllıken, a.g.e.) tarafından yapılan araştırma sonucunda, çalışanların örgütte güvensizlik hissettiklerinde sessizlik davranışında artma olacağı sonucu yapılan araştırma sonucuyla benzeşmektedir.

FULL TEXTS BOOK

Okul yöneticilerinin kullandıkları zorlayıcı güç de öğretmenlerin sessiz kalma nedenlerinden biridir. Araştırma sonucuna göre öğretmenlerin '' her şeyin en iyisini ben bilirim'' tavrındaki idarecilerle iletişim kurmada zorluk yaşadıkları, fikirlerini rahatça ifade edemedikleri görülmüştür. Baskı altında hissettikleri için çalışmalarında da özgür olamadıkları dikkati çekmektedir. Botero ve Dyne (2009) tarafından yapılan araştırma sonucunda, yönetimde güç kullanımının çalışanlarda sessizlik davranışı oluşturduğu, güç kullanmaktan kaçınan idarecilerle çalışanların kurduğu olumlu ilişki sonucunda ise çalışanların fikirlerini daha açık şekilde ifade ettikleri sonucuna ulaşması araştırma sonucuyla örtüşmektedir. Apak (2016) ' ın yaptığı araştırma sonuçlarına bakıldığında; yöneticiler zorlayıcı güç kullandıklarında çalışanların sessiz kalma davranışlarında artış olduğu sonucuna varması araştırmanın sonuçlarıyla benzeşmektedir

Araştırmanın diğer sonucu da katı hiyerarşik yapının sessizlik davranışını ortaya çıkardığı görülmüştür. Mevzuat ve yasal zorunluluklar nedeniyle öğretmenlere yüklenen artı iş yükü, Eğitim sisteminin yapısı gereği yukarıdan aşağı doğru ilerleyen hiyerarşik yapı nedeniyle öğretmenler fikirlerinin önemli olmadığını, değersiz olduklarını hissedebilir. Alınacak kararlarda öğretmenlere de düşüncelerini sormak, görüş ve önerilerini almak sessizlik davranışını önleyebilir. (Afşar, 2013) yaptığı araştırma sonucunda kararlar alınırken çalışanlarının fikrinin alınması, karar alınırken çalışanların katılının teşvik edilmesi sessizliğin önüne geçecektir sonucuna ulaşılmış, araştırma sonucuyla benzeşmektedir.

Öneriler

1. Öğretmenlerde korku duygusunu engellemek için okul yöneticileri tarafından desteklenmelilerdir.
2. Okullarda güven ortamını oluşturmak için okul yöneticileri herkese eşit davranmalı, tutarlı olmalı, öğretmenler de üzerine düşen görev ve sorumlulukları zamanında yerine getirmelidir.
3. Örgütte alınan kararlara tüm çalışanların katılımı teşvik edilmelidir.
4. Yapılan çalışmalar desteklenmeli ve gerekli olduğunda ödüllendirilmelidir.
5. Okul Yöneticilerinin görevlendirilmesinde liyakat ön planda tutulmalıdır.
6. Olumlu bir örgüt kültürü oluşturmak amacıyla tüm çalışanların katılımıyla okul içi ve okul dışı etkinlikler düzenlenmelidir.
7. Öğretmenlerin motivasyonunu arttırıcı önlemler alınmalıdır.
8. Zorlayıcı güç yerine ödül gücü kullanılmalı öğretmenlerin değerli hissetmesi sağlanmalıdır.
9. Okul yöneticileri kendilerini geliştirici seminer ve hizmet içi eğitimlere katılmalıdır.
10. Örgütte verimli çalışmaların sayısını artırmak için öğretmenler fikirlerini açıkça söylemeleri konusunda cesaretlendirilmelidir.
11. Demokratik bir çalışma ortamı oluşturulmalıdır.
12. Yönetici ve öğretmen arasında yukarıdan aşağı iletişim yerine yatay iletişim daha çok tercih edilmelidir.
13. Adalet ve hakkaniyet ihmal edilmemeli, hiç kimseye ayrımcılık yapılmamalıdır.

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CLIMATE CHANGE AND ITS IMPACT ON AGRICULTURE IN INDIA: A REVIEW STUDY



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ABSTRACT

Agriculture sector is of the utmost importance to the economy of a country and incidentally it is also most vulnerable to global climate change. Climate change is taking a toll on India's agricultural production and productivity. Intergovernmental panel on climate change (IPCC) has projected that by the end of 21st century temperature in India is likely to increase by 3-4°C which would lead to a loss of 3-26% in net agricultural revenues. Aggravated climatic factors will ultimately decline plant productivity, which will result in increased prices and unaffordable rates for the common population. The absence of mitigation and adaptation measures may result in lower farm income by 12-40% in the coming years. This issue is an important concern for livelihood, economic development and ensuring food and job security of an agrarian nation like India. The causes that ultimately are contributing to increase in greenhouse gases, deterioration of soil and water ecology must be identified and rectified. Crop productivity in the countries of southern hemisphere is expected to decrease by as much as 20 per cent, with less developed countries suffering the greatest negative effects according to IPCC report 2007. Hence, adaptation to current agricultural scenario must be undertaken at once to avoid the risks incurred and tackle complications arising due to global climate change. How quickly Indian farmers are able to adjust in their farming practices to adapt to climate change and what policies or technologies will enable rapid adaptation are issues that merit attention of everyone. However, a rapid adaptation is less possible in a developing country like India, where availability to information and capital is limited among the majority of farmers.

Over the past several decades, the international and national research communities have developed a progressively clearer picture of how and why Earth's climate is changing and of the impacts of climate change on a wide range of human and environmental systems. Varyingclimate has resulted in quality and quantity of food, soil degradation, depletion of ozone layer, increasing air and marine pollution etc. Changes which occurs beyond the average atmospheric conditions which is caused either by natural events such as sun's temperature, volcanic eruptions, crustal movements and human activities accelerates to global climate change but natural causes contributes very little compared to anthropogenic activities such as deforestation, emission from factories, vehicles, power stations, burning of fossil fuel releases huge amount of carbon dioxide and suspended particulate matter (SPM) into atmosphere. Every year 35 billion metric tons of carbon dioxide is emitted into the atmosphere through human activities. Future climate change extent relies on what all measures we adopt toreduce the emission of greenhouse gases. The more we release the larger

FULL TEXTS BOOK

future alterations will be. There is no doubt that human activities has are adding fuel to the global climate change. Human-induced climate change and its impacts will continue for many decades and in some cases for many centuries. Climate change can be warming or cooling of the climate. Emission of CO_2 from human activities is more than 100 times as compared to natural processes. Climateis warmed by 0.7· In 2019, the average temperature across global land and ocean surfaces was recorded to be 1.71°F (0.95°C) making it the second-warmest year on record. Global warming is a prominent cause of climate change which occurs due to the increased concentration of several gases such as carbon dioxide (CO_2), chlorofluorocarbons (CFCs), hydrogen (H), sulphur dioxide (SO) and nitrous oxide (N_2O) into the atmosphere and causingdepletion of ozone layer. Anthropological activities are root cause of climate change which is affecting the earth's temperature, rainfall distribution pattern and hydrological cycles and posing severe threat to agricultural production, hence food security. Incidentally agricultural production is a major emitter of greenhouse gases contributing about 18% of the total GHGs emissions in India which eventuate at the primary production state. Weather condition is altered by Climate change which has direct, indirect and biophysical effect on agricultural production. Climate change might have positive or negative impact on human population and crop production. Increase in temperature can lead to reduced yield of crops, increased incidence of pest and disease outbreak. Heat waves can cause more mortality in plants. Heat extremities results in reduced photosynthesis, reduced growth rate, increased leaf abscission and photo oxidative stress and humans in shorter time span than any other climatic phenomenon.

Agriculture sector is highly vulnerable to climate change. High temperature favors infestation of pest and obnoxious weeds. When the temperature is less than or equal to 25°C, there is no spread of rust fungus which acts like a cancer but as soon as the temperature increases the climate becomes hot and dry, fastening the breeding process, covering and destroying entire crop/plantation which are more vulnerable to the temperature. Increased temperature can reduce crop duration, increased vapor-transpiration, crop respiration rate, rapid mineralization of nutrients, decreased nutrient use efficiency, breeding, survival and outbreak of any pest is greatly affected. Increase in temperature and reduction in rainfall adversely affects non-irrigated areas compare to irrigated areas. Increased or reduced rainfall has impaired the soil fertility and productivity. Rainfall over India is likely to increase by 15-40%, by the 21st century end Such changes will hugely impact agricultural activities and will increase the pressure on Indian agriculture. It can disrupt food availability, affect nutritional quality of some foods and reduced access to food.

Keywords: Climate change, food security, mitigation, production, temperature, India.

Introduction

Climate change has emerged as one of the most significant environmental challenges of our time, with profound implications for agricultural productivity and food security, particularly in a developing country like India. This review study aims to analyze the impacts of climate change on agriculture in India, highlighting the multifaceted effects on crop yield, soil health, water resources, and the socio-economic fabric of agrarian communities. By synthesizing current research and policy frameworks, this paper provides a comprehensive overview of the adaptive strategies and mitigation measures being adopted to combat the adverse effects of climate change on Indian agriculture. India's agricultural sector is a cornerstone of its economy, providing livelihood to nearly 58% of the population (FAO, 2020). However, the sector is highly vulnerable to climate change due to its dependence on the monsoon and climatic conditions. This review examines the extent of climate change impacts on Indian agriculture and explores the adaptive measures being implemented to ensure sustainability.

FULL TEXTS BOOK



India is an agrarian country with agriculture playing a crucial role in its economy and the livelihoods of its people. It contributes around 17% to the national GDP and provides employment to nearly 58% of the population. The agricultural sector in India is highly dependent on climatic conditions, especially the monsoon, which accounts for about 70-80% of the annual rainfall. This dependency makes agriculture particularly vulnerable to climate variability and change. Climate change refers to long-term alterations in temperature, precipitation patterns, and other climatic factors, primarily driven by anthropogenic activities such as deforestation, industrial emissions, and extensive use of fossil fuels. The Intergovernmental Panel on Climate Change (IPCC) has indicated that global temperatures have risen by approximately 1.2°C above pre-industrial levels, and further increases are projected unless substantial mitigation measures are implemented (IPCC, 2021).

India has experienced significant climatic changes over the past few decades, including increased temperatures, altered precipitation patterns, and a rise in the frequency and intensity of extreme weather events such as droughts, floods, and cyclones. These changes pose a significant threat to the agricultural sector, impacting crop yields, soil health, water resources, and the socio-economic conditions of farming communities.

Objectives

1. **To review the existing literature on the impacts of climate change on agriculture in India**: This involves a comprehensive analysis of how various climatic factors affect different aspects of agriculture, including crop yield, soil health, and water resources.
2. **To assess the socio-economic implications of these impacts on agrarian communities**: Understanding the broader socio-economic effects, such as food security, income levels, and migration patterns, is crucial for developing effective adaptation strategies.
3. **To evaluate the effectiveness of adaptive and mitigation strategies in Indian agriculture**: This includes examining current practices, technological innovations, policy frameworks, and community-based approaches that aim to enhance agricultural resilience to climate change.

Literature Review

Impact of Climate Change on Crop Yield- Changes in temperature, precipitation patterns, and increased frequency of extreme weather events are affecting crop productivity in India (Lobell et al., 2011). For instance, rice and wheat, which are staple crops, have shown significant yield reductions under changing climatic conditions (Aggarwal et al., 2019).

Soil Health and Fertility- Climate change affects soil health through alterations in soil moisture content, organic matter decomposition, and erosion rates. Increased temperatures and irregular rainfall can lead to soil degradation, reducing its fertility and, consequently, crop yield (Lal, 2013).

Water Resources- Water scarcity is a critical issue exacerbated by climate change. The alteration in precipitation patterns and the decline in glacier mass in the Himalayas are impacting the availability of water for irrigation (Shah & Gulati, 2018). The over-extraction of groundwater has also led to a decline in water tables, further stressing agricultural practices.

FULL TEXTS BOOK

Socio-Economic Implications- The socio-economic fabric of rural communities is closely linked to agricultural productivity. Climate change-induced crop failures and reduced yields can lead to food insecurity, increased poverty, and migration (Patnaik & Narayanan, 2015).

Climate Change and Its Effects

Climate change manifests through various phenomena, including:

1. **Temperature Changes**: Rising temperatures can affect crop growth cycles, reduce yields, and increase the prevalence of pests and diseases. Crops such as wheat and rice are particularly sensitive to temperature changes, with even slight increases potentially leading to significant yield reductions.
2. **Altered Precipitation Patterns**: Changes in the timing, intensity, and distribution of rainfall can disrupt the agricultural calendar, affect sowing and harvesting times, and lead to water stress during critical growth stages of crops. Erratic rainfall patterns also contribute to increased soil erosion and reduced soil fertility.
3. **Extreme Weather Events**: The increased frequency and severity of extreme weather events such as droughts, floods, and cyclones pose direct threats to agricultural productivity. These events can cause immediate crop damage, reduce land suitability for farming, and lead to long-term degradation of natural resources.
4. **Sea Level Rise**: Coastal agriculture is threatened by rising sea levels, which lead to salinization of soil and water resources, adversely affecting crop production. States like West Bengal and Odisha, with extensive coastal agriculture, are particularly vulnerable.
5. **Glacial Melting**: The melting of Himalayan glaciers, which are crucial for the perennial river systems in northern India, affects the availability of water for irrigation. Reduced glacial flow during summer months can lead to water shortages, impacting crop irrigation.

Importance of Addressing Climate Change in Agriculture

Climate change in the context of agriculture is critical for several reasons:

1. **Food Security**: Agriculture is the backbone of food security in India. Climate change-induced disruptions in agricultural productivity can lead to food shortages, price volatility, and increased hunger and malnutrition.
2. **Economic Stability**: The agricultural sector supports a significant portion of the Indian population. Declines in agricultural productivity can lead to economic instability, increased poverty, and social unrest in rural areas.
3. **Sustainable Development**: Achieving sustainable development goals (SDGs) related to poverty, hunger, and environmental sustainability is closely linked to the health of the agricultural sector. Climate-resilient agriculture is essential for meeting these goals.
4. **Biodiversity and Ecosystem Services**: Agriculture is interconnected with biodiversity and ecosystem services. Sustainable agricultural practices can help preserve biodiversity, enhance ecosystem services, and contribute to climate change mitigation efforts.

Adaptive Strategies

Farmers can adapt to droughts through a variety of strategies aimed at enhancing water use efficiency, conserving soil moisture, and building resilience to water scarcity. Here are several effective adaptation measures:

1. Water Management Practices

- **Drip Irrigation and Sprinkler Systems**: These methods use water more efficiently compared to traditional flood irrigation by delivering water directly to the plant roots.
- **Rainwater Harvesting**: Collecting and storing rainwater for use during dry periods helps ensure a consistent water supply.
- **Conservation Tillage**: Reducing tillage helps maintain soil structure and moisture, reducing evaporation and runoff.

FULL TEXTS BOOK

- **Efficient Water Use**: Scheduling irrigation based on crop needs and soil moisture levels can minimize water waste.

2. Crop Management

- **Drought-Resistant Crops**: Planting drought-tolerant crop varieties that require less water and can survive prolonged dry periods.
- **Crop Diversification**: Growing a variety of crops can reduce the risk of total crop failure and spread the risk associated with drought.
- **Adjusting Planting Dates**: Shifting planting dates to align with expected rainfall patterns can help optimize water use and improve crop resilience.

3. Soil Management

- **Mulching**: Applying organic or inorganic mulch helps retain soil moisture by reducing evaporation and moderating soil temperature.
- **Cover Crops**: Planting cover crops during the off-season can improve soil health, reduce erosion, and enhance water retention.
- **Soil Organic Matter**: Increasing organic matter in soil through composting and green manures enhances soil structure and water-holding capacity.

4. Technological Solutions

- **Weather Forecasting Tools**: Utilizing weather forecasts and climate models to plan agricultural activities more effectively.
- **Soil Moisture Sensors**: Using sensors to monitor soil moisture levels can inform precise irrigation practices.
- **Mobile Applications**: Leveraging mobile technology to receive timely information and advice on water management and drought conditions.

5. Financial and Institutional Support

- **Insurance Schemes**: Crop insurance can provide financial support to farmers in the event of crop failure due to drought.
- **Subsidies and Incentives**: Governments can offer subsidies for adopting water-efficient technologies and practices.
- **Training and Education**: Providing farmers with training on sustainable farming practices and water conservation techniques.

6. Community-Based Approaches

- **Water User Associations**: Forming local groups to manage and allocate water resources more efficiently.
- **Collective Action**: Encouraging collective efforts to implement large-scale water conservation projects, such as watershed management.

7. Long-Term Strategies

- **Integrated Water Resource Management (IWRM)**: Promoting a holistic approach to managing water resources that considers the interconnections between different water uses and the environment.
- **Infrastructure Development**: Investing in infrastructure such as dams, reservoirs, and canals to improve water storage and distribution.
- **Policy Advocacy**: Advocating for policies that support sustainable water use and provide incentives for drought-resilient farming practices.

By combining these strategies, farmers can build resilience to drought conditions, maintain productivity, and ensure the sustainability of their agricultural operations.

FULL TEXTS BOOK

Technological Innovations

The adoption of climate-resilient crop varieties, improved irrigation techniques, and precision agriculture can help mitigate the adverse effects of climate change (Jat et al., 2020). For example, the use of drought-tolerant rice varieties and efficient water management practices has shown promising results.

Policy Frameworks

Government policies play a crucial role in supporting adaptive measures. Initiatives such as the National Mission for Sustainable Agriculture (NMSA) and Pradhan Mantri Krishi Sinchai Yojana (PMKSY) are aimed at enhancing agricultural resilience to climate change (GoI, 2018).

Community-Based Adaptation

Community-based adaptation strategies, including knowledge sharing, collective resource management, and participatory decision-making, are essential for building resilience at the grassroots level (Reid et al., 2009).

Mitigation Measures

Reducing Greenhouse Gas Emissions

Agriculture is both a victim and a contributor to climate change. Strategies to reduce greenhouse gas emissions from agricultural practices, such as optimizing fertilizer use and promoting organic farming, are vital (Smith et al., 2014).

Agroforestry

Integrating trees into agricultural landscapes can sequester carbon, improve soil health, and enhance biodiversity, making agroforestry a viable mitigation strategy (Mbow et al., 2014).

Case Studies

Punjab and Haryana: Green Revolution and Its Aftermath

The Green Revolution significantly boosted agricultural productivity in Punjab and Haryana. However, the intensive use of chemical inputs has led to soil degradation and water scarcity, highlighting the need for sustainable practices (Singh, 2018).

Andhra Pradesh: Climate-Resilient Agriculture

Andhra Pradesh has implemented various climate-resilient agricultural practices, such as the Zero Budget Natural Farming (ZBNF) initiative, which promotes chemical-free farming and enhances soil health (Reddy, 2020).

Discussion

Challenges and Opportunities

1. **Unpredictable Weather Patterns**

The increasing unpredictability of weather patterns poses a significant challenge for Indian agriculture. Erratic rainfall, unseasonal storms, and temperature fluctuations disrupt traditional farming calendars, making it difficult for farmers to plan their activities effectively. The reliance on monsoons means that any deviation in rainfall patterns can lead to droughts or floods, severely affecting crop yields (Gadgil & Gadgil, 2006).

2. **Water Scarcity**

Water scarcity is a critical issue exacerbated by climate change. Decreased rainfall and over-extraction of groundwater have led to a decline in water tables. This is particularly problematic in regions like Punjab and Haryana, where intensive agriculture practices demand high water usage (Shah & Gulati, 2018). The availability of water for irrigation is crucial for sustaining crop production, and its scarcity threatens agricultural productivity.

3. **Soil Degradation**

Soil health is deteriorating due to increased temperatures, irregular precipitation, and extreme weather events. These factors contribute to soil erosion, loss of soil organic matter, and nutrient depletion. The

FULL TEXTS BOOK

excessive use of chemical fertilizers and pesticides, driven by the need to maximize yields under challenging conditions, further degrades soil quality (Lal, 2013).

4. **Increased Pest and Disease Incidence**

Climate change alters the habitats and life cycles of pests and diseases, leading to increased incidence and intensity. Warmer temperatures and higher humidity levels create favorable conditions for pests like the pink bollworm in cotton and diseases like rust in wheat (Chakraborty & Newton)

While climate change presents significant challenges to agriculture in India, it also offers unique opportunities for innovation and transformation in the sector. By leveraging advancements in technology, policy, and sustainable practices, India can enhance agricultural resilience and productivity. Here are several opportunities that arise from the intersection of climate change and agriculture:

1. Development of Climate-Resilient Crop Varieties

- **Genetic Engineering and Biotechnology**: Advances in genetic engineering can be utilized to develop crop varieties that are more tolerant to drought, heat, and salinity. These genetically modified crops can sustain yields under adverse climatic conditions.
- **Traditional Breeding Techniques**: Leveraging traditional breeding methods to select and cultivate native crop varieties that are inherently more resilient to local climate variability.

2. Adoption of Precision Agriculture

- **Digital Farming Technologies**: Implementing precision agriculture technologies such as satellite imagery, GPS, and IoT devices can optimize resource use, improve crop management, and increase efficiency.
- **Data-Driven Decision Making**: Using big data and analytics to predict weather patterns, pest outbreaks, and soil health can help farmers make informed decisions and reduce risks.

3. Expansion of Sustainable Farming Practices

- **Organic Farming**: Promoting organic farming practices that reduce reliance on chemical inputs, improve soil health, and enhance biodiversity.
- **Agroforestry**: Integrating trees and shrubs into farming systems to improve soil fertility, provide shade, and act as windbreaks, thereby enhancing the resilience of agricultural landscapes.
- **Conservation Agriculture**: Encouraging practices such as minimal tillage, crop rotation, and cover cropping to maintain soil health and reduce erosion.

4. Enhancing Water Management Techniques

- **Efficient Irrigation Systems**: Scaling up the use of drip and sprinkler irrigation systems to conserve water and improve irrigation efficiency.
- **Integrated Water Resource Management**: Implementing holistic water management strategies that include rainwater harvesting, watershed management, and the use of recycled water.

5. Leveraging Renewable Energy

- **Solar-Powered Irrigation**: Utilizing solar energy to power irrigation pumps, reducing dependence on fossil fuels and ensuring a sustainable energy source for agricultural operations.
- **Bioenergy Production**: Converting agricultural waste into bioenergy can provide an additional income stream for farmers and contribute to energy security.

6. Strengthening Policy and Institutional Frameworks

- **Climate-Smart Agriculture Policies**: Developing and implementing policies that promote climate-smart agricultural practices, provide financial incentives, and support research and development.
- **Farmer Support Programs**: Establishing programs that offer technical assistance, training, and financial support to farmers adopting innovative practices and technologies.

7. Promoting Market Access and Value Addition

- **Supply Chain Improvements**: Enhancing supply chains to reduce post-harvest losses, improve market access, and ensure fair pricing for farmers.

FULL TEXTS BOOK

- **Value-Added Products**: Encouraging the production of value-added agricultural products, which can increase farmers' income and create new market opportunities.

8. Fostering Community-Based Initiatives

- **Farmer Cooperatives**: Strengthening farmer cooperatives and organizations to improve bargaining power, share knowledge, and access resources collectively.
- **Participatory Research**: Involving farmers in research and development processes to ensure that innovations are practical, culturally appropriate, and address local challenges.

9. Education and Capacity Building

- **Farmer Training Programs**: Providing ongoing education and training programs to equip farmers with the skills and knowledge needed to adapt to climate change.
- **Extension Services**: Enhancing agricultural extension services to deliver timely information and support to farmers in remote areas.

While significant progress has been made in adopting adaptive measures, several challenges remain. These include the need for greater investment in research and development, improved infrastructure, and more robust policy frameworks. However, opportunities exist in leveraging technology, enhancing community participation, and promoting sustainable practices.

Conclusion

Climate change poses a significant threat to the agricultural sector in India, which is crucial for the country's food security and economic stability. This review has highlighted the various ways in which changing climatic conditions are impacting agriculture, including alterations in temperature, precipitation patterns, and the frequency of extreme weather events. These changes are affecting crop yields, soil health, water availability, and pest dynamics, thereby posing a multifaceted challenge to the agricultural community.The evidence indicates that rising temperatures and shifting rainfall patterns are leading to reduced crop productivity and increased vulnerability of crops to pests and diseases. Regions dependent on monsoon rains, in particular, are experiencing increased unpredictability, which complicates planting schedules and harvesting processes. Additionally, extreme weather events such as droughts and floods are becoming more frequent and severe, further exacerbating the risks to agricultural productivity and food security.To mitigate these impacts, it is essential to adopt a multi-pronged approach. This includes the development and dissemination of climate-resilient crop varieties, improved irrigation practices, and the adoption of sustainable agricultural techniques. Policymakers must also focus on enhancing the adaptive capacity of farmers through education, access to technology, and financial support. Furthermore, integrated water management practices are crucial to address the issues of water scarcity and ensure efficient water use in agriculture.

In conclusion, while climate change presents formidable challenges to agriculture in India, strategic interventions and adaptive practices can help mitigate these impacts. Continued research, along with robust policy frameworks and proactive measures, is essential to safeguard India's agricultural future and ensure food security in the face of an evolving climate.

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FULL TEXTS BOOK

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FULL TEXTS BOOK

THE PRINCIPLE OF DIRECT EFFECT OF EU LAW: *THE VAN GEND EN LOOS* CASE

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ABSTRACT
The European Union's law provides the legal basis for the legal framework of its Member States. This article analyzes the principle of direct effect of European Union (EU) law, a concept upheld by the case law of the Court of Justice of the EU (the Court of Justice), which gives individuals the rights that can be upheld in national courts.
The principle of direct effect is one of the most important principles of EU law, as it allows private subjects to rely on EU treaties and regulations in their national courts. This improves the effectiveness and consistency of EU law across Member States legal systems. In addition to discussing its implications in the Member States' legal systems, this article examines the development, importance and impact of direct effect in promoting legal integration within the EU through the jurisprudence of the Court of Justice. The *Van Gend en Loos* judgment of the Court of Justice is the focus of this paper's examination of the history, development and implications of direct effect of EU law.
In order to analyze the subject matter of this article, both descriptive and case study analysis methods were used.
Keywords: direct effect, principle, jurisprudence, EU law, Van Gend en Loos.

1. Introduction

Van Gend en Loos[2] is the judgment that has established the fundamental principles upon which almost every significant development in EU law has been based. In a reference to Article 177 of the Treaty of the European Economic Community (TEEC) at the time, the Dutch court sought the opinion of the Court of Justice as to whether an article of the Treaty, specifically Article 12 of the TEEC, would have direct application within the territory of a Member State. Considering this, it is pertinent to inquire whether the citizens of a Member State may invoke this article to seek the protection of their individual rights.[3]
From the outset, the Dutch government has maintained that the Court of Justice lacks the requisite jurisdiction to adjudicate this case. The government's position is based on the premise that the case does not pertain to the interpretation of the Treaty, but rather to its application in accordance with the constitutional law of the Netherlands. The government asserts that the Court is not empowered to make decisions pertaining to matters of Dutch constitutional law. In response to these claims, the Court of Justice determined that: *"The Court is not obliged to assess the application of the Treaty in accordance with the principles of national law, which remains the domain of national courts. However, it is required to ensure compliance with subparagraph (a) of paragraph 1 of Article 177 of the Treaty, solely in terms of interpreting the scope of Article 12 of the Treaty within the context of Community law and its impact on individuals"*.[4]
In stating that it had only been asked to explain the scope of Article 12 by reference to its effect on individuals, the Court of Justice implied that it assumed it could answer this question exclusively based

[2] Case 26-62 *"NV Algemene Transport- en Expeditie Onderneming van Gend & Loos vs. Netherlands Inland Revenue Administration"*, pg. 11, in https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:61962CJ0026&from=EN .
[3] *Van Gend en Loos*, paragraph 1, pg. 3.
[4] Ibid, pg. 10.

FULL TEXTS BOOK

on Community law, without considering the concepts of national constitutional law on how international treaties are incorporated into national law. Furthermore, the Court of Justice determined that it was within the purview of the national court to ascertain when a preliminary reference was necessary to enable it to reach a decision. Subsequently, the Court of Justice considered the question of the direct effect of Article 12 and concluded that: *"In accordance with the spirit and wording of the Treaty, Article 12 must be interpreted as producing direct effect and creating rights for individuals, which national courts are obliged to protect"*.[5]

Notwithstanding the assertion by a Member State that the EEC Treaty is not distinct from conventional international treaties, the Court concluded that it is indeed a unique entity, diverging from other international treaties in its scope, which extends beyond the mere joint commitment of states to an intergovernmental level. In consequence of its purpose and institutional framework, it is empowered to confer directly upon individual's rights that are enforceable against Member States.[6]

2. The Van Gend en Loos case: The direct effect of the provisions set forth in the Treaty.

To substantiate its stance on the direct impact of the Treaty articles, the Court of Justice primarily advanced the following arguments:

The Court of Justice initiated its reasoning by referencing the objectives of the TEEC, rather than analyzing Article 12 in isolation. It was argued that the fundamental and general issue raised by the Dutch court was not limited to a specific article of the Treaty. It was thus determined that: *"The objective of the Treaty, namely the establishment of a common market, is of direct interest to the parties involved in the Community. As such, the Treaty is more than an agreement which simply creates mutual obligations between the contracting parties"*.[7] Furthermore, the Court of Justice observed that the Preamble of the TEEC refers not only to governments but also to peoples. The institutions of the EEC were endowed with sovereign rights, and the citizens of the Member States participate in their functioning through the European Parliament.[8] In this approach, the Court of Justice relies on the functioning of EEC.

Secondly, the Court provided further support for this determination in Article 177 TEEC, which states: *"Furthermore, the task given to the Court of Justice under Article 177, the object of which is to ensure a uniform interpretation of the Treaty by national courts, confirms that States have accepted that the law of the Community has an authority which may be exercised by their own nationals before these courts"*.[9] Consequently, Article 177 confers upon national courts the authority to refer a preliminary request to the Court of Justice solely in instances where it is determined that the decision on the case is indispensable for the Court to render an informed decision. A decision may be deemed "necessary" only if the legal position of individuals is affected by the provisions of the Treaty.

Considering the aforementioned arguments, the Court of Justice reached the following conclusion: The Community represents a novel order of international law, within which the Member States have relinquished certain sovereign rights, and to which they are subject not only as states, but also as to their citizens. Irrespective of the legislation enacted by the Member States, Community law not only imposes obligations on individuals but also aims to confer rights upon them that become part of their legal

[5] Ibid, pg. 13.
[6] Claus Hamacher "Parliamentary sovereignty in the European communities: the developing doctrine", Durham theses, Durham University, 1992, in http://etheses.dur.ac.uk, pg. 79.
[7] Ibid, pg. 11.
[8] Ibid, pg. 12.
[9] Claus Hamacher "Parliamentary sovereignty in the European communities: the developing doctrine", Durham theses, Durham University, 1992, in http://etheses.dur.ac.uk, pg. 78.

FULL TEXTS BOOK

inheritance. These rights emerge not only from express provisions in the Treaty, but also from the clear obligations imposed on individuals, as well as on Member States and Community institutions.[10]

Thirdly, the Court of Justice considered Article 12 TEEC, which states that it is generally possible for Treaty provisions to recognize rights applicable to individuals. The Court of Justice determined that the wording of the provision in question contains a clear and unconditional prohibition and constitutes a negative obligation, independent of further legislative measures of national law. Consequently, it was deemed to be ideally suited to produce direct effects between Member States and their subjects. Furthermore, although the Member States are subject to the negative obligation set forth in this article, it does not preclude their citizens from benefiting from this obligation.[11]

3. Additional matters pertaining to the direct effect

3.1 Regulations

Regarding instruments of secondary legislation of the EU, the founding Treaties and the Treaty of Lisbon stipulate that only regulations are directly applicable, whereas directives and decisions are not. The second paragraph of Article 288 TFEU,[12] states the following: “A regulation shall have general application. It shall be binding in its entirety and directly applicable in all Member States”.[13] However, the fact that the Treaties have granted the regulation direct application does not necessarily imply that it also has direct effect.[14]

In the case of *Van Duyn v. Home Office*, the Court of Justice provided further clarification on this matter through the wording that "under Article 189 TEEC, the regulations are directly applicable and, therefore, may have direct effect by their very nature".[15] In her view, the term "direct implementation" can be understood to imply a "direct effect". However, in the same case, the Court of Justice stated that the fact that the regulations are "directly applicable" does not necessarily imply that they have a "direct effect". The question of whether the regulations will have a direct effect on the citizens of the Member States will be answered on a case-by-case basis.[16]

In the case of *Commission v. Italy*, the Italian Government was held accountable because the regulation was implemented, which called into question the legal character and direct application of that measure. In its ruling, the Court of Justice stated that: *"All of the methods of implementation were contrary to the Treaty, and as a consequence, would create obstacles to the direct effect of Community regulations and endanger their simultaneous and equal application throughout the Community." In the case of Muñoz, the Court of Justice ruled that: "Given their intrinsic nature and position within the hierarchy of Community law sources, regulations confer rights upon individuals, which national courts are duty-bound to safeguard."*[17]

In conclusion, with reference to the content of Article 288 TFEU, it can be stated that regulations are directly applicable in all Member States. This implies that they become part of national law without the necessity of a transposing act. Once they become part of the domestic law of a Member State, they will

[10] Case *Van Gend en Loos*, pg. 12.
[11] Ibid, pg. 13.
[12] Former article 189 TEEC, ex article 249 TEC.
[13] Article 288 TFEU, paragraph 2.
[14] Josephine Steiner, “Textbook on EEC Law”, 1990, pg. 24.
[15] Case, Yvonne Van Duyn vs. Home Office, 1974, paragraph 12, pg. 11, in https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:61974CJ0041&from=EN.
[16] Ibid.
[17] Ibid.

FULL TEXTS BOOK

have direct effect if their provisions are sufficiently clear, precise, and appropriate to the situation of an individual litigant.[18]

3.2 Decisions

In the former articles 189 of the TEEC and 249 of the TEC, it was established that: "*A decision is binding in all its elements for the parties to whom it is addressed*". In Article 288 of the TFEU, the wording of the Treaty regarding decisions has been modified. The revised text states, "*The decision has binding force in its entirety*". The decision that determines the addressees is binding only for them.[19] With regard to the question of jurisprudence, the Court of Justice initially adopted a somewhat cautious approach regarding the definition of judgments as directly effective. This was even though the relevant Treaty article made no reference to their direct applicability.[20]

The Council or the Commission may take decisions, which may be addressed to individuals or Member States. Decisions addressed to individuals will, by their very nature, have a direct effect.[21] Nevertheless, even if the decision is addressed to a Member State, it can be used by individuals (vertical direct effect) if it meets the same conditions that are defined for the direct effect of primary Community law. Primarily, it must determine an obligation that is clear, precise and unconditional.[22]

However, the Court of Justice is hesitant to determine that a decision directed towards a Member State can result in enforceable obligations between private parties, a concept known as the direct horizontal effect. In the case of *Carp Snc di L. Moleri e vs. Corsi v Ecorad Srl*, the Court of Justice ruled that a decision addressed to Member States and containing appropriate procedures for certain construction materials does not impose obligations on private parties. This conclusion was reinforced by the wording of Article 288 of the TFEU, which stipulates that a decision that determines those to whom it is directed is binding only for them. Nevertheless, a decision may be addressed to a private party, in which case it is binding upon that party. In such cases, the decision may create a direct horizontal effect between the private parties, provided that the obligation established is clear, precise and unconditional.[23]

3.3 Directives

One of the most controversial aspects of the principle of direct effect is the fact that its application has been extended to directives. In accordance with Article 288 TFEU, paragraph 2, a directive has binding force with respect to the desired outcome for each Member State to which it is addressed. However, the authority to select the appropriate forms and methods is retained at the national level.[24] Upon initial examination, it becomes evident that the directives are not directly applicable, as they necessitate the implementation of measures at the level of the Member States. Furthermore, they do not have a direct effect. It thus appears that some of the criteria for direct effect, as defined in the Court of Justice's case law, are absent. Notwithstanding this apparent obstacle, the objective of legal integration, which reinforced the initial formulation of the Court of Justice regarding the direct effect of Treaty provisions,

[18] Case Azienda Agricola Monte Arcosu vs. Regione Autonoma della Sardegna 2001, paragraph 26, pg. 11, in https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:61998CJ0403&from=EN.

[19] Article 288 TFEU.

[20] Paul Craig, Grainne De Burca "EU law: text, cases and materials" Oxford University Press 2011, pg. 200.

[21] Claus Hamacher "Parliamentary sovereignty in the European communities: the developing doctrine", Durham theses, Durham University, 1992, in http://etheses.dur.ac.uk, pg. 98.

[22] See the Court of Justice cases of the year 1970: Case *Grad vs Finanzamt Traustein*, 1970; *Case Lesage vs. Hauptzollamt Freiburg*, 1970 and *Case Haselhorst vs Finanzamt Dilsseldorf*, 1970.

[23] Paul Craig, Grainne De Burca, "E drejta e Bashkimit Evropian: tekste, çështje gjyqësore dhe materiale" The Albanian version AIIS, 2013, pg. 321.

[24] Article 288 TFEu, paragraph 2.

FULL TEXTS BOOK

may be equally applicable to directives in its view. In the case of *Grad v. Finanzamt Traustein*, the Court of Justice ruled that, in certain circumstances, directives could also have direct effect.[25]

In two related decisions, *Vand Duyn* and *Ratti*, the Court of Justice set forth the rationale for the direct effect of directives. In the *Van Duyn* case, the Court of Justice advanced two arguments to substantiate the recognition of the direct effect of directives. Firstly, the effect of a directive defining an obligation for Member States would be diminished if individuals were not granted the right to use it before a national court and if these obstacles were ultimately considered an element of Community law.[26] The Court of Justice has acknowledged the direct effect of directives designed to safeguard the rights of individuals. Secondly, Article 177 TEEC (now Article 267 TFEU) empowers national courts to refer to the Court of Justice matters pertaining to the legitimacy and interpretation of all acts of Community institutions, irrespective of classification. This indicates that such acts may be invoked by individuals before national courts.[27]

In the *Ratti* case, the Court of Justice established the principle of "prohibition," which held that Member States were prohibited from refusing to recognize the direct effect of a directive due to a failure to implement it properly. Furthermore, the Court of Justice has established that: *"the directive must have reached its deadline for implementation before it can have direct effect. In conclusion, as a directive imposes obligations solely on Member States, it is not feasible for an individual to safeguard the principle of "legitimate expectation" before the deadline for its implementation has elapsed"*.[28]

During the implementation period, Member States are at liberty to select the act they deem most appropriate, provided that the period is not exceeded. Once the designated period has elapsed, the obligation is absolute and non-compliance with the directive is no longer an option. In conclusion, the Court of Justice has, in its judicial practice, recognized the direct effect of a directive when its provisions are unconditional, sufficiently clear and precise, and when the Member State has not transposed the directive within the specified period or has not implemented it properly.

4. Conclusions

In the case of *Van Gen en Loos*, the Court of Justice established the principle of direct effect for certain provisions of the Treaty. Subsequently, the Court of Justice extended the application of these principles to EU secondary legislation.

In the *Van Gend en Loos* case, the Court provided an elaboration of the conditions for direct effect in relation to Treaty provisions. The *Van Gend en Loos* decision defined the criteria for a provision of primary EEC law to have direct effect. The Court determined that for a provision of the Treaty to have direct effect, it must meet the following criteria: it must be clear, negative, unconditional, and independent of any national enforcement measure.

The conditions for the application of the "direct effect" principle have also been developed in other cases before the Court of Justice. The cases in question pertain to the direct effect of EU secondary legislation. It is important to note that when the Court determines that a specific measure of secondary Community law has direct effect, it is legally equivalent to a provision of the Treaty.[29]

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[25] Paul Craig, Grainne De Burca, "E drejta e Bashkimit Evropian: tekste, çështje gjyqësore dhe materiale" The Albanian version AIIS, 2013, pg. 321.

[26] Case *Yvonne van Duyn vs. Home Office, 1974,* paragraph 12, in https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:61974CJ0041&from=EN.

[27] Ibid.

[28] Case *Pubblico Ministero vs. Ratti*, 1979, paragraph 46, in https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:61978CJ0148&from=EN.

[29] Claus Hamacher "Parliamentary sovereignty in the European communities: the developing doctrine", Durham theses, Durham University, 1992, in http://etheses.dur.ac.uk, pg. 97.

FULL TEXTS BOOK

The Court of Justice is responsible for ensuring that national courts safeguard the rights conferred upon individuals in Member States by Community law.

It is notable that none of the Treaties contains a stipulation regarding the direct effect of their respective provisions. It seems plausible to suggest that the drafters of the Treaties may have assumed that the question of direct effect would be decided by national courts in relation to rules of domestic law. In this regard, the jurisprudence of the Court represents a significant development in the field of EU law.[30]

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13. Case Yvonne van Duyn vs. Home Office, 1974.

FULL TEXTS BOOK

[30] Trevor C. Hartley, "The Foundations of European Union Law: An Introduction to the Constitutional and Administrative Law of the EU", Oxford University Press, 2014, pg. 216.

THE PRINCIPLE OF SUPREMACY IN THE JURISPRUDENCE OF THE COURT OF JUSTICE OF THE EU
IMPLICATIONS FOR NATİONAL PARLIAMENTS

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ABSTRACT
The Court of Justice of the European Union (Court of Justice) is the guardian of respect for legality and the instrument of harmonization of the law within the European Union. It has taken a firm view to determine the status of *acquis* of the European Union and to give it priority when it is in conflict with the national legal systems of the Member States.
The doctrine of the supremacy of European Union law was elaborated by the Court of Justice in the early 1960s in the case *Costa vs Enel*. It constitutes one of the most significant constitutional doctrines of the European Union law, which did not have a legal basis in the founding Treaties of the first European Communities. However, it was developed by the Court of Justice on the basis of the concept that community law/EU *acquis* constituted a "new legal order". The Court of Justice has continuously insisted in its jurisprudence on the development of the principle of supremacy.
In order to analyze the subject matter of this article, both descriptive and case study analysis methods were used.
Keywords: supremacy, principle, jurisprudence, EU acquis, harmonization.

1.1. Introduction
In this article, the author examines the Court of Justice's judicial decision, which have established the principle of supremacy of European Union (EU) law over national laws of Member States. The analysis of case law focuses on the case of *Costa vs Enel*.[31] The consequences of applying the principle of supremacy were defined by the Court of Justice in another case, the *Simental II*.[32] The selected approach examines the interconnection between this pivotal EU legal principle and the legislative authority of national parliaments, addressing the question of whether the Court of Justice's ruling on the supremacy of EU law impinges upon legislative parliamentary sovereignty.

1.2. Costa vs. Enel: Facts and the Ruling of the Courts of Justice
In the *Van Gend en Loos*[33] case, the Court of Justice initially addressed the nature of community law. This ruling established the direct effect principle, according to the Court of Justice. This definition inevitably gives rise to the question of which law the national court should apply in the event of a conflict between a norm of national law and a norm with direct effect of Community law. The Dutch national court had not addressed this matter in its reference to the Court of Justice. Consequently, despite the evident interconnection between the two cases, the Court of Justice chose to refrain from addressing it in *Van Gend en Loos*. In the case of *Costa v. Enel*, the Court of Justice took this into account. The ENEL decision constitutes the foundation of the doctrine of the supremacy of Community law.

[31] Flaminio Costa v. ENEL (Case 6/64), 15 July 1964.
[32] Amministrazione delle Finanze dello Stato v. Simmenthal SpA, 9 March 1978.
[33] NV Algemene Transporten Expeditie Onderneming van Gend en Loos v. Nederlandse Administratis der Belastingen (Case 26/62), 5 February 1963.

FULL TEXTS BOOK

To facilitate an understanding of the issues under discussion, it is essential to present the facts of this case, as in *Costa v. Enel* a law of the Italian Parliament was opposed on the grounds of incompatibility with the Treaty of European Economic Community (TEEC).

In light of the apparent conflict between the Parliamentary Act of 1962, which nationalized the electricity industry, and the TEEC, Flamino Costa elected to refrain from paying his electricity bills to the State Energy Corporation (ENEL). In order to ascertain the constitutionality of the Parliamentary Act of Nationalization, the national judge had referred the case to the Italian Constitutional Court. In the case of *Costa v. Enel*, the Italian Constitutional Court ruled that limitations in support of international organizations like the European Economic Community (EEC) were permitted by Article 11 of the Italian Constitution.

However, the European Treaties' standing and the standards that the Community institutions[34] had approved for the Italian internal legal system were unaffected by this clause. The investigation concluded that the dual system should be subject to the current international agreement provisions. The subsequent legislation, the Parliamentary Energy Nationalization Act of 1962, was unable to override the TEEC, which had been incorporated into domestic law in 1957.[35]

In a statement presented before the Court of Justice, the Italian Government advanced the position that the referral initiated by the Italian judge was devoid of legal validity. This assertion was accompanied by a reference to the reasoning employed by the Italian Constitutional Court in a similar matter. The national court was without the requisite authority to invalidate a parliamentary act on the grounds of conflict with EEC law, as per Italian legislation. This renders it impossible for this court to request that the EEC's legislation be interpreted.[36] The Italian Government advanced the further argument that the judge was obliged to decide the case solely in accordance with national law, and not in contravention of any provision of the Treaty.[37] In light of the Italian judge's request for the Court of Justice to determine the compatibility of Italian law with the TEEC, the Court of Justicelimited its consideration to matters pertaining to the Treaty's interpretation. In this manner, the Court of Justice did not address the initial objection raised by the Italian Government.

This ruling represents a significant expansion of the Court of Justice's constitutional conceptions regarding the nature of Community law. It acknowledges that the Member States had restricted their sovereign rights in the Community's formation and emphasizes the perpetual nature of the EEC, the independence of its powers and the delegation of powers from the Member States to the EEC:

"*The establishment of an unlimited-duration Community with its own institutions, distinct identity, legal capacity and international representation, coupled with the transfer of powers from Member States to the Community, has effectively curtailed the sovereign rights of the latter, albeit within defined limits. In this manner, they have established a legally binding entity, to which they and their citizens are subject.*"[38]

Despite the absence of any explicit mention of the principle of supremacy in the TEEC, the Court of Justice nevertheless proceeded to draw inferences from the text of the treaty, thereby implying the existence of this principle. The Court of Justice was resolute in demonstrating that the "words and spirit of the Treaty" unavoidably implied that:

[34] De Witte, B., "Direct Effect, Primacy and the Nature of the Legal Order", 2011, pg. 328, in Paul Craig, Gráinne de Búrca, (eds) "The Evolution of EU Law", 2011.

[35] Decision of the Italian Constitutional Court, 7 March 1964, No. 14, in: http://www.giurcost.org/decisioni/1964/0014s-64.html.

[36] De Witte, B., "Direct Effect, Primacy and the Nature of the Legal Order", 2011, pg. 328. In Paul Craig, Gráinne de Búrca, (eds) "The Evolution of EU Law", 2011.

[37] Case *Costa v. ENEL*, pg. 3.

[38] *Ibid* pg. 7.

FULL TEXTS BOOK

"It is not possible for Member States to introduce a further unilateral measure that is in conflict with a legal order which they have accepted on the basis of reciprocity.[39]

The Court of Justice determined that, based on the language of Article 189 of the TEEC, which stipulates that regulations are "binding" and "directly applicable" in all Member States, the supremacy of EEC law is inherently implied:
"The supremacy of Community law is also supported by Article 189, which stipulates that a regulation "shall be binding" and "directly applicable in all Member States". This provision, which is not subject to any reservation, would be devoid of any legal effect if a Member State were to unilaterally annul its effect by means of legislative measures which could prevail over EEC law."[40]

Ultimately, the Court of Justice reached to the conclusion that:

"From the aforementioned observations, it can be concluded that the right derived from the Treaty, as an independent source of law, due to its distinctive and original nature, cannot be contravened by national legal provisions, regardless of their wording, without being deprived of its character as a community right and without challenging the legal foundation of the Community itself.
The transfer of rights and obligations from the national legal system of Member States to the Community legal system is a permanent limitation of their sovereign rights, which cannot be overridden by subsequent acts. This unilateral action is incompatible with the concept of the Community."[41]
In a manner consistent with its approach in the *Van Gend en Loos* case, the Court of Justice did not consult the constitution of any specific Member State to determine whether or not such a transfer of powers was permitted by that state's constitution. In order to reach the conclusion that it was "impossible" for Member States to give precedence to domestic laws over Community law, the Court of Justice based its decision on an analysis of the "spirit and intentions" of the Treaty.

In comparing the Costa case to Van Gend en Loos, it becomes evident that the Court of Justice was confronted with a more complex and challenging task. The principle of supremacy cannot be applied to the conditions of direct effect since the latter could be evaluated in accordance with international law standards, which represents a crucial aspect of the Court of Justice's interpretive role. The principle that "among states contracting parties to a treaty, domestic law cannot prevail over that of the treaty" has been widely acknowledged as a fundamental tenet of international law since its inception.[42] Nevertheless, this principle was applied between the parties, which essentially meant that in the international sphere, Community law took precedence over national law. Meanwhile, the question of whether Community law should be given domestic primacy was being discussed in the context of the *Costa v Enel* case. This implies that national courts are obliged to apply Community norms in instances where there is a conflict between domestic law and Community law.[43]

[39] *Ibid*, pg. 8.
[40] *Ibid.*
[41] *Ibid.*
[42] The Permanent Court of International Justice, Advisory opinion of 31 July 1930; The Greco-Bulgarian "Communities", pg. 3, cited in De Witte, B., "Direct Effect, Primacy and the Nature of the Legal Order", 2011, pg. 329.
[43] De Witte, B., "Direct Effect, Primacy and the Nature of the Legal Order", 2011, pg. 329, in Paul Craig, Gráinne de Búrca, (eds) "The Evolution of EU Law", 2011.

FULL TEXTS BOOK

The Court of Justice has historically adopted a pragmatic approach to the concept of supremacy. As a consequence of the fact that it establishes all Community law norms as superior to all national norms, this viewpoint had the potential to have radical consequences. Nevertheless, its application will be constrained to instances where two norms that pertain to the same issue are manifestly in conflict with one another. Prior to establishing the status of this standard within the domestic legal framework, it is necessary to ascertain whether EEC acts have direct effect. Consequently, a clause cannot be assessed for adherence to national norms until it has been validated by a Member State court, otherwise, it may not be implemented.[44]

The Court of Justice's decision in the *Costa v. Enel* case is of considerable significance for two reasons. Primarily, it establishes the principle of supremacy of Community law over national laws of Member States. Consequently, it may be inferred that other treaty provisions may also have the same effect as Article 12 TEEC. Secondly, the Court of Justice's decision in the Costa case represents a pivotal moment in the history of European integration, establishing the notion of Community law's direct applicability and direct effect over national laws.

1.3 Conclusions

The fundamental principles of EU law are derived from the rulings of the Court of Justice regarding the nature and status of EU law, rather than from the text of the EU Treaties themselves. It is therefore essential to consider the Court's jurisprudence in the context of this article. The Court of Justice has considered the impact of these rulings on the legislative sovereignty of the national parliaments of the Member States. In the Costa case, the Court of Justice reaffirmed the primacy of EC law over national law. Furthermore, the Court of Justice extended this principle to encompass secondary EU legislation.

From the outset of the Costa case, the Court of Justice has established a consistent body of case law indicating that EU law is to be regarded as superior to national laws in each decision. The national institutions of the Member States are now subject to a number of obligations as a consequence of these decisions. National parliaments are prohibited from enacting legislation that is in contravention of EU law, as they are duty-bound to uphold the supremacy of EU law. In accordance with this principle, it is also incumbent upon them to amend any legislation that is in conflict with EU law.

The principles of a constitutional nature announced in the decisions of the Court of Justice have established the supremacy of EU law over national law by limiting the legislative functions of national parliaments. It is incumbent upon national governments to ensure that their legislation is in alignment with the minutest technical detail of the EU legislative framework.

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FULL TEXTS BOOK

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FULL TEXTS BOOK

ANALYSIS OF METH MODEL OF DRUG CRIME OF USER AND FAMILY ROLE WITH LAW ENFORCEMENT AGENCIES IMPACT IN NIGERIA

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ABSTRACT
This paper presents a mathematical model that integrates family dynamics and law enforcement into the analysis of methamphetamine use and related drug crimes. The model explores the system's dynamic behavior, the existence of equilibrium states, and their global stability using advanced mathematical techniques. Specifically, the study examines equilibrium scenarios, distinguishing between drug crime-free and drug crime-persistent states, and calculates the reproduction number to assess potential spread under varying conditions. The results reveal that drug crime-persistent equilibria are asymptotically stable, indicating that the system tends toward these states over time. The study emphasizes the need for government intervention through policies and strategies aimed at controlling and eradicating drug crime in Nigeria, with a particular focus on law enforcement's role in implementing these measures. The findings highlight the importance of a coordinated, multi-faceted approach in combating methamphetamine use, focusing on key areas such as law enforcement, prevention, and recovery efforts to achieve a stable, drug-free state.
Keywords: drug abuse, drug crime, reproduction number, law enforcement agencies, stability

1.0 Introduction

Drug abuse and its associated criminal activities are significant global challenges, including in Nigeria (Farai Nyabadza, 2017). The relationship between criminal networks, political and civil institutions, and drug use has been studied, particularly in Cape Town (Khalil Goga, 2014). These issues have far-reaching negative effects on families, communities, and law enforcement, contributing to various social problems (Shakti M, Ramson, and Rajendra Chetty, 2016). The socio-economic impact of drug abuse extends beyond individual health, affecting broader societal structures (T.O. Orwa and F. Nyabadza, 2019). The study highlights the urgent role of families and friends in supporting drug users and traders (Surapol Naowarat and Nuengruedee Kumat, 2018), with the increasing drug supply linked to the rise in drug users (Nyabadza *et al.*, 2012). (Akpienbi & Iroka, 2024), research focuses on mathematical model of treatment control of substance abuse in Nigeria, highlighting the roles of inpatient and outpatient care. The study finds that the basic reproduction number can predict the stability of substance abuse dynamics, and that effective control methods, along with individual commitment, are crucial for reducing the progression of substance abuse in Nigeria. According to Akpienbi & Iroka (2024) developed a mathematical model to explore narcotic drug-related crimes in Nigeria, showing that consistent law enforcement and comprehensive rehabilitation are crucial, as the issue will decline if the reproduction number is below one but become endemic if it exceeds one, necessitating coordinated multi-sectoral efforts. The proposed study aims to analyze a model for the transmission of crime related to drug abuse, focusing on the roles of family and law enforcement.

2,0 Model formulation

this research work, incorporate family role, law enforcement agency as major control measure into the research work of Akpienbi *et al.* (2021), to eradicate substance abuse in Nigeria. The model was

FULL TEXTS BOOK

developed base on this assumption that; all parameters are positive, all susceptible individuals are born or immigrated, all individuals in the study have an equal chance of becoming drug users at a time, an infected individual are either refer to treatment by family or captured and be prosecuted for drug crime, susceptible individuals become drug users through social contract process only, We assume drug infected individuals recovered, recovered individuals returned to quite or relapse to heavy drug user class

2.1 Model diagram

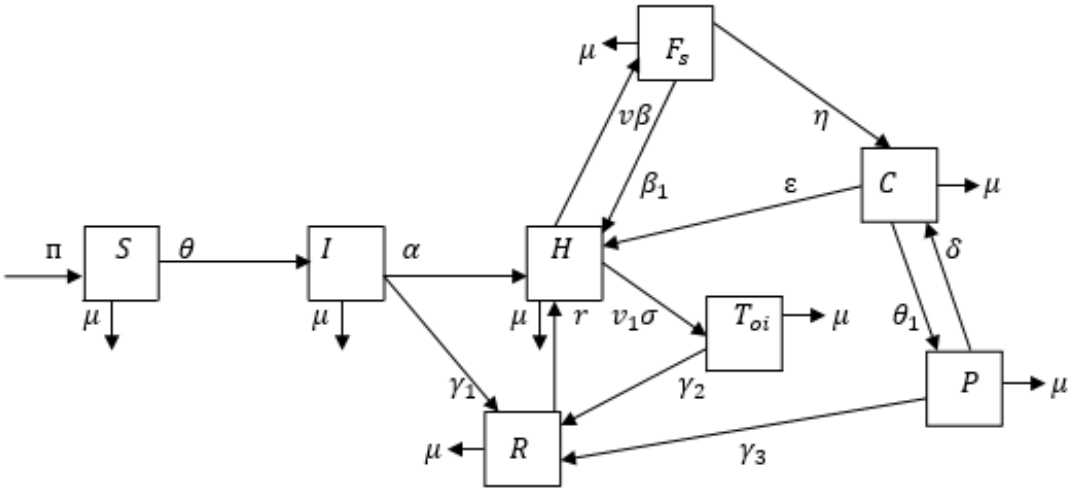


Fig.1. Schematic flow diagram of the drug crime epidemic model.

2.1 Model equation

$$\left.\begin{aligned}
\frac{dS}{dt} &= \Pi - \theta SH - \mu S \\
\frac{dI}{dt} &= \theta SH - \left(\gamma_1 + \propto + \mu\right) I \\
\frac{dH}{dt} &= \propto I + \varepsilon C + rR + \beta_1 F_s - \left(v\sigma_1 + \mu + v\beta\right) H \\
\frac{dT_{oi}}{dt} &= v\sigma_1 H - \left(\gamma_2 + \mu\right) T_{oi} \\
\frac{dF_s}{dt} &= v\beta H - \left(\beta_1 + \mu + \eta\right) F_s \\
\frac{dC}{dt} &= \eta F_s + \delta P - \left(\varepsilon + \mu + \theta_1\right) C \\
\frac{dP}{dt} &= \theta_1 C - \left(\gamma_3 + \delta + \mu\right) P \\
\frac{dR}{dt} &= \gamma_1 I + \gamma_2 T_{oi} + \gamma_3 P - \left(r + \mu\right) R
\end{aligned}\right\}$$

With initial condition $S(0) = S(0) > 0, I(0) = I(0) \geq 0, H(0) = H(0) \geq 0, T_{oi}(0) = T_{oi}(0) \geq 0,$
$F_s(0) = F_s(0) \geq 0, C(0) = C(0) \geq 0, P(0) = P(0) \geq 0, R(0) = R(0) \geq 0$

FULL TEXTS BOOK

Table 1Definition of variable/parameters in drug abuse crime model

Variable/Parameters	Description
S	susceptible individuals at risk of using drug
I	Mild or light drug user
H	heavy drug users
F_s	health care services or treatment center
T_{oi}	security forces unit or law enforcement agency
C	Law court trial for drug abuse crime
P	Correctional center for convicted suspect of drug abuse crime
R	recovered individuals
Π	Constant birth rate and immigration
β	crime suspect rate
μ	Natural Death rate
θ	per capita contact rate of a product of the effective number of contacts c between drug user and the susceptible population and the probability$\hat{\beta}$ that a contact results into initiation into drug use
r	the level of relapse to being a heavy drug user
γ_1	the recovery rate for light drug users
γ_2	the recovery rate for light drug users
γ_3	recovery rate for drug user in the correctional center
σ	uptake rate into treatment programs
α	Rate of charging suspect to law court
ν_1	Family roles in referring of drug abuse individual to treatment
ε	rate of suspect been discharge when not guilty of the crime
η	Recovered rate of outpatient
ν	η is rate of transfer or charging of suspect to law court
β_1	rate at which suspect been release after investigation
δ	transfer rate of suspect held in prison to court for hearing
θ_1	rate which suspect been guilty and sentence to prison as well to be held for further hearing of the court

3.0 Model Analysis

The drug crime analysis with control system establish the mathematical significance and existence of equilibrium points, and their stability. The basic reproduction number R_0 and effective reproduction number are computed using the next-generation matrix method. The value of the basic reproduction numberR_0 is used to determine the impact of family role and law enforcement agency and as well define the conditions for global and local stability of the equilibrium points. The focus of analysis of drug crime is to observed the control measures which aim to reduce the effect of crime related to drug abuse in Nigeria.

FULL TEXTS BOOK

3.0 Basic properties of the model

3.1 Invariant region

Drug abuse has a significant effect in Nigerian and there are need to model it process and proffer solution to it. Regard to this, we assumption state variables and parameters used in the model are positive for $\forall \geq 0$. Now need to analyze the drug abuse crime model so that it is defined in a suitable feasible region $\forall$ which has positive state variables and therefore result to Theorem 3.1; The existing forward solutions in R_+^8 of the drug abuse model system are feasible $\forall \geq 0$ whenever they enter the invariant region namely $\forall$.

$$\forall = \{(S, I, H, T_{oi}, F_s, C, P, R) \in \mathrm{R}_+^{\,8} : 0 \leq N \leq \frac{n}{\mu}\}$$

Where

Since substance abuse has an effect on the human population, there is a need to model its process. In regard to that, the following assumptions are made:

The state variables and parameters used in the model are non-negative for $\forall \geq 0$

- The drug abuse crime model is defined in a suitable feasible region that has positive state variables. The existing forward solutions in R_+^8 of the substance abuse model system are feasible $\forall \geq 0$whenever they enter the invariant region $\forall$.

where $S_0 \geq 0, I_0 \geq 0, H \geq 0, T_{oi0} \geq 0, F_{s0} \geq 0, C_0 \geq 0, P_0 \geq 0,$ and $R_0 \geq 0$

conclusively, the drug abuse crime model is well-defined, and the solutions remain within a non-negative and bounded region over time.

Proof: add up the model equation to obtain total population that satisfies differential equation that is

$$\frac{dN}{dt} \leq nn - \mu N$$

Then applying Lakshikantham *et al.* (1989) theorem by method of integrating factor

$$0 \leq N(t) \leq \frac{\Pi}{\mu} + N(0)e^{-\mu t}$$

.

In particular, if $0 \leq N \leq \frac{\Pi}{\theta}$, then for $t > 0$ if, then either the solution enters $\forall$ in finite time or $N(t)$ approaches to when taking limit as $t \to \infty$,hence the region $\forall$ attract all solutions in R_+^8 Indeed, the stated variable in set $\forall$ remain biological meaningful

3.2 Positivity of the solution

The model variables and parameters used in the drug abuse crime are non-negative $\forall \geq 0$. Assuming the initial values of the drug abuse crime model system (1) to be:

$S(0) > 0, I(0) > 0, H(0) > 0, T_{oi}(0) > 0, F_s(0) > 0, C(0) > 0, P(0) > 0$ and $R(0) > 0.$

Then the model's solution set

$(S(t), I(t), H(t), T_{oi}(t), F_s(t), C(t), P(t), R(t)) : (0, \infty) \to (0, \infty)$ remain positive for all $t > 0$

3.3 Analysis of the equilibrium points

This research section would be considering existence of stationary states, basic reproduction number $R_0$and sstability of the stationary

3.4 Drug Abuse Crime Free Equilibrium (DACFE)

At (**DACFE)**, we set all the model equation equal to zero. Solving the resultant to have equilibrium point E_0

$E_0 = S^*, I, H, T_{oi}, F_s, C, P, R$

FULL TEXTS BOOK

Therefore,

3.2.2 Drug Abuse Crime Persistent Equilibrium (DACPE)

denoted by $E_1 = S^*, I^*, H^*, T_{oi}^*, F_s^*, C^*, P^*, R^*$ **: here we solve the model equation simultaneously to have**

$$S^* = \frac{\Pi}{\theta I^* + \mu}$$

$$I^* = \frac{-\left((\gamma_1 + \alpha + \mu)\mu + \theta n\right) \pm \sqrt{\left((\gamma_1 + \alpha + \mu)\mu + \theta n\right)}}{(\gamma_1 + \alpha + \mu)\theta}$$

$$T_{oi}^* = \frac{v\sigma H^*}{(\gamma_1 + \mu)}$$

$$R^* = \frac{(\gamma_1 + \mu)\gamma_1 I^* + \gamma_2 v\sigma H^* + (\gamma_1 + \mu)\gamma_3 P^*}{(\gamma_1 + \mu)(r + \mu)}$$

$$H^* = \frac{\left(g_3 \propto + (\gamma_1 + \mu)\gamma_1 r\right) I^* + g_3 \varepsilon C^* + (\gamma_1 + \mu)\gamma_3 r P^* + g_3 \beta_1 F_s^*}{\left(g_3(\sigma + v\beta + \mu) - \gamma_2 rv\sigma\right)}$$

$$F_s^* = \frac{\left(g_3 \propto + (\gamma_1 + \mu)\gamma_1 r\right) v\beta I^* + g_3 \varepsilon v\beta C^* + (\gamma_1 + \mu)\gamma_3 rv\beta P^*}{\left((\beta_1 + \eta + \mu)g_4 - g_3\beta_1 v\beta\right)}$$

$$C^* = \frac{\left(g_3 \propto + (\gamma_1 + \mu)\gamma_1 r\right)\eta v\beta I^* + \left((\gamma_1 + \mu)\gamma_{3\eta} rv\beta + g_5\delta\right) P^*}{g_5(\varepsilon + \mu + \theta_1) - g_3\eta\varepsilon v\beta}$$

$$P^* = \frac{\left(g_3 \propto + (\gamma_1 + \mu)\gamma_1 r\right)\eta v\beta\theta_1 I^*}{g_6(\gamma_3 + \delta + \mu) - \left((\gamma_1 + \mu)\gamma_{3\eta} rv\beta\theta_1 + g_5\delta\theta_1\right)}$$

3.5 Basic reproduction number R_0 for drug abuse crime model

Using next generation matrix method by Van den Driessche and Watmoungh (2002)., we can generate an effective reproduction number that takes into account the effect of control measures in the model. The basic reproduction number, denoted as R_0represents the number of secondary drug abuse crime cases that are produced by one drug user over the entire period of their drug use in a population defined solely by susceptible individuals.

The criteria for this dimensionless parameter R_0 are as follows:

If $R_0 > 1$, then a single drug user in a population defined by only susceptible individuals may influence less than one individual to start using drugs. This implies that the drug abuse problem may be eradicated from the population, and the drug-free stationary point is asymptotically stable, meaning that the drug abuse cannot persist in the society.

When $R_0 < 1$n, it indicates that one drug user in a population defined by only susceptible individuals may influence more than one individual to start using drugs. This means that the drug abuse problem may continue to persist in the society. In this situation, the drug-free equilibrium point is unstable, and it is clear that the drug abuse problem can attack the society and remain for a long time.

If $R_0 = 1$, it suggests that one drug user in an entirely susceptible population may influence drug use to one new individual. Hence, the drug abuse problem will be alive in the country without a serious epidemic.

FULL TEXTS BOOK

The basic reproduction number R_0 is also known as the spectral radius, which is a critical epidemiological parameter in the drug abuse model.

$$R_0 = \frac{\Pi\theta\alpha}{\mu(\gamma_1+\alpha+\mu)(v_1\sigma+\mu+v\beta)}$$

When early identification and referrer family control and law enforcement methods are used, the number of secondary cases of drug abuse crime will decline. The reduction in the number of drug abuse crime will subsequently decrease the number of adequate contacts between the drug abuse crime population and the susceptible population.

The effective reproduction number represents the number of new drug abuse crime cases that are produced by one drug user during their entire infectious period, when the early identification and referrer family control and law enforcement agency are in place.

This effective reproduction number can be used to assess the impact of the control strategies on the dynamics of the drug abuse crime problem. If the effective reproduction number is less than 1, it suggests that the control measures are effective in limiting the spread of drug abuse in the population. Conversely, if the effective reproduction number is greater than 1, it indicates that the drug abuse crime problem may still persist despite the implementation of the control measures.

Analyzing the effective reproduction number, researchers and policymakers can evaluate the efficacy of the early identification and referrer family control and law enforcement methods in containing and potentially eradicating the drug abuse crime issue within the population.

$$R_a = \frac{\Pi\theta\alpha}{\mu(\gamma_1+\alpha+\mu)(\mu)}$$

When $v_1\sigma + v\beta \neq 0$ it reduces the value of the number of secondary cases produced as it can be seen in the expression R_0 it can be seen that the increase of the control efforts will reduce the value of the expression in R_0 which the number of secondary cases of drug users produced by a drug user in the entire period of drug abuse, but when $v_1\sigma + v\beta = 0$ the value of the number of secondary cases produced t can be seen in the expression R_a it can be seen that none control efforts was apply and there are increase the value of the expression in R_a which the number of secondary cases of drug users produced by a drug user in the entire period of drug abuse,. Therefore, R_0 become the basic reproduction number

3.6 Sensitivity analysis

We conduct sensitivity analysis of the given parameters on meth-related drug crime by evaluation of how each parameter affects the reproduction number R_0, which serves as an indicator of the potential spread of drug-related activities within Nigeria. The sensitivity of each parameter will be assessed using a normalized sensitivity index, which provides insight into which parameters have the greatest influence on R_0 as used in (Ogofotha *et al.* 2023; Ogwumu & Ataribu 2022 and Ogwumu *et al. 2023*)

$$\theta_{index} = \frac{\partial R_0}{\partial\theta}\cdot\frac{\theta}{R_0} = \frac{\Pi\alpha}{\mu(\alpha+\gamma_1+\mu)(v\beta+v_1\sigma+\mu)}$$

$$\Pi_{index} = \frac{\partial R_0}{\partial\Pi}\cdot\frac{\Pi}{R_0} = \frac{\theta\alpha}{\mu(\alpha+\gamma_1+\mu)(v\beta+v_1\sigma+\mu)}$$

$$\alpha_{index} = \frac{\partial R_0}{\partial\alpha}\cdot\frac{\alpha}{R_0} = -\frac{\Pi\alpha}{\mu(\alpha+\gamma_1+\mu)^2(v\beta+v_1\sigma+\mu)}$$

$$\beta_{index} = \frac{\partial R_0}{\partial\beta}\cdot\frac{\beta}{R_0} = -\frac{\Pi\theta\alpha v}{\mu(\alpha+\gamma_1+\mu)(v\beta+v_1\sigma+\mu)^2}$$

FULL TEXTS BOOK

$$\sigma_{index} = \frac{\partial R_0}{\partial \sigma} \cdot \frac{\sigma}{R_0} = -\frac{\Pi \theta v_1 \alpha}{\mu(\alpha+\gamma_1+\mu)(v\beta+v_1\sigma+\mu)^2}$$

$$v_{index} = \frac{\partial R_0}{\partial v} \cdot \frac{v}{R_0} = -\frac{\Pi \alpha \theta \beta}{\mu(\alpha+\gamma_1+\mu)(v\beta+v_1\sigma+\mu)^2}$$

$$\mu_{index} = \frac{\partial R_0}{\partial \mu} \cdot \frac{\mu}{R_0} = -\frac{\Pi \alpha \theta}{\mu(\alpha+\gamma_1+\mu)(v\beta+v_1\sigma+\mu)^2}$$

$$\gamma_{1index} = \frac{\partial R_0}{\partial \gamma_1} \cdot \frac{\gamma_1}{R_0} = -\frac{\Pi \alpha \theta}{\mu(\alpha+\gamma_1+\mu)^2(v\beta+v_1\sigma+\mu)}$$

$$v_{1index} = \frac{\partial R_0}{\partial v_1} \cdot \frac{v_1}{R_0} = \frac{\Pi \alpha \sigma \theta}{\mu(\alpha+\gamma_1+\mu)(v\beta+v_1\sigma+\mu)^2}$$

Sensitivity Impact of the drug abuse crime are rank and discus according to the most impactful to least impact. Law Enforcement Agencies Intervention Capture Rate parameters, indicate to be more sensitive significantly reduce the spread of meth-related crime. Effective law enforcement can directly reduce R_0 by capturing and deterring drug users and suppliers which is the strong impact due to high capture rates, indicating the critical role of law enforcement in controlling drug-related activities. The recruitment into drug user significantly increases R_0 parameter reflects the rate at which new users are introduced to meth, often influenced by factors like peer pressure, availability, and social environments and has a substantial contributor to the spread of drug use, emphasizing the need for preventive measures targeting at-risk populations. Crime Suspect Rate which represents the likelihood of users being suspected of or caught in drug-related activities, which can affect their future behavior and the public perception of drug use and influences the dynamics of the user population, affecting both deterrence and public health responses. Meth Drug Abuse Infection Rate Due to Interaction likewise represents the baseline transmission potential of drug abuse due to interactions between susceptible individuals and heavy users and this rate serves as a baseline multiplier for the spread of drug use, crucial for understanding how interactions contribute to the epidemic. Recovery Rate as a higher recovery rates decrease $R_0$by reducing the number of active users and reflects the success of treatment programs and natural recovery processes. Important for achieving a reduction in active users, highlighting the effectiveness of recovery programs. Effective Family Referrer Role intervention plays a significant role in preventing drug use and supporting recovery and strong family networks can deter initial drug use and aid recovery and has a moderate impact, emphasizing the importance of social and family support systems in addressing drug issues. Relative Infectivity of Heavy Drug User Rate are more likely to spread drug use compared to casual users and the parameter underscores the heightened risk associated with heavy users influencing new cases with less impactful than the top parameters but still significant, particularly in understanding the role of heavy users in the drug use chain. Uptake Rate into Treatment Program is the rate at which users access treatment which increased treatment uptake can lead to lower $R_0$by reducing the number of active users and lower impact due to the relatively low rate, but critical for long-term reduction in drug use prevalence. Natural Death Rate is least impactful parameter on R_0 while it does remove individuals from the population, it has minimal effect compared to other factors and very low impact, indicating that natural death is not a significant factor in controlling the drug epidemic

FULL TEXTS BOOK

3.7 Global stability of the drug crime persistent equilibrium steady state

In this section, we prove the global asymptotic stability of E_1 by using Lyapunov's direct method. The ideal of Akpienbi *et al (2021)* were employed in constructing a common quadratic Lyapunov function of the model equations

Theorem If $R_0 > 1$, the equilibrium point E_1 of model Equations is globally asymptotically stable for $R_0 \le 1$ and unstable if $R_0 > 1$ in the interior of region Ω.

Proof. Let define $L:\{(S,I,H,T_{oi},F_s,C,P)\in\Omega : S,I,H,T_{oi},F_s,C,P>0\}\to R$

Then, we construct common quadratic Lyapunov function of the model equation and obtain

$$L(S,I,H,T_{oi},F_s,C,P)=\frac{1}{2}\left[\begin{array}{l}(S-S^*)+(I-I^*)+(H-H^*)+(T_{oi}-T_{oi}^*)+(F_s-F_s^*)+(C-C^*)\\+(P-P^*)\end{array}\right]^2 \quad (1.7)$$

L is D_1 in the interior of Ω, where E_1 denotes the global minimum of L on Ω hand $L(S^*,I^*,H^*,T_{oi}^*,F_s^*,C^*,P^*)=0$

Now, we differentiate L along the solution of the model system equations (0.1)-(0.8), we obtain

$$\frac{dL}{dt}=\left[(S-S^*)+(I-I^*)+(H-H^*)+(T_{oi}-T_{oi}^*)+(F_s-F_s^*)+(C-C^*)+(P-P^*)\right]\frac{d}{dt}$$
$$(S+I+H+T_{oi}+F_s+C+P) \quad (1.8)$$

Where

$$\frac{d}{dt}(S+I+H+T_{oi}+F_s+C+P)=n-\mu(S+I+H+T_{oi}+F_s+C+P)-\gamma_1 I-\gamma_2 T_{oi}-\gamma_3 P$$

Then, equations (0.1)-(0.8) becomes

$$\frac{dL}{dt}=\left[(S-S^*)+(I-I^*)+(H-H^*)+(T_{oi}-T_{oi}^*)+(F_s-F_s^*)+(C-C^*)+(P-P^*)\right]\times n$$
$$-\mu(S+I+H+T_{oi}+F_s+C+P)-\gamma_1 I-\gamma_2 T_{oi}-\gamma_3 P \quad (1.9)$$

At the equilibrium poin, E_1 π in equation (1.9) becomes

$$n=\mu(S^*+I^*+H^*+T_{oi}^*+F_s^*+C^*+P^*)+\gamma_1 I^*+\gamma_2 T_{oi}^*+\gamma_3 P^*$$

Therefore, equations (1.9) can be rewritten as

$$\frac{dL}{dt}=\left[(S-S^*)+(I-I^*)+(H-H^*)+(T_{oi}-T_{oi}^*)+(F_s-F_s^*)+(C-C^*)+(P-P^*)\right]$$
$$\times\left(\begin{array}{l}\mu(S^*+I^*+H^*+T_{oi}^*+F_s^*+C^*+P^*)-\mu(S+I+H+T_{oi}+F_s+C+P)+\gamma_1 I^*+\gamma_2 T_{oi}^*+\gamma_3 P^*\\+\gamma_1 I+\gamma_2 T_{oi}+\gamma_3 P\end{array}\right) \quad (2.0)$$

From equations (2.0) we have

$$\frac{dL}{dt}=\left[(S-S^*)+(I-I^*)+(H-H^*)+(T_{oi}-T_{oi}^*)+(F_s-F_s^*)+(C-C^*)+(P-P^*)\right]\times$$
$$\left(\begin{array}{l}\mu\left[(S-S^*)+(I-I^*)+(H-H^*)+(T_{oi}-T_{oi}^*)+(F_s-F_s^*)+(C-C^*)+(P-P^*)\right]-\\\gamma_1(I-I^*)-\gamma_2(T_{oi}-T_{oi}^*)-\gamma_3(P-P^*)\end{array}\right) \quad (2.1)$$

FULL TEXTS BOOK

Let

$$M_1=\left(S-S^*\right), M_2=\left(I-I^*\right), M_3=\left(H-H^*\right), M_4=\left(T_{oi}-T_{oi}^*\right), M_5=\left(F_s-F_s^*\right), M_6=\left(C-C^*\right),$$

$$M_7=\left(P-P^*\right), M_8=M_1+M_2+M_3+M_4+M_5+M_6+M_7$$

Thus, equation (2.1) becomes

$$\frac{dL}{dt}=M_8\left[-\mu M_8-\gamma_1 M_2-\gamma_2 M_4-\gamma_3 M_7\right]$$

It can also be rewritten as

$$\frac{dL}{dt}=-\left[\mu M_8^{\,2}+\gamma_1 M_2 M_8+\gamma_2 M_4 M_8+\gamma_3 M_7 M_8\right]$$

Therefore,

$$\frac{dL}{dt}=-\left[\mu M_8^{\,2}+\gamma_1 M_2 M_8+\gamma_2 M_4 M_8+\gamma_3 M_7 M_8\right]\le 0$$

Also, $\frac{dL}{dt}=0$ if $S=S^*, I=I^*, H=H^*, T_{oi}=T_{oi}^*, F_s=F_s^*, C=C^*$ and $P=P^*$ in equation (2.1).

So, the largest compact invariant set in $\left(S,I,H,T_{oi},F_s,C,P\right)\dot{o}\square : \frac{dL}{dt}=0$ is singleton E_1, where E_1 is the endemic equilibrium point. By Lassalle's invariance principle E_1 is globally asymptotically stable in the interior of $\forall$.

Conclusion

The study provides significant insights into the dynamics of methamphetamine use and associated drug-related crimes through a comprehensive mathematical model. The analysis of equilibrium states and the calculation of the reproduction number offer a deeper understanding of how these issues can persist or be eradicated within a population. The stability of both drug crime-free and drug crime-persistent equilibria underscores the potential for these states to be maintained under specific conditions.

The findings suggest that effective control and eradication of drug crimes require a multifaceted approach, including robust law enforcement, prevention strategies, and recovery support systems. The study advocates for targeted governmental policies and strategies, highlighting the critical role of law enforcement agencies in executing these measures. By prioritizing these key areas, there is a strong potential to significantly reduce the prevalence of methamphetamine use and move towards a stable, drug-free society. This research serves as a crucial foundation for policymakers and stakeholders in formulating effective interventions to combat methamphetamine use and its associated challenges

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FULL TEXTS BOOK

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FULL TEXTS BOOK

ARCHITECTURAL PSYCHOLOGY AND INTERIOR DESIGN: A CHALLENGING INTERSECTION

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ABSTRACT
Architectural psychology used to be an emerging research and applied area in 1970s. But for unclear reasons, its popularity faded. Nowadays architects (especially interior architects) and psychologists rarely work together which is strange and tragic. Architectural psychology as a subfield of environmental psychology and as a bridge connecting psychology with design has yet a lot to contribute to the human understanding of built-in spaces. The references to this research field are rare, obsolete, and mostly unexpected. But we as a psychologist and an interior architect propose that architectural psychology can be the future's rising star as long as people prefer to live in psychologically relaxing spaces. Interior architectural designs allow residents and users of the buildings in general to perceive the environment in a certain way which has implications for human psyche. This paper poses an intellectual challenge to melt psychology and architectural design in the same theoretical pot.
Keywords: Architecture, psychology, and architectural psychology.

1 Brief History of Architectural Psychology

Janetius (2016) states that
"Architectural psychology is an important multidisciplinary field, bridging traditional psychology, engineering, architecture, domestic planning, and much more to assist people to design buildings and living spaces for better occupation. By understanding more about how people experience the built form, one can further take a more occupant-centred approach towards designing and engineering, which will lead to more truly innovative architectural designs" (p.67). According to Joye (2007), "One of the central issues of environmental psychology is how different types of settings can trigger different affective states in individuals (e.g., liking or preference reactions)" (p.306).
A precursor to architectural psychology is feng shui which is not scientifically proven (Bonaiuto et al., 2010). Bonaiuto et al. (2010) synthesizes feng shui principles and concludes with a taxonomy including colors: Green for hospitals, red for political centers, yellow for balconies, white/gray for commercial centers, black for any building.
According to Pol (2007), architectural psychology is the third stage in history of environmental psychology after the first environmental psychology and the American transition. It is an historical school which is no longer active, with its heydays from late 1950s to late 1980s. In those times, the terms environmental psychology and architectural psychology were mostly used synonymously, largely focusing on the psychological influences of the built-in spaces and ignoring other environmental issues (Petrović et al., 2015; Pol, 2007). One of the incipient topics were "spatial behaviour in psychiatric centres and hospitals" (Pol, 2007, p.3). Reuber (1996), in this context, investigates the evolution of asylum architecture in Ireland and delineates how the panopticon model evolved into the curative model. According to Philip (1996), when we reflect on psychology and architecture, we need to specify what kind of a psychology we are talking about: It can be behavioristic, cognitive, humanistic and so on. The first works on architectural psychology focused person-environment relationship and went to the

FULL TEXTS BOOK

extremes of architectural determinism sometimes and somehow (Philip, 1996). Later on behavioristic experiments were conducted excluding the by-then unpopular psychoanalytic approach (Philip, 1996). In those studies, environment was reconceptualized as a giant Skinner Box and manipulation was at the center stage of the research studies (Philip, 1996). In the next stage of architectural psychology, the key activity moved from prediction to understanding through the psychological turn towards humanism (Philip, 1996). From behavioristic perspective, this turn is not scientific at all, at is based on phenomenology and mostly qualitative. Moreover, humanist perspective considers person and the environment as a whole rather than separating them (Philip, 1996). A number of theoretical problems were identified at this point:

1. Overemphasizing the influence of physical environment at the expense of other influences such as personality and group influence,
2. Assuming the directness of the influences of the physical environments, ignoring ascribed meanings,
3. A passive modelling of individuals without goals, will or choice,
4. Assuming that the influence of the physical environment will not change and people will not do modifications to change the physical environment (Franck, 1984).

According to Philip (1996), the era of architectural psychology ended, because psychologists could not deliver what they hoped to deliver for architects. As a result, psychology became irrelevant for architects just as the time preceding the rise of architectural psychology. We think that this is partially correct. Although references to architectural psychology is rare after 1980s, architecture-relevant psychology research has moved towards specific topics such as spatial cognition (cf. Montello, 2004; Proulx et al., 2016; Soria, & Roth, 2018), residential identity (cf. Dandolova, 2017; Fleury-Bahi et al., 2008; Pahlavan et al., 2021), residential satisfaction (cf. Azizibabani et al., 2021; Fernández-Portero et al., 2017; Zohreh, & Rezaei, 2020) etc. Furthermore, a number of articles still revolve on the intersection of psychology and architecture (e.g. Barros et al., 2019; Berto, 2007; Chang et al., 2008; Coburn et al., 2020; Dreyer et al., 2018; Graham et al., 2015; Hadavi et al., 2015; Hartig et al., 1997; Herzog & Gale, 1996; Hill, & Daniel, 2007; Hur et al., 2010; Ikemi, 2005; Ivarsson, & Hagerhall, 2008; Kearnet, 2006; Larkin et al., 2021; Lindal & Hartig, 2013; Liu et al., 2020; Masoudinejad, & Hartig, 2020; Mouratidis, & Hassan, 2020; Nasar, 1994; 2016; Peschardt, & Stigsdotter, 2013; Staats et al.; Stoneham, & Smith, 2015; Subiza-Pérez et al., 2021; Twedt et al., 2016; Van den Berg et al., 2016; Weinberger et al., 2021; White, & Gatersleben, 2011; White et al., 2010).

Environmental psychology, the successor to architectural psychology covers topics such as "psychological effects of urban policies; place attachment and place identity; perceptions of city image and urban design; pro-environmental behavior, transportation choices, urban navigation and commuting issues; urban noise, recycling behavior, energy-related behaviors, green identities; and perceptions, attitudes and information on green issues such climate change, global warming, sustainability, conservation, biodiversity, and mitigation measures" (Gezgin, 2011, p.56).

The relationship between psychology and architecture has been elaborated in various settings including health care (Bonnes et al., 2009), justice and police architecture (Headley et al., 2021). Bonnes et al. (2009) concludes that humanization of the architectural design leads to better psychological outcomes, whereas in Headley et al. (2021), ethnic differences were observed in the way justice and police building designs perceived. Headley et al. (2021) compared the perceptions of hostile police stations characterized by "buildings kept behind large walls or barriers and lacking transparent windows" (p.3), with welcoming police stations which refer to "visible entryways, green and orderly surroundings, plentiful transparent windows"(p.3). While White respondents were affected by design variations, it was not the case for ethnic minorities (Headley et al., 2021).

FULL TEXTS BOOK

Historically speaking, that aesthetic experience in built environments is reduced to stimulus-response and to individual tastes and preferences had been criticized (Hubbard, 1996). This has been replaced by a more social approach (Hubbard, 1996). This brings social psychology and sociology to the fore. Architectural preferences are not immune to class positions in capitalist societies (Hubbard, 1996). However, these explanations do not exclude each other. On the other hand, gestalt psychology is one of the avenues for architectural psychology (Popow, 2000; Zhu et al., 2018). Moreover, Rodemann (2009) asks "Does architecture express personality? Does architectural pattern design have the ability to affect behaviour or physiological outcomes?" (p.102). These questions are obviously relevant for architectural psychology.

2 Guidelines in Architectural Psychology

People are inclined to prefer natural landscapes over built-in environments (Coburn et al., 2019; Joye, 2007). One of the examples mentioned by Joye (2007) is a train station project which resembles tree. He also reminds us that the interior of Gaudí's Sagrada Familia showcases branch and flower-like patterns (Joye, 2007). Ulrich (1984) compared the effects of facing a brick wall and a tree group in a hospital on various health variables, and found the restorative functions of tree-view rooms. Likewise, natural paintings are found to decrease stress (Wise and Rosenberg, 1986).

One point to consider in the intersection of psychology and architecture is the user groups. These can be "children, elderly, handicapped, infirm, different socioeconomic groups, groups with different ways of life" (Mahmoud, 2017, p.2). Another is place settings which covers "regions, cities and towns, urban areas, residential areas, complexes of buildings, buildings of various types, parts of the buildings, rooms, furniture, equipment and objects" (Mahmoud, 2017, p.2). The third point is behavioral phenomena concepts which are "anthropometrics, proxemics, personal space, territoriality, privacy, perception, cognition, meaning" etc.

It is not surprising to see that experts' and lay people's architectural preferences are discrepancy (Hubbard, 1996; Joye, 2007). However, considering the fact that often lay people will be occupants of the new projects, the latter should be given priority over the former. Furthermore, those who pay for the design are not necessarily the users. For instance, the company pays for the factory that the workers would occupy or the board of the school pays for the school that the students would occupy (Namazian & Mehdipour, 2013). This complicates the relationship between psychology and architecture even more. It requires participatory planning which is an emerging approach in urban planning (see Abdalla et al., 2016). In a study which compares architects' and accountants' views, Groat (1982) observes significant differences in design thinking. Thus, it is a matter of architectural Jacobenism to decide whether to follow the masses or elites. It may be the case that a particular building can be a feat of architectural success, but does not mean anything to lay people.

McAndrew (2020) proposes that places carry emotions with them. E.g. abandoned houses and places associated with death evoke creepiness in us. As a default value, people prefer places where they feel safe and they have a view of outside. This is the prospect-refuge theory where 'prospect' involves observation and 'refuge' refers to feeling safe without being watched (Dosen, & Ostwald, 2013). This is called as 'womb with a view' (Hester, 1979). This may have implications for phallic architecture (see Gezgin, 2014). Children, McAndrew (2020) adds, like to play in hidden places and boxes. This is also visible in cats, dogs and birds if not other species. Furthermore, people prefer the corners at restaurants to be backed by the walls (McAndrew, 2020). People, evolutionarily prefer to be in places where they can see but not seen, eat but not eaten, Greenbie (1982) concludes. Thus, buildings with neither prospect nor secure are felt to be creepy (McAndrew, 2020).

Another concept relevant for psychology and architecture is legibility. It refers to "the ease with which a place can be recognized, organized into a pattern and recalled—in other words, a place that we can wander around in without getting lost" (McAndrew, 2020, p.49). It is directly relevant for finding our

FULL TEXTS BOOK

way in a building (Weisman, 1981). A degree of illegibility brings mystery which may be positive (McAndrew, 2020), but a high degree of illegibility brings creepiness. These are good places for horror houses in thematic parks. In uncertain environments, people prefer not to be alone and isolated, as this increases threat perception (McAndrew, 2020). This is key to many horror movies.

In his discussion of the schools of future in the architectural sense, Walden (2015) criticizes the fact that five senses are usually considered in architectural psychology, but other senses such as "the sense of equilibrium (vestibular sense), of one's own movement (kinesthetic sense), and the various receptors for the sensation of our own bodily functions (somatovisceral senses)" are ignored (p.91).

One consideration in psychology and architecture is to ensure different forms of privacy and publicity through built-in structures (Namazian & Mehdipour, 2013). Some settings require privacy while others need publicity.

The open plan office concept is a matter of dispute (cf. Bernstein & Waber, 2019). In an early study, Sundstrom et al. (1980) find that architectural privacy is correlated with job satisfaction. People dislike noise and distraction.

3 Conclusion

In this article we aimed to delineate a brief history for architectural psychology and moved towards a set of guidelines. We propose that the days of architectural psychology is not over, but we need more systematic research to combine various studies in the intersection of architecture and psychology. Albeit that the term 'architectural psychology' is rarely used nowadays, its significance looms larger with a plethora of intersectional research. Thus, we need new architectural psychology books to systematize field and combine isolated research studies.

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FULL TEXTS BOOK

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FULL TEXTS BOOK

PUBLIC INVESTMENTS IN THE GREEN ECONOMY: BENEFITS AND CHALLENGES

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ABSTRACT
Public investments in the green economy play a pivotal role in shaping sustainable development by aligning economic growth with environmental stewardship and social equity. This essay examines their significance amidst global imperatives and ecological urgencies, emphasizing their role in job creation, economic resilience, and environmental mitigation. Drawing on examples from Germany, China, and Costa Rica, it highlights how strategic investments can yield substantial dividends, yet also explores challenges such as financial constraints, policy barriers, technological hurdles, market dynamics, and societal resistance. Innovative financing mechanisms, robust policy frameworks, technological advancements, infrastructure development, and public awareness campaigns are proposed as essential strategies to overcome these challenges. By navigating these complexities, stakeholders can harness the transformative potential of public investments in the green economy to foster sustainable growth and address pressing environmental challenges worldwide.
Keywords: Green economy; Public investments; Sustainable development; Environmental stewardship; Social equity; Job creation; Policy frameworks; Technological innovation

INTRODUCTION

In the contemporary economic landscape, public investments wield unparalleled influence, serving as linchpins for national development agendas. Embracing a multifaceted approach, these investments, underwritten by governmental coffers and driven by taxpayer support, traverse critical domains—from foundational infrastructure and educational advancements to healthcare innovations, research and development, and pivotal environmental stewardship initiatives. At the heart of their efficacy lies the strategic allocation of resources, poised not merely to spur economic dynamism and heighten productivity but also to significantly elevate societal well-being.

Central to this discourse are the Sustainable Development Goals (SDGs), a visionary mandate ushered in by the United Nations in 2015. These goals, an ambitious blueprint for global transformation by 2030, mandate the eradication of poverty, the safeguarding of planetary resources, and the equitable advancement of human prosperity. Within this framework, public investments emerge as indispensable catalysts, pivotal in engendering the infrastructural backbone and systemic resilience requisite for sustainable progress.

Foregrounding this paradigmatic shift is the ascendant concept of the green economy—a transformative ethos recalibrating economic growth trajectories towards environmental sustainability and social equity. Delving into how these investments not only galvanize economic vigor but also champion environmental integrity and societal inclusivity, it critically evaluates the impediments that temper their transformative potential.

In the pursuit of sustainable development, public investments in the green economy play a pivotal role, aligning economic prosperity with environmental stewardship and societal equity. Through strategic deployment of resources, these investments not only foster innovation and job creation in burgeoning sectors like renewable energy and sustainable agriculture but also mitigate climate change impacts and enhance community resilience. Yet, amid these promises lie significant challenges—financial constraints, policy ambiguities, technological barriers, and societal resistance—that demand innovative solutions and concerted efforts.

FULL TEXTS BOOK

Thus, against the backdrop of burgeoning global imperatives and emergent ecological urgencies, the discourse on public investments in the green economy assumes profound relevance—a testament to the imperatives of stewardship and resilience in shaping a sustainable future.

RESEARCH AND FINDINGS

Benefits of Public Investments in the Green Economy

The green economy is defined by the United Nations Environment Program (UNEP) as an economy that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities (UNEP, 2011).

According to various authors and sources, the benefits of public investments in the green economy can be illustrated as follows:

1.Economic growth and the creation of jobs. Public investments in the green economy have the potential to stimulate job creation and foster economic expansion through the development of new markets and sectors. Emerging sectors such as sustainable agriculture, energy efficiency, and renewable energy show considerable growth prospects. For instance, the International Renewable Energy Agency (IRENA) reported that the global renewable energy sector employed approximately 11 million people in 2018 (IRENA, 2019, p. 8).

Investments in green technologies further promise to generate high-quality employment opportunities. The U.S. Department of Energy forecasts that the clean energy sector could potentially support up to 1.5 million jobs by 2030 (U.S. Department of Energy, 2020, p. 12).

2.Environmental Sustainability. Green investments offer substantial environmental advantages, notably through the mitigation of greenhouse gas emissions and conservation of natural resources. Renewable energy sources like wind, solar, and hydroelectric power generate minimal to zero emissions, thus contributing significantly to climate change mitigation. The Global Commission on the Economy and Climate highlights that transitioning to a low-carbon economy could yield economic benefits exceeding $26 trillion by 2030, compared to projections under conventional economic practices (Global Commission on the Economy and Climate, 2018, p. 5)

3.Social Equity and Inclusivity. The green economy may foster social equity by facilitating equal opportunities and mitigating disparities. Public investments in green infrastructure, such as public transportation and energy-efficient housing, have the potential to enhance access to vital services and improve the living standards of marginalized communities. Furthermore, initiatives focusing on the development of green skills and training programs can aid in transitioning workers from declining industries to burgeoning green sectors (ILO, 2011, p. 22).

Several illustrative cases underscore the potential for countries to achieve economic, environmental, and social advantages through investments in the green economy, thereby fostering sustainable development at a global level. The following examples highlight countries that have realized substantial benefits from such investments:

- Germany. Germany has been a leader in promoting renewable energy and green technologies through its Energiewende (energy transition) policy. This initiative has not only reduced greenhouse gas emissions but has also spurred innovation and created numerous jobs in the renewable energy sector. According to studies by the German Federal Ministry for Economic Affairs and Energy, investments in renewable energy have significantly contributed to economic growth and energy security (German Federal Ministry for Economic Affairs and Energy, 2020, p. 10).
- Denmark. Denmark's commitment to wind energy has made it a global leader in this sector. The country's investments in wind farms and related technologies have not only bolstered its energy independence but have also positioned it as an exporter of wind energy expertise. Reports from the Danish Energy Agency underscore the economic benefits and technological advancements resulting from these investments (Danish Energy Agency, 2021, p. 15).

FULL TEXTS BOOK

- China. China has invested heavily in renewable energy infrastructure, including solar and wind power. These investments have not only reduced China's reliance on fossil fuels but have also positioned it as a key player in the global renewable energy market. According to the National Energy Administration of China, investments in renewable energy have contributed to economic growth while addressing environmental challenges (National Energy Administration of China, 2020, p. 8).
- Costa Rica. Costa Rica has made significant strides in promoting environmental sustainability through its investments in renewable energy and biodiversity conservation. The country's efforts to achieve nearly 100% renewable electricity generation have not only reduced carbon emissions but have also boosted ecotourism and enhanced environmental stewardship. Reports from the Costa Rican Ministry of Environment and Energy highlight the socio-economic benefits and ecological gains from these initiatives (Costa Rican Ministry of Environment and Energy, 2019, p. 12).

Challenges of Public Investments in the Green Economy

Embarking on the transition to a green economy entails navigating a complex landscape of challenges that span financial constraints, policy and regulatory barriers, technological and infrastructure hurdles, market dynamics, and social-cultural resistance. The following sections delve into a detailed examination of the challenges associated with public investment in the green economy:

1.Financial Constraints. Public investments in the green economy face significant financial challenges due to the substantial upfront costs involved. Transitioning to a green economy necessitates considerable expenditures for developing new infrastructure, funding research and development initiatives, and providing subsidies for green technologies. According to the International Energy Agency (IEA), achieving the objectives outlined in the Paris Agreement requires an annual investment of $2.3 trillion in clean energy technologies by 2035 (IEA, 2019, p. 10).

2.Policy and Regulatory Barriers. Effective public investment in the green economy hinges on the establishment of supportive policy frameworks and regulatory environments. Inconsistent or inadequately designed policies can impede the growth of green sectors. For instance, the absence of standardized regulations for carbon pricing can distort markets and diminish the efficacy of investments in green technologies (World Bank, 2019, p. 15).

3.Technological and Infrastructure Challenges. The transition towards a green economy necessitates substantial advancements in technology and infrastructure. The development and deployment of new green technologies are resource-intensive and time-consuming endeavors. Additionally, there is often a need to retrofit or replace existing infrastructure, which poses significant costs and disruptions (IEA, 2017, p. 25).

4.Market Dynamics and Competitiveness. The green economy contends with entrenched industries that benefit from economies of scale and established market positions. Notably, fossil fuel industries historically received substantial subsidies, presenting challenges for renewable energy sources to compete on an equitable basis. According to research by the International Monetary Fund (IMF), global subsidies for fossil fuels amounted to $5.2 trillion in 2017, constituting 6.5% of global GDP (IMF, 2019, p. 3).

5.Social and Cultural Resistance. Transitioning to a green economy encounters resistance rooted in social and cultural factors. Changes in consumption patterns, adjustments in lifestyles, and shifts in employment sectors may provoke opposition from diverse stakeholders. Effective public awareness campaigns and educational initiatives are indispensable in garnering support for green initiatives and dispelling misconceptions about the viability and benefits of the green economy (OECD, 2018, p. 18).

The following case studies highlight exemplary initiatives in the realm of green investments, showcasing diverse national strategies aimed at advancing renewable energy adoption, enhancing environmental sustainability, and addressing associated challenges:

FULL TEXTS BOOK

- Germany's Energiewende. This initiative has yielded a substantial increase in the share of renewables in electricity generation, rising from 6.3% in 2000 to over 40% by 2019 (BMWi, 2020, p. 4). However, the transition has encountered challenges such as escalating electricity costs and concerns over grid stability (Agora Energiewende, 2020, p. 7).
- China's Green Investment Initiatives. China has emerged as a global frontrunner in green investments, particularly in renewable energy and electric vehicles. In 2018 alone, China accounted for nearly 45% of the world's total investment in renewable energy, amounting to $126.6 billion (REN21, 2019, p. 29). These initiatives have not only propelled significant economic growth but also contributed to mitigating air pollution. Nevertheless, China faces ongoing challenges including the imperative to harmonize economic development with environmental preservation and address regional disparities in green investment (World Resources Institute, 2019, p. 11).
- The European Green Deal. The European Green Deal represents an ambitious strategy aimed at positioning Europe as the world's first climate-neutral continent by 2050. Encompassing a broad spectrum of initiatives such as the Circular Economy Action Plan, Biodiversity Strategy, and Farm to Fork Strategy, this initiative aims to mobilize a minimum of €1 trillion in sustainable investments over the coming decade (European Commission, 2019, p. 3). While the plan holds promise for delivering substantial economic and environmental dividends, it confronts challenges related to securing adequate financing, coordinating policy measures across member states, and engaging diverse stakeholders in the transition (European Environment Agency, 2020, p. 14).

Strategies to Overcome Challenges

In the pursuit of advancing the green economy, several critical pillars emerge, encompassing innovative financing mechanisms, robust policy frameworks, technological innovation and research, infrastructure development, and public awareness and education. The following sections delve into a detailed examination of the strategies to overcome challenges:

✓ Innovative Financing Mechanisms. In response to financial constraints, innovative financing mechanisms such as green bonds, public-private partnerships, and climate funds can be strategically employed. Green bonds have emerged as a prominent instrument for mobilizing capital towards environmentally sustainable projects, with the global green bond market reaching $257.7 billion in 2019, and anticipated robust growth in subsequent years (Climate Bonds Initiative, 2019, p. 2).

✓ Robust Policy Frameworks. The development of robust policy frameworks that offer clear guidelines and incentives for green investments is imperative. Policies encompassing carbon pricing, renewable energy mandates, and tax incentives play a pivotal role in fostering an enabling environment for investments in sustainable initiatives. Moreover, fostering international cooperation and harmonizing standards are essential strategies to mitigate regulatory hurdles and market distortions (World Bank, 2019, p. 15).

✓ Technological Innovation and Research. Continuous investment in research and development is critical to drive technological innovation and achieve cost efficiencies within the green economy. Public funding directed towards research institutions, partnerships with private sector entities, and support for entrepreneurial ventures can expedite the advancement and deployment of green technologies (UNEP, 2018, p. 8).

✓ Infrastructure Development. The enhancement and expansion of green infrastructure are pivotal for facilitating the transition towards a sustainable economic model. Investments targeted at smart grids, public transportation networks, and energy-efficient building initiatives serve as foundational elements for fostering sustainable growth. Coordinated planning and collaboration among diverse stakeholders are essential to ensure that infrastructure development aligns harmoniously with the objectives of the green economy (World Bank, 2019, p. 23).

FULL TEXTS BOOK

✓ Public Awareness and Education. Elevating public awareness and advancing educational initiatives are essential strategies to mitigate social and cultural resistance to the green economy. Advocacy campaigns that underscore the multifaceted benefits—economic, environmental, and social—of green investments are instrumental in garnering public support and fostering behavioral change. Furthermore, initiatives aimed at vocational training and skill development are pivotal in preparing the workforce for emerging opportunities within green sectors (ILO, 2011, p. 31).

Each of abovementioned strategies plays a pivotal role in navigating the complexities of transitioning towards a sustainable economic paradigm, addressing financial, regulatory, technological, infrastructural, and societal challenges along the way.

CONCLUSION

In conclusion, the discourse on public investments in the green economy illuminates a transformative path towards sustainable development amidst global imperatives and ecological urgencies. The benefits of such investments are manifold, offering pathways to economic dynamism, environmental integrity, and social inclusivity. Through fostering job creation and economic growth in burgeoning sectors like renewable energy and sustainable agriculture, public investments not only bolster economic resilience but also mitigate environmental risks. The significant strides made by countries like Germany, China, and Costa Rica exemplify how strategic investments can yield substantial economic, environmental, and social dividends, positioning these nations as pioneers in the global green economy landscape.

However, the journey towards a green economy is fraught with challenges that demand nuanced strategies and steadfast commitment. Financial constraints loom large, requiring innovative financing mechanisms such as green bonds and public-private partnerships to mobilize substantial capital for sustainable projects. Policy and regulatory barriers necessitate the establishment of robust frameworks that incentivize green investments while harmonizing standards across jurisdictions to mitigate market distortions. Technological advancements and infrastructure developments are essential but fraught with complexities, requiring continuous research, strategic planning, and stakeholder collaboration to overcome.

Moreover, market dynamics that favor entrenched industries and social-cultural resistance to behavioral and lifestyle changes pose additional hurdles. Overcoming these challenges demands comprehensive strategies that integrate innovative financing, supportive policies, technological innovation, infrastructure development, and robust public awareness campaigns. By aligning these pillars, stakeholders can navigate the intricate terrain of the green economy transition, ensuring sustainable growth that balances economic prosperity with environmental stewardship and societal equity.

Looking ahead, the imperative remains clear: concerted global efforts are needed to scale up investments in the green economy, leveraging its transformative potential to address pressing ecological challenges while fostering inclusive and sustainable development worldwide. Through collaborative action, informed policy-making, and sustained public engagement, nations can chart a course towards a resilient future where prosperity thrives in harmony with planetary boundaries. As the world navigates towards achieving the Sustainable Development Goals by 2030, public investments in the green economy stand poised as catalysts for shaping a future that is prosperous, equitable, and environmentally sustainable.

In essence, the discourse on public investments in the green economy transcends conventional economic paradigms, underscoring a collective commitment to stewardship and resilience in pursuit of a sustainable future for generations to come.

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RECENT REGIONAL MACROECONOMIC DEVELOPMENTS AND POSSIBLE FINANCIAL RISKS AT THE GLOBAL LEVEL

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ABSTRACT
This study aims to examine some phenomena that can be discussed at the global and regional levels, with a particular focus on the latter. The aim is to reveal the regional impact values and change processes related to the macro variables and to identify the stage at which the possible expectations can be brought to the agenda. From a global perspective, it is essential to comprehend the components of regional growth worldwide. Following the year 2022, it has become evident that regional disparities have become more pronounced with the increase in GDP, particularly when examining regional perspectives. The population fluctuations resulting from the Corona 19 pandemic and the differential effects of regional changes in government borrowing and the monitoring of price variations in commodities, in particular, have been observed. Furthermore, it is crucial to comprehend the fluctuations in energy prices, the utilisation of energy, and the alterations in the prices of raw materials and minerals employed in industry, particularly within the context of commodity prices and the agricultural sector. In addition to per capita incomes, the deviations in common and exchange values in developing and emerging economies, particularly national income per capita and income growth, are also worth consideration. Developing countries exhibit a markedly higher level of these variables than developed countries. This necessitates understanding the interrelations between government consumption, private sector consumption, investments (gross and net), and the margins of private sector investment. Furthermore, macroeconomic variations, particularly those occurring at the regional level, have impacted potential economic and fiscal projections, making it apparent that the macroeconomic framework can be essential for evaluating this structure.
Key Words: Developing Countries, Emerging Markets, Financial Risks, Macroeconomic Developments, Regional Macroeconomy.
JEL Codes: F43, F62, F63.

INTRODUCTION

These economic and fiscal policies have been insufficient to compensate for the losses after 2023 in developing economies, and they are affecting all regions. Again, it is remarkable that the expectations for the continuation of a structure in which the Gross Domestic GDP does not grow at the desired level in all regions at the global level are continued. This fact has been more remarkable, especially in some regions in 2023, and it is noteworthy that the negative impact of fiscal deficits will continue to overcome the concepts of economic curiosity. All regions will have to have a greater protective efficient production output, especially at the global price level. India has been in a position where financial difficulties caused a deficit of approximately 8% in production. The existence of economic growth, albeit small, during the pandemic period in countries such as Türkiye has created a positive impact on the global level as an essential value. Undoubtedly, employment level and economic growth trends are in the foreground as regional macroeconomic variables (International Labour Organization, 2023). These variables play a critical role in understanding the dynamics of regional economies and possible financial risks. Inflation trends, which are directly linked to economic growth trends, also have an essential place on a regional basis. Understanding the effects of these macro variables, especially in emerging economies and development plans, is critical regionally. Besides, analysing employment, production, and productivity

FULL TEXTS BOOK

levels, as well as actual added value creation, as macroeconomic variables, is essential to understanding their direct effects on economic growth (Wang et al, 2021). In this context, it means scoping the regional impacts of financial fragility levels and fiscal costs in financial resource sharing, especially energy costs, for regions expressing different growth values.

These analyses are also critical regarding the effective use of production factors and the determination of actual impact values in regions such as Pacific countries, Asian countries, and Central Asian countries. The efficiency of production processes in these regions and their contributions to economic growth require understanding regional macroeconomic variables due to careful examination of these variables and factors (Acemoglu & Restrepo, 2017). This fact enables us to better understand the differences between regions and the effects of these differences on financial fragility, especially for emerging market economics. Macroeconomic changes in recent years have led to various financial risks, especially in the United States (USA), within the framework of regional macroeconomic developments. The US economy has had a remarkable regional impact in recent years in terms of employment figures and consumer spending. In this context, the Federal Reserve Bank's monetary policy decisions significantly affect global financial markets.

On the other hand, factors such as increased inflation rates in regions such as the European Union (EU), supply chain crises, and energy crises stand out as the main financial effects of regional economic problems. These have important implications for the European Central Bank's monetary policy practices and regional economic stability When evaluated in terms of Asia Pacific countries, large economies such as China, Japan, and India caused regional financial crises with macroeconomic variability, especially during the pandemic process. Problems in China's real estate market and debt levels and Japan's long struggle with low inflation and low growth increase financial fragilities in these countries. With the increase in global financial risks, central banks were forced to increase interest rates, negatively affecting economic growth by increasing borrowing costs.

This process increased the risk of indebted countries and companies being unable to pay their debts, and fluctuations in global financial markets reduced investor confidence and created significant uncertainties (Awakening, 2023). Negative effects on capital outflows and debt sustainability have been observed, especially in emerging markets. Deviations in economic policies and increases in global interest rates, which affect debt sustainability and financial-economic stability, lead to financial risks regarding countries' inability to pay their debts. In addition, climate change and environmental risks increase the costs of the stance in macroeconomic variables, causing significant economic losses (Autor, 2013). Namely, the lack of coordination of regional risk management at national and international levels creates deviations from the effectiveness of countries' central banks' fiscal policies. This situation is reflected in the process as a justification for deviation effects in regional economic growth trends. It is observed that this approach especially points out the economic magic and disruptions resulting from the pandemic and a broader-got rapid growth structure in macroeconomic terms.

REGIONAL MACROECONOMIC DEVELOPMENT EVALUATIONS AT GLOBAL LEVEL AND PROJECTIONAL RISKS

Recent macroeconomic developments reveal that regional approaches, which demonstrate significant differences at the global level, have differentiated in some important determinations and targets. In particular, these determinations are divided between regions such as North America and Europe and other regions such as China and Asia, as well as Latin American countries and Africa, which means that some regional trends are also investigated. Again, by keeping the Middle East separately in this evaluation today, it is seen that interest rate increases are frequently on the agenda to fight inflation, especially with the North America II programmes, which include the United States, within the same regional framework on the subject, where economic vitality is supported, or certain deviations are the subject (Adrian et al, 2023).

FULL TEXTS BOOK

Outlook of Regional Macroeconomic Developments and Macro Projections at The Global Level

It can be addressed the recent macroeconomic variations with a different regional classification for our study to the regional macroeconomic variations at the global level. Important Macro-economic variables at the global level, especially regarding the reconstruction of some regional contexts, especially an Economic growth cycle balance that can be handled on the basis of GDP has transformed into a structure that draws attention to some important issues. This structure also shows that in the growth of the GDP, especially after a pandemic process that can create an impact value in emerging Markets and Developing regions in 2022 and 2023 in the emerging Markets and Developing regions, it affects East Asia and countries every week and that it affects the countries in these regions every week (Financial Stability Board, 2022).

While these decreases also reveal the structure of countries that can be expressed in different values, on the other hand, it has turned into a structure that reveals regional differences in growth trends that can be expressed differently, especially in 2022 and 2023, as macroeconomic developments, it has turned into a period that reveals the structural differences between the target values in the emergence of the deficits of the GDP well as the growth on the basis of gross domestic product. This period after COVID-19 has also turned into a structural position in which a structure that can be expressed between the targeted values with the targeted macroeconomic projection structures and the current values in question can be expressed in different positions (Deghi et al, 2022). This concept of the difference between the targeted GDP and the actual realised structure can be described as a gap and open (Gap). This phenomenon has emerged with a structure that directly affects the emergence of capital increases in countries, especially in the South Asia and South Asia African region.

Besides, it is essential to say that inflation has started to increase in North America and especially in the United States of America, or it is crucial to say that the process of controlling the projected increase in inflation continues. When the event is evaluated based on North America, it is understood that, especially in Canada, energy export dependence comes to the fore on an economic scale and changes the macroeconomic balances with a significant level of impact as factors determining trade relations or macroeconomic situations, especially in the direction of fluctuations, and affects economic growth.

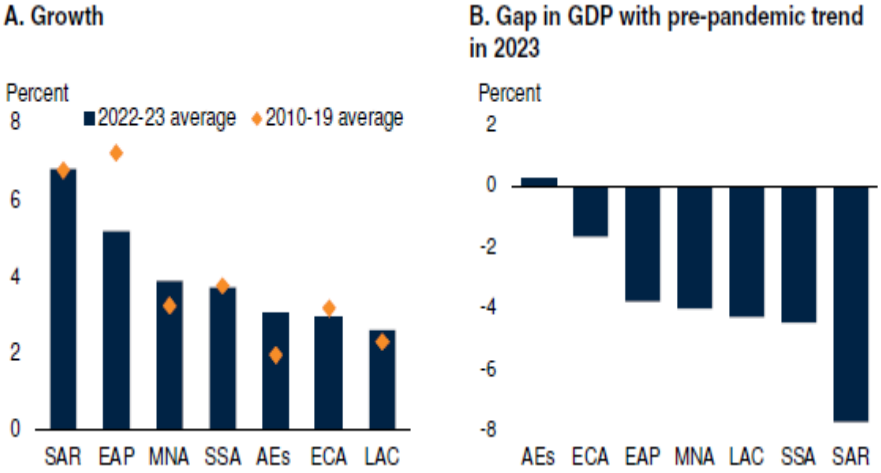
On the other hand, when these obligations are evaluated, especially within the European Union countries, it reveals that structural reforms aimed at ensuring financial and economic stability in the post-Brexit period are frequently on the agenda and monetary policies, especially in the European Central Bank, constitute an essential trend towards supporting economic growth with low interest rates (European Central Bank, 2022). In the case of the United Kingdom, which can be considered outside the European Union, especially the financial and macroeconomic developments in the United Kingdom also reveal that the United Kingdom has included some structural reform attempts that have reshaped the UK economy with trade agreements and new economic strategies. It is seen that inflation and supply chain problems are among the critical issues that reveal the necessity of balancing the macroeconomic variables in the United Kingdom with an import trend that can only be balanced with a more export-oriented potential (Office for National Statistics, 2023). This may occur, especially with a structure that directly affects the emergence of capital increases in the GDP gap. "- 8%" in 2023 with a negative value has turned into a macroeconomic development trend that values even more as "negatively" but positively creates the effect. Graph 1 below shows a gap between these values, primarily based on the GDP's alterations as economic growth levels and the difference between the actual GDP and projection values.

This regional classification at the global level can be expressed as follows:

AEs = Advanced Economies.
EAP = East Asia and Pacific,
ECA = Europe and Central Asia,
LAC = Latin America and the Caribbean,
MNA = Middle East and North Africa,

FULL TEXTS BOOK

SAR = South Asia; SSA = Sub-Saharan Africa.



Source: World Bank (2022). *Global Economic Prospects- January 2022*, Chapter 1, Washington, D.C.: World Bank, 2022, p. 18.

Graphic 1. Economic Growth and in Gap in GDP based Deficit of Regional locations at Global Level

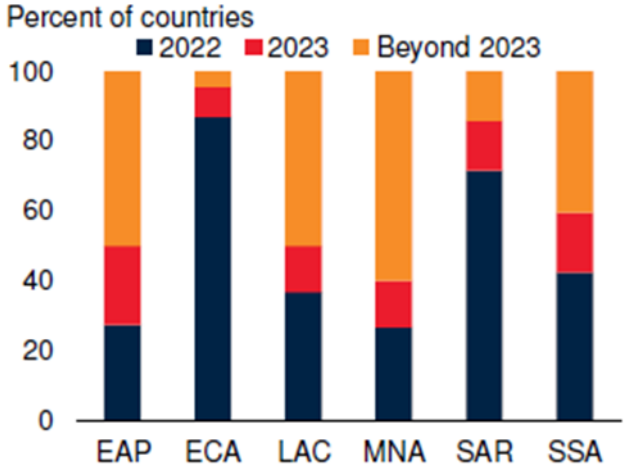
Graph 1 shows that, despite economic growth, the growth in 2022 and 2023 is much more pronounced in emerging markets and developing economies. This growth rate indicates a post-pandemic period in Europe and Central Asia. It is important to note that if the SAR is present during the pre-pandemic period and there is no significant discrepancy between the regions, more than half of the Middle Eastern and North African economies will be eliminated by 2023. After 2019, this trend will continue, especially in East Asia, Latin America and the Pacific countries (DAP). It is crucial to highlight that this represents a structural position in which the gross net profit will consistently remain well below the gross net income per capita at the beginning of the year. In this context, cyclical recoveries, which can be expressed as Macroeconomic variables, increased throughout the period after 2021. Still, in the regions of emerging markets and developing economies (EMDE), they did not return to the average in 2022 and 2023 compared to the years before the pandemic (Ha et al, 2021). This projection regarding the macroeconomic variability of the regions mentioned above at the global level reveals that the growth in the Middle East and North Africa (MNA) will, on the contrary, be faster than the 2019 average in 2022 and 2023.

In this context, it is possible to talk about a policy in which increases in economic growth trends support and continue to significantly suppress growth, especially in regions representing markets and developing economies that continue to be supportive both politically and in a political sense (Valderrama et al, 2023). This policy also means a regional distribution regarding macroeconomic effects, where possible sanctions on these economies will have a different impact in developing countries between 2021 and 2023, especially in the post-pandemic period. This regional macroeconomic variability reveals a positive effect of 8%, which may contribute to the production gap, especially with the ongoing financial difficulties in India, especially when limited macroeconomic supports were on the agenda before the epidemic and the financial constraint obstacles were removed after the COVID-19 pandemic process after 2021 (European Systemic Risk Board, 2021).

This structure, which can be expressed mainly concerning the macroeconomic balance trend before the pandemic, has turned into a structural position that may be above 4%, especially in the SSA = Sub-Saharan Africa region, and which may be approximately 4% for the GDP deficit (Gap) is also monitored (African Development Bank, 2023). On the other hand, to understand the regional distribution and impact levels of macroeconomic variations globally, it is crucial to understand and analyse the regional distribution of GDP per capita, especially after the COVID-19 period. In the chart below, it is possible

FULL TEXTS BOOK

to monitor the process of regional variability per capita at the global level and the macroeconomic deviations in recent years:



Source: World Bank (2022). *Global Economic Prospects- January 2022*, Chapter 1, Washington, D.C.: World Bank, 2022, p. 18.

Graphic 2. Regional GDP per Capita and Alterations Process in The Recent Years

As seen in chart two above, a situation in which the rate of recovery is unequal at the global level between regions will further increase inequality and may lead to a growing deficit in terms of GDP on a per capita basis. Half or perhaps more of the countries dependent on the tourism economy, which may experience a striking deep contraction in 2020, especially in terms of tourism-dependent countries, will be below the GDP per capita levels before the 2019 Corona 19 process in 2023 and beyond. Even this situation, in the case of SSA = Sub-Saharan African countries, indicates a situation where two-fifths of these countries will still be below the pre-pandemic 19 process. Especially in Chart 2, the situation of EAP = East Asia and Pacific and ECA = Europe and Central Asia from 2022 to 2023 and after 2023 is quite striking.

In the expression of this structure, in terms of macroeconomic variability, where macroeconomic variability occurs as GDP deviation per capita in these two global regions, this situation increases even more, especially as GDP deviation, and this situation for 2022 turns into a structure where it shrinks even more, especially after 2023. reveals. However, the variability of this structure, especially in the ECA = Europe and Central Asia region, has turned into a situation where a very high per capita national income is expressed in 2022 but a shallow trend in 2023 and after that. On the other hand, the closeness of the variations that may occur in the global regions of LAC = Latin America and the Caribbean and MNA = Middle East and North Africa in the period 2023 and onwards, as the macroeconomic recovery in these countries, whose position in per capita national income values is relatively high in 2023 and after 2023, which is observed that it reveals a structure in which the recovery speed and effective macroeconomic together with fiscal policies speed is quite effective (World Bank, 2023).

Another regional issue that should be emphasised in this context is Asia and Asia's economic and financial support for the primary dynamics of the economic and financial support of China, India, and Japan (EAP, SAR) as the regions that form the primary dynamics. Especially in Asia (EAP), it is also observed that China's continuation of quite a severe economic growth trend and its economic relations with India and Japan in the same process within an economic trend constitute the grounds for those crucial changes based on structural reforms (Uchida, 2024). Factors such as unemployment and poverty in India have turned into a regional Asian look, and economic macroeconomic variables in the Asian region have affected the low growth and deflation and the struggling structure in Japan for a long time. Looking at Latin America, especially in South America, Brazil and Argentina draws attention to the position of Argentina, which has been in an important endeavour to combat high inflation and debt

FULL TEXTS BOOK

problems for a long time, frequently brings up the understanding of reform with a crucial financial structure in the agreements made with the structure of high inflation and debt problems. (Goodhart & Pradhan, 2020).

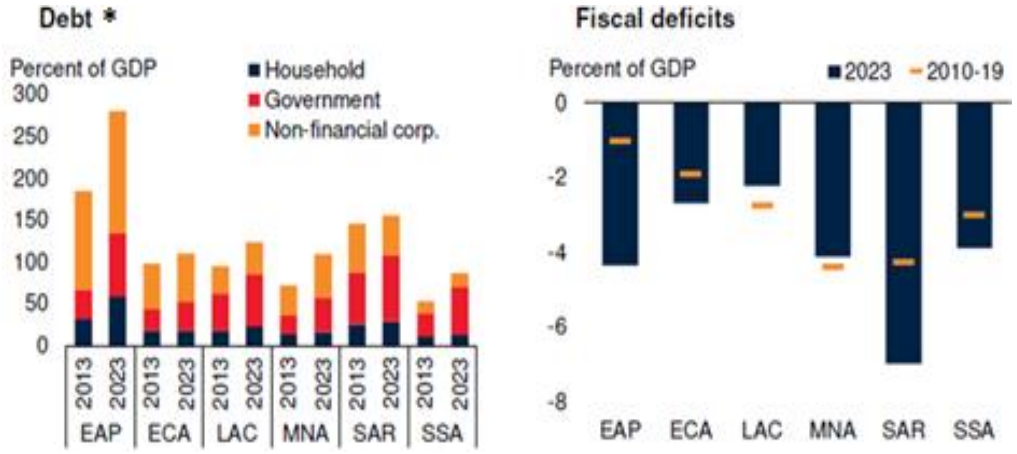
Regional Risk Dynamics and Possible Regional Risks Related to Global Macroeconomic Changes

Notably, the possible risks from regional macroeconomic variables at the global level pose some critical economic and financial risks due to the recent inflation and some other regional political and economic conflicts. What can be stated explicitly for these risks is that, as a result of the emergence of debt values and financial deficits of some countries regionally, it is also possible to say that the differences in the value chain outputs at the global level, which are very effective in the emergence of fiscal deficits, are caused by differences at the regional level and the worldwide level. In other words, when we consider the issue, it can be seen that such regional risks also affected the percentage of projection values and that the deviations in the output values before the pandemic formed a necessary infrastructure regarding financial policies in shaping the projection expectations.

Especially when we consider the issue in terms of neighbourhood risks as a proportional value on a GDP basis and regional borrowing trends, we see that borrowing trends are directly related to changes in trends in household borrowings, government borrowings and debt to the central government budget, and Comparing the variability values of non-financial regional companies at the global level in 2023 with the average values between 2010 and 2019 reveals meaningful change impact values. When we consider regional risks related to global macroeconomic fluctuations, we observe that the vacancy rate can be pretty high, especially in underdeveloped regions. This situation takes on different dimensions when evaluated from the perspective of developing countries or emerging markets. Examining the various impacts of this approach in Asian and Pacific countries reveals different borrowing trends with comparisons between 2013 and 2023. On the other hand, when looking at the trends in the MNA = Middle East and North African countries and SSA = Sub-Saharan Africa, it is understood that debt trends were relatively low between 2013 and 2023.

When economic trends in these regions are examined, borrowing rates are low. This situation may lead to macroeconomic deviations, especially despite increased borrowing trends in developed and developing countries. However, it is observed that these possible financial and economic risk factors are not very effective in the short term in terms of Gross Domestic Product (GDP) targets in developed economies. In particular, significant increases or decreases are observed in household and government borrowing trends, and this situation remains at lower levels at different values in Asia-Pacific, Middle East and North African countries. In this context, where the weight of government borrowing, which financial companies are insufficient, should be emphasized, this issue seems vital regarding possible financial risks (Warjiyo, 2024). Borrowing trends are low in the Latin America and Caribbean region, and possible financial risks are lower in these regions with tourism-oriented economic values. Chart 3 below shows that global borrowing trends are considered regionally based on households, governments, and non-financial companies. The variability level in the last ten years, between 2019 and 2023, can be monitored as a GDP ratio:

FULL TEXTS BOOK



***** Decade Change between 2013 and 2023

Source: World Bank (2024). *Global Economic Prospects- January 2024*, A World Bank Group Flagship Report, Washington, D.C.: World Bank, 2024, p. 17.

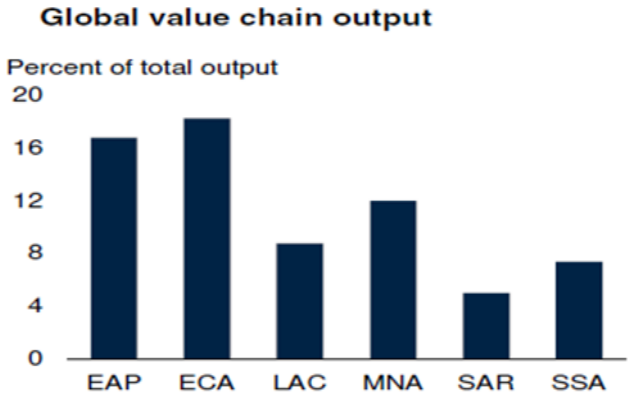
Graphic 3. Changes in Regional Debt Composition and Fiscal Deficits at the Global Level

As seen in Chart 3 above, the increases, especially as a proportion of the Gross Domestic Product, in which companies that are not financial transactions come to the fore, follow a trend at a higher rate, especially in East Asian and Pacific Countries. There is a significant increase in value as the 2013-2023 average is observed, and it is revealed that Europe and the European Centre countries have more negligible fiscal risks and are stable. This regularity also shows minimal government and household borrowings from non-fiscal companies. On the other hand, when looking at South Asia, these rates indicate that, due to the possibility of a financial crisis, non-financial corporate borrowings have increased with a more significant trend around South Asia. Subsequently, government borrowings have a higher position than other borrowings. In terms of financial risks, this situation reveals that in these regions, because of the increase in regional debt ratios at the global level as a percentage of GDP, financial risks may turn into a higher financial risk element than in East Asia and active countries, where debt trends are generally high (Open Government Licence, 2023).

However, there is also a controlled borrowing trend in Latin American and Caribbean countries, as well as in the Middle East and North African countries, MNA = Middle East and North Africa, where these borrowings are in a more controlled position. However, in any case, the higher ratio of government borrowings on a GDP basis, especially for Latin American and Caribbean countries, LAC = Latin America and the Caribbean, indicates a position where the level of financial fragility in these countries increases even more. Increasing financial fragility is a significant risk factor, especially for this region's emerging markets and developing economies. This risk factor is also directly reflected in the fiscal deficits as a proportion of the GDP, as seen in Graph 3 above. It reveals that there is time in the position. These risk positions are observed as a year in which fiscal deficits will increase even more as an essential financial fragility value, especially in East Asia, EAP = East Asia and Pacific, countries, and South Asia, especially after the Corona 19 pandemic. Possible regional governors' risks have turned into a situation where borrowing trends are more prominent, especially lending trends, to eliminate the lack of savings in underdeveloped countries and sufficient resources concerning economic growth (Loewald, 2024). These countries' underground resources and other natural resources are more mortgaged. This also means that it is marketed as a financial debt cycle in exchange for a fiscal cycle that may continue. Regionally, it is observed that the lowest values in terms of such financial risks and budgetary deficits are revealed by the average of the Latin American and Caribbean countries. as a ratio of GDP, which is why it is probably revealed the lower fiscal risk (Goldfajn, 2024).

FULL TEXTS BOOK

However, those who cannot evaluate the needs of more controlled industrial structures cannot create the necessary real contribution value in making the essential production only with the effect of borrowings. They form a specific insufficient added value due to non-effective resource use whose savings are inadequate, like SSA = Sub-Saharan African countries; concerning Sub-Saharan Africa, the regional rising fiscal risk has resulted in negative economic growth, probably due to financial and budgetary deviation risk components present. It reveals a shallow structure in the global output values of investments within its countries. It also shows a process of macroeconomic variability that has recently caused negative effects as a reflection of a possible financial-economic risk value in production processes based on the Sub-Saharan Africa region. In Chart 4 below, it is possible to monitor the global and regional distribution values as a percentage of the total output as a worldwide production value chain output:



Source: World Bank (2024). *Global Economic Prospects- January 2024*, A World Bank Group Flagship Report, Washington, D.C.: World Bank, 2024, p. 18.

Graphic 4. Value Production Chain and Its Regional Distribution at the Global Level

As seen in Chart 4, it should be emphasized that this risk process noted in Chart 3 primarily affects the regional distribution of the value chain and production, especially as percentages of total output, from which the value chain at the global level arises. Therefore, it can be seen that it represents a process in which the regional global distribution in the total percentage value of the levels in global production processes is directly compatible with the graphs with a significant structure. This process also expresses a structure in which the risk positions are even higher, especially in countries with very high debt ratios, and the global value chain output chain also encounters a higher output value as a percentage value in the total output value, although there is a further increase. It states that increases in possible borrowings create an impact value globally with more productive investments.

Therefore, the high growth in all kinds of borrowing values, especially of households and non-financial investment-oriented companies, creates significant limits within the production process. Still, in terms of fiscal deficits, there will be a low budgetary deficit in 2023, which will also have a positive result with a controllable fiscal deficit. It also reveals that because of the structure in which the deficit persists, a vital production process and total output production values have reached the highest point at EAP = East Asia and Pacific and ECA = Europe and Central Asia. This structural regional macroeconomic position has created more economic growth and a stable fiscal position at the global level in the prominent region by a significant percentage in the lower fiscal-economic risk process (Parries et al, 2020).

When we consider the issue based on regional macroeconomic developments, primarily based on Africa and the Middle East, it also reveals that the economies of South Africa, especially in the Southern Africa region, are waiting as a projection of a significant stability potential with the intensity of political and economic reforms in South Africa. However, it is also seen that financial problems such as high

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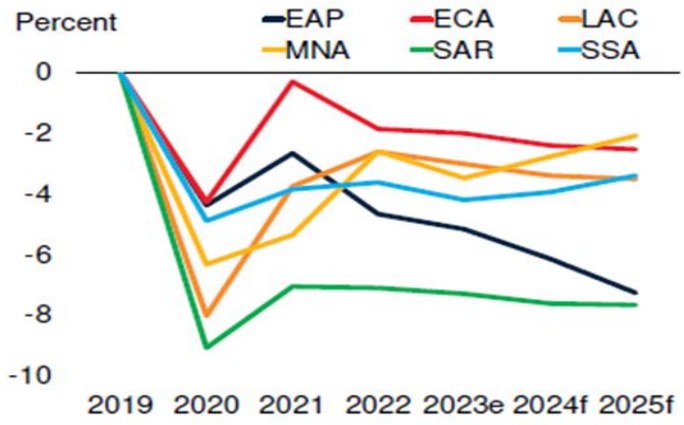
insecurity and macro social inequality in the Southern Africa region are subject to significant deviations that may arise, especially with different effects. They are still ongoing, thus causing substantial deviations in macroeconomic growth balances.

On the other hand, it is observed that Nigeria is significantly affected by the changes, especially in oil exports, sometimes with negative and sometimes with positive values, and at the same time, it causes a macroeconomic balance fluctuation in which diversification is made. However, in addition to this, Nigeria has undergone significant economic restructuring, demonstrating that cyclical political and security fluctuations exert a considerable influence on macroeconomic balances within the broader African region. When we examine the situation in the Middle East, particularly in Saudi Arabia and the United Arab Emirates, we observe the emergence of components that can be expressed with different values.

DISCUSSION

From a regional and development-oriented perspective, the critical reason for discussing the case, especially regarding macroeconomic variables, is that the projected impact values after 2024 are more clearly revealed by the deviations in output values in the pre-pandemic regional process. In this context, when regional differences at the global level are considered, it is seen that the highest output values in terms of economic variability occur in East and South Asia regions.

It is observed that this significantly affects output, especially given the deficiencies that existed before the pandemic. It has been observed that the deviation values in these regions are related to the high production deficit, especially in South Asia, and that after the pandemic period, there was -8% contraction by 2020. However, when this region is compared to others, it appears that the production output deviation values in SSA = Sub-Saharan Africa and MNA = Middle East and North Africa have decreased to -0.5% as of 2021 as the deviation of output for regional. Graphic 5 below presents the deviation of output for the region from the pre-pandemic process and projection expecting to years:



Source: World Bank (2024). Global Economic Prospects- January 2022, Chapter 1, Washington, D.C.: World Bank, 2022, p. 17.

Graphic 5. Deviation of Output for Regional from Pre-pandemic Process and Projection Expecting to Years

Regarding macroeconomic variables, global production chains have significantly declined, especially after 2021, and a meaningful structure has emerged to express this issue. On the other hand, the positive growth values in Latin American and Caribbean countries are striking. Europe and Central Asia have the most positive development trends. Production output values show stability with the least financial risk and the lowest negative impact of economic changes. Another issue to be discussed is whether these values will remain the same after 2024 and 2025. Projected equal production output gaps for Europe and Central Asia (ECA) and the Middle East and North Africa (MNA) regions at the end of 2024 suggest that global macro variables will have the same impact on fiscal risks. The shifts in the macroeconomic

FULL TEXTS BOOK

landscape of Saudi Arabia have given rise to a novel and distinct global outlook that bears direct implications for the global economy and the country's export capabilities. The development of non-oil sectors has recently become a pivotal objective in the Middle East region, spearheaded by Saudi Arabia. An analysis of regional changes and approaches based on the United Arab Emirates (UAE) reveals that the positions in the tourism, finance and real estate sectors, especially in the tourism, finance and real estate sectors, have increased non-oil revenues. There are notable differences between regions and between regions and commodity prices, which are lower than expected. This is having a critical effect on the results. Furthermore, social unrest is caused by geopolitical tensions. Insecurities about price changes in food and food prices continue to affect regions. The UAE will find a place in the process, with an effect that can significantly impact economic activities, primarily focused on Dubai after 2020, and further accelerate economic growth as a positive macroeconomic evaluation (IMF, 2023).

CONCLUSION

The post-pandemic revival of growth rates below the pre-pandemic trend regarding the continuation of regional production in emerging and developing economies, the effects of financial tightening policies that bring financial conditions in the context of the pandemic to the agenda, as well as other natural disasters, has impacted economic growth and GDP. Moreover, risk factors significantly impact the cyclical recovery after 2021, particularly in emerging markets, where growth differences are pronounced. The current structure of monetary and financial tightening policies, primarily based on China, is rapidly reducing leverage in the real estate sector and causing significant differences in the pre-pandemic environment. It is clear that the regional distributions affected by macroeconomic variations at the global level, especially when the economic growth-based GDP is considered mutually, have seen a significant decrease in impact values, particularly following the 2022 pandemic period.

These are almost exact comparisons. The data clearly shows that compared to 2023 in a pre-pandemic period, there has been a significant increase in regional selling authority, particularly in South Asia and the SAP-Saharan Africa region. The increasing impact of this structure creates a remarkable agenda in these regions compared to the pre-pandemic period of 2023 on a GDP basis. It is also important to note that developed countries grew approximately 0.5 per cent in 2023 compared to the pre-pandemic period. Despite positive expectations for regional divisions representing developing economies, it is clear that there is a stable preference for small economic growth, which continues to increase despite negative growth values in other global locations. This structure clearly shows that the relationship brings different regional risks to the agenda, especially as a percentage of the countries in question. This is particularly relevant for companies that do not have a financial functional structure other than government borrowings. It is clear that the risk mechanism at this level is on the rise and that this level brings to the agenda a structure that reveals the most critical risk mechanism in the Middle East and Pacific countries. On the other hand, they are trying to balance macroeconomic variability in return for higher government borrowings in Southern North Africa, especially the Pacific regions. Government borrowings are lower in these regions than in less developed regions, especially during the financial-economic restructuring process. This phenomenon also signifies a regional interaction process, whereby it is evident that in Middle Eastern and North African countries, government borrowings continue to be more stable, and household borrowings continue to be more controlled. This structure of economic variables unquestionably reveals macro risks, and the increasing financial risks are a direct result of the fiscal deficit, which will continue to grow in 2023, especially in response to the values seen in the 2010 and 2019 periods. It is clear that the impact of increasing fiscal deficits, particularly in the SAR-South Asia and SSA = Sub-Saharan Africa regions, will continue to affect the future projectivity. The productive production structure related to the global value chain output has increased, especially in East Asia. It is understood that this will lead to lower but more stable economic growth in Europe and Central Asia.

FULL TEXTS BOOK

Still, this expected phenomenon will probably make them more fragile and also affect financial risk preferences due to probable macroeconomic alterations.

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FULL TEXTS BOOK

IDENTIFICATION AND RANKING OF THE FACTORS AFFECTING EMPLOYEE PERFORMANCE WITHIN AN ORGANIZATION

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ABSTRACT
The purpose of this study is to examine the factors that affect employee job performance in the textile sector of Punjab, Pakistan. The data were collected from three big cities of Punjab, namely Lahore, Sialkot, and Faisalabad through a 5-point Likert scale varying from strongly disagree to strongly agree. Nine factors (Salary, Job Security, Working Conditions, Training and Development, Opportunity for Promotion, Work-life Balance, Relationship with Co-workers, Leadership, and Fringe Benefits & Recognitions) were identified from previous research and studied statistically through analytic hierarchy process (AHP) and regression analysis. Cronbach's alpha value was found to check the reliability of the questionnaire. Classic assumption tests were also used such as the Normality test, Multicollinearity test, Heteroscedasticity test, and Autocorrelation test. This study showed that all the nine factors mentioned above have a strong positive relationship with the performance of employees working in the textile sector. Hence, company management can use this research to improve employee performance and company productivity.
Keywords; Employee Performance, Analytic Hierarchy Process, Textile Organizations

1. Introduction

An organization is a place where a group of people work together in a coordinated and structured way to achieve a common goal. The primary goal for every organization is to increase its efficiency and that is not possible without the performance of its employees [1]. Business organizations across the globe are facing fierce competition so they are well aware of their human resources as a competitive advantage. Organizations are busy in finding out the ways through which they get the highest level of employee performance to generate economic advantages for the organization [2]. In modern times, almost every organization knows the importance of employee performance for the organization's success. Enhancing employee performance or the approach through which employee performance can be increased becomes one of the crucial factors for the organization's growth. Managers work to accomplish the corporate goals and objectives by using the available resources efficiently and effectively [3]. Employee's job performance can be increased by focusing on the factors that affect their performance[2]. From previously conducted research the employee's performance has been observed to have a positive relation with Job Security, Fringe Benefits and Recognition, Opportunities for Promotion, Relationship with Co-workers[4], Training and Development[5] Salary[6] Working Conditions[7] Work-life Balance[8] and Leadership [9].

Therefore, for an organization to accomplish its goal the organization must focus on the factors that increase its employee's performance. Efficient and productive Employees result in the overall performance of the organization. (Markos and Sridevi, 2010). Organizations are now aware of the fact that without enhanced employee performance the organization's goal cannot be achieved. (Anitha, 2014) [2].

The current study attempts to understand the influence of various factors on employees' performance through the help of the Analytic hierarchy process (AHP) and regression analysis. AHP analysis was used to rank the factors and regression analysis was used to find out the partial and significant relationship between the independent variables and with dependent variable.

FULL TEXTS BOOK

1.2. Objectives

- To identify the factors affecting employee performance.
- To find out the influence of these factors on employee performance.
- To find out the partial and simultaneous effect of these factors on employee performance.

2. Literature Review

(ADI BANDONO et al., 2022) have considered salary, work facilities, and leadership factors for their research to find their influence on the employee's performance in government institutions, according to their study the dominant factor is salary followed by leadership style and work facilities. The work he carried out concluded that these three factors have partial and overall significant positive effects on the employees of government institutions [10].

(Gurpreet Randhawa et al., 2019) studied the effect of Job Security, Fringe Benefits and Recognition, Opportunities for Promotion, and Relationships with Co-workers including other factors to find its influence on the Agri warehouse employees. Their study concluded all the factors have a positive relation with the Agri warehouse employees, training opportunity counts as the most important one followed by the rest [4].

(Mohamed Hamed AL-Rawahi, 2022) concluded in his research that training and development can increase the performance of Oman Air's staff. By proper training and development plan, he concluded that the company can get competitive advantages, enhancing employee performance and reducing turnover [5].

(Dr. B Nagaraju and Pooja J, 2017) came out with the result of the positive influence of salary on the performance of public and private sector banks of Karnataka [6].

(Mohammad Shammout, 2021) took the variable work environment for his study to find out its effect on the employees of a real estate company Investo Global. He concluded that the work environment has a positive impact on the performance of the selected company. Pearson's correlation analysis was used for the analysis of the study [7].

(Gnei Rushna Preena, 2021) investigated the impact of work-life balance on the employee performance of a shipping company in Sri Lanka. According to her finding the work-life balance has a strong positive impact on the employee's performance of the shipping company in Sri Lanka. Regression analysis was carried out for the analysis of the data [8].

(Abbas Umar Ibrahim and Cross Ogohi Daniel, 2007) studied the impact of variable leadership on the employees' performance at the Coca-Cola Company in Abuja. According to their research, the performance of employees has a direct link with the leadership style the managers adopt. The leadership helps in improving the performance of the employees, goal attainment of the organization, and objectives fulfillment. They concluded that the achievement of organizational goals and objectives depends on the leadership style an organization adopts [9].

(Zaizura Che Zakaria et al., 2013) has studied the influence of promotion opportunities on the job satisfaction of higher public institutions employees in Malaysia. He took the lectures of four public universities and concluded that the promotion opportunity has a great effect on employee job satisfaction hence performance. He uses the Pearson product-moment correlation to find the relationship between the promotion opportunity and employees' job satisfaction. To retain the employee's best understanding and employee's satisfaction he recommended for the organization to consider promotion opportunities [11].

(Esuh Ossai-Igwe Lucky et al., 2013) considered the variable job security to find its effect on organizational performance in a Multiethnic Environment. The results showed that job security has a significant effect on the overall performance of a team as well as on the organizational performance. Moreover, according to them the more an employee experiences job security the more they are likely to perform their task effectively which is reflected in the overall performance of the organization. In

FULL TEXTS BOOK

addition, the study concluded that employees must consider job security before they decide on an organization to work with [12].

(Evangelos Triantaphyllou et al., 1995) used the analytic hierarchy process (AHP) for deciding engineering applications. The analytic hierarchy process (AHP) is a Multi-decision criteria method used for choosing the best alternative. The analytic hierarchy process is popular among researchers due to its easy use and precise mathematical properties [13].

(Zahra Idrees et al., 2015) Measured the effect of the variables salary, training, and motivation on the performance of the educational institutions. Regression analysis was used to find the relationship between these variables. They concluded that all three factors have strong positive effects on employee performance but the most dominant one was salary followed by training and motivation. The study intended to guide managers to give more focus to the factors that ultimately enhance employee performance and organizational productivity [14].

Ali et al. find out the impact of employees' training and development on organization performance. Their research area was the employees working in MOBILINK Islamabad and Rawalpindi region collectively. Regression analysis was used for the data analysis. The results concluded that the variable training and development has a positive and significant effect on employee productivity. Moreover, training and development positively and significantly affected organizational performance. Hence, training and development and employee productivity positively and significantly accounted for organizational performance [15].

(Syed Umar Farooq et al., 2015) studied the impact of employee participation, employee relations and job involvement on employee performance. He concluded that all the three variables mentioned above have a great influence on the employee's performance and can positively increase the overall productivity of the firm. He used descriptive statistics and the Pearson correlation for his study [16].

2.1. Conceptual framework

The factors that are considered for this study are; Salary, job security, working conditions, training and development, opportunity for promotion, work-life balance, Relationship with co-workers, leadership, fringe benefits and recognition are the independent variables and job performance is the dependent variable.

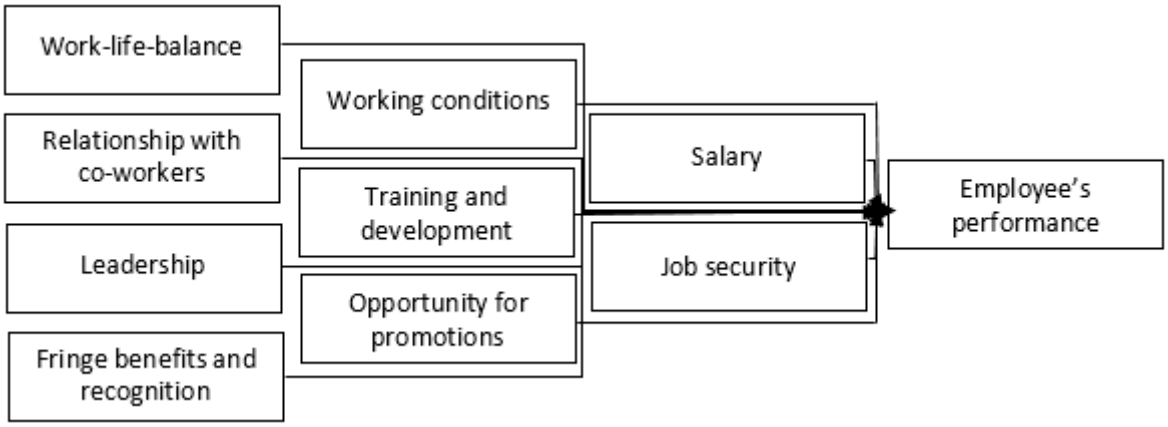


Figure. 1: Conceptual framework of the independent variables and dependent variable

3. Research Methodology

3.1. Research Design

This research was conducted to determine the effect of the nine independent variables on employee performance in the textile sector of Punjab, Pakistan.

FULL TEXTS BOOK

3.2. Data Collection Instruments and sampling techniques

A questionnaire structured with a 5-point Likert scale varying from strongly disagree to strongly agree was used to collect data from the employees working in textile industries f Punjab, Pakistan. The questionnaire was composed of two parts; the first part was comprised of the demographic information of the respondents and the second part with questions about these nine factors and employees' performance. For the data collection random sampling technique was used. A total of 87 responses were collected and 78 responses were considered for the study as the incomplete and irrelevant responses were dropped out.

3.3. Data Analysis

Cronbach's alpha value was found to check the reliability of the questionnaire. Classic assumption tests were also used such as the Normality test, Multicollinearity test, Heteroscedasticity test, and Autocorrelation test. Analytic Hierarchy Process (AHP) was used to rank the factors. Pearson correlation and regression analysis were used to determine the association between independent and dependent variable.

3.4. Results of the study

Cronbach's value of the proposed study

Variable	Cronbach's Alpha
1. Salary (X_1)	0.625
2. Job security (X_2)	0.607
3. Working Conditions (X_3)	0.645
4. Training and development (X_4)	0.723
5. Opportunity for promotion (X_5)	0.543
6. Work-Life Balance (X_6)	0.545
7. Relationship with Co-workers (X_7)	0.584
8. Leadership (X_8)	0.581
9. Fringe benefits and recognition (X_9)	0.649
Performance (Y)	0.693

The analytic hierarchy process (AHP) was used as a multi-criteria decision-making method. AHP is one of the most effective techniques for organizing and analyzing complex decisions. It was developed by Thomas L. Saaty in the 1970s.

The incompatibility rate ($\lambda_{Max}\, W$) is calculated based on the following steps:

Step 1. Estimating ($\lambda_{Max}\, W$)

$$\begin{bmatrix} 1.0000 & 0.9819 & 0.9888 & 0.9531 & 1.0135 & 1.0307 & 0.9893 & 1.0231 & 1.0114 \\ 1.0185 & 1.0000 & 1.0071 & 0.9707 & 1.0322 & 1.0497 & 1.0076 & 1.0420 & 1.0301 \\ 1.0113 & 0.9930 & 1.0000 & 0.9638 & 1.0249 & 1.0423 & 1.0005 & 1.0346 & 1.0228 \\ 1.0492 & 1.0302 & 1.0375 & 1.0000 & 1.0634 & 1.0814 & 1.0381 & 1.0735 & 1.0612 \\ 0.9867 & 0.9688 & 0.9757 & 0.9404 & 1.0000 & 1.0169 & 0.9762 & 1.0094 & 0.9979 \\ 0.9703 & 0.9527 & 0.9554 & 0.9247 & 0.9834 & 1.0000 & 0.9599 & 0.9927 & 0.9813 \\ 1.0108 & 0.9924 & 0.9995 & 0.9633 & 1.0244 & 1.0418 & 1.0000 & 1.0341 & 1.0223 \\ 0.9774 & 0.9597 & 0.9665 & 0.9316 & 0.9906 & 1.0074 & 0.9670 & 1.0000 & 0.9886 \\ 0.9887 & 0.9708 & 0.9777 & 0.9423 & 1.0021 & 1.0190 & 0.9782 & 1.0115 & 1.0000 \end{bmatrix} \times \begin{bmatrix} 0.1110 \\ 0.1130 \\ 0.1122 \\ 0.1164 \\ 0.1095 \\ 0.1077 \\ 0.1121 \\ 0.1084 \\ 0.1097 \end{bmatrix} = \begin{bmatrix} 0.9986 \\ 1.0170 \\ 1.0098 \\ 1.0477 \\ 0.9853 \\ 0.9689 \\ 1.0093 \\ 0.9760 \\ 0.9873 \end{bmatrix}$$

FULL TEXTS BOOK

Step 2. Calculating (λ_{Max} *W*)

$\lambda_{Max1} = \frac{0.9986}{0.1110} = 8.9964$

$\lambda_{Max2} = \frac{1.0170}{0.1130} = 9.0000$

$\lambda_{Max3} = \frac{1.0098}{0.1122} = 9.0000$

$\lambda_{Max4} = \frac{1.0477}{0.1164} = 9.0009$

$\lambda_{Max5} = \frac{0.9853}{0.1095} = 8.9982$

$\lambda_{Max6} = \frac{0.9689}{0.1077} = 9.1820$

$\lambda_{Max7} = \frac{1.0093}{0..1121} = 9.0036$

$\lambda_{Max8} = \frac{0.9760}{0.1084} = 9.0037$

$\lambda_{Max9} = \frac{0.9873}{0.1097} = 9.0000$

Step 3. Calculating λ_{Max} (Average) = $\frac{\lambda Max1 + \lambda Max2 + \cdots \lambda Max9}{9}$

$= \frac{8.9964+9.0000+9.0000+9.0009+8.9982+9.1820+9.0036+9.0037+9.0000}{9} = 9.0205$

Step 4. Calculating incompatibility index (CI) = CI= $\frac{\lambda Max - n}{n-1} = \frac{9.0205-9}{9-1} = 0.0026$

Step 5. Calculating incompatibility index (CR) = CR = $\frac{CI}{RI} = \frac{0.0026}{1.45} = 0.0018$

Table 1. Random Index (RI) (Saaty, 1980),

Number of elements (n)	1	2	3	4	5	6	7	8	9	10
RI	0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.50

The Consistency Ratio (CR) value is less than 0.1, that's showing the consistency of the responses. Therefore, the overall priority ranking of the factors has been calculated.

Step 6. Overall priority ranking

Table 2. Factors ranking

Factor	S	J.S	W.C	T.A.D	O.F.P	W.L.B	R.W.C	L	F.B.A.R
Value	0.9986	1.0170	1.0098	1.0477	0.9853	0.9689	1.0093	0.9760	0.98731
Rank	5	2	3	1	7	9	4	8	6

S=Salary; J.S=Job security; W.C=Working condition; T.A.D=Training and development; O.F.P=Opportunity for promotion; W.L.B=Work life balance; R.W.C=Relationship with co-workers; L=Leadership; F.B.A.R=Fringe benefits and recognition.

According to the participants' responses, Training and Development is the most important factor having the highest value and ranked 1 followed by Job Security, Working Conditions, Relationship with Co-workers, Salary, Fringe Benefits and Recognition, Opportunities for Promotion, Leadership, and Work-life Balance.

FULL TEXTS BOOK

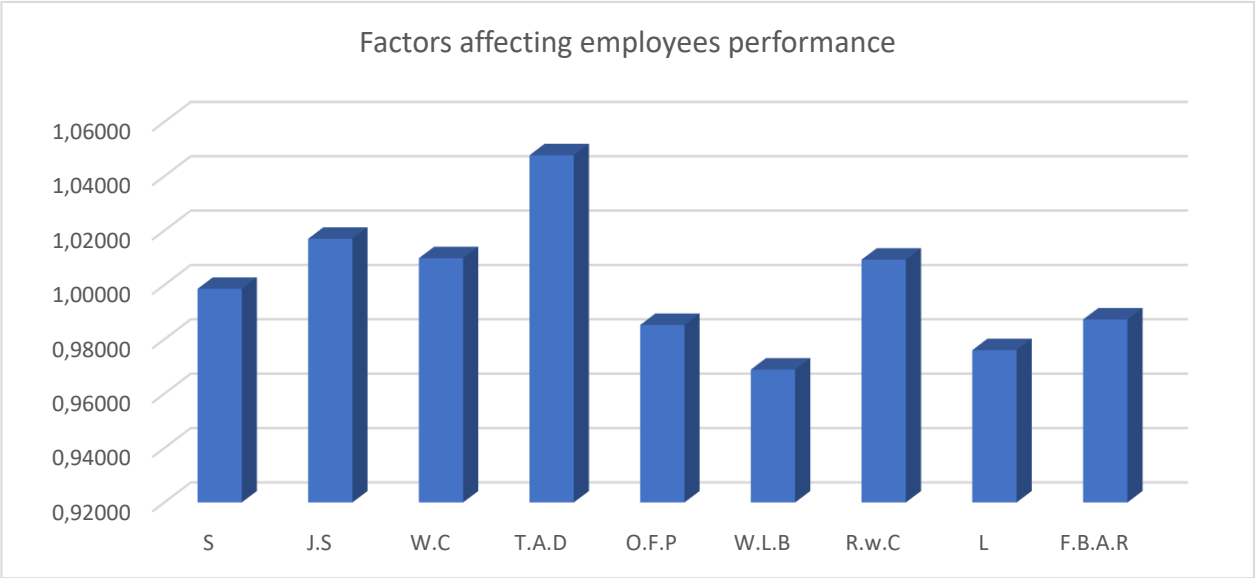


Figure 2. Prioritization of factors affecting employee performance in the textile sector

Table 3. Correlations Analysis

Correlations

		S	JS	WC	TAD	OFP	WLB	RWC	L	FBAR	EP
S	Pearson Correlation	1	.397**	.293**	.192	.311**	.404**	.377**	.314**	.421**	.311**
	Sig. (2-tailed)		.000	.009	.092	.006	.000	.001	.005	.000	.006
	N	78	78	78	78	78	78	78	78	78	78
JS	Pearson Correlation	.397**	1	.388**	.378**	.205	.433**	.491**	.332**	.280*	.456**
	Sig. (2-tailed)	.000		.000	.001	.071	.000	.000	.003	.013	.000
	N	78	78	78	78	78	78	78	78	78	78
WC	Pearson Correlation	.293**	.388**	1	.370**	.179	.521**	.507**	.460**	.419**	.498**
	Sig. (2-tailed)	.009	.000		.001	.117	.000	.000	.000	.000	.000
	N	78	78	78	78	78	78	78	78	78	78
TAD	Pearson Correlation	.192	.378**	.370**	1	.256*	.516**	.198	.218	.200	.306**
	Sig. (2-tailed)	.092	.001	.001		.024	.000	.082	.055	.078	.006
	N	78	78	78	78	78	78	78	78	78	78
OFP	Pearson Correlation	.311**	.205	.179	.256*	1	.275*	.230*	.435**	.322**	.400**
	Sig. (2-tailed)	.006	.071	.117	.024		.015	.043	.000	.004	.000
	N	78	78	78	78	78	78	78	78	78	78
WLB	Pearson Correlation	.404**	.433**	.521**	.516**	.275*	1	.562**	.612**	.463**	.538**
	Sig. (2-tailed)	.000	.000	.000	.000	.015		.000	.000	.000	.000
	N	78	78	78	78	78	78	78	78	78	78
RWC	Pearson Correlation	.377**	.491**	.507**	.198	.230*	.562**	1	.587**	.473**	.645**
	Sig. (2-tailed)	.001	.000	.000	.082	.043	.000		.000	.000	.000

FULL TEXTS BOOK

	N	78	78	78	78	78	78	78	78	78	78
L	Pearson Correlation	.314**	.332**	.460**	.218	.435**	.612**	.587**	1	.594**	.514**
	Sig. (2-tailed)	.005	.003	.000	.055	.000	.000	.000		.000	.000
	N	78	78	78	78	78	78	78	78	78	78
FBAR	Pearson Correlation	.421**	.280*	.419**	.200	.322**	.463**	.473**	.594**	1	.303**
	Sig. (2-tailed)	.000	.013	.000	.078	.004	.000	.000	.000		.007
	N	78	78	78	78	78	78	78	78	78	78
EP	Pearson Correlation	.311**	.456**	.498**	.306**	.400**	.538**	.645**	.514**	.303**	1
	Sig. (2-tailed)	.006	.000	.000	.006	.000	.000	.000	.000	.007	
	N	78	78	78	78	78	78	78	78	78	78

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

PC= Pearson Correlation; N= Number; S 2-t= Sig. (2-tailed); S=Salary; J.S=Job security; W.C=Working condition; T.A.D=Training and development; O.F.P=Opportunity for promotion; W.L.B=Work life balance; R.W.C=Relationship with co-workers; L=Leadership; F.B.A.R=Fringe benefits and recognition.

Pearson correlation was used to check the relationship between the independent variables with the dependent variable. Pearson correlation for the employee's performance with Salary (r=.311), Job Security (r=.457), Working Condition (r=.498), Training and Development (r=.307), 0pportunity for Promotion (r=.400), Work-life-Balance (r=.539), Relationship with Co-workers (r=.645), Leadership (r=.515), and Fringe benefits and Recognitions (r=.303) show a positive relationship. The findings show that all the variables are statistically significant at a significant level of (p<.05).

Table 4. Regression Analysis ANOVA

ANOVA[a]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	11.365	9	1.263	9.497	.000[b]
	Residual	9.041	68	.133		
	Total	20.406	77			

a. Dependent Variable: EP

b. Predictors: (Constant), S, JS, WC, TAD, OFP, WLB, RWC, L, FBAR

The ANOVA table shows a significant value of the F statistic that is less than 0.05, which indicates the statistical significance of the model. Based on the results of the F test as shown in the table, the F-count value is greater than F_{table} (9.497 > 2.017) with a significant level of (0.000<0.05). This means that simultaneously the factors Salary, Job security, Working conditions, Training and development, Opportunity for promotion, Work-life balance, Relationship with Co-workers, Leadership, and Fringe benefits & recognition have a significant effect on the performance of textile sector employee's. Therefore these nine factors have simultaneously significant influence on the employee's performance.

FULL TEXTS BOOK

Table 5. Regression Analysis Model Summary

Model Summary[b]										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.746[a]	.557	.498	.36464	.557	9.497	9	68	.000	2.047
a. Predictors: (Constant), S, JS, WC, TAD, OFP, WLB, RWC, L, FBAR										
b. Dependent Variable: EP										

Table 5 indicates the model is significant at .05. The model includes the correlation coefficient R and the coefficient of determination R square. The value of R is .746 which indicates that the correlation or relationship between these independent variables is strong because the value is above 0.5 with a value in the form of a positive influence value. Thus, it means the effect of the independent variables partially on the dependent variable which is employee's performance has significant.

The coefficient of determination i.e. R square value (0.557) shows 56% variation in employee performance is due to the proposed model. That means the factors Salary, Job security, Working conditions, Training and development, Opportunity for promotion, Work-life balance, Relationship with Co-workers, Leadership and Fringe benefits & recognition have a positive influence on Employee performance in the textile sector. Thus, it is proved from the proposed model that these nine independent variables contribute positively towards change in the dependent variable.

4. Conclusions and Discussions

This study considered nine independent factors that affect employee performance in the textile sector. Based on analytic hierarchy process (AHP) findings, "Training and development" was the most important factors for enhancing employee performance, followed by Job security, Working conditions, Relationships with Co-workers, Salary, Fringe benefits and recognition, Opportunity for promotion, Leadership, and Work-life balance.

The correlation and regression analysis indicated there is a significant relationship between the independent variables Salary, Job security, Working conditions, Training and development, Opportunity for promotion, Work-life balance, Relationship with co-workers, Leadership, and Fringe benefits & recognition with the dependent variable i.e. employees performance. The study also revealed that all the nine independent variables have partially and simultaneously significant influence on employee performance. The study concluded that employee performance can be increased by giving proper focus and attention to the employee's considerations.

4.1. Recommendations

It is clear from the results that the independent variables (Salary, Job security, Working conditions, Training and development, Opportunity for promotion, Work-life balance, Relationship with Co-workers, Leadership, and Fringe benefits & recognition) positively influence the employee's performance, So the management should implement these practices to achieve the desired goals. The organizations should provide proper training and development opportunities as well as the adequate availability of these independent variables to increase the employee's performance. Based on the proposed study it is recommended to give more concentration on (Salary, Job security, Working conditions, Training and development, Opportunity for promotion, Work-life balance, Relationships with Co-workers, Leadership, and Fringe benefits & recognition) to enhance employee's performance.

FULL TEXTS BOOK

4.2. Limitations and Future Research

The research study was only limited to the textile sector, while future research can be extended to consider different sectors of different locations to further strengthen the results. The sample size of the respondents can be increased to have a broader insight into the study. Other variables that are not included in this study can be added to get a clear understanding of their importance on employee performance.

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FULL TEXTS BOOK

SAĞLIK OKURYAZARLIĞI: KAVRAMSAL BİR ÇALIŞMA

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ÖZET
İnsan, uygarlık tarihi sürecinde hastalıklardan kaçınmanın yollarını aramış ve sağlığın peşinden koşmuştur. Bireyler her çağda ve her uygarlıkta hastalıklardan korunmak, sağlık durumlarını iyileştirmek ve sağlıklarını etkileyen olumlu veya olumsuz faktörlerin farkında olmak için temel sağlık bilgisine gereksinim duymuşlardır. Tıp ve iletişim bilimlerinin günümüzde geldiği noktada sağlık, bir okuryazarlık türü olarak kabul görmektedir. Kavramsal açıdan 'sağlık okuryazarlığı' olarak adlandırılan bu okuryazarlık; bireylerin sağlıkla ilgili bilgilere ulaşması, bu bilgileri anlaması, uygulayabilmesi ve sağlıkla ilgili kararlarında kullanabilmesi için gerekli olan zihinsel ve sosyal beceriler olarak tanımlanmaktadır. Bu bağlamda sağlık okuryazarlığı, bireylere ve toplumlara büyük avantajlar sunmaktadır. Sağlık okuryazarı olan bireyler kendilerine, yakın çevrelerine ve topluma önemli katkılarda bulunarak sağlık ve yaşam kalitesinin yükselmesine yardımcı olmaktadırlar. Bu çalışmada son dönemlerin dikkat çekici kavramlarından biri olan sağlık okuryazarlığı konu edilmektedir. Çalışma, kavramsal bir bakış açısına sahiptir. Çalışma kapsamında sağlık okuryazarlığı; tanımı ve amacı, tarihsel gelişimi, tarafları, boyutları ve düzeyi temelinde ele alınmaktadır. Çalışmanın insan ve toplum yaşamı açısından önem arz eden kavramlardan biri olan sağlık okuryazarlığını konu alması nedeniyle önemli olduğu ve ardıl çalışmalar bağlamında alanyazına katkı sunacağı düşünülmektedir.
Anahtar kelimeler: Sağlık, Okuryazarlık, Sağlık Okuryazarlığı, Sağlık İletişimi, Sağlık Yönetimi.

ABSTRACT
Throughout the history of civilization, human beings have sought ways to avoid diseases and pursued health. In every age and civilization, individuals have needed basic health information in order to prevent diseases, improve their health status and be aware of the positive or negative factors affecting their health. At the point where medical and communication sciences have reached today, health is recognized as a type of literacy. This literacy, conceptually called 'health literacy', is defined as the mental and social skills necessary for individuals to access, understand, apply and use health-related information in their health decisions. In this context, health literacy offers great advantages to individuals and societies. Individuals who are health literate make significant contributions to themselves, their immediate environment and the society and help to improve health and quality of life. This study focuses on health literacy, which is one of the remarkable concepts of recent times. The study has a conceptual perspective. Within the scope of the study, health literacy is discussed on the basis of its definition and purpose, historical development, parties, dimensions and level. It is thought that the study is important because it deals with health literacy, which is one of the important concepts in terms of human and social life, and will contribute to the literature in the context of successive studies.
Keywords: Health, Literacy, Health Literacy, Health Communication, Health Management.

GİRİŞ

İnsanların ve toplumların en önemli gündem maddelerinden biri olan sağlık, tarihsel süreç içinde kavramsallaşmış ve gelişerek günümüzdeki görünümüne ulaşmıştır. Sağlık temel bir insani hak

FULL TEXTS BOOK

olmasının yanı sıra bir davranıştır. Sağlık, en yalın ifadeyle bireyin sağlığını korumak, geliştirmek, sürdürmek ve hastalıklardan korunmak için inandığı ve yaptığı davranışların tümüdür (WHO, 1998).
Bireyin sağlığa ilişkin inandığı ve gerçekleştirdiği tüm eylemlerini ifade eden sağlık davranışı; geçmiş deneyimlerden, etkileşimlerden ve toplumsal dinamiklerden etkilenerek şekillenmektedir. Tıbbi bakış açısıyla hastalıkların temelinde biyolojik ve fizyolojik faktörlerin yanı sıra davranışsal faktörler yatmaktadır. Bu bağlamda bireyin davranışları, sağlık durumunun olumlu veya olumsuz olabilmesi sonucunu doğurmaktadır. Buna göre olumlu sağlık davranışlarının oluşabilmesi için sağlık okuryazarlığına gereksinim bulunmaktadır.
Sağlık okuryazarlığı, günümüz dünyasında sağlık bilgisine sahip olma ve sağlığı koruma ile ilgili en önemli kavramlardan biridir. Sağlığın birey ve toplum için öneminden hareket eden çalışma kapsamında sağlık okuryazarlığı, kavramsal bir bakışla konu edilmektedir.

Sağlık Okuryazarlığı: Tanımı ve Kapsamı

Sağlık okuryazarlığı -health literacy- en yalın ifadeyle sağlık bilgilerini anlama, analiz etme, yorumlama ve uygulamadır. Sağlık okuryazarlığı, temel okuryazarlık seviyesi ile doğrudan ilişkilidir (Onotai, 2008; Sorensen vd., 2012). Basit bir örnekle bireyin okuma ve yazma güçlüğü yaşamasının, sağlık süreçlerini olumsuz etkileyeceği açıktır (Shahid vd., 2022). Bununla birlikte temel okuryazarlık becerilerinin gelişmiş olması, sağlık okuryazarlığını garanti etmemektedir.
Tüm okuryazarlık türleri gibi sağlık okuryazarlığı da temel okuryazarlık becerilerinin üzerine inşa edilmiştir ancak çağcıl dünyanın karmaşık ve kompleks sağlık sistemini anlayabilmek ve anlamlandırabilmek için temel okuryazarlık becerilerinden daha fazlasına ihtiyaç vardır (Liu vd., 2020). Bu bağlamda sağlık okuryazarlığı bireylerin sağlık hizmetlerini anlaması, sağlığın geliştirilmesi ve hastalıklardan korunma gibi konularda kararlar alması amacıyla sağlık bilgisine ulaşma, anlama, analiz etme ve uygulama yeterliliklerini içermektedir.

Sağlık Okuryazarlığının Tarihsel Gelişimi

Sağlık okuryazarlığı, amacı ve kapsamı itibarıyla önemli bir kavram olmakla birlikte görece yenidir. Alanyazın incelendiğinde sağlık okuryazarlığı ile ilgili çalışmaların, 1990'lar sonrasında yoğunlaştığı görülmektedir. Sağlık ve okuryazarlık kavramlarının önem kazanmaya başlaması, sağlık okuryazarlığının daha dikkat çekici olmasını sağlamıştır.
Sağlık okuryazarlığı kavramı, ilk kez Scott K. Simond tarafından 1974 yılında Sosyal Politika Olarak Sağlık Eğitimi (Health Education as Social Policy) isimli çalışmada gündeme getirilmiştir. Michael Grossman tarafından 1972 yılında yazılan Sağlık Sermayesi Kavramı ve Sağlık Talebi Üzerine (On the Concept of Health Capital and Demand for Health) isimli makale ise sağlık okuryazarlığı ve sağlık ekonomisi arasındaki ilişkiyi ilk kez ortaya koyması nedeniyle, daha öncel bir niteliktedir (Vernon vd., 2007, s. 4).
Sağlık okuryazarlığı kavramının yaygınlaşması, 1989 yılında Kanada'nın Ottawa kentinde düzenlenen Uluslararası Sağlığı Geliştirme Konferansı (International Conference on Health Promotion) ile olmuştur. Konferansta, sağlığı geliştirmede yalnızca sağlık sektörünün çabalarının yeterli olmadığı düşüncesinden hareketle sağlık bilgilerinin anlaşılabilir olması ve bireylerin bu bilgilere uygun davranışlar geliştirmesi gerekliliği konu edilmiştir. Bu kapsamda sağlığı geliştirmede sağlık ile ilgili bilgilerin anlaşılır bir dil kullanılarak uygun araçlarla iletilmesi aracılığıyla olumlu yönde davranış geliştirilebileceğine dikkat çekilmiştir (Kickbusch vd., 2013, s. 4).
Sağlık okuryazarlığı kavramı, zamanla önem kazanmış ve Dünya Sağlık Örgütü (World Health Organization) tarafından 1998 yılında yayımlanan Sağlığın Geliştirilmesi Sözlüğü'nde (Health Promotion Glossary) "bireylerin, iyi sağlığı teşvik edecek ve sürdürecek şekilde bilgiye erişme, bilgiyi anlama ve kullanma becerisi ve motivasyonunu belirleyen bilişsel ve sosyal beceriler" şeklinde tanımlanmıştır.

FULL TEXTS BOOK

Sağlık okuryazarlığı ile ilgili alanyazında ulaşılabilen ilk çalışma, Hornik ve arkadaşları (1987) tarafından gerçekleştirilen çalışmadır. Sağlık okuryazarlığının sağlık davranışlarına etkisini araştıran çalışmada, 2000'li yıllardan itibaren sağlık okuryazarlığına olan ilginin ve konuya ilişkin çalışmaların arttığı gözlenmektedir.

Sağlık okuryazarlığı kavramı zamanla gelişmiş ve disiplinlerarası bir nitelik kazanmıştır. Küresel çapta etkili olan covid-19 pandemisi sürecinde sağlık okuryazarlığının önemi tüm dünyada kabul görmüş ve bu konudaki çalışmalarda artış yaşanmıştır. Sağlık okuryazarlığı kavramının gelişimindeki bir diğer kilometre taşı ise yeni iletişim teknolojilerinin gelişimine koşut olarak gündeme gelen e-sağlık okuryazarlığı (e-health literacy) kavramıdır (Gürel & Taşkıran, 2024). Sağlık konularının ve sağlığa ilişkin davranışların insan ve toplum yaşamındaki önemi düşünüldüğünde sağlık okuryazarlığı ile ilgili gelişmelerin devam edeceğini öngörmek mümkündür.

Sağlık Okuryazarlığının Tarafları

Sağlık süreci, genel bir bakışla sağlık hizmeti kullanıcıları ve sağlık profesyonelleri temelinde işleyen bir süreçtir. Sağlık hizmeti kullanıcıları, sağlık hizmetine gereksinim duyan bireyleri ve yakınlarını ifade etmektedir. Sağlık profesyonelleri ise sağlık çalışanları, sağlık uygulayıcıları ve sağlık hizmeti sağlayıcılarından oluşmaktadır. Sağlık profesyonelleri; bireylere, ailelere ve topluma sistematik bir şekilde önleyici, iyileştirici ve rehabilite edici sağlık hizmeti sağlamaktadır.

Sağlık okuryazarlığı, Şekil. 1'de sunulduğu üzere sağlık sürecinin iki temel öznesi olan sağlık hizmeti kullanıcılarını ve sağlık profesyonellerini konu etmektedir.



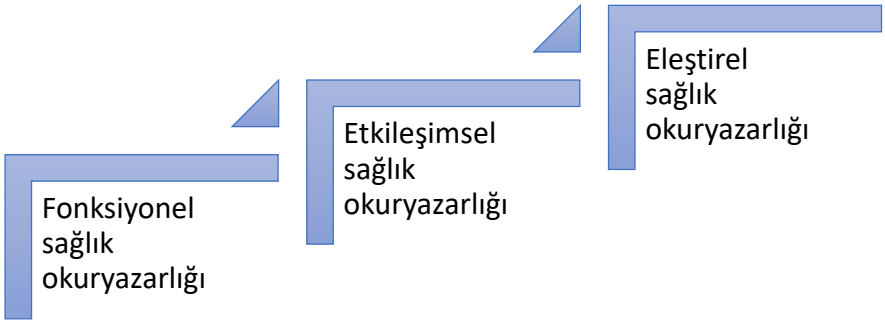
Şekil 1. Sağlık Okuryazarlığının Tarafları
Kaynak: Araştırmacılar tarafından geliştirilmiştir.

Sağlık okuryazarlığı, sağlık hizmeti kullanıcıları açısından da sağlık profesyonelleri açısından da önem arz eden bir okuryazarlık türüdür. Her iki taraf da sağlık süreçleri uyarınca doğru bilgiye ulaşmak, etkili iletişim kurmak, kendini ifade etmek, etkileşim içinde olmak, sorun çözmek, karar vermek, olası riskleri öngörmek ve elimine etmek gereksinimi ve arayışı içerisindedir. Bu nedenle de sağlık okuryazarlığı, sağlık sürecinin her iki taraf açısından da büyük anlam ifade etmektedir.

Sağlık Okuryazarlığı Boyutları

Sağlık okuryazarlığı, kavramsal düzlemde birbirinin üstüne kümelenen üç boyuttan oluşmaktadır. Don Nutbeam (2000) sağlık okuryazarlığını "sağlık", "toplum" ve "eğitim" olmak üzere üç değişken çerçevesinde ele alarak boyutlandırmaktadır. Bu bağlamda sağlık okuryazarlığını Şekil 2'de sunulduğu üzere "fonksiyonel sağlık okuryazarlığı", "etkileşimsel sağlık okuryazarlığı" ve "eleştirel sağlık okuryazarlığı" olmak üzere üç boyutta ele almak mümkündür.

FULL TEXTS BOOK



Şekil 2. Sağlık Okuryazarlığı Boyutları
Kaynak: Nutbeam'den (2000) yararlanılarak araştırmacılar tarafından geliştirilmiştir.

Sağlık okuryazarlığının boyutlarını oluşturan fonksiyonel sağlık okuryazarlığı, etkileşimsel sağlık okuryazarlığı ve eleştirel sağlık okuryazarlığı sonraki bölümlerde irdelenmiştir.

Fonksiyonel Sağlık Okuryazarlığı

Fonksiyonel sağlık okuryazarlığı -functional health literacy-, sağlık okuryazarlığının ilk boyutudur. Sağlık okuryazarlık boyutlarının hiyerarşik niteliği göz önüne alındığında fonksiyonel sağlık okuryazarlığı en temel boyuttur (Baker, 2006). Bu anlamıyla fonksiyonel sağlık okuryazarlığı, sağlık okuryazarlığının varlığı ve sağlık okuryazarlığının diğer boyutlarının oluşması için bir gerekliliktir.

Fonksiyonel sağlık okuryazarı olan bireyler, sağlık sistemi ve sağlık riskleri konusunda temel düzeyde bilinç ve farkındalığa sahiptir (Nutbeam, 2008). Sağlık ile ilgili temel bilgileri içeren bir süreç olan fonksiyonel sağlık okuryazarlığı, temel okuma ve yazma becerilerinden hareketle temel sağlık bilgilerini bilmeyi ve kullanmayı ifade etmektedir (Stormacq vd., 2020). Bu okuryazarlık; ilkyardım ve sağlıklı beslenme gibi temel sağlık bilgilerine sahip olma, ilaç prospektüsü okuyabilme, hekim randevularını oluşturabilme, sağlık ile ilgili riskleri bile gibi eylemleri içermektedir.

Fonksiyonel sağlık okuryazarlığı, bireylerin yaşam ve sağlık kalitelerini yükseltmeleri, toplumsal düzlemde fayda sağlamaları açısından bir ön şart olarak değerlendirilebilmektedir (Coughlin vd., 2020). Fonksiyonel sağlık okuryazarlığının düşük olması; bireyin yazılı sağlık bilgilerini anlamada ve kullanmada zorlanması anlamına gelmektedir. Aynı zamanda sağlık okuryazarlığının tüm tarafları açısından zorlayıcı bir görünüme neden olmaktadır. Bu bağlamda bireysel ve toplumsal düzeyde olumsuz sonuçların gündeme gelmesi sonucunu doğurmaktadır (Carthery-Goulart vd., 2009).

Fonksiyonel sağlık okuryazarlığının en dikkat çekici özelliği, bireyin pasif konumda olmasıdır. Fonksiyonel okuryazarlık kapsamında birey, sağlık bilgisine çeşitli şekillerde ulaşabilmektedir. Ancak birey, bu sürece doğrudan dahil değildir ve yalnızca alıcı konumundadır.

Etkileşimsel Sağlık Okuryazarlığı

Etkileşimsel sağlık okuryazarlığı -interactive health literacy-, sağlık okuryazarlığının ikinci düzeyini oluşturmaktadır. Fonksiyonel sağlık okuryazarlığının üzerine konumlanan etkileşimsel sağlık okuryazarlığı; gelişmiş okuryazarlık becerisinden hareketle sağlık ile ilgili bilişsel ve sosyal becerileri ifade etmektedir. Bu okuryazarlık türü bilgiye ulaşma ve kullanma, farklı iletişim kanallarından anlama, ulaşma ve söz konusu bilgileri yeni durumlara uygulama becerisini kapsamaktadır (Nutbeam, 2000, s. 263).

Etkileşimsel sağlık okuryazarlığı, karmaşık ve çok sayıda olan sağlık bilgisine ulaşma ve bu bilgilerin bireyler üzerindeki yönelimlerini değerlendirebilme anlamına gelmektedir (Rubin vd., 2011). Genel bir bakışla etkileşimsel sağlık okuryazarlığı, bireylerin günlük faaliyetlere katılımının artması için kişisel becerilerin kullanılması ve güçlendirilmesi anlamına gelmektedir (Nutbeam & Lloyd, 2020). Bu

FULL TEXTS BOOK

anlamıyla etkileşimsel sağlık okuryazarlığı; bireylerin sağlık iletişimi becerilerinin güçlenmesi, sağlık ile ilgili birçok bilgi içinden yararlı olanları seçebilmesi, hızla değişen sağlık sistemini kavraması ve bu sağlık sistemindeki bilgilerin uygulanmasını kapsamaktadır (Tones, 2002, s. 288).

Etkileşimsel sağlık okuryazarlığının bir diğer önemli özelliği, bireyin pasif konumdan çıkarak aktif konuma geçmesidir. Bu bağlamda birey; sağlık bilgilerine çeşitli şekilde ulaşabilmesinin yanı sıra onları anlayabilmekte ve uygulayabilmektedir. Örneğin birey, sağlıklı besinlerin bilgisine sahip olmanın dışında sağlıklı besinleri diyetine dahil edebilmektedir.

Eleştirel Sağlık Okuryazarlığı

Eleştirel sağlık okuryazarlığı -critical health literacy-, sağlık okuryazarlığının son boyutunu ifade etmektedir. Sağlık okuryazarlığının bu boyutunda birey, sağlık okuryazarlığının diğer iki boyutuna kıyasla ileri düzeyde sağlık bilgisine sahiptir ve hem bu bilgiyi doğru olarak yönetip kendi çıkarları için kullanabilmekte hem de sağlık sürecini sorgulayabilmektedir. Diğer bir deyişle eleştirel sağlık okuryazarı olan bir birey; gelişmiş sosyal ve bilişsel becerilerine ek olarak sağlık bilgisini eleştirel bir bakış açısıyla analiz edebilmekte; sağlık sürecinin işleyişini, eksikliklerini, yanlışlıklarını sorgulayabilmekte; medyada yer alan sağlık bilgilerini yorumlayabilmekte; sağlığın ekonomik ve politik boyutlarını anlayabilmektedir (Nutbeam, 2000, s. 263-264).

Eleştirel sağlık okuryazarlığının en ayırt edici özelliği, eleştirel düşünceyi ve analizi içermesidir. Eleştirel sağlık okuryazarlığı, fonksiyonel sağlık okuryazarlığının ve etkileşimsel sağlık okuryazarlığının aksine sağlık bilgisine eleştirel bakış anlamına gelmektedir (Chinn, 2011). Sağlık okuryazarlığının en son boyutu olan eleştirel sağlık okuryazarlığı, 'üçüncü nesil sağlık okuryazarlığı' olarak da tanımlanabilmektedir. Bu anlamıyla eleştirel okuryazarlığı, birey ya da grup temelinde politik veya sosyal hareketler aracılığıyla tepkisellik geliştirmeyi ve eylem oluşturmayı ifade etmektedir.

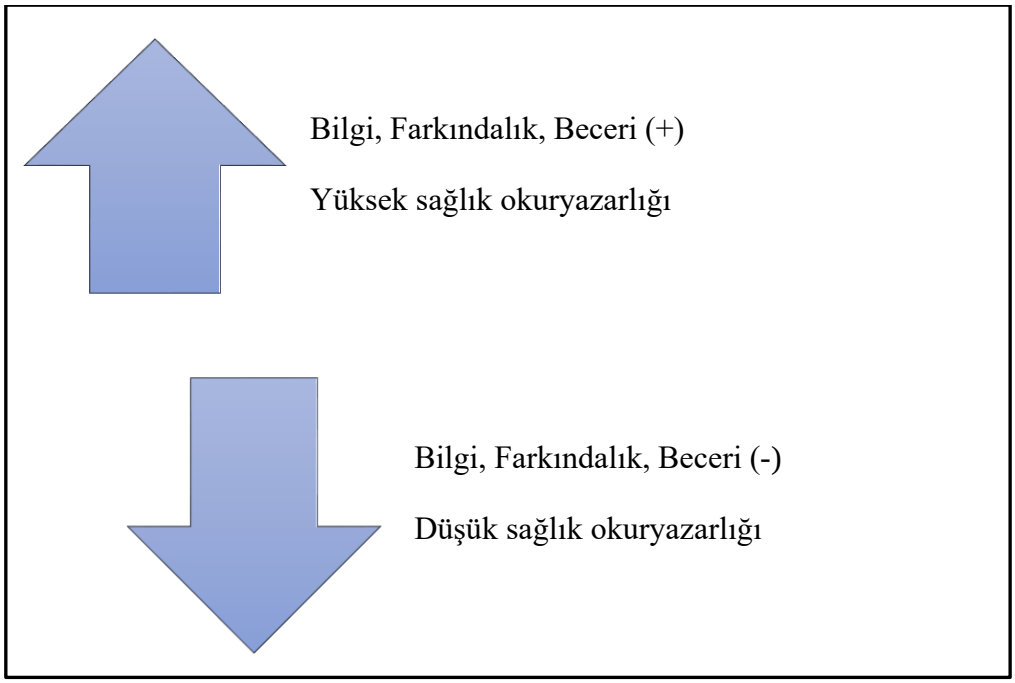
Eleştirel sağlık okuryazarlığı, sağlık bilgisini daha bilinçli bir şekilde algılama ve analiz etme becerisinden oluşmaktadır (Pleasant & Kuruvilla, 2008). Bireyin ve eleştirel düşünmenin aktif olduğu bu okuryazarlık türü, sağlık sisteminin işleyişindeki sorunları çözmeyi, sağlık sistemindeki eşitsizlikleri ve adaletsizlikleri azaltmayı hedeflemektedir. Dolayısıyla eleştirel sağlık okuryazarlığı, hem birey hem de toplum düzleminde önemli getiriler vaat eden bir okuryazarlık türüdür.

Sağlık Okuryazarlığı Düzeyleri

Sağlık okuryazarlığı, bireylerin kendi sağlık durumlarına ilişkin doğru kararları alabilmeleri ve sağlık profesyonelleri ile medya tarafından iletilen mesajları doğru olarak anlayabilmeleri için bir gerekliliktir (Urstad, 2022). Özellikle covid-19 pandemisi sürecinde, bireylerin ve toplumların sağlık okuryazarlık bilgilerinin ne denli önemli olduğu ortaya çıkmıştır. Sağlık okuryazarlığı ile sağlık bilgilerini anlama, uygulama ve sağlık süreçlerini yönetme arasında doğrusal bir ilişki bulunmaktadır.

Sağlık okuryazarlığı düzeylerini, Şekil 3'de sunulduğu üzere "düşük sağlık okuryazarlığı" ve "yüksek sağlık okuryazarlığı" olmak üzere iki kapsamda ele almak mümkündür.

FULL TEXTS BOOK



Şekil 3. Sağlık Okuryazarlığı Düzeyleri
Kaynak: Araştırmacılar tarafından geliştirilmiştir.

Düşük Sağlık Okuryazarlığı

Düşük sağlık okuryazarlığı; sağlık ile ilgili bilgi, tutum ve davranış eksikliği anlamına gelmektedir. Bireyin sağlık okuryazarlığı derecesinin düşük olması; sağlık bilgilerini anlama, değerlendirme ve uygulamada zorluk yaşamasına neden olmaktadır. Sağlık okuryazarlık düzeyi düşük olan birey; sağlığıyla ilgili kendisini aşan durumlarda kime, neye ve nasıl başvuracağını bilememektedir. Örneğin sağlık sorunu ile ilgili hangi uzmanlık alanına müracaat edeceğini, nasıl randevu alabileceğini bilememekte veya yanlış randevular alabilmektedir. Böylelikle sağlık sorunu ile ilgili zaman kaybı yaşayabilmekte, sağlık sorunun ilerlemesine neden olabilmekte ve yaşam kalitesini düşürebilmektedir.

Düşük sağlık yazarlığı, bireylerin sağlık sorunlarını anlamada ve değerlendirmede yetersizlik yaşamalarına neden olabilmektedir. Uluslararası ve ulusal alanyazın bulguları düşük sağlık okuryazarlık düzeyinin; hastalık belirtilerini anlamada gecikmeye, sağlık bilgisini anlama ve değerlendirmede yetersizliğe, sağlıkla ilgili tedavinin gecikmesine ve kronikleşmesine, sağlık profesyonellerinin önerilerine uymakta zorlanmaya, sağlık sorunu ile ilgili ilaç kullanımı, onam, randevu tarihi gibi bilgilerde yanlış anlamaların yaşanmasına ve sağlık risklerinin artmasına, öz bakımı sağlamamaya, koruyucu sağlık hizmetlerinden yararlanamamaya ya da yetersiz yararlanmaya neden olduğunu ortaya koymaktadır (Williams vd., 1995; Gazmararian, 2003; Durusu Tanrıöver vd., 2014; Yılmazel & Çetinkaya, 2016).

Düşük sağlık yazarlığı, bireyin yanı sıra topluma da etki etmektedir. Bu bağlamda düşük sağlık okuryazarlığı, bireylerin olumsuz sağlık davranışlarına yönelmelerine neden olmakta ve toplum genelinde sigara, alkol, obezite gibi davranışların yaygınlaşması sonucunu doğurmaktadır (Cho vd., 2008). Ayrıca düşük sağlık yazarlığı olan bireyler; kendilerinin ya da bakım verdikleri kişilerin hastaneye yatışların fazla ve uzun süreli olması, acil servislere gereksiz ve fazla başvurmaların yaşanması gibi nedenlerle sağlık giderlerinde artışa ve kamusal kaynakların israfına neden olabilmektedirler (Baker vd., 2004; De Walt vd., 2007).

FULL TEXTS BOOK

Yüksek Sağlık Okuryazarlığı

Yüksek sağlık okuryazarlığı; sağlık ile ilgili bilgi, tutum ve davranışın güçlü olduğu anlamına gelmektedir. Tıp biliminin ve sağlık bilgisinin geliştiği 21. yüzyılda bireylerin, gelişmiş sağlık bilgisine ve farkındalığına sahip olması, sağlık ile ilgili yetkinliklerini sağlık davranışlarına yansıtarak daha bilinçli kararlar verebilmeleri beklenmektedir. Bu beklenti; bireylerin sağlık bilgilerini anlama, analiz etme, uygulama, eleştirel bakış açısıyla yaklaşabilme becerilerini içeren yüksek sağlık okuryazarlığına sahip olmalarını gerektirmektedir.

Yüksek sağlık okuryazarlığına sahip bireyler, düşük sağlık okuryazarlığına sahip bireylere kıyasla sağlık ile ilgili konulara bireysel ve toplumsal düzlemde daha yetkin hareket edebilmektedirler. Bu bireylerin beslenmelerine dikkat etme, sağlıklarını koruma, sağlık ile ilgili konularda karar verebilme, sağlıklı davranışı ve yaşam tarzı seçebilme becerilerinin gelişmiş düzeyde olduğu bilinmektedir (Sorensen vd., 2012; Speirs vd., 2012).

Yüksek sağlık okuryazarlığı düzeyi, birey ve sağlık profesyonelleri arasındaki iletişim ve etkileşimi doğrudan etkilemektedir. Sağlık okuryazarlığı yüksek bir birey; sağlık sorunlarını sağlık profesyonellerine doğru aktarabilme ve sağlık profesyonellerinin bilgilendirmelerini doğru anlayabilme becerisine sahiptir. Dolayısıyla öz sağlık yönetimini doğru şekilde yapabilmekte ve olası sağlık sorunlarını daha etkili bir şekilde çözebilmektedir.

SONUÇ

Sağlık okuryazarlığı, çağcıl okuryazarlık türleri arasında en yaşamsallarından biridir. Sağlığın insan yaşamı için önemi ve tüm bireylerin sağlık hizmetlerine gereksinim duyduğu düşünüldüğünde, sağlık okuryazarlığının niteliği ve hayati konumu ortaya çıkmaktadır. Sağlık okuryazarlığı; bireyin sağlık ile ilgili bilgilere ulaşması, bu bilgileri anlaması, gündelik yaşamında kullanabilmesi, karar alabilmesi ve sağlık süreçlerine eleştirel yaklaşabilmesi için gerekli zihinsel ve sosyal becerilerdir.

Fonksiyonel sağlık okuryazarlığı, etkileşimsel sağlık okuryazarlığı ve eleştirel sağlık okuryazarlığı olmak üzere üç boyutta ele alınan sağlık okuryazarlığı, bireylerin sağlık süreçlerindeki aktif katılımını ve bilgiye dayalı karar alma süreçlerini güçlendirmektedir. Fonksiyonel sağlık okuryazarlığı, temel sağlık bilgilerini anlamayı ve kullanmayı içerirken, etkileşimsel sağlık okuryazarlığı bireylerin sağlık bilgilerini yeni durumlara uygulayabilme becerisini kapsamaktadır. Eleştirel sağlık okuryazarlığı ise bireylerin sağlık bilgilerini eleştirel bir bakış açısıyla analiz edebilme ve sağlık sisteminin işleyişini sorgulayabilme yeteneğini ifade etmektedir.

Sağlık okuryazarlığının bireylere ve toplumlara yönelik önemli avantajları vardır. Sağlık okuryazarlığı, birey ve toplum nezdinde sağlık ve yaşam kalitesinin artmasına katkı sunan temel faktörlerdendir. Bu bağlamda sağlık okuryazarlık düzeyinin düşük veya yüksek olması söz konusudur. Sağlık okuryazarlığının düşük olması; sağlık bilgilerini anlamakta, yorumlamakta, uygulamada ve analiz etmede zorluk anlamına gelmektedir. Sağlık okuryazarlığının düşük olması, sağlık hizmeti kullanıcıları ile sağlık profesyonelleri arasındaki iletişim ve ilişkiyi de olumsuz etkilemektedir.

Sağlık okuryazarlığı düzeyinin yüksek olması, bireylerin ve toplumların sağlık hizmetlerine erişimini ve bu hizmetlerden yararlanma düzeyini artırmaktadır. Yüksek sağlık okuryazarlığına sahip bireyler, sağlık bilgilerini daha etkin bir şekilde kullanarak sağlıklı yaşam tarzlarını benimseyebilmekte ve sağlık sorunlarını daha etkili bir şekilde yönetebilmektedir. Bu durum, sağlık sisteminin verimliliğini artırmakta ve sağlık hizmeti maliyetlerini düşürmektedir. Özellikle covid-19 pandemisi sürecinde, bireylerin ve toplumların sağlık okuryazarlık seviyelerinin ne kadar önemli olduğu bir kez daha ortaya çıkmıştır. Yüksek sağlık okuryazarlığı, bireyin yanı sıra toplumu da olumlu yönde etkilemektedir. Bu bağlamda yüksek sağlık okuryazarlığı; toplumun daha sağlıklı bireylerden oluşmasını, sağlık sorunlarının daha kolay çözülmesini, koruyucu önlemlerin alınmasını, sağlık iletişiminin daha etkili işlemesini, sağlık hizmetlerinin daha kaliteli olmasını, sağlık sektöründe memnuniyet oranının artmasını ve sağlık ile ilgili kaynakların daha verimli kullanılmasını sağlamaktadır.

FULL TEXTS BOOK

Sağlık okuryazarlığının artırılması, bireysel ve toplumsal sağlık düzeyini yükseltmek için kritik bir öneme sahiptir. Bu kapsamda eğitim programlarının ve sağlık iletişiminin, bireylerin sağlık okuryazarlığını geliştirmeye yönelik stratejilerle zenginleştirilmesi gerekmektedir. Böylelikle, bireylerin sağlık bilgilerine erişimi, bu bilgileri anlaması ve sağlıkla ilgili doğru kararlar alması teşvik edilebilecek ve genel sağlık düzeyinin yükseltilmesi sağlanabilecektir.

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ÜNİVERSİTE ÖĞRENCİLERİNİN KARAR VERME STİLLERİNİN ÇEŞİTLİ DEĞİŞKENLER AÇISINDAN İNCELENMESİ
INVESTIGATION OF UNIVERSITY STUDENTS' DECISION-MAKING STYLES IN TERMS OF VARIOUS VARIABLES

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ÖZET
İnsanlar"günlük yaşam içerisinde birçok karar verme durumunda kalmaktadır. Karar, belirli bir hedef doğrultusunda mevcut olanaklara göre mümkün olabilen çeşitli muhtemel eylem şekillerinden en uygun olanı seçmektir. Karar verme, çeşitli seçenekler arasından seçim ve tercih yapmaya ilişkin bilişsel ve davranışsal çabalar olarak ifade edilebilir. Kişinin yaşamında mutlu olabilmesi için doğru zamanda, doğru yerde, doğru ve uygun kararlar verebilmesi gerekmektedir. Karar verme karmaşık ve aşamalı bir süreçtir. Kişilerin bu süreci algılama ve uygulama tarzları karar verme stili olarak adlandırılmaktadır. Diğer bir ifadeyle karar verme stili, herhangi bir konuda karar verme ile karşı karşıya kalan kişinin gösterdiği yaklaşım, tepki ve eylemlerdir."Üniversite öğrencilerinin üniversite yaşamında doğru ve etkili karar verebilmeleri açısından karar verme stillerinin önemli olduğu düşünülmektedir. Bu araştırmanın amacı, üniversite öğrencilerinin karar verme stillerinin çeşitli değişkenlere göre incelemektir. Araştırmada betimsel tarama yönteminden yararlanılmıştır."Araştırmaya 2023-2024 eğitim öğretim yılında Manisa Celal Bayar Üniversitesi, Salihli İktisadi ve İdari Bilimler Fakültesi ve Salihli Meslek Yüksekokulunda öğrenim gören 231 öğrenci gönüllülük esasına göre katılmıştır. Araştırma verileri, öğrencilere kişisel bilgi formu ve Melbourne Karar Verme Ölçeği uygulanarak toplanmıştır. Elde edilen bulgulara göre, öğrencilerin özsaygı düzeylerinin düşük düzeyde olduğu tespit edilmiştir. Kaçıngan karar verme stili en yüksek puan ortalamasına sahip iken, dikkatli karar verme stili en düşük puan ortalamasına sahiptir. Ayrıca demografik değişkenler (cinsiyet, yaş, sınıf, birim, gelir, yaşadığı yer) ile karar verme stilleri arasında anlamlı ilişkiler tespit edilmiştir.
Anahtar Kelimeler: Karar, Karar Verme, Karar Verme Stili, Üniversite Öğrencileri

ABSTRACT
People have to make many decisions in daily life. Decision is choosing the most appropriate course of action among various possible courses of action, which are possible according to the available possibilities, towards a particular goal."Decision making can be expressed as cognitive and behavioral efforts to choose and choose among various options. In order to be happy in one's life, one must be able to make the right and appropriate decisions at the right time, in the right place. Decision making is a complex and gradual process. The way people perceive and implement this process is called decision-making style. In other words, decision-making style is the approach, reaction and actions of a person who is faced with making a decision on any issue."It is thought that decision-making styles are important for university students to make correct and effective decisions in university life."The purpose of this research is to examine the decision-making styles of university students according to various variables. Descriptive scanning method was used in the research. 231 students studying at Manisa Celal Bayar University, Salihli Faculty of Economics and Administrative Sciences and Salihli Vocational School participated in the research on a voluntary basis in the 2023-2024 academic year. Research data were collected by applying the "Personal Information Form" and "Melbourne Decision Making Scale" to the students. According to the findings, it was determined that the students' self-esteem levels were low. While the avoidant decision-making style has the highest mean score, the careful decision-making style

FULL TEXTS BOOK

has the lowest mean score. Additionally, significant relationships were detected between demographic variables (gender, age, class, unit, income, place of residence) and decision-making styles.
Key Words: Decision, Decision Making, Decision Making Style, University Students

GİRİŞ

İnsanlar tüm yaşam süreçlerinde her zaman karar verme durumunda kalmaktadır. Karar kavramı, hedefe erişmek için var olan olanak ve duruma göre çeşitli seçenekler arasından en uygun olanı tercih etmek olarak tanımlanabilir (Ghareeb ve Kaya, 2022: 119). Karar verme, var olan alternatiflerden en uygun olanı seçme süreci olarak ifade edilebilir (Kırımoğlu, 2017: 2789). Bu bağlamda karar verme bir süreç, karar ise sonuçtur (Nas, 2010, 43). Heppner'e (1978) göre karar verme, alternatifleri değerlendirmeyi ve sonuçlarını takip etmeyi içerir (Akpınar vd., 2015: 93). Başka bir ifadeyle karar verme, birçok faktör dikkate alınarak çeşitli seçeneklerin seçiminde bu seçenekleri açıklamanın yanı sıra uygun olanı hedeflemek, isteyerek eyleme geçmek ve bu seçenekler arasından tercih yapma sürecidir (Harris, 1998; Tükel, 2021: 44). Karar verme süreci, beş aşama içermektir. İlk aşamada verilecek karara yönelik amaç belirlemek ya da sorun tanımlamak, ikinci aşamada belirlenen amaçlar ile tanımlanan sorunların irdelenmesi ve önceliklerin saptanması, üçüncü aşamada sorunu ortadan kaldıracak çözüm alternatiflerinin belirlenmesi, dördüncü aşamada üretilen çözüm alternatiflerinin irdelenmesi ve son aşamada ise seçim kriterlerinin belirlenmesi ve alternatifler arasından en uygun olanın seçilmesi yer almaktadır (Koçel, 2020:139). Karar verme sürecinde kişinin tercihinde, onun sahip olduğu kişisel özellikleri ve çevresel faktörler etkide bulunabilir (Akpınar vd., 2015: 94). Öğrencilerin üniversite ortamına adapte olabilmeleri için doğru ve etkili karar verme becerilerine sahip olmaları gerekmektedir (Mutlu ve Kaya, 2023: 59). Bu bağlamda karar verme stilleri önemli bir konu olarak karşımıza çıkmaktadır. Literatüre bakıldığında karar verme stili kavramımna ilişkin birçok farklı tanım olduğu görülmektedir. Phillips ve diğerleri (1985) karar verme stili kavramını "kişinin, karar verme sürecindeki bakış açısını, davranışlarını ve verdiği tepkileri" şeklinde tanımlamaktadır (Yılmaz, 2023b: 18). Diğer bir ifadeyle karar verme stili, "karar verme sürecinde kişinin problem durumuna ilişkin tutumu" olarak tanımlanabilir (Kuzgun, 2006: 148). Scott ve Bruce (1995) karar verme stilini, "bireyin bir karar verme durumu ile karşı karşıya kaldığında öğrenilmiş ve alışkanlık haline gelmiş tepki seti" olarak tanımlamışlardır (Yılmaz, 2023a: 54). Literatürde karar verme stillerine ilişkin birçok alanda çalışmaların yapıldığı ve her alana özgü yaklaşımların ileri sürüldüğü görülmektedir. Bu çalışmada Mann ve arkadaşlarının (1998) farklı toplumlardaki üniversite öğrencilerine yönelik gerçekleştirdikleri araştırmalarda belirlenen karar verme stilleri göz önüne alınmıştır. Söz konusu karar verme stilleri (Deniz, 2004: 23-25): Dikkatli karar verme stilinde; birey karar vermeden önce dikkatli bir şekilde bilgi toplar ve seçenekleri titizlikle inceledikten sonra tercih yapar. Kaçıngan karar verme"stilinde; birey karar vermekten kaçınır, karar vermeyi başkalarına bırakma eğilimi gösterir ve böylece sorumluluğu başkalarına bırakır. Erteleyici karar verme stilinde; birey kararları herhangi bir geçerli nedeni olmadan devamlı olarak erteler, geciktirir ve sürüncemede bırakır. Panik karar verme stilinde; birey bir karar verme ile karşı karşıya kaldığında, kendini zaman baskısında hissederek aceleci davranışlar gösterip çok hızlı biçimde sonuca ulaşmaya çalışır. Bu boyutların dışında ölçekte özsaygı düzeyi de ölçülmektedir. Özsaygı, karar verme sürecini etkileyen önemli bir faktördür. Yüksek özsaygıya sahip insanlar verdikleri kararlardan emin olurlar" (Avşaroğlu ve Üre, 2007: 91). Üniversite ortamına adapte olmada zorlanan öğrencilere destek olabilmek için öncelikle nasıl bir karar verme stiline sahip olduklarının bilinmesi gerekmektedir (Mutlu ve Kaya, 2023: 59). Dolayısıyla üniversite öğrencilerinin üniversite yaşamında doğru ve etkili karar verebilmeleri açısından karar verme stillerinin önemli olduğu düşünülmektedir. Bu noktadan hareketle"bu çalışmanın amacı, üniversite öğrencilerinin karar verme stillerini çeşitli değişkenlere göre incelemektir.

FULL TEXTS BOOK

YÖNTEM

Araştırmanın Yöntemi ve Amacı

Araştırmada ilişkisel tarama ve fark analizi modeli kullanılmıştır. Araştırma verilerinin toplanmasında anket yöntemi uygulanmıştır. Bu araştırmanın amacı, üniversite öğrencilerinin karar verme stillerini belirlemek ve karar verme stillerini sosyo-demografik özelliklerine göre incelemektir. Bu amaç doğrultusunda aşağıdaki sorulara yanıt aranmıştır:

1. Üniversite öğrencileri karar verme stillerini hangi düzeyde kullanmaktadır?
2. Üniversite öğrencilerinin sosyo-demografik özelliklerine göre karar verme stillerinde anlamlı farklılık var mıdır?

Araştırmanın Evreni ve Örneklemi

Araştırmanın“evrenini 2023-2024 eğitim öğretim yılında öğrenim gören Manisa Celal Bayar Üniversitesi Salihli Meslek Yüksekokulu ve Salihli İktisadi ve İdari Bilimler Fakültesi öğrencileri oluşturmaktadır. Örneklemi ise tesadüfi örnekleme yöntemiyle anket uygulanan 231 öğrenci oluşturmaktadır.”

Veri Toplama Araçları

Kişisel Bilgi Formu: Araştırmacı tarafından oluşturulan form; cinsiyet, yaş, sınıf, birim, gelir ve yaşadığı yer ile ilgili sosyo-demografik özelliklerine ilişkin bilgileri içeren sorulardan oluşmaktadır.

Araştırmaya katılan öğrencilerin karar verme stillerini belirlemeye yönelik “Melbourne Karar Verme Ölçeği” kullanılmıştır. Orijinali Mann ve diğerleri (1998), tarafından geliştirilmiş olan Melbourne Karar Verme Ölçeğini, (Melbourne Decision Making Questionary) Deniz (2004), Türkçe’ye uyarlayarak geçerlik ve güvenirlik çalışmasını yapmıştır. Melbourne Karar Verme Ölçeği iki bölümeden oluşmaktadır (Mann vd., 1998; Deniz, 2004: 23-35):

I. Bölüm-Öz Saygı: Karar vermede öz saygıyı (kendine güven) belirlemeye yöneliktir. 6 madde ve tek boyut içermektedir. 3’lü likert tipi ölçekte 2, 4, 6. maddeler ters yönde puanlanmaktadır. Bu ölçekte “Doğru” yanıtı 2 puan, “Bazen” yanıtı 1 puan, “Doğru değil” yanıtı 0 puandır. Ölçekten alınabilecek maksimum puan 12’dir. Yüksek puanlar karar vermede öz saygının yüksek olduğunu göstermektedir

II. Bölüm-Ölçeğin ikinci bölümü ise karar verme stillerini ölçmeye yöneliktir.“Ölçek 22 madde ve 4 alt boyut içermektedir.”Bunlar; dikkatli karar verme, kaçıngan karar verme, erteleyici karar verme ve panik karar verme boyutlarıdır.

Üçlü likert tipi ölçekte “Doğru” 2 puan, “Bazen” 1 puan, “Doğru değil” 0 puandır. Dikkatli Karar Verme Stili 0-12, Kaçıngan Karar Verme Stili 0-12, Erteleyici Karar Verme Stili 0-10 ve Panik Karar Verme Stili 0-10 puan arasında değerlendirilir. Puanların yüksekliği ilgili karar verme stilinin kullanıldığı şeklinde yorumlanmaktadır.” Bu çalışmada ölçeğe ait Cronbach Alpha değeri .80’dir.

Verilerin Analizi

Araştırmada, karar verme stillerinin tanımlayıcı istatistik analizi yöntemi ile sosyo-demografik faktörler ve karar verme stillerine yönelik farklılık analizi kullanılmıştır. Verilerin analizinde $p<0.05$ anlamlılık düzeyi esas alınmıştır.

BULGULAR

Tablo 1. Katılımcıların Sosyo-Demografik Özelliklerinin Frekans Dağılımı

Değişkenler	Grup	f	%
Cinsiyet	Kız	138	59,7
	Erkek	93	40,3
Yaş	18-21 yaş	201	87
	22-23 yaş	24	10,4
	24 ve üzeri	6	2,6

FULL TEXTS BOOK

Sınıf Düzeyi	1. Sınıf	122	52,8
	2. Sınıf	68	29,4
	3. Sınıf	26	11,3
	4. Sınıf	15	6,5
Birim	Salihli MYO	144	62,3
	Salihli İİBF	87	37,7
Gelir	Düşük	66	28,6
	Orta	138	59,7
	İyi	21	9,1
	Çok iyi	6	2,6
Yaşadığı yer	Kırsal	27	11,7
	Şehir	108	46,8
	Büyükşehir	96	41,6

Tablo 1'de görüldüğü gibi, araştırmaya katılan öğrencilerin %59,7'si kız, %40,3'ü ise erkektir. Yaş dağılımına bakıldığında öğrencilerin %87'si 18-21, %10,4'ü 22-23 yaş aralığında, %2,6'sı ise 24 ve üzeri yaş grubunda yer almaktadır. Araştırmaya katılan öğrencilerin %52,8'i 1.sınıf, %29,4'ü 2.sınıf, %11,3'ü 3.sınıf, %6,5'i ise 4.sınıftadır. Araştırmaya katılan öğrencilerin %62,3'ü Slihli MYO'da, %37,7'si Salihli İİBF'de öğrenim görmektedir. Araştırmaya katılan öğrencilerin %28,6'sı düşük, %59,7'si orta, %9,1'i iyi ve %2,6'sı çok iyi gelir düzeyine sahiptir. Yaşadığı yer değişkenine göre bakıldığında öğrencilerin %46,8'i şehirde, %41,6'sı büyükşehirde ve %11,7'si kırsalda yaşamaktadır.

Tablo 2. Karar Verme Stillerinin Ortalama ve Standart Sapma Değerleri

Değişkenler	**N**	**Min.**	**Max.**	**Ortalama**	**Std. Sapma**
Özsaygı	231	0	12	2,74	,757
Dikkatli Karar Verme	231	0	12	2,69	,825
Kaçıngan Karar Verme	231	0	12	7,90	,982
Erteleyici Karar Verme	231	0	10	6,17	,897
Panik Karar Verme	231	0	10	5,26	,860

Tablo 2'de görüldüğü gibi, özsaygı $\bar{X}$ =2,74, karar verme stilleri alt boyutları olan dikkatli karar verme $\bar{X}$=2,69, kaçıngan karar verme $\bar{X}$ =7,90, erteleyici karar verme $\bar{X}$=6,27 ve panik karar verme $\bar{X}$ =5,26 puan ortalamasına sahiptir. Buna göre, kaçıngan karar verme stilli en yüksek puan ortalamasına sahiptir. Bunu da erteleyici karar verme stili izlemektedir. Diğer taraftan dikkatli karar verme stili en düşük puan ortalamasına sahiptir.

Tablo 3. Öğrencilerin Karar Verme Stillerinin Cinsiyete Göre Fark Testi (t-Testi)

Değişkenler	**Cinsiyet**	**N**	**$\bar{X}$**	**Ss**	**t**	**p**
Özsaygı	Kız	138	2,84	1,845	1,057	,298
	Erkek	93	2,59	1,565		
Dikkatli Karar Verme	Kız	138	2,97	2,370	1,932	,024
	Erkek	93	2,27	2,163		
Kaçıngan Karar Verme	Kız	138	8,03	2,766	1,845	,058
	Erkek	93	7,69	2,030		
Erteleyici Karar Verme	Kız	138	5,98	2,538	1,475	,049
	Erkek	93	6,45	2,064		
Panik Karar Verme	Kız	138	5,10	2,761	1,145	,003
	Erkek	93	5,50	2,121		

FULL TEXTS BOOK

Tablo 3'e bakıldığında, karar verme stilleri alt boyutlarından dikkatli karar verme stili (t=1,932;p<0.05), erteleyici karar verme stili (t=1,475;p<0.05) ve panik karar verme stili (t=1,145;p<0.05) puanlarının cinsiyete göre anlamlı farklılık gösterdiği tespit edilmiştir. Kız öğrencilerin dikkatli karar verme stiline ait puan, erkek öğrencilerin puanına göre anlamlı düzeyde daha yüksektir. Erkek öğrencilerin erteleyici karar verme stili ve panik karar verme stiline ait puanlar, kız öğrencilerin puanına göre anlamlı düzeyde daha yüksektir. Özsaygı (t=1,057;p>0.05), ve kaçıngan karar verme stili (t=1,845;p>0.05) puanlarının cinsiyete göre anlamlı farklılık göstermediği tespit edilmiştir

Tablo 4. Öğrencilerin Karar Verme Stillerinin Yaşa Göre Fark (Anova) Testi

Değişkenler	**Yaş**	**N**	**$\bar{X}$**	**Ss**	**F**	**p**
Özsaygı	18-21 yaş	201	2,80	1,734	4,740	,010
	22-23 yaş	24	1,88	1,569		
	24 ve üzeri	6	4,00	2,190		
Dikkatli Karar Verme	18-21 yaş	201	2,82	2,418	2,615	,075
	22-23 yaş	24	1,88	1,392		
	24 ve üzeri	6	1,50	,547		
Kaçıngan Karar Verme	18-21 yaş	201	7,84	2,927	2,767	,065
	22-23 yaş	24	8,88	1,569		
	24 ve üzeri	6	6,00	4,381		
Erteleyici Karar Verme	18-21 yaş	201	6,05	2,307	2,259	,107
	22-23 yaş	24	7,13	2,626		
	24 ve üzeri	6	6,50	2,834		
Panik Karar Verme	18-21 yaş	201	5,19	2,523	,530	,589
	22-23 yaş	24	5,75	2,053		
	24 ve üzeri	6	5,50	1,643		

Tablo 4 incelendiğinde özsaygı alt boyutuna ait puanın (F=4,740; p<0.05) yaş değişkenine göre anlamlı farklılık gösterdiği tespit edilmiştir. Özsaygı alt boyutu ile olan farklılığın nedenini tespit etmek için yapılan Tukey HSD testine göre 24 ve üstü yaş aralığında olanların puanı 22-23 yaş aralığında olanlara göre daha yüksektir ($\bar{x}$=4,00). Dikkatli (F=2,615; p>0.05, kaçıngan (F=2,767; p>0.05), erteleyici (F=2,259; p>0.05) ve panik karar (F=,530; p>0.05) verme stillerine ait puanların yaş değişkenine göre anlamlı farklılık göstermediği tespit edilmiştir.

Tablo 5. Öğrencilerin Karar Verme Stillerinin Sınıf Düzeyine Göre Fark (Anova) Testi

Değişkenler	**Sınıf Düzeyi**	**N**	**$\bar{X}$**	**Ss**	**F**	**p**
Özsaygı	1. Sınıf	122	2,87	1,757	1,623	,185
	2. Sınıf	68	2,50	1,670		
	3. Sınıf	26	2,73	1,929		
	4. Sınıf	15	2,80	1,897		
Dikkatli Karar Verme	1. Sınıf	122	2,81	2,392	1,694	,169
	2. Sınıf	68	2,68	2,301		
	3. Sınıf	26	2,08	1,937		
	4. Sınıf	15	2,80	2,541		
Kaçıngan Karar Verme	1. Sınıf	122	8,04	2,826	,139	,937
	2. Sınıf	68	7,87	2,911		
	3. Sınıf	26	8,00	2,993		
	4. Sınıf	15	6,67	2,015		

FULL TEXTS BOOK

Erteleyici Karar Verme	1. Sınıf	122	5,94	2,382	2,017	,031
	2. Sınıf	68	6,59	2,260		
	3. Sınıf	26	6,27	2,892		
	4. Sınıf	15	5,93	2,153		
Panik Karar Verme	1. Sınıf	122	5,11	2,531	2,047	,108
	2. Sınıf	68	5,47	2,605		
	3. Sınıf	26	5,46	2,928		
	4. Sınıf	15	5,20	2,007		

Tablo 5 incelendiğinde erteleyici karar verme stiline ait puanın (F=2,017; p<0.05) sınıf değişkenine göre anlamlı farklılık gösterdiği tespit edilmiştir. Erteleyici karar verme stili ile olan farklılığın nedenini tespit etmek için yapılan Tukey HSD testine göre 2. Sınıfta olanların puanı 4. sınıfta olanlara göre daha yüksektir ($\bar{x}$=4,00). Özsaygı (F=1,623; p>0.05), dikkatli (F=1,694; p>0.05), kaçıngan (F=,139; p>0.05) ve panik (F=2,047; p>0.05) karar verme stillerine ait puanların sınıf değişkenine göre anlamlı farklılık göstermediği tespit edilmiştir.

Tablo 6. Öğrencilerin Karar Verme Stillerinin Birime Göre Fark Testi (t-Testi)

Değişkenler	**Birim**	**N**	**$\bar{X}$**	**Ss**	**t**	**p**
Özsaygı	MYO	144	2,63	1,721	1,284	,200
	İİBF	87	2,93	1,809		
Dikkatli Karar Verme	MYO	144	2,63	2,323	,532	,596
	İİBF	87	2,79	2,338		
Kaçıngan Karar Verme	MYO	144	7,40	2,894	2,474	,001
	İİBF	87	8,72	2,679		
Erteleyici Karar Verme	MYO	144	6,21	2,344	,321	,748
	İİBF	87	6,10	2,496		
Panik Karar Verme	MYO	144	5,54	2,606	2,170	,031
	İİBF	87	4,79	2,426		

Tablo 6'ya bakıldığında, karar verme stilleri alt boyutlarından kaçıngan karar verme stili (t=2,474; p<0.05) ve panik karar verme stili (t=2,170; p<0.05) puanlarının birime göre anlamlı farklılık gösterdiği tespit edilmiştir. İİBF öğrencilerinin kaçıngan karar verme stiline ait puanı, MYO öğrencilerinin puanına göre anlamlı düzeyde daha yüksektir. Özsaygı (t=1,284; p>0.05), dikkatli karar verme stili (t=,532; p>0.05) ve erteleyici karar verme stili (t=,321; p>0.05) puanlarının birime göre anlamlı farklılık göstermediği tespit edilmiştir.

Tablo 7. Öğrencilerin Karar Verme Stillerinin Gelire Göre Fark (Anova) Testi

Değişkenler	**Gelir**	**N**	**$\bar{X}$**	**Ss**	**F**	**p**
Özsaygı	Düşük	66	2,00	,902	2,009	,114
	Orta	138	2,14	1,871		
	İyi	21	3,29	1,626		
	Çok iyi	6	2,85	2,190		
Dikkatli Karar Verme	Düşük	66	1,50	2,180	3,448	,017
	Orta	138	2,14	2,449		
	İyi	21	3,71	1,528		
	Çok iyi	6	2,85	1,643		
Kaçıngan Karar Verme	Düşük	66	9,00	2,707	4,445	,005
	Orta	138	8,39	2,819		

FULL TEXTS BOOK

	İyi	21	7,14	2,945		
	Çok iyi	6	7,00	1,095		
Erteleyici Karar Verme	Düşük	66	5,14	2,007	1,493	,217
	Orta	138	6,22	2,385		
	İyi	21	6,50	2,478		
	Çok iyi	6	6,36	2,738		
Panik Karar Verme	Düşük	66	5,09	1,719	,521	,668
	Orta	138	5,30	2,483		
	İyi	21	5,57	2,829		
	Çok iyi	6	5,50	2,834		

Tablo 7'ye bakıldığında, karar verme stilleri alt boyutlarından dikkatli karar verme stili (F=3,488; p<0.05) ve kaçıngan karar verme stili (F=4,445; p<0.05) puanlarının gelire göre anlamlı farklılık gösterdiği tespit edilmiştir. Tukey HSD testi sonuçlarına göre gelir düzeyi iyi ve çok iyi olan öğrencilerin dikkatli karar verme stillerine ait puanlar, gelir düzeyi düşük olan öğrencilerin puanlarına göre anlamlı düzeyde daha yüksektir. Gelir düzeyi düşük olan öğrencilerin kaçıngan karar verme stiline ait puanı, gelir düzeyi iyi ve çok iyi olan öğrencilere göre anlamlı düzeyde daha yüksektir. Özsaygı (F=2,009p>0.05), erteleyici karar verme stili (F=1,493; p>0.05) ve panik karar verme stili (F=,521;p>0.05) puanlarının gelire göre anlamlı farklılık göstermediği tespit edilmiştir.

Tablo 8. Öğrencilerin Karar Verme Stillerinin Yaşam Yerine Göre Fark (Anova) Testi

Değişkenler	**Yaşam Yeri**	**N**	**$\bar{X}$**	**Ss**	**F**	**p**
Özsaygı	Kırsal	27	2,44	1,601	6,280	,002
	Şehir	108	3,17	1,931		
	Büyükşehir	96	2,34	1,478		
Dikkatli Karar Verme	Kırsal	27	2,86	2,674	4,799	,009
	Şehir	108	3,67	2,235		
	Büyükşehir	96	2,22	2,229		
Kaçıngan Karar Verme	Kırsal	27	8,00	2,631	3,068	,048
	Şehir	108	7,42	2,301		
	Büyükşehir	96	8,41	2,328		
Erteleyici Karar Verme	Kırsal	27	6,22	2,439	,231	,794
	Şehir	108	6,06	2,699		
	Büyükşehir	96	6,28	2,014		
Panik Karar Verme	Kırsal	27	5,78	2,292	2,566	,079
	Şehir	108	4,86	2,627		
	Büyükşehir	96	5,56	2,512		

Tablo 8'e bakıldığında, özsaygı (F=6,280; p<0.05), karar verme stilleri alt boyutlarından dikkatli karar verme stili (F=4,799; p<0.05), kaçıngan karar verme stili (F=3,068; p<0.05) puanlarının yaşadığı yere göre anlamlı farklılık gösterdiği tespit edilmiştir. Tukey HSD testi sonuçlarına göre yaşam yeri şehir olan öğrencilerin özsagyı ve dikkatli karar verme stillerine ait puanları, yaşam yeri kırsal ve büyükşehir olan öğrencilerin puanlarına göre anlamlı düzeyde daha yüksektir. Yaşam yeri büyükşehir olan öğrencilerin kaçıngan karar verme stiline ait puanı, yaşam yeri kırsal ve şehir olan öğrencilere göre anlamlı düzeyde daha yüksektir. Erteleyici karar verme stili (F=,231; p>0.05) ve panik karar verme stili (F=2,566;p>0.05) puanlarının yaşam yerine göre anlamlı farklılık göstermediği tespit edilmiştir.

FULL TEXTS BOOK

SONUÇ

Bu bölümde, araştırmaya katılan öğrencilerin karar verme stilleri ve cinsiyet, yaş, sınıf, birim, gelir ve yaşadığı yer değişkenlerine göre elde edilen bulgular tartışılmış ve yorumlanmıştır. Bu bağlamda, elde edilen bulgular aşağıda özetlenmiştir.

Araştırmanın ölçeğe ilişkin tanımlayıcı istatistiki analiz sonuçlarına bakıldığında, araştırmaya katılan öğrencilerin karar vermede özsaygı düzeylerinin düşük olduğu, karar verme stilleri alt boyutları olan dikkatli karar verme ve kaçıngan karar verme stillerini düşük düzeyde kullandıkları, erteleyici karar verme ve panik karar verme stillerini orta düzeyde kullandıkları, kaçıngan karar verme stilini ise yüksek düzeyde kullandıkları görülmektedir. Buna göre, öğrencilerin en çok kullandıkları karar verme stili kaçıngan ve ertelemeci iken, en az kullandıkları karar verme stili ise dikkatli karar vermedir. Literatüre farklı sonuçların elde edildiği çalışmalar bulunmaktadır. Akpınar ve Akpınar'ın (2017) "Yüksekokullarda öğrenim gören öğrencilerin bazı değişkenler açısından problem çözme becerileri ve karar verme stillerinin incelenmesi" başlıklı yaptığı çalışmada, karar verme stillerinde dikkatli karar verme en yüksek puana sahip iken, kaçıngan karar verme en düşük puana sahiptir. Ayrıca karar vermede özsaygı düzeyi yüksek olarak tespit edilmiştir.

Araştırmaya katılan öğrencilerin karar verme stilleri, cinsiyet değişkenine göre incelendiğinde, dikkatli karar verme stili, erteleyici karar verme stili ve panik karar verme stili puanlarında anlamlı bir farklılık olduğu tespit edilmiştir. Farklılığın nedenine bakıldığında, kız öğrenciler dikkatli karar verme stilini erkeklere göre daha fazla kullanırken, erkek öğrencilerin erteleyici karar verme ve panik karar verme stillerini kızlara göre daha fazla kullandıkları görülmektedir. Buna göre, cinsiyetin karar verme stillerini etkilediği söylenebilir.

Araştırmaya katılan öğrencilerin karar verme stilleri, yaş değişkenine göre incelendiğinde, karar vermede özsaygı puanının yaşa göre anlamlı farklılık gösterdiği tespit edilmiştir. Farklılığın nedeni 24 ve üstü yaşında olan öğrencilerin özsaygısı diğerlerine göre daha yüksek olmasından kaynaklanmaktadır. Buna göre kişilerin yaşı arttıkça özsaygılarının arttığı söylenebilir. Karar verme stilleri (dikkatli, kaçngan, erteleyici, panik) ile yaş arasında anlamlı fark bulunamamıştır. Bu bağlamda yaşın karar verme stillerinde etkili olmadığı söylenebilir.

Araştırmaya katılan öğrencilerin karar verme stilleri, sınıf değişkenine göre incelendiğinde, karar vermede özsaygı puanının sınıfa göre anlamlı farklılık göstermediği tespit edilmiştir. Karar verme stilleri alt boyutlarından sadece erteleyici karar verme ile sınıf arasında anlamlı fark bulunurken (2. sınıf öğrencilerinin erteleyici karar verme puanı diğerlerine göre daha yüksektir.), diğer alt boyutlar ile anlamlı fark bulunamamıştır. Bu bağlamda genel olarak sınıf değişkeninin karar verme stillerinde etkili olmadığı söylenebilir.

Araştırmaya katılan öğrencilerin karar verme stilleri, birim değişkenine göre incelendiğinde, karar vermede özsaygı puanının birime göre anlamlı farklılık göstermediği tespit edilmiştir. Karar verme stilleri alt boyutlarından kaçıngan karar verme ve panik karar verme ile birim değişkeni arasında anlamlı fark bulunurken (İİBF öğrencilerinin kaçından karar verme puanı MYO öğrencilerinin puanında daha yüksektir.), diğer alt boyutlar ile birim değişkeni arasında ise anlamlı fark bulunamamıştır. Bu bağlamda genel olarak sınıf değişkeninin karar verme stillerinde etkili olmadığı söylenebilir.

Araştırmaya katılan öğrencilerin karar verme stilleri, gelir değişkenine göre incelendiğinde, karar vermede özsaygı puanının gelire göre anlamlı farklılık göstermediği tespit edilmiştir. Karar verme stilleri alt boyutlarından dikkatli karar verme (gelir düzeyi iyi ve çok iyi olan öğrencilerin dikkatli karar verme puanları, gelir düzeyi düşük olan öğrencilere göre daha yüksektir.) ve kaçıngan karar verme (gelir düzeyi düşük olan öğrencilerin kaçıngan karar verme puanı, gelir düzeyi iyi ve çok iyi olan öğrencilere göre daha yüksektir.) ile gelir değişkeni arasında anlamlı fark bulunurken, diğer alt boyutlar ile gelir değişkeni arasında ise anlamlı fark bulunamamıştır. Bu bağlamda genel olarak gelir değişkeninin karar verme stillerinde etkili olduğu söylenebilir.

FULL TEXTS BOOK

Araştırmaya katılan öğrencilerin karar verme stilleri, yaşadığı yer değişkenine göre incelendiğinde, karar vermede özsaygı puanının yaşadığı yere göre anlamlı farklılık gösterdiği tespit edilmiştir. Bunun nedeni yaşam yeri şehir olan öğrencilerin özsagyı puanları, yaşam yeri kırsal ve büyükşehir olan öğrencilerin puanlarına göre daha yüksek olmasından kaynaklanmaktadır. Karar verme stilleri alt boyutlarından dikkatli karar verme (yaşam yeri şehir olan öğrencilerin dikkatli karar verme puanları diğerlerine göre daha yüksektir.) ve kaçıngan karar verme (yaşam yeri büyükşehir olan öğrencilerin kaçıngan karar verme puanı diğerlerine göre daha yüksektir.) puanlarının yaşadığı yere“göre anlamlı farklılık gösterdiği tespit edilmiştir.

Sonuç olarak üniversitelerde öğrencilerinin karar verme stilleri önem ulaştıkları sonuçlar açısından büyük önem taşımaktadır. Dolayısıyla üniversitelerde öğrencilerin karar verme becerilerini geliştirecek sosyal ve kültürel faaliyetlere yer verilmesi, bu konulara ilişkin farkındalık yaratmaya yönelik hem öğrencilere hem de akademik ve idari personele gerekli eğitimlerin verilmesi yararlı olabilir.

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ÜNİVERSİTE ÖĞRENCİLERİNİN EMPATİK EĞİLİMLERİ İLE MOTİVASYON DÜZEYLERİ ARASINDAKİ İLİŞKİ
THE RELATIONSHIP BETWEEN UNIVERSITY STUDENTS' EMPATHIC TENDENCIES AND MOTIVATION LEVELS

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ÖZET
İnsan sosyal bir varlık olduğu için başkalarıyla etkileşim ve iletişim kurarak varlığını sürdürmekte ve sosyalleşmektedir. Sağlıklı ilişkiler kurmanın ve sürdürmenin en etkili yolu empati kurmaktan geçmektedir. Empati, bireyin kendisini karşısındaki kişinin yerine koyarak, onun duygu ve düşüncelerini doğru olarak anlaması ve karşısındaki kişiye bunu hissettirmesidir. Motivasyon, bireyin hedef ve amaçları doğrultusunda kendi isteği ile ya da dışarıdan bir etki ile hareket emesidir. Empatik eğilimi yüksek olan kişilerin motivasyon düzeylerinin de yüksek olduğu düşünülmektedir. Bu noktadan hareketle bu araştırmanın amacı, üniversite öğrencilerinin empatik eğilimleri ve motivasyon düzeyleri arasındaki ilişkiyi incelemektir. Araştırmanın örneklemini Salihli Meslek Yüksekokulunda 2023-2024 eğitim öğretim yılında öğrenim gören 177 öğrenci oluşturmaktadır. Araştırma ilişkisel tarama modeline uygun yapılmıştır. Veri toplama aracı olarak "Kişisel Bilgi Formu", "Empatik Eğilim" ve "Motivasyon" ölçeği kullanılmıştır. Araştırma sonucunda, öğrencilerin algısına göre empatik eğilim ile Motivasyon arasında istatistiksel olarak anlamlı ilişkiler olduğu görülmüştür.
Anahtar Kelimeler: Empatik Eğilim, Motivasyon, Üniversite Öğrencileri

ABSTRACT
Since humans are social beings, they maintain their existence and socialize by interacting and communicating with others. The most effective way to establish and maintain healthy relationships is through empathy. Empathy is the ability of an individual to put himself in the other person's shoes, accurately understand his feelings and thoughts, and make the other person feel this. Motivation is the individual's ability to act voluntarily or under external influence in line with his goals and objectives. It is thought that people with high empathic tendencies also have high motivation levels. Starting from this point, the aim of this research is to examine the relationship between university students' empathic tendencies and motivation levels. The sample of the research consists of 177 students studying at Salihli Vocational High School in the 2023-2024 academic year. The research was conducted in accordance with the relational screening model. "Personal Information Form", "Empathetic Tendency" and "Motivation" scales were used as data collection tools. As a result of the research, it was seen that there were statistically significant relationships between empathic tendency and Motivation according to the students' perception.
Key Words: Empathic Tendency, Motivation, University Students

GİRİŞ
İlk olarak Lipps tarafından kullanılan empati kavramı Yunancada 'emp' teriminden türemiş olup, İngilizce 'empathy' sözcüğü ile kullanılmaktadır. Empati kavramı, Türk dilinde duygudaşlık anlamına gelmektedir (Sabirli, 2024: 10). Dökmen'e (2005) göre bu kavram, "aynı duyguların paylaşılması" anlamına gelmektedir. Empati kavramı; "kişinin kendisini karşısındakinin yerine koyması, karşıdaki kişinin duygularını ve düşüncelerini doğru anlaması, hissetmesi ve bunu da ona hissettirmesi" olarak tanımlanmaktadır (Işık, 2024: 586). Diğer bir ifadeyle empati, başkalarının yerine kendini koyarak ya da kendi bakış açısından olayları ve hayatı anlayabilme sanatı şeklinde ifade edilebilir (Gül vd.,

FULL TEXTS BOOK

2017:1862). Davis (1983) empatiyi, "bir kişinin gözlenebilir deneyimlerine diğer kişinin tepkileridir" şeklinde tanımlarken (Kaya ve Çolakoğlu, 2015: 22), Rogers (1983) "insanların şahsi iletişimde oldukları kişilerin ruh haline bürünmesi, durumları onların gözü ile görmesi, o kişilerin duygu ve davranışlarını doğru olarak kabul etmesi ve sonuç olarak bu tavırlarını onlara bildirmesi süreci" olarak tanımlamıştır (Sabirli, 2024: 12). Hogan (1969) ise empati kavramını, başka bir insanın içinde bulunduğu durumu zihinde ve hayali olarak algılama durumu ya da kişi aynı durumu hiç yaşamamış dahi olsa diğer insanların duygularını anlayabilme becerisi şeklinde ifade etmiştir (Aydın, 2023: 29). Bir başka tanıma göre ise empati, bir kişinin başka bir kişinin duygularını anlayarak o kişiyle ilişki oluşturmasıdır (Türk, 2023: 4). Empatik eğilim kavramı ise, kişinin rutin yaşamında kendisini karşısındaki kişinin yerine koyabilme ve yaşadığı olaylara ve içinde bulunduğu duruma onun gözünden bakabilme potansiyeli olarak tanımlanabilir (Aydın, 2023: 27). Diğer bir deyişle empatik eğilim, kişilerin duygusal halini ve duygusal derinliğini ortaya koyabilme becerisi olarak tanımlanabilir. Dolayısıyla empatik eğilim, empatinin duygular ile ilişkisini açıklar (Atasoy, 2024: 4). Empatik eğilim, empatik duyarlılık ile ortaya çıkmaktadır. Empatik eğilimi yüksek olan kişiler kolaylıkla empati kurabilirler. Empatik eğilimi yüksek olanların yaşama pozitif bakan, hoşgörülü, özgüvenli, psikolojisi sağlam, sevecen, yardımsever ve motivasyonu yüksek kişiler oldukları söylenebilir (Yüksel, 2004: 343). Empati becerisi, kişinin sosyal ilişkilerinin daha pozitif ve kaliteli olmasına katkıda bulunmaktadır. Bu durum kişilerin motivasyonunu da olumlu yönde etkilemektedir (Aydın Kartal ve Aker, 2020: 98).

Motivasyon, insan davranışlarına yön veren bir güçtür. Bu bağlamda motivasyon, kişinin içindeki gücü harekete geçirme, bir şeye istek duyma ve ona ulaşma isteğidir. Motivasyon gerek eğitim yaşamında öğrenciler, gerekse iş yaşamında çalışanların başarısı açısından önemli bir role sahiptir (Korkmazer, 2020: 502). Çünkü motivasyon, kişilerin ihtiyaç duyduğu neredeyse her şeyle yakından ilişkilidir. Bu açıdan motivasyon, kişilerin hedeflerini gerçekleştirmeye yönelik ortaya koyduğu çabalardır (Tataroğlu, 2017: 1). Akademik açıdan motivasyonu yüksek olan öğrenciler derslere istekli bir şekilde katılarak derslere yönelik başarıları ve performansları olumlu etkilenir (Korkmazer, 2020: 502). Motivasyon kavramını, Türk Dil Kurumu "hedefe doğru yönelmeye neden olan zihinsel bir durum" olarak tanımlanmaktadır (TDK, 2011). Tucker vd. (2002) motivasyonu, "öğrencinin eğitime olan yatırımı ve bağlılığını belirleyen zihinsel, duygusal ve davranışsal belirleyicileri" şeklinde tanımlamaktadır (Ergin ve Karataş, 2018: 868). Motivasyon kişide çalışma isteği uyandıran ve bu çalışmanın sürekliliğini sağlayan güçler topluluğudur (Güney, 2013: 353). Motivasyonun genel olarak iç ve dış motivasyon olmak üzere iki türü vardır. Eğitimde öğrencilerin başarı motivasyonunda da etkili olan içsel ve dışsal kaynaklar vardır (Ergin ve Karataş, 2018: 868). İç motivasyon, dışarıdan herhangi bir etki olmadan kişinin belirli davranışlara yönelmesi ve odaklanmasıdır. İçsel motivasyonda davranışlar kişinin içinden gelen güçle ilgi, merak, ihtiyaç vb. gibi duygularla kendiliğinden ortaya çıkmaktadır (Gömleksiz ve Serhatlıoğlu, 2013: 102). İç motivasyonda kişinin elde ettiği sonuç; bireysel mutluluk, sahip olduğu inanç ve beklentiler doğrultusunda ulaştığı tatmindir (Ağduman, 2014: 24). Dış motivasyon, davranışın belirli bir sonuca ulaşmak için sergilendiği motivasyon türüdür. Kişinin bir davranışı, davranıştan çok davranışın sonuçları için gerçekleştirmesidir (Deci vd., 1991: 328). Dış motivasyonda davranışlar çevrenin etkisindedir. Bu bağlamda çevre davranışı kontrol etmektedir (Tataroğlu, 2017: 28). Dış motivasyon ödül ve ceza temeline dayalıdır.

YÖNTEM

Araştırmanın Amacı

Bu araştırmada, üniversite öğrencilerinin algılarına göre empatik eğilim ile motivasyon arasındaki ilişkinin incelenmesi amaçlanmıştır. Çalışmada ilişkisel tarama modeli uygulanmıştır. Araştırma verilerini toplamada anket yöntemi kullanılmıştır.

FULL TEXTS BOOK

Evren ve Örneklem

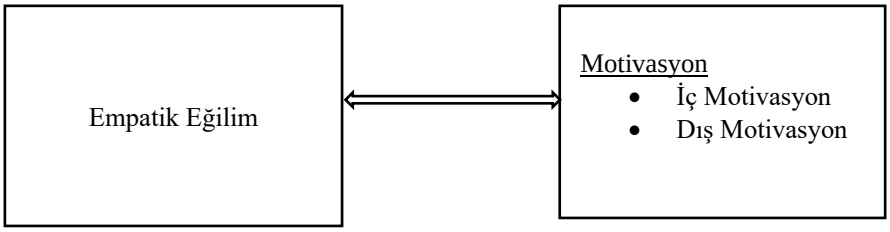
Manisa Celal Bayar Üniversitesi Salihli Meslek Yüksekokulu öğrencileri araştırmanın evrenini oluşturmaktadır. Tesadüfi örnekleme yöntemiyle anket uygulanan 177 öğrenci ise araştırmanın örneklemi oluşturmaktadır. Veriler 2023-2024 eğitim öğretim yılı bahar döneminde toplanmıştır.

Veri Toplama Araçları

Araştırmaya katılan öğrencilerin empatik eğilimlerini belirlemeye yönelik "Empatik Eğilim Ölçeği", motivasyon düzeylerini belirlemek için "Üniversite Öğrencilerinde Motivasyon Ölçeği" kullanılmıştır. Araştırmada kullanılan "Empatik Eğilim Ölçeği" Dökmen (1988) tarafından geliştirilmiştir. Ölçek 20 maddeden ve tek boyuttan oluşmaktadır. 5'li Likert tipindeki (1=tamamen aykırı, 5=tamamen uygun) ölçekten alınan yüksek puan empatik eğilim düzeyinin yüksek olduğunu göstermektedir. Bu çalışmada ölçeğin Cronbach Alpha değeri .77 olarak tespit edilmiştir. Öğrencilerin motivasyon düzeylerini belirlemek için ise Yılmaz (2018) tarafından geliştirilen, 22 madde ve üç boyuttan (iç motivasyon, dış motivasyon, motivasyonsuzluk) oluşan "Üniversite Öğrencilerinde Motivasyon Ölçeği" kullanılmıştır. Bu çalışmada ölçek motivasyonsuzluk boyutu (5, 9, 17, 22, 23 nolu maddeler) hariç tutularak, iç motivasyon ve dış motivasyon olmak üzere iki boyut kapsamında değerlendirilmiştir. 5'li likert tipindeki ölçekten alınan yüksek puanlar motivasyon düzeyinin yüksek olduğunu göstermektedir.

Araştırma Modeli ve Hipotezleri

Bu araştırma ilişkisel tarama modelinde tasarlanmıştır. Bu doğrultuda üniversite öğrencilerinin algılarına göre empatik eğilim ile motivasyon ve alt boyutları (iç motivasyon, dış motivasyon) arasındaki ilişkiler incelenmiştir.



Şekil 1. Araştıma Modeli

Araştırmanın hipotezleri aşağıdaki gibi oluşturulmuştur.

H1: Katılımcıların empatik eğilimleri ve motivasyon düzeyleri arasında ilişki vardır.

H2: Katılımcıların empatik eğilimleri ve iç motivasyon düzeyleri arasında ilişki vardır.

H3: Katılımcıların empatik eğilimleri ve dış motivasyon düzeyleri arasında ilişki vardır.

Verilerin Analizi

Araştırmanın amacı doğrultusunda empatik eğilim ve motivasyon ve alt boyutları arasında anlamlı ilişki olup olmadığını saptamak için Pearson Korelasyon Analizi yapılmıştır. Ayrıca demografik değişkenlere ve ölçeklere ilişkin betimsel istatistikler belirlenmiştir.

BULGULAR

Tanımlayıcı İstatistiklere İlişkin Bulgular

Demografik değişkenlere dağılım ve empatik eğilim ile motivasyon ölçeklerine ilişkin tanımlayıcı istatistikler aşağıda tablolar halinde sunulmuştur.

Tablo 1. Katılımcıların Cinsiyetine Göre Dağılımı

Değiken	Grup	N	%
Cinsiyet	Kız	69	39
	Erkek	108	61
	Toplam	177	100

Tablo 1'de görüldüğü gibi, araştırmaya katılan öğrencilerin %39'u kız, %61'i erkektir.

FULL TEXTS BOOK

Tablo 2. Katılımcıların Yaşına Göre Dağılımı

Değiken	Grup	N	%
Yaş	18-21 yaş	81	45,8
	22-23 yaş	64	36,2
	24 ve üzeri	32	18,1
	Toplam	177	100

Tablo 2'de görüldüğü gibi, araştırmaya katılan öğrencilerin %45,8'i 18-25 yaş, %36'2'si 22-23 yaş ve %18,1'i ise 24 ve üzeri yaş aralığındadır.

Tablo 3. Katılımcıların Sınıf Düzeyine Göre Dağılımı

Değiken	Grup	N	%
Sınıf düzeyi	1.Sınıf	64	36,2
	2.Sınıf	113	63,8
	Toplam	177	100

Tablo 3'de görüldüğü gibi, araştırmaya katılan öğrencilerin %36,2'si 1. Sınıf, %63,8'i ise 2. Sınıf öğrencisidir.

Tablo 4. Katılımcıların Gelir Düzeyine Göre Dağılımı

Değiken	Grup	N	%
Gelir düzeyi	Çok düşük	14	7,9
	Düşük	44	24,9
	Orta	78	44,1
	Yüksek	27	15,3
	Çok yüksek	14	7,9
	Toplam	177	100

Tablo 4'de görüldüğü gibi, araştırmaya katılan öğrencilerin %44,1'i orta, %24,9'u düşük, %15,3'ü yüksek, %7,9'u çok düşük, %7,9'u ise çok yüksek gelir düzeyine sahiptir.

Tablo 5. Empatik Eğilim İle Motivasyon ve Alt Boyutlarına İlişkin Tanımlayıcı İstatistikler

Değişkenler	N	Ortalama	Std. Sapma
Empatik Eğilim	177	3,57	,600
İç Motivasyon	177	2,49	,409
Dış Motivasyon	177	2,68	,695
Genel Motivasyon	177	2,59	,479

Tablo 5'de görüldüğü gibi, empatik eğilim 3,57, motivasyon alt boyutları olan iç motivasyon 2,49, dış motivasyon 2,68 ve genel motivasyon 2,59 puan ortalamasına sahiptir.

Empatik Eğilim İle Motivasyon Arasındaki İlişkiye İlişkin Bulgular

Tablo 6. Empatik Eğilim İle Motivasyon Ölçekleri Arasındaki Korelasyon Değerleri

Değişkenler	1	2	3	4
1.Empatik Eğilim	1	,527**	,422**	,488**
2.İç Motivasyon	,527**	1	,482**	,600**
3. Dış Motivasyon	,422**	,482**	1	,760**
4. Genel Motivasyon	,488**	,600**	,760**	1

Tablo 6'daki empatik eğilim ile motivasyon ve alt boyutları arasındaki korelasyon değerleri incelendiğinde, empatik eğilim ile motivasyon boyutlarından iç motivasyon (r=,527; p=,000), dış motivasyon (r=,422; p=,000) ve genel motivasyon (r=,488; p=,000) arasında pozitif yönlü, orta düzeyde

FULL TEXTS BOOK

ve istatistiksel olarak anlamlı ilişkiler olduğu görülmektedir. Elde edilen bu sonuçlara göre H1, H2, H3 hipotezlerinin desteklendiği söylenebilir.

SONUÇ

Çalışmanın konusunu empatik eğilimler ve motivasyon kavramları oluşturmaktadır. Araştırmanın kapsamını Manisa Celal Bayar Üniversitesi Salihli Meslek Yüksekokulu öğrencileri oluşturmaktadır. 21. Yüzyılda bireylerin iş yaşamında başarılı olabilmeleri için dışa dönük, girişken, sosyal becerileri ve motivasyonu yüksek bireyler olmaları gerekmektedir. Dolayısıyla üniversite öğrencilerinin empatik becerilerinin geliştirilmesi ve motivasyonlarının artırılması konusunda onlara katkı sağlayacağı söylenebilir.

Yapılan araştırmada empatik eğilim ve motivasyon arasındaki ilişki üniversite öğrencileri özelinde incelenmiştir. Araştırma bulgularına göre; empatik eğilim ile motivasyon ve motivasyonun iç motivasyon ve dış motivasyon alt boyutları arasında pozitif yönlü orta düzeyde anlamlı ilişkiler tespit edilmiştir. Buna göre H1, H2 ve H3 hipotezleri doğrulanmıştır. Ölçeklere ilişkin betimsel istatistiklere göre empatik eğilim düzeyi yüksek (3,57), motivasyon düzeyi ise ortalamanın biraz altındadır (2,59). Ayrıca motivasyon alt boyularından dış motivasyon puan ortalaması iç motivasyon puan ortalamasından daha yüksektir.

Empatik eğilim ve motivasyon ilişkisi üzerine literatürde bir çalışmaya rastlanmadığından bu araştırmada elde edilen sonuçlar başka çalışmalarla karşılaştırılıp tartışılamamıştır. Bu bağlamda bu çalışmanın söz konusu iki kavramı birlikte ele alan çalışmalara ışık tutması açısından literatüre katkı sağlayacağı düşünülmektedir.

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FULL TEXTS BOOK

DAMAR YOLU AÇMA İŞLEMİ SIRASINDA DİKKATİ BAŞKA YÖNE ÇEKME YÖNTEMİNİN ÇOCUKLARIN AĞRI DÜZEYİNE ETKİSİ: PARMAK KUKLA

THE EFFECT OF DISTRACTION METHOD ON CHILDREN'S PAIN LEVEL DURING THE VASCULAR ACCESS PROCEDURE: FINGER PUPPET

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ÖZET

Amaç: Parmak kuklasıyla dikkati yönlendirmenin amacı 3-6 yaş aralığındaki çocukların ağrı düzeyi üzerindeki etkisini bulmaktı. Bu çalışmanın çocukların ağrılı işlemlere ilişkin olumsuz deneyimlerini azaltacağı ve çocuk servisinde çalışan hemşirelerin hasta bakım uygulamalarına yön vereceği düşünülmektedir.

Yöntem: Yapılan çalışmanın evrenini, Orta Karadeniz bölgesinde yer alan bir Eğitim Araştırma Hastanesine 01/12/2023-30/05/2024 tarihleri arasında yatışı yapılan 3-6 yaş grubu çocuklar oluşturmaktadır. G-power ile 64 kişilik (deney grubu=32, kontrol grubu=32 kişi) örneklem belirlenmiştir. Veriler, 'Veli Onay Formu' alınması ardından 'Çocuk ve Aileye Yönelik Tanıtım Bilgi Formu', 'flacc ağrı skalası' ile toplandı. Deney grubunda damar yolu açma işlemine başlamadan bir dakika önce parmak kuklası oynatıldı. Kontrol grubunda ise sadece damaryolu açıldı. Çocukların işlem esnasında hissettiği ağrı hemşire ve çocukların ifadeleri ile değerlendirildi. Verilerin değerlendirilmesinde Kolmogorov Smirnov testi, Ki-kare ve Fisher's Exact testi, t testi, Mann-Whitney U testi kullanıldı. Önem düzeyi $p<0,001$; $p<0,01$ ve $p<0,05$ olarak alındı.

Bulgular: sosyodemografik özelliklerinin dağılımı ve karşılaştırılmasında Kontrol grubunun %46,9'u ve deney grubunun %53,1'i kızlardan oluşmaktadır. Kontrol grubun bulunan çocukların yaş ortalaması 4,1±1,1 iken, deney grubunda bulunan çocukların yaş ortalaması 2,13±1,04'dır. Deney grubundaki çocukların damar yolu açma işlemi sırasında daha az ağrı yaşadığı ($p<0,001$), Kız çocuklarının ağrı puan ortalamasının erkek çocuklarınkinden daha yüksek olduğu belirlenmiştir. Kontrol grubundaki kız ve erkek çocukların ağrı puan ortalamalarının birbirine oldukça yakın olduğu görülmüştür.

Sonuç: Çalışmada işlem sırasındaki ağrı puanının deney grubunda kız ve erkek çocukları arasında istatistiksel olarak fark olduğu ortaya çıkmıştır. Kız çocuklarının ağrı puan ortalamasının erkek çocukların ağrı puan ortalamasından daha yüksek olduğu saptandı.

Anahtar Kelimeler: Damar Yolu Açma; Çocuk; Parmak Kukla; Ağrı; Dikkati Başka Yöne Çekme.

ABSTRACT

Purpose: The aim of directing attention with a finger puppet was to find out the effect of directing attention on the pain level of children aged 3-6. It is thought that this study will reduce children's negative experiences regarding painful procedures and will guide the patient care practices of nurses working in the pediatric ward.

Method: The population of the study consists of children aged 3-6 who were admitted to a Training and Research Hospital located in the Central Black Sea region between 01/12/2023-30/05/2024. A sample of 64 people (experimental group = 32, control group = 32 people) was determined with G-power. Data were collected with the 'Introduction Information Form for Children and Family' and the 'flacc pain scale' after obtaining the 'Parent Approval Form'. In the experimental group, a finger puppet was played one minute before starting the vascular access procedure. In the control group, only vascular access was

FULL TEXTS BOOK

established. The pain felt by the children during the procedure was evaluated by the statements of the nurse and the children. Kolmogorov Smirnov test, Chi-square and Fisher's Exact test, t test, Mann-Whitney U test were used to evaluate the data. Significance level $p<0.001$; It was taken as $p<0.01$ and $p<0.05$.

Results: In the distribution and comparison of sociodemographic characteristics, 46.9% of the control group and 53.1% of the experimental group are girls. While the average age of the children in the control group is 4.1±1.1, the average age of the children in the experimental group is 2.13±1.04. It was determined that the children in the experimental group experienced less pain during the vascular access procedure ($p<0.001$), and the average pain score of the girls was higher than that of the boys. It was observed that the pain score averages of girls and boys in the control group were quite close to each other.

Conclusion: The study revealed that there was a statistical difference in the pain score during the procedure between boys and girls in the experimental group. It was determined that the average pain score of girls was higher than the average pain score of boys.
Key Words: Vascular Access; Child; Finger Puppet; Pain; Diverting Attention.

Giriş

Kişisel yapı ile yakından ilişkili olan ağrı; fizyolojik, davranışsal, psikolojik, gelişimsel ve sosyokültürel faktörlerle ilişkili bir deneyimdir. İlk kez çocukluk döneminde deneyimlenir (1). Uluslararası Ağrı Araştırmaları Derneği'nin (International Association for the Study of Pain-IASP) tanımlamasında ağrı "Vücudun belirli yerinde kaynaklanan, doku hasarı sebebiyle veya olmayan, bireyin daha önce yaşadığı tecrübelerinden etkilenen ve istenilmeyen olayı uzaklaştırmaya yönelik iyi olmayan biyolojik durum veya deneyim"dir. Hastalık, her çocuğun yaşayabileceği en sık görülen stres kaynaklarından biridir. Yaşı ne olursa olsun hastanede kalmak çocuklar üzerinde olumsuz izlenim bırakabilecek önemli bir olaydır (2). Hastanede yatan çocuklarda damar yolu açma yaygın olarak uygulanan bir tıbbi işlemdir ve küçük bir müdahale gibi görünse de ciddi ağrı ve sıkıntıya neden olur (3). Çocuğun yaşadığı ağrı; davranışlarını, aileyle iletişimini, beslenme düzeyini etkilemenin yanı sıra büyümeyi de olumsuz etkileyerek beyin ve duyu gelişiminde değişikliklere neden olur (4,5). Ağrı çocukların yaşamını etkileyen en önemli durumlardan biridir (6). Çocukluk çağında oluşan ağrı reaksiyonu çocuğun gelecekteki ağrısını oluşturur ve ağrılı işlemler sırasında edinilen deneyimler onun ağrıya olan tepkisini şekillendirir (7,8). Bilimsel araştırmalar da, özellikle aşı, enjeksiyon ve damar yolu açma gibi uygulamaların çocuk için ağrı verici işlemler olduğu gösterilmiştir (9). Çocuklar bu işlemleri korku verici bir girişim olarak algılarlar (10). Çocukların, artan ağrı ve korkuya yanıt olarak daha sonraki tıbbi uygulamalardan kaçınmasına neden olur (11). Bu nedenle damar yolu açarken ve diğer tıbbi uygulamalarda girişimlerin etkili yönetilmesi gerekmektedir (12). Ağrı yönetimi için farmakolojik ve nonfarmakolojik yöntemler kullanılmaktadır. Ağrının algı ve duyu ile ilişkili bir boyutu olduğunu varsayan bilişsel/davranışsal görüşe göre çocuklar da dikkati dağıtmak ağrıyı az hissetmelerinde etkilidir (13). Hasta dikkatini başka yöne çevirerek kendini acıdan korur.Hastalarda dikkati başka yöne çekme yöntemi ağrının tamamen yok olmasını sağlamaz ama ağrı toleransını artırır (14,15). Bu da hastanın ağrı eşiğini yükseltir. Dikkati farklı yöne çekme ağrı kontrolü hissi sağlayarak hastanın keyif aldığı şeylere odaklanmasını sağlar (16,17). Dikkati dağıtmak için farklı yöntemler kullanılmaktadır. Flash kart kullanmak, çizgi film izlemek, kaleydoskop kullanmak, köpük üfleyerek balon oluşturmak, değişik konular hakkında konuşmak, müzik dinlemek, sanal gerçeklik gözlüğü kullanmak, balon şişirmek ve parmak kukla oynatmak gibi sayabiliriz (17,18).

Oyun; çocuğun kişiliğini rahatsız eden travmaya neden duygularını deneyim ve korkularını, oyun ve oyuncağa yansıtarak, stres ve ağrının az hissedilmesinde, problemle başa çıkma ve uyum sağlamasına

FULL TEXTS BOOK

yardımcı olan bir araçtır. Oyun esnasında çocuğun damar yolu açma işleminde kullanılan araçları eline alıp tanıması ile yaşadığı korkuyu ve ağrıyı azalttığı bildirilmiştir (18). Ayrıca bazı araştırmalar oyunun çocukların hastanedeki iyileşmesini hızlandırdığını da ortaya çıkarmıştır (19).

3- 6 yaş arası çocuklar aktif ve enerjiktir. Oyun döneminde olan çocuklar korkularını düzgün ifade edemezler ve her zaman ailelerinin ve oyuncaklarının yanında bulunmalarını isterler. 3-6 yaş grubu çocuk için oyun ve oyuncaklar oldukça önemlidir (20). 3-6 yaş arası çocukların dikkat ve gözlem becerileri henüz tam olarak gelişmemiştir. IV uygulamalarını ceza gibi değerlendirebilirler.Çocuklara yapılan işlemin nedeni anlatılmalı ve çocuğun yaşadığı stres ve korkusu samimi bir dokunuşla hafifletilmelidir. Bu nedenle hemşirelerin çocuklarla etkili iletişim kurmaları ve onların renkli dünyalarını gözlemlemeleri, çocukların ağrılarını ve işlemlere verdikleri duygusal tepkileri yaşa/zamana uygun farmakolojik olmayan yöntemlerle yönetmeleri gerekmektedir (21).

Parmak kuklasıyla dikkati yönlendirmenin amacı 3-6 yaş aralığındaki çocukların ağrı düzeyi üzerindeki etkisini bulmaktı. Bu çalışmanın çocukların ağrılı işlemlere ilişkin olumsuz deneyimlerini azaltacağı ve çocuk servisinde çalışan hemşirelerin hasta bakım uygulamalarına yön vereceği düşünülmektedir.

Gereç Ve Yönetim

1. Araştırmanın Amacı ve Tipi

Araştırma, pediatri 1-2-3 servislerinde parmak kukla oyunu ile dikkati başka yöne çekerek damar yolu açma işlemi sırasında 3-6 yaş grubu çocukların ağrı düzeyini belirlemek amacıyla yarı deneysel olarak yapıldı.

2. Araştırma Hipotezi

Damar yolu açma işlemi esnasında parmak kuklası oynatılarak dikkati farklı tarafa çekilen deney grubundaki çocukların hissettikleri ağrı puan ortalaması diğer grup olan kontrol grubunda bulunan çocuklara göre daha azdır.

3. Araştırmanın Bağımlı-Bağımsız Değişkenleri

3.1. Araştırmanın Bağımlı Değişkenleri;

Face, Legs, Activity, Cry, Consolability (FLACC) Ağrı Değerlendirme Skalası puan ortalaması

3.2. Araştırmanın Bağımsız Değişkenleri;

Araştırmaya katılan kişilerin sosyo demografik özellikleri

4. Araştırmanın Yapıldığı Yer ve Zaman

Araştırma, Orta Karadeniz bölgesinde yer alan bir Eğitim Araştırma Hastanesi çocuk servislerinde 01/12/2023-30/05/2024 tarihleri arasında yapılmıştır. Bu hastanede 3 çocuk servisi bulunmaktadır. Çocuk 1 servisinde 25, çocuk 2 servisinde 25, çocuk 3 servisinde 20 hasta yatağı bulunmaktadır. Damar yolu açma işlemi servilerin tedavi ve müdahale odalarında gerçekleştirilmiştir. Çocuk 1 servisinde 11 hemşire, 8 tane pediatri doktoru 2 tane endokrinoloji uzmanı, 1 tane gastroentroloji uzmanı, 1 tane enfeksiyon uzmanı, 1 tane alerji ve immünoloji uzmanı görev yapmaktadır. Çocuk 2 servisinde 11 tane hemşire, 8 tane pediatri uzmanı, 2 tane endokrinoloji uzmanı, 2 tane nefroloji uzmanı, 1tane hematoloji uzmanı görev yapmaktadır. Çocuk 3 servisinde 11 hemşire, 2 tane kardiyoloji uzmanı, 1 tane nöroloji uzmanı, 1 tane nefroloji uzmanı, 1 tane göğüs hastalıkları uzmanı çalışmaktadır.

5. Araştırmanın Evreni ve Örneklemi

Yapılan çalışmanın evrenini, Orta Karadeniz bölgesinde yer alan bir Eğitim Araştırma Hastanesine 01/12/2023-30/05/2024 tarihleri arasında yatışı yapılan çocuklar oluşturmaktadır (N=751). Çalışmanın yapılabilmesi için yapılmış bir yayın referans alınarak makalenin ana hipotezine göre; iki grup ortalamalarına göre etki büyüklüğü 0,63 olarak hesaplanmıştır. Hesaplanan etki büyüklüğünden hareket ile 64 kişilik (deney grubu=32, kontrol grubu=32 kişi) örneklemin yeterli olacağı belirlenmiştir. Örneklem genişliğinin tespit edilebilmesi için G-Power, v.3.1.0 programı ile analiz yapılmış, ve alfa hata 0.05,güç değeri 0,80 alınmış olup, yapılacak olan anket görüşmesi sonucunda değişkenler arasında farklılık olacağı düşünülerek minimum 64 kişilik örneklemin yeterli olacağı ön görülmüştür.

FULL TEXTS BOOK

6. Araştırmaya Alınma ve Dışlanma Ölçütleri

Araştırmaya alınma ölçütlri;, 3-6 yaş grubunda olma, araştırmaya katılmaya gönüllü olma, psikiyatrik tanısı olmama, iletişim engeli bulunmama ve bilinç bulanıklığı olmamasıdır.

Araştırmadan dışlanma ölçütleri; 3-6 yaş grubunda olmama, psikiyatrik tanısı olma, iletişim engeli bulunması,araştırmaya katılmayı kabul etmemeleri ve bilinç bulanıklığının bulunmasıdır. 3.9. İstatistiksel Analiz

IBM SPSS V23 ile verilerin analizi yapıldı. Kolmogorov Smirnov testi ile normal dağılıma uygunluğu incelendi. Ki-kare ve Fisher's Exact testleri gruplara göre kategorik değişkenlerin karşılaştırmasında kullanıldı. Her iki gruba göre normal dağılan verilerin karşılaştırılmasında Bağımsız örnekler t testi ve normal dağılmayan verilerin karşılaştırılmasında Mann-Whitney U testi kullanıldı. Analiz sonuçları nicel veriler için ortalama±s. sapma ve ortanca (minimum – maksimum) şeklinde kategorik veriler ise frekans (yüzde) olarak sunuldu. Önem düzeyi $p<0,001$; $p<0,01$ ve $p<0,05$ olarak alındı.

7. Araştırmanın Etik Yönü

Araştırmanın gerçekleştirilebilmesi için Ondokuz Mayıs Üniversitesi Sosyal ve Beşeri Bilimler Araştırmaları Etik Kurulu'ndan 24.11.2023 'de ''Etik Kurul Onayı'' alındı (Karar No: 2023/964).

Etik kurul onayı alındıktan sonra araştırmayı yapabilmek için Samsun Eğitim araştırma hastanesinden gerekli kurum izni alındı.

Araştırmaya katılım gönüllülük esasına istinaden yapılmaktadır. Araştırmaya katılan tüm katılımcılardan ''Veli Onay Formu''nu dikkati okumaları hakkında bilgi verildi. Çalışmada kullanılan ölçekler için ölçeği geliştiren kişilerden kullanım için izin alındı.

8. Araştırmanın Sınırlılıkları

Araştırmanın yapıldığı tarihlerde çalışmaya katılan ebeveynler ile sadece Samsun Eğitim ve Araştırma hastanesinde yürütülmüştür.

9. Veri Toplama Araçları

'Veli Onay Formu', 'Çocuk Ve Aileye Yönelik Tanıtım Bilgi Formu', 'Flacc Ağrı Skalası' ve parmak kukla kullanıldı.



Şekil.1.Parmak Kuklası

Bulgular

Bu kısımda damar yolu açma işlemi esnasında parmak kuklası gösterisi ile dikkati farklı yöne çekmenin 3-6 yaş aralığındaki çocukların hissettikleri ağrı düzeyine etkisini belirlemek amacıyla yarı deneysel olarak gerçekleştirilen araştırmadan elde edilen bulgular yer almaktadır.

FULL TEXTS BOOK

Tablo.1 Deney ve Kontrol Grubun Bulunan Çocukların Tanıtıcı Ozelliklerinin Dağılımı ve Karşılaştırılması (N=64)

Tanıtıcı özellikler	Deney (n=32)	Kontrol (n=32)	Toplam	Test İs.	p
Cinsiyet					
Kız	17(53,1)	15(46,9)	32(50,00)	X^2=0,063	0,803
Erkek	15(46,9)	17(53.1)	29(50.00)		
Yaş (yıl)					
$Ort \pm ss$	2,13 ± 1,04	2,13 ± 1,04	…	$z = 0.648$	0,694
$M(min - \max)$	2(1-4)	2(1-4)	…		
Yatış nedeni					
Bronşit	12(37,5)	6(18,8)	18(28,1)		
Age	4(12,5)	6(18,8)	10(15,6)	X^2=10,893	**0,012***
Üsye	…	6(18,8)	6(18,8)		
Diğer*	16(50,0)	14(43,8)	30(46,9)		
Damar yolu açtırma sayısı					
1-5	5(15,6)	9(28,1)	14(21,9)		
6-10	12(37,5)	14(43,8)	26(40,6)	X^2=2,829	0,243
11 ve üstü	15(46,9)	9(28,1)	24(37,5)		

Ort: Ortalama, ss: Standart sapma, M: Medyan, : Ki kare test istatistiği, z: Mann Whitney U testi, n:Örnek sayısı, %:Yüzde; *Anemi, ateş ety, pnömoni, epilepsi, immün yetmezlik, plevral efüzyon, senkop, iye, sünnet

Tablo 1'de, grupların sosyodemografik özelliklerinin dağılımı ve karşılaştırılması sunulmaktadır. Kontrol grubunun %46,9'u ve deney grubunun %53,1'i kızlardan oluşmaktadır. Kontrol grubun bulunan çocukların yaş ortalaması 4,1±1,1 iken, deney grubunda bulunan çocukların yaş ortalaması 2,13±1,04'dır. Her iki grupta da çocukların en yaygın olarak (%46,9) servise diğer kategorisinde yer alan hastalıklar nedeniyle başvurduğu görülmüştür. Kontrol grubundaki hastaların %43,8'i daha önce 6-10 kez kan aldırmışken, deney grubundaki hastaların %46,9'u daha önce 11 kez veya daha fazla damar yolu açtırmıştır. Hastaneye yatış nedenlerine göre deney ve kontrol grupları karşılaştırıldığında, gruplar arasında istatistiksel olarak anlamlı bir fark bulunmuştur ($p<0,05$). Ancak, cinsiyet, yaş ve damar yolu açtırma sayıları açısından gruplar karşılaştırıldığında, istatistiksel olarak anlamlı bir fark olmadığı tespit edilmiştir ($p>0,05$)

FULL TEXTS BOOK

Tablo.2 Deney ve Kontrol Grubun Bulunan Çocukların Ailelerinin Tanıtıcı Özelliklerinin Dağılımı ve Karşılaştırılması (N=64) - Devam

Tanıtıcı özellikler	Deney (n=32)	Kontrol (n=32)	Toplam	Test İs.	p
Ailede bulunan çocuk sayısı (n,%)					
Bir	6(9,4)	14(21,9)	20(31,3)		
İki	17(26,6)	16(25,0)	33(51,6)	X^2=7,685	0,065
Üç ve üzeri	9(14,1)	2(3,1)	11(17,2)		
Aile tipi (n,%)					
Çekirdek	30(46,9)	31(48,4)	61(95,3)	X^2=0,350	0,554
Geniş	2(3,1)	1(1,6)	3(4,7)		
Gelir durumu (n,%)					
Gelir giderden az	9(47,4)	10(52,6)	19(29,7)	X^2=0,075	0,784
Gelir gidere eşit	23(51,1)	22(34,4)	45(70,3)		
İşlem sırasındaki ebeveyn (n,%)					
Anne	29(45,3)	28(43,8)	57(89,1)	X^2=0,160	0,689
Baba	3(4,7)	4(6,3)	7(10,9)		

X^2 : Ki kare test istatistiği, n:Örnek sayısı, %:Yüzde

Her iki gruptaki ailelerde çocuk sayısının genellikle 2 olduğu (kontrol grubu %25,0; deney grubu %26,6) ve ailelerin büyük çoğunluğunun çekirdek aile yapısında olduğu (kontrol grubu %98,4; deney grubu %96,9) tespit edilmiştir. Ailelerin gelir durumu incelendiğinde ise, her iki gruptaki ailelerin çoğunun gelirinin giderine denk olduğu (kontrol grubu %34,4; deney grubu %51,1) belirlenmiştir. İşlem sırasında çocukların yanında çoğunlukla annenin (%89,1) bulunduğu görülmüştür. Babaların yaş ortalamaları açısından deney ve kontrol grupları arasında istatistiksel olarak anlamlı bir fark bulunmuştur ($p<0,05$), deney grubundaki babaların yaş ortalaması kontrol grubundakilerden daha yüksektir. Ancak, ailelerin diğer tanıtıcı özellikleri açısından gruplar arasında istatistiksel olarak anlamlı bir fark bulunmamıştır ($p>0,05$).

Tablo. 3 Grupların Flacc Ağrı Skalası Toplam Puan Ortalamasının Cinsiyete Göre Karşılaştırılması (N=64)

Ölçüm zamanı	Deney Grubu			Kontrol Grubu		
	Kız n=17 $Ort \pm SS$	Erkek n=15 $Ort \pm SS$	Test Değeri	Kız n=15 $Ort \pm SS$	Erkek n=17 $Ort \pm SS$	Test Değeri
İşlm sırası	4,76 ± 2,19	2,46 ± 2,26	t=2,913;**p=0,007****	6,80 ± 2,54	7,17 ± 2,45	t=-.426 p=0,673

Ort: Ortalama, SS: Standart sapma, t: Bağımsız örnekler t testi, **p<0,01

Deney grubundaki kız ve erkek çocukların işlem sırasındaki ağrı puan ortalamaları arasında istatistiksel olarak anlamlı bir fark bulunmuştur ($p<0,001$). Kız çocuklarının ağrı puan ortalamasının erkek çocuklarınkinden daha yüksek olduğu belirlenmiştir. Kontrol grubundaki kız ve erkek çocukların ağrı puan ortalamaları arasındaki fark ise istatistiksel olarak anlamlı değildir ($p>0,05$). Kontrol grubundaki kız ve erkek çocukların ağrı puan ortalamalarının birbirine oldukça yakın olduğu görülmüştür.

Tartışma

İnvaziv prosedürler çocuklar için her zaman ağrı, korku ve kaygı kaynağı olmuştur. Yaşanılan korkular çocuğu ve aileyi kan alma, damar yolu açma, dikiş atma gibi ağrılı müdahalelere karşı isteksiz hale

FULL TEXTS BOOK

getirir ve çocuğun tıbbi tedavisini ve bakımını olumsuz yönde etkiler. Uzun süreli hastanede tedavi görmek zorunda kalan çocuklara tanı ve tedavi sırasında birçok ağrılı müdahale yapılmaktadır. Araştırmalar sonucunda, tıbbi müdahaleler esnasında çocukların anksiyete, korku ve ağrı yaşadığı tespit edilmiştir.

Bu bölümde, damar yolu açma müdahalesi esnasında parmak kukla gösterisi ile yapılan dikkati farklı tarafa çekmenin 3-6 yaş aralığındaki çocukların ağrı seviyesine etkisini tespit etmek amacıyla gerçekleştirilen çalışmadaki bulgular literatür bilgisi eşliğinde üç başlık halinde tartışılmıştır.

1. Çocukların Tanıtıcı Özelliklerinin Tartışılması

Araştırma grubunu 32 kontrol, 32 deney olmak üzere toplam 64 çocuk oluşturmuştur. 32 kız çocuk ve 32 erkek çocukta oluşan örneklem grubunun gruplar arasında fark bulunmaktadır ve deney grubunun da kontrol grubunun da yaş ortalaması 2.13 ±1.04'dür. Çocuk populasyonunda değişik yaş gruplarında ağrının azaltılmasına yönelik yapılmış pek çok çalışma bulunmaktadır (22,23).

Ağrılı uyarana karşı çocuğun verdiği tepkileri cinsiyet, bireysel farklılıklar genel sağlık durumu, hastalığının şiddeti, geçmiş deneyimler, baş etme yeteneği, uyanıklık durumu, ağrılı uyaranların çeşidi ve zamanı etkilemektedir (24). Bu sebeple araştırma kapsamında kontrol gruplarında ve deney gruplarında olan bütün çocuklar belirleyici özellikler açısından incelenmiş, cinsiyet, yaş ve damar yolu açtırma sayısı yönünden gruplar arasında istatistiksel yönünde anlamlı farklılık bulunmamıştır ($p>0,05$). Damar yolu açma işlemi sırasında ağrıyı etkileyebileceği düşünülen cinsiyet, yaş ve damar yolu açtırma sayısı gibi özelliklerin deney ve kontrol gruplarında eşit dağılması sağlanmış ve yapılan uygulamanın etkinliği değerlendirilirken bu özelliklerden etkilenme ihtimali ortadan kaldırılmıştır (Tablo 1).

2. Çocukların Ailelerinin Tanıtıcı Özelliklerinin Tartışılması

Çalışma sonuçlarına göre; anne yaşı, anne öğrenim durumu, anne iş durumu, baba öğrenim durumu, baba iş durumu, aile tipi, ailede çocuk sayısı, gelir durumu ve işlem sırasıdaki ebeveyn cinsiyeti arasında istatistiksel açıdan bir fark bulunmamaktadır , ($p \square 0.05$)(Tablo2).

Girişimsel işlemler gibi ağrılı işlemler sırasında ebeveyninin çocuğun yanında olmasının olumlu etkilerini inceleyen çalışmalar, ağrı skorlarını düşürmede, korkuyu azaltmada ve çocuğu sakinleştirmede olumlu etkisi olduğunu göstermiştir (25,26).

Çocuğa araştırma ve tedavi amacıyla invaziv girişimler öncesinde çocuğun ve ebeveynlerin bilgilendirilmesi ve işleme hazırlanması, çocuk ve ebeveynin kaygısını azaltmayı amaçlamaktadır. Sağlık profesyonellerinin sunduğu bilgilerde ebeveynlerin özellikleri önemlidir (27).

3. İşlem Sırası Flacc Ağrı Skalası Puan Ortalamalarının Tartışılması

Çalışma deney grubu ve kontrol grubu olmak üzere toplamda 64 (deney grubu: 32 kişi, kontrol grubu: 32 kişi) çocuk ile yapılmış, kukla oyunun damar yolu açma işlemi esnasında gelişen ağrıyı hafifletmedeki etkinliği araştırılmıştır. Literatürdeki diğer çalışmalara bakıldığında, ağrı yönetiminde dikkati farklı yöne çekme teknikleri birçok araştırmada kullanıldığı belirlenmiştir (28,30). Fakat 3-6 yaş grubunda damar yolu açma sırasında tedavi edici oyun yöntemlerinden olan kukla gösterisi yapılmış bu tür bir çalışmaya rastlanmamıştır. Çalışmamızın bu alanda yapılan tek araştırma özelliği taşıması nedeniyle literatüre önemli bir katkı sağlayacağı düşünülmektedir.

Çalışmamızda FLACC Ağrı Değerlendirme Ölçeği puan ortalamaları incelendiğinde (Tablo 3), gruplar arasında işlem sırasında fark olduğu tespit edilmiştir. Kukla gösterisi yapılan deney grubunda bulunan çocukların işlem esnasındaki ağrı puan ortalamalarının kontrol grubunda bulunan çocukların ağrı puan ortalamasından belirgin derecede düşük olduğu bulunmuştur.

Damar yolu açma işlemi esnasında parmak kukla gösterisi ile dikkati farklı yöne çekilen çocukların hissettikleri ağrı puanı ortalaması kontrol grubunda bulunan çocuklarla karşılaştırıldığında daha azdır hipotezi desteklenmiş, yapılan kukla oyununun ağrıyı büyük oranda azalttığı sonucuna varılmıştır.

FULL TEXTS BOOK

Venöz kan alma sırasında, Murat Ceylan'ın çalışmasında; terapötik oyun oynatma ve kuklaların ağrıyı hafifletmede etkili olduğu gösterilmiştir (31,32). Crevatin vd."nin (2016) kan alma odasında yaptıkları çalışmada; 200 çocuktan oluşan grubun yarısına oynatılan Angry Bird gösterisi, diğer yarısına ise eğitimli hemşire tarafından farklı figürlerden oluşan kukla gösterisi, balon şişirme- patlatma ve hikaye kitapları okuma gibi dikkati farklı tarafa çekme tekniği uygulanmıştır (30). Video oyunu ile oynayan çocukların hissettikleri ağrı seviyesinin diğer kontrol grubundaki çocuklara göre daha az hissetikleri tespit edilmiştir. Çalışmalarda ağrılı işlemler esnasında değişik yaş grubu çocuklara özgü uygulanan farklı dikkati başka yöne çekme tekniklerinin etkili olduğu görülmüştür (28, 33-36). Çalışma sonuçları, bu çalışma sonuçları ile benzerlik göstermektedir.

Çalışma sonucundan farklı olarak; Landolt ve ark. (2002) tarafından 4-12 yaş grubu yanık tedavisi gören çocuklara pansuman değişimi esnasında çizgi film izlemenin çocuklar tarafından algılanan ağrı seviyesinde istatistiksel olarak anlamlı bir fark oluşturmadığı tespit edilmiştir (37).

Sonuç Ve Öneriler

Bu çalışmada, damar yolu açma işlemi esnasında parmak kukla gösterisi ile dikkati farklı tarafa çekilen çocukların ağrı düzeyine etkisi araştırılmıştır.

Damar yolu açma işlemi sırasında yapılan kukla gösterisi, damar yolu açma işlemine bağlı gelişen ağrıyı azaltmada etkili olduğu sonucuna varılmıştır.

Çalışmaya katılan gruplardaki gruplar arasında yaş ortalaması yönünden belirgin fark olmadığı sonucuna varılmıştır.

Çalışmada işlem sırasındaki ağrı puanının deney grubunda kız ve erkek çocukları arasında istatistiksel olarak fark olduğu ortaya çıkmıştır. Kız çocuklarının ağrı puan ortalamasının erkek çocukların ağrı puan ortalamasından daha yüksek olduğu saptandı.

1. Öneriler

İnvaziv işlemler sırasında, işlem sırasında ve sonrasında ağrıyı azaltmak için oyun ve oyuncakların tedavi yöntemlerinden biri kullanılabilir. Sağlık profesyonelleri çocuklara gereksiz ağrılı işlemlerden mümkün olduğunca kaçınmalı ve ağrıyı azaltacak önlemler almalıdır. Hemşireler araştırmaya dayalı kanıtlarla yeni non farmakolojik yöntemlerden haberdar olmalıdır. Çocuk servislerinde çalışan hemşire ve diğer sağlık çalışanlarına ağrının azaltılmasının önemi ve uygulaması kolay olan parmak kuklanın etkinliği ve kullanımı anlatılmalıdır. Ayrıca bu yaş grubunda daha fazla randomize kontrollü araştırma yapılması önerilmektedir.

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FULL TEXTS BOOK

SÜRDÜRÜLEBİLİR AKILLI KENTLER İÇİN DEĞER ESASINA DAYALI İMAR UYGULAMA YÖNTEMİNİN GEREKLİLİĞİ

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ÖZET

Arazi ve arsa düzenlemesi çalışmalarının değer esasına dayalı olarak yapılması, taşınmazların "ekonomik tabanlı sosyal hizmet olanaklarının sağlandığı, teknik altyapıya erişimin kolay olduğu ve yerleşim odaklı yönetilmesini" sağlayabilir. Bu bağlamda, değer esaslı (eşdeğerlilik ilkesi uyarınca) yapılacak imar uygulamaları, kentin etkin kaynaklarını yönlendiren, teşvik eden ve sürdürülebilirliği sağlayan teknik bir yaklaşım olarak görülebilir. Ülkemizde mevcut imar uygulama mevzuatımıza (3194 sayılı İmar Kanunu'nun 18. Maddesi ve uygulama yönetmeliği) uygun bir şekilde yapılan arazi ve arsa düzenlemesi çalışmalarına göre daha objektif ve adil bir yaklaşım sunan değer esasına dayalı uygulama modeli, "taşınmazların düzenleme öncesi ve sonrası değerlerinin çeşitli parametreler ve ölçütler kullanılarak belirlenmesi ve bu değer baz alınarak taşınmazın sahipleri adına 'yapılaşmaya hazır imar parseli' olarak tapu sicilinde tescili" esasına dayanır. Değer esasına dayalı olarak yapılan düzenleme çalışmaları, taşınmazları en uygun hale getirmek suretiyle en efektif şekilde kullanımlarını sağlamayı amaçlar. Taşınmazların doğru bir yaklaşımda değerlendirilerek düzenlenmesi, kent yapısının geliştirilmesini, sürdürülebilir odaklı kullanımını, adaletli ve güvenli bir yapının oluşturulmasının temeli olarak görülebilir. Bu kapsamda yerel yönetimler, kamu kurumları ve halkın katılımın sağlandığı 'taşınmaz değerleme' ve 'düzenleme' çalışmalarının yapılması gerekmektedir. Böylelikle, daha sürdürülebilir ve akıllı bir şehir için gerekli olan taşınmazların mevcut ve olası potansiyel değerlerinin belirlenmesi, toplumsal katmanlarda iş birliği (kurumsal eşgüdüm) içerisinde ve şeffaf bir ortamda belirlenebilir. Taşınmazların düzenleme sonunda artan değerlerinin adil dağıtımı sonrasında "artan değerin kamuya aktarılmak suretiyle kentlinin kent içi yaşam koşullarının iyileştirilmesi ve yerel yönetimin güçlendirilmesi" sağlanabilir. Bu nedenle, değer esaslı yapılacak arazi ve arsa düzenlemeleri, sürdürülebilir akıllı kentlerin planlanması ve yürütülmesi için en önemli araçtır. Yapılan çalışma ile bu gereklilik ortaya konulmuştur.

Anahtar Kelimeler: Arazi ve Arsa Düzenlemeleri, Değer Esaslı Dağıtım, Sürdürülebilir Kentsel Gelişme, İmar Uygulaması, Akıllı Kent, Sürdürülebilirlik.

GİRİŞ

Birleşmiş Milletler (BM) tarafından ileriye yönelik yapılan tahminler sonucunda, dünya genelinde kentli nüfusunun 2050 yılına kadar 2,5 milyar kişi daha artabileceği öngörülmüştür. Söz konusu bu artışın tahminen %90'ının Afrika ve Asya'da gerçekleşeceği öngörülmektedir (World Bank, 2014). Dünya Kalkınma Raporu (2016) ise, yaşanan kentleşme hızı nedeniyle kaçınılmaz iklim değişikliği, artan toplumsal eşitsizlik gibi sorunların varlığına ve "kentlerimizi yeniden düzenlemenin" önemine değinmiştir. Dünya şehirlerinin hızla gelişmeleriyle birlikte, daha sürdürülebilir ve yaşanabilir bir ortam oluşturmak önemli bir hedef haline gelmiştir. Bu bağlamda, 'akıllı şehirler' konsepti ortaya çıkmış ve kent kullanımını daha verimli, çevre dostu ve insan odaklı olmasını sağlamayı hedeflemiştir.

Bugünün ve geleceğin ihtiyaçlarını düşünebilen, kente ait kaynakların ve altyapının yönetilebildiği, teknolojik gelişmeler ve sürdürülebilir çevre gelişimini sağlayan bir bütün olarak ele alınan kentler için kullanılan "akıllı kent" (zeki kent, dijital kent, sürdürülebilir kent, teknolojik kent) kavramı, planlama, uygulama, işletme döngüsünde yeni ve etkin bir yaklaşımdır (Varol, 2017). Akıllı şehirlerin yapısında,

FULL TEXTS BOOK

kalkınma amaçlı yapılan mekânsal planlamayı ve kullanımın etkili bir şekilde gerçekleştirilmesi gerekliliği bulunduğundan, arazi ve arsa düzenlemeleri büyük bir öneme sahiptir.
Arazi ve arsa düzenlemesi çalışmaları, gelişimin ve kalkınmanın sürdürülebilirliğin sağlanması amacı ile yapılan imar planlarının uygulanmasında önemli bir araçtır. Uygulama değer esasına dayalı olarak yapıldığı takdirde, arazi yönetimini düzenleyerek, arazinin verimli kullanımını sağlayarak, yerleşim yerlerinin düzenli ve estetik bir şekilde gelişimini teşvik etmenin yanında, arazi kullanımındaki eşitsizlikleri düzeltmek ve adaleti sağlamak bakımından da ayrıca önemlidir.

ARAZİ VE ARSA DÜZENLEMESİ (AAD) VE ELEŞTİRİLER

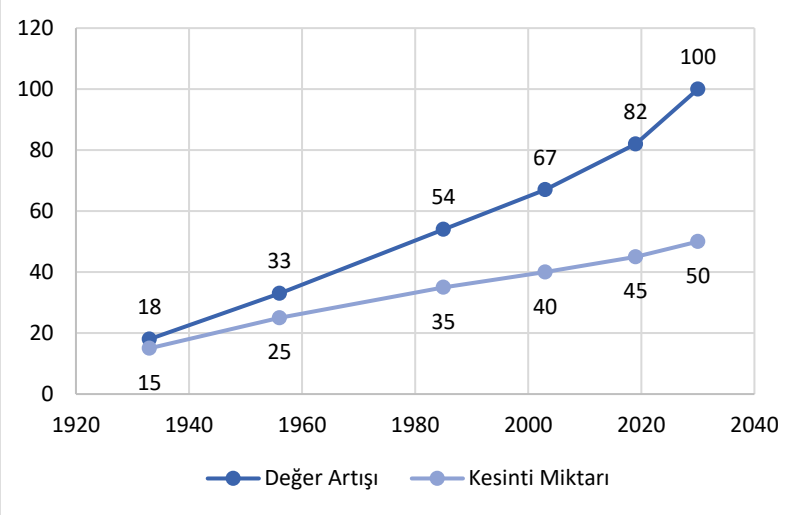
Ülkemizde Arazi ve Arsa Düzenlemesi (AAD) çalışmaları, 1848 yılında Mustafa Reşat Paşa döneminde ilk olarak sadece İstanbul ilinde uygulanmak üzere çıkarılan "Ebniye Nizamnamesi (Yapı Tüzüğü)" ile başlamıştır. 1864 yılında "Turuk ve Ebniye Nizamnamesi (Yapı ve Yollar Tüzüğü)" ile yürürlükteki mevzuat geliştirilmiştir. Günümüze kadar yaklaşık 160 yıldır uygulandığı düşünüldüğünde, AAD yönteminin 'kendine has özellikleri içerisinde barındıran köklü bir uygulama' olduğu söylenebilir. Yöntem en kısa şekilde "*tapuda kayıtlı olan taşınmazların, imar planı hükümlerince getirilen düzene uygun biçimde kullanılmalarını sağlamak*" amacıyla; yasal, ekonomik ve toplumsal özellikler dikkate alınarak 'taşınmazların biçimlendirilmesi ve kullanım özelliklerinin belirlenmesi' olarak tanımlanabilir (Salalı ve ark., 2022). Bu nedenle hem taşınmazın mülkiyet yapısında hem de kentsel alanda kullanımında bazı değişimler (taşınmazın cinsi, konumu, sınırları, şekli, payı ve ekonomik değeri) olması mümkündür.
Türkiye'de mevcutta uygulanan arazi ve arsa düzenlemesi yönteminde, alan esaslı dağıtımın benimsendiği, bu yöntemin gereği olarak "düzenlemeye alınan her parselden, düzenleme sahası için hesaplanmış 'düzenleme ortaklık payı (DOP) ve oranı (DOPO) nispetinde toprak kesintisi yapılması" modeli/ilkesi kullanılmaktadır. Bu uygulama, düzenleme ortaklık payı (DOP) kesintisi nedeniyle kamulaştırmaya benzetilen bazı çevreler tarafından kullanım adına yapılan bir düzenleme olarak görülse de aslında bir kamulaştırma işlemi değildir (Köktürk, 2007). İmar ile ilgili işlemler, kamu hukukundan doğan ve kamu gücü kullanılan planlama ve uygulama işlemleridir (Aksay, 1999). Bu nedenle, arazi ve arsa düzenlemesi işlemi, taşınmazlarda imar planına bağlı olarak kullanım haklarını kısıtlayan "kamu kullanımı" amacına sahiptir (Türk ve Türk, 2006). Türkiye'de AAD yönteminin uygulanmasına başlanmasıyla birlikte Tablo 1'de görüldüğü gibi kentsel gereksinimden kaynaklanan altyapı yönetimini sağlamak amacıyla DOP oranı sürekli artmıştır.

Tablo 1.Türkiye'de farklı DOP oranları (Köktürk ve Köktürk, 2019).

Toprak Kesinti Oranı **(p) %**	Taşınmaz Üzerindeki Değer Artışı **(%)**	Yer Aldığı Yasa ya da Uygulama Adı	Yasa Tarini / No
15	18	Yapı e Yollar Kanunu / Tüm Belediyeler İçin	21.06.1933 / 2290
25	33	İmar Kanunu / 42. Madde	09.07.1956 / 6785
35	54	İmar Kanunu	03.05.1985 / 3194
40	67	İmar Kanunundaki DOP Oranının Değiştirilmesi Hususunda Kanun	03.12.2033 / 5006
45	82	Tapu Kanunu ve Bazı Kanunlarda Değişiklik Yapılmasın Dair Kanun	04.07.2019 / 7181
50	100	-	-

FULL TEXTS BOOK

Bu artışların hukuksal zeminde "imar planı ve uygulaması sebebiyle parselde oluşan değer artışına karşılık" olarak yapıldığı ifade edilse de her bir parselden aynı oranda miktarların bedelsiz olarak kesilmesiyle "her parselde aynı oranda bir değer artışının oluşmasının" beklenmesi yanlış olacaktır. Çünkü her bir taşınmazın aynı imar hakkına sahip olması ve uygulamanın ardından her taşınmazda aynı oranda değer artışının yaşanması mümkün olmayacaktır. Ülkemizde AAD uygulamaları sürecinde farklı DOP oranlarına göre oluşan değer artışı ilişkisi Şekil.1'de verilmiştir (Salalı ve ark., 2022).



Şekil. 1. DOP oranlarına göre oluşan değer artışı miktarları (Salalı ve ark., 2022).

Mevcut imar mevzuatımıza göre uygulanan AAD yöntemine bakıldığında, uygulamayı yapan kamusal idare ve uygulamaya katılan taşınmaz sahipleri kesimlerinde olumlu ve olumsuz yönleriyle eleştiriler yaşanmaktadır. Yöntem, sorumlu idare açısından bütüncül ve hızlı olması, sorumlu idareye kamulaştırma yükünü azaltması, arsa spekülasyonlarının önlenmesi, düzenli bir kentsel gelişimin sağlanması, kaçak yapıların önlenerek vergi kaynağı yaratması ve istihdam sağlaması gibi avantajlı yönlere sahiptir. Taşınmaz sahipleri için de mülkiyet hakkının korunması, taşınmazın aktif kullanımının sağlanarak ekonomik kazanç sağlaması, taşınmazın sınır ve boyutlarının düzeltilmesi, sosyal ve teknik altyapının sağlanması ve maliyetin yerel yönetim tarafından karşılanması gibi avantajlardan söz edilebilir (Salalı, 2014; Salalı ve ark, 2022).

Taşınmazlarda plana göre meydana gelen değişikliklerden kaçınmanın mümkün olmadığı, ancak önemli olanın bu değişikliklerin her taşınmaza dengeli bir şekilde yansıtılması olduğu açıktır. Söz konusu denge sağlanamadığında ise sorun yaşanacaktır (Salalı, 2014). Düzenleme çalışmaları ile oluşan kentsel taşınmazların (arsa) tahsisi, katkı yüzdesine bağlı olarak göreceli büyüklüklerde olmak üzere sadece düzenlemeye katılan asıl taşınmaz sahipleriyle sınırlıdır. Uygulama neticesinde plan kararlarına göre büyük taşınmazların arsaya dönüşümünde sorun yaşamaz iken, küçük yüzölçümlü ve çok hisseli taşınmazların dönüşümü daha sorunlu olmaktadır (Manandhar, 2019). Ayrıca, düzenleme çalışmalarında her taşınmaz sahibinin onayı gerektiğinden, stresli ve zaman alıcı bir süreç olduğu da söylenebilir (Larsson, 1997). AAD yöntemi benzer nedenlerle, özellikle düzenleme çalışmalarının öncesi ve sonrasını kapsayan süreç içinde yaşanan sorunlar bakımından temelde teknik, planlama, hakçalık, ekonomik ve hukuki konularında eleştirilmektedir (Salalı, 2014).

AAD yöntemi ile ilgili öncelikli eleştirilerin, uygulama öncesi ve sonrası arasında yaşanan değer artışından kaynaklandığı görülmektedir. Mevcut yöntem sürdürülebilir gelişimin sağlanmasından ziyade, yapıya uygun arsa üretmek için uygulanmaktadır. Düzenleme çalışmalarının taşınmaz sahiplerini etkilediği halde katılımın sağlanmaması, değer artışının malikler arasında eşit dağıtılmaması, oluşan bu farkın kamuya aktarılamaması ve alternatif yaklaşımların uygulamaya konulamaması büyük

FULL TEXTS BOOK

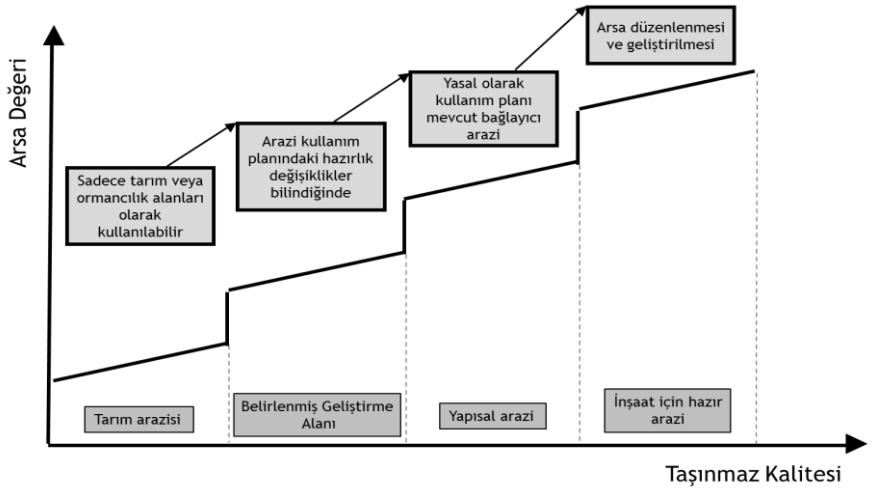
bir sorun olarak yöntemi zorlamaktadır. Yapılan düzenleme çalışmalarına yapılan itirazların çoğu belediyeler tarafından reddedilmekte ve konu idari yargıya taşınmaktadır. Uygulamanın odağında yer alan DOP kavramının sadece 'alan esaslı' bir uygulamanın temeli olması, mevcut teknik sorunlara ilave pek çok hukuki soruna da yol açmaktadır. Bu nedenle, mülkiyetin kullanımına ilişkin toplumsal alışkanlıklarımızı da göz önünde tutarak, Türkiye'de AAD yönteminde değer esaslı uygulama (eş değerlilik) ilkesine geçilmesi önem arz etmektedir. Kaldı ki, bütün dünya ülkelerinde AAD yönteminin 'eşdeğerlilik ilkesi/modeli' esaslı uygulanması konusunda fikir birliği bulunmaktadır (Salalı ve ark., 2022).

DEĞER ESASINA DAYALI ARAZİ VE ARSA DÜZENLEMESİ

Günümüzde hızla büyüyen kentli nüfusu ve kentleşme hızı, şehir planlama ve arazi yönetimi konusunda daha sürdürülebilir ve etkili yaklaşımların benimsenmesi hususunu gündemde tutmaktadır. Bu noktada, kalkınma amacı ile hazırlanan imar planlarının mekâna aplikasyonu açısından arazi ve arsa düzenlemeleri önemli bir uygulama aracıdır. Türkiye'de arazi ve arsa düzenlemesi çalışmaları, 3194 sayılı İmar Kanunu'nun 18. maddesi ve buna iat uygulama yönetmeliği baz alınarak gerçekleştirilmektedir. Bu süreçte, değer esaslı (eşdeğerlik ilkesi) dağıtım kriterinin benimsenmesi büyük bir gereklilik olarak ortaya çıkmaktadır.

Değer esası ile yapılan uygulamalarda, taşınmaz sahibine "düzenlemeye başlanmadan önceki taşınmaz değerine yakın ya da aynı değerde" yeni bir taşınmaz (imar parseli) verilir. Değer ölçütü kullanılarak yapılan uygulama yöntemine "**değer esaslı yöntem**" ya da "**eşdeğerlik ilkesi**" denir. Eşdeğerlik ilkesi ile taşınmaz sahibi düzenleme sonucu ne kar ne de zarar etmelidir. Düzenlemeden öncesi ve sonrası bakımından söz konusu taşınmazın imar planına bağlı olarak yüzölçümü, geometrisi ve adresi değişebilir ama değeri aynı kalmalıdır. Bu nedenle, değer esaslı dağıtım kriterinin benimsenmesi, "taşınmazın adil bir şekilde dağıtılmasını, daha verimli kullanılmasını, daha esnek projeler hazırlanmasını, imar planlarına göre kamusal tesisler için gerekli alanın sağlanmasını ve ekonomik kalkınmayı" sağlamaya hizmet edecektir.

Yöntemin esasları, arazilerin mevcut ve sonrası için geçerli olan kullanım değeri, konum, altyapı erişimi ve diğer faktörler dikkate alarak belirlenir. Belirli bir bölgede alınan imar planı kararı ile başlayan taşınmazın ekonomik değer artışı, arsa düzenlemesi uygulamasının yapılması ile olgunlaşıp, iyice artış göstermektedir (Şekil 2). Bu nedenle, uygulama projeleri kentsel gelişim için oldukça önemlidir. Genellikle yenilikçi, ekonomik ve bölgesel arazi kullanımlarının gerçekleştirilmesini amaçlar. Bu içerikte proje geliştirmeleri, piyasaya uygun olması ve kullanımı sürdürülebilir varlıklara odaklanan bir gayrimenkul yaratmaktadır (Ortner ve ark., 2019).



Şekil. 2. Taşınmazın kalitesine bağlı olarak arsa değerinin değişimi (Ortner ve ark., 2019).

FULL TEXTS BOOK

Değer esaslı dağıtım, herkesin mülkiyetini koruyan ve toplumsal adaleti sağlayan bir yaklaşım sunar. Kaynakların etkin ve verimli bir şekilde kullanımını sağlar. Böylelikle enerji, su, altyapı ve diğer kaynaklarda, israfın önlenmesine ve sürdürülebilirlik ilkesinin sağlanmasına katkıda bulunur. Kaynakların doğru ve sürdürülebilir kullanılması ile yatırımların teşvikini sağlar. Artan iş imkânları ile istihdamın sağlanmasına, gelir birikimlerinin artmasına ve ekonomik açıdan kazanç elde edilmesine ve yerel yönetimlerin güçlenmesine neden olur.

Değer esaslı arazi ve arsa düzenlemeleri, akıllı kentlerin sürdürülebilirlik hedeflerinin başarısında da etkin bir rol oynar.

İlk olarak, bu yaklaşım, kaynakları etkin ve verimli şekilde korumayı sağlar. Sınırlı olan kaynaklar, daha yoğun ve kompakt yerleşimlerle daha verimli bir şekilde kullanılır. Bu yöntem altyapı, enerji ve su kaynaklarını daha iyi yönetmeye ve kullanmaya yardımcı olur.

İkinci olarak, değer esaslı arazi ve arsa düzenlemeleri, çevreyi korumayı ve sürdürülebilirlik ilkesini gözetmeyi hedefleyen bir yaklaşımdır. Bu düzenlemeler, doğal çevrenin ve yeşil alanların korunmasını ön planda tutar. Parklar, bahçeler, ağaçlandırmalar ve su sistemleri gibi yeşil alanlar düzenleme sürecine dahil edilir. Bu sayede biyoçeşitlilik korunur, hava ve su kalitesi iyileştirilir ve doğal kaynaklar sürdürülebilir bir şekilde kullanılır. Bu yöntem, çevre dostu bir planlama ve düzenleme yaklaşımı olarak öne çıkarır ve doğal çevrenin dengeli bir şekilde korunmasıyla uyumlu bir yapı oluşturur.

Üçüncü olarak, değer esaslı arazi ve arsa düzenlemeleri, toplumsal bütünleşmeyi ve sosyal dengenin sağlanmasını amaçlayan bir yaklaşımdır. Bu uygulamalar, farklı gelir ve yaşam biçimlerine yönelik konut seçeneklerini değerlendirir ve toplumsal katılımı teşvik eder. Aynı zamanda, erişilebilir ve yaşanabilir kültürel ve sosyal merkezlere kolay erişim sağlamayı hedefler. Bu şekilde, toplumun geniş kesimleri için uygun ve çeşitli konut seçenekleri sunar, sosyal ve kültürel etkileşimi arttırır ve toplumun bir arada yaşama ve katılımını destekler.

Son olarak, değer esaslı arazi ve arsa düzenlemeleri, ekonomik gelişmeyi teşvik etmek, sürdürülebilirlik alanlarında akıllı kentler oluşturmak ve yaşam kalitesini artırmak amacıyla verimli bir arazi kullanımı sağlamada önemli bir rol oynamaktadır.

Bu yaklaşım, iş fırsatlarından yararlanmayı ve yatırımları çekmeyi başararak kentlerde ekonomik gelişmeyi artırırken, istihdam maliyetlerini azaltır. Yöntem, adil bir dağıtım, toplumsal bütünleşme ve ekonomik gelişme gibi önemli amaçları gerçekleştirir. Değer esaslı düzenlemeler akıllı kentlerin sürdürülebilirlik hedeflerine ulaşmasında kritik bir rol oynar. Yöntem sayesinde akıllı kentler daha yaşanabilir, sürdürülebilir ve insan odaklı hale gelir; bu nedenle bu tür uygulamaların yaygınlaşması büyük önem taşır.

DEĞER ESASINA DAYALI İMAR UYGULAMALARI VE AKILLI KENTLER

Akıllı kentler için çeşitli tanımlar yapılmakla birlikte; kavram temel olarak, kentsel problemlerin çözümünde teknolojinin aktif olarak kullanılmasıyla ortaya çıkmıştır (Dameri, 2013). Albino ve diğerleri (2015) tarafından yapılan bir çalışmada, uluslararası yayınlarda yer alan farklı tanımlamalar bir araya getirilerek akıllı kentlere yönelik çeşitli ele alışlar belirlenmeye çalışılmıştır. Bu çalışmada, akıllı kent tanımlamalarında teknoloji, altyapı, bilgi yönetimi, bağlantılılık, sürdürülebilirlik, yaşam kalitesi, katılımcı yönetişim gibi kavramların öne çıktığı görülmektedir.

Sürdürülebilir kalkınma yaklaşımının uluslararası politikadaki toplantıları incelendiğinde (Rio Zirvesi ve Gündem 21, BM İnsan Yerleşimleri Konferansı-Habitat II, BM Milenyum Zirvesi, Rio+20 Zirvesi, Sürdürülebilir Kalkınma Hedefleri, Gündem 2030 ile Habitat III-Yeni Kentsel Gündem, vb.), dünya genelinde artan kentleşmenin özellikle kentsel alanlara daha fazla dikkat çektiği görülmektedir. Sürdürülebilir Kalkınma Hedeflerinde öngörülen 11. hedef, şehirlerin ve insan yerleşimlerinin "kapsayıcı, güvenli, dayanıklı ve sürdürülebilir hale getirilmesi" ilkesini içermektedir. Dünyadaki birçok şehirde hızlı kentleşmenin yönetilmesi, artan nüfusa destek sağlanması, yeterli konut ve altyapının temini, çevresel etkilerin ve afetlere karşı savunmasızlığın azaltılması gibi zorluklar olduğundan bahsedilmektedir. Bu nedenle, sürdürülebilir kalkınma için arazi kullanımı ve şehir planlamasıyla yerel stratejilerin geliştirilmesi gerektiği vurgulanmaktadır (BM, 2018).

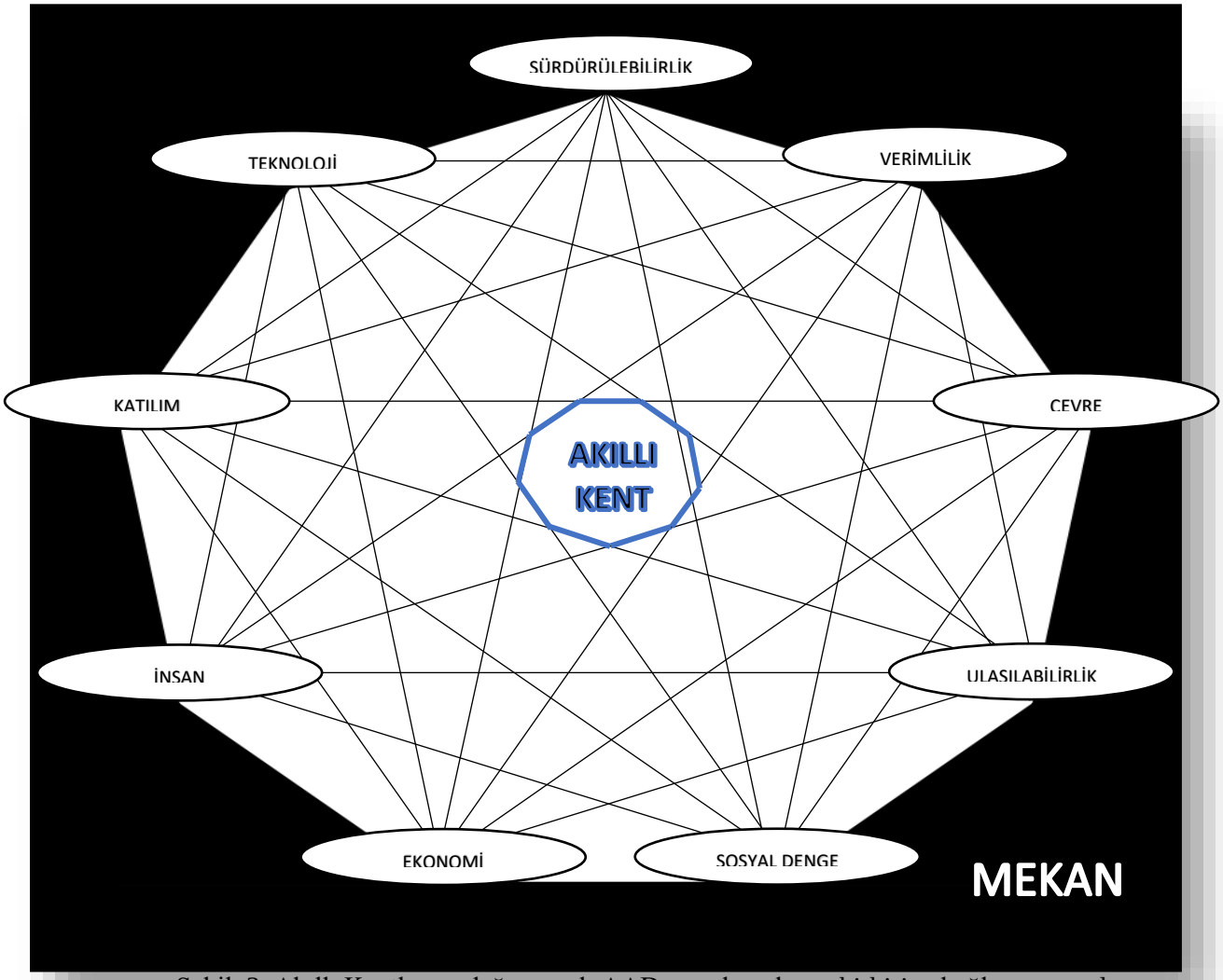
Bu bağlamda, Caragliu ve arkadaşları (2011), akıllı kentleri "*sürdürülebilir ekonomik gelişme ve yaşam kalitesini besleyen beşerî ve sosyal sermaye ile katılımcı yönetişimin birleştiği kentler*" olarak vurgular. 2012 yılında Bakıcı ve arkadaşları tarafından yapılan çalışma, akıllı kenti "*sürdürülebilir, yeşil, rekabetçi, yenilikçi ve yaşam kalitesinin arttığı bir kent*" olarak tanımlar. Bu tanımlamalarda, insanları, bilgiyi ve kenti birbirine bağlamada yeni teknolojilerin kullanıldığı ileri teknolojili bir kentten

FULL TEXTS BOOK

bahsedilir. Cretu (2012) ise akıllı kentlere iki yönlü bir bakış açısı sunar. Bunlar, akıllı kentlerin yönetişim ve ekonomi ile ilgili her şeyi yeni bir anlayış ile gerçekleştirmesi ve akıllı kentlerin insan odaklı bir düzenleme ile akıllı teknolojilerin kullanılarak (akıllı cihazlar, sensörler, gerçek zamanlı veriler, bilgi ve iletişim teknolojileri) kent ile bütünleşmesinin sağlanması olarak tanımlanabilir.

Akıllı kentlerde, teknik ve sosyal donatı tesis ve alanların takip edilmesi, veri toplanması ve analiz edilmesiyle (Korah, 2021); hizmet faaliyetlerinin ve kalitesinin artırılması, kaynak yönetimi sağlanarak maliyetlerin azaltılması öncelikli hedeflerdendir (Varol, 2017). Kenti oluşturan temel faktörlere (insan, iş, ulaşım, iletişim, su ve enerji) ek olarak (Naphade vd., 2011), akıllı kentlerde özellikle işletme ve organizasyon, teknoloji, yönetişim, politika, insan ve toplum, ekonomi, altyapı ve doğal çevre gibi önemli faktörlerinde benimsenmesi gerektiği vurgulanmaktadır (Chourabi vd., 2012; Joshi vd., 2016). Bu nedenle, akıllı kent kavramı sadece teknolojik (bilgi, iletişim) olarak gelişmişlik değil, insanların ve toplumun ihtiyaçlarının karşılanmasını ve yaşam kalitesinin artırılmasını da amaçlamaktadır (Albino vd., 2015).

Akıllı şehirler ve kentsel sürdürülebilirlik kapsamında kent içi taşınmazların ve kaynakların tasarrufunun önemli olduğu, yapılan çalışmalar ile vurgulanmaktadır. Bu konuda değer esasına dayalı arazi ve arsa düzenlemeleri oldukça önemli bir rol oynamaktadır. Değer esaslı dağıtım, taşınmazların kullanımının ve dağıtımının, alanların ekonomik, sosyal ve çevresel değerlerine göre yapılması anlamına gelir. Bu yaklaşım, kaynakların etkin ve verimli kullanımını teşvik ederken, sürdürülebilirlik ve akıllı kentlerin hedeflerine ulaşmayı amaçlar (Kaya ve Susan, 2020; Korah, 2021). Akıllı kentler oluşturmak için değer esasına dayanan arazi ve arsa düzenlemeleri ile imar planlarının mekâna aplikasyonu, dokuz temel ilkeyi benimsemektedir. Söz konusu ilkeler ve birbirleri ile olan ilişki Şekil 3'te verilmiştir.



Şekil. 3. Akıllı Kentler ve değer esaslı AAD uygulamalarını birbirine bağlayan temel noktalar.

FULL TEXTS BOOK

Değer esaslı imar uygulamaları, akıllı kentlerde hem ekonomik hem de sosyal sürdürülebilirliği temel bir ilke olarak benimser. Bu kapsamda, arazi kullanımının çevresel etkilerini minimize etmek için çeşitli stratejiler geliştirilir. Yeşil alanların korunması, doğal kaynakların verimli kullanımı, enerji verimliliği, atık yönetimi ve ulaşım planlaması gibi sürdürülebilirlik odaklı uygulamaları içerir. Böylece, kentlerin çevresel ayak izi azaltılarak gelecek nesillere daha sağlıklı bir yaşam alanı bırakılmasını hedefler (Dameri, 2013; Kaya ve Susan, 2020).

Değer esaslı uygulama yaklaşımı, arazi kullanımının en verimli şekilde gerçekleştirilmesini hedefler. Bu yaklaşım, kaynakların etkin ve verimli kullanımını teşvik eder. Verimlilik (üretkenlik) ilkesi ile var olan kaynakların ve değerli ve stratejik alanların sağlanması, altyapı ve hizmetlerin daha efektif şekilde kullanılması, israfın önlenerek ekonomik kalkınmanın gerçekleştirilmesi hedeflenir (Joshi vd., 2016).

Akıllı kentlerde değer esaslı imar uygulamaları; yeşil altyapı, doğal ve tarihi çevrenin, kentsel dokunun ve kimliğinin korunmasını öncelikli hedefler arasına alır. Parklar, bahçeler, su sistemleri, orman alanları gibi doğal ve tarihi dokuya sahip alanlar, düzenleme sürecine entegre edilir ve bu alanların korunması ve artırılması için planlar yapılır. Bu doğal alanlar, biyoçeşitliliğin korunması, su kaynaklarının sürdürülebilir kullanımı ve ekolojik planlama ve denge açısından büyük önem taşır (Steiner, 2000; Özcan, 2007; Nayim, 2011).

Akıllı kentlerde yaşayanların ve ziyaretçilerinin yaşam kalitesini artırmak, temel hizmetlere erişimi kolaylaştırmak ve çevre dostu ulaşım seçeneklerine ulaşımı sağlamak amacıyla ulaşılabilirlik ilkesi, akıllı kentlerin tasarımında ve planlamasında önemli bir rol oynar (Cairney, & Speak, 2000). Değer esaslı arazi ve arsa düzenlemeleri, kentin farklı bölgelerindeki potansiyel değerleri analiz ederek, ulaşılabilirlik ilkesine uygun şekilde altyapı ve hizmetleri planlamayı kolaylaştırabilir. Toplu taşıma, bisiklet yolları, yaya dostu alanlar gibi çevre dostu ulaşım seçeneklerinin teşvik edilmesi önemlidir. Böylece, insanların ihtiyaçlarına daha iyi yanıt veren ve yaşam kalitesini artıran bir kent tasarımı sağlanabilir.

Akıllı kentlerde değer esaslı imar uygulamaları, sosyal dengenin sağlanmasını da hedefler. Farklı gelir ve yaşam biçimlerine yönelik konut seçenekleri sunularak, toplumun geniş kesimlerinin kente katılımı ve yaşam kalitesinin artırılması amaçlayan geniş kapsamlı bir hedeftir (Dameri, 2013). Ayrıca, eğitim, sağlık, kültürel ve spor alanları gibi sosyal altyapıların planlanması da sosyal dengenin korunmasına katkı sağlar.

Değer esasına dayalı olarak yapılan imar uygulamaları, kent içi arazilerde aşırı artan değerin önüne geçerek, kentlerin mevcut ve potansiyel değerlerini analiz eder, yatırım fırsatlarını ve potansiyel ekonomik büyüme alanlarını belirlemeye yardımcı olur. Bu sayede, kent yöneticileri ve yatırımcılar, ekonomik büyümeyi teşvik edecek alanlara odaklanabilir ve doğru yatırım kararlarını alabilir. Altyapı yatırımlarının etkin bir şekilde planlanmasını ve kaynakların en iyi şekilde kullanılmasını sağlar. Akıllı kentlerde altyapı yatırımları, teknoloji ve veri kullanımı ile optimize edilir; böylece maliyetler düşer ve hizmetlerin kalitesi artar. Kent içinde çeşitli sektörlerde istihdam yaratmayı teşvik eder. Planlama ve düzenleme süreçlerinde, işletmelerin ve girişimcilerin ihtiyaçları göz önünde bulundurulur; böylece ekonomik büyüme ve istihdam artışı desteklenir. Değer esası ile yapılan uygulamalar sonrası oluşan değer artışının kamuya aktarımı sağlanarak kentlerin cazip ve rekabetçi hale gelmesi sağlanır. Sürdürülebilir ve yaşanabilir kent yapıları, yatırımcıların ve şirketlerin ilgisini çeker, böylece kente yapılan yatırımlar artar (Görgülü ve Görgülü, 2016; Kocalar, 2018; Korah, 2021).

Arazi kullanımı ve yönetiminde rol alan politika yapıcıları, uygulayıcıları, karar vericileri, çevre korumacıları ve mülk sahipleri gibi farklı paydaşların farklı fikir ve çıkarları olduğu bir gerçektir. Bu nedenle, plansız bir kentleşmeden bahsetmek yanlış olmayacaktır (Gabriela vd, 2006). Mevcutta uygulanan mevzuatın özellikle katılım konusunda yetersiz olduğu da açıktır. Değer esaslı arazi ve arsa düzenlemeleri, uygulama süreci boyunca karar alma süreçlerine katılımı teşvik eden bir yaklaşım benimsenir. Kent sakinleri, yerel topluluklar, sivil toplum kuruluşları, yerel yönetimler, düzenleyiciler ve diğer paydaşlar, düzenleme sürecine aktif olarak dahil edilir. Şeffaf bir yaklaşım benimseyerek,

FULL TEXTS BOOK

kararların açıkça paylaşılması ve tüm tarafların görüşlerine saygı gösterilmesi önemlidir (Dameri, 2013; Bilsel ve Yomralıoğlu, 2016; Hajinedan ve Ramli, 2017; Guo vd., 2017).

Akıllı kentlerde değer esaslı imar uygulamaları, verilerin analiz edilmesi ve akıllı teknolojilerin kullanılmasıyla daha etkili, verimli ve adil kararlar almayı sağlar. Akıllı ulaşım sistemleri, enerji yönetimi, akıllı bina teknolojileri gibi akıllı çözümler, kentsel planlama ve düzenleme süreçlerini optimize eder ve sürdürülebilir bir şehir yönetimine olanak tanır. Değer esaslı arazi ve arsa düzenlemeleri, akıllı teknolojilerin kullanılmasıyla bütünleşerek şehirlerin kaynak verimliliğini, hizmet kalitesini, yaşam kalitesini ve sürdürülebilirlik performansını artırır. Akıllı teknolojiler; veri toplama ve analizi, iletişim, enerji verimliliği, ulaşılabilirlik ve diğer alanlarda şehirlerin daha akıllı ve sürdürülebilir olmasına katkı sağlar. Bu sayede şehirler daha iyi planlanır ve yönetilir, çevresel etkileri azaltılır ve insanların yaşam kalitesi artırılır. (Bilsel ve Yomralıoğlu, 2016; Varol, 2017; Trindade vd., 2017; Soydakök, 2022).

Son olarak, değer esaslı imar uygulamaları, kentlerin insanların ihtiyaçlarına uygun şekilde tasarlanması açısından göz ardı edilemeyecek kadar önemli bir yöntemdir. Erişilebilir ve yaşanabilir ortamların yaratılması, insanların günlük yaşamını kolaylaştırır ve kentsel yaşam kalitesini artırır. Yaya dostu alanlar, bisiklet yolları, toplu taşıma ağları gibi insan odaklı çözümler, kent sakinlerinin günlük hayatını daha keyifli ve kolay hale getirir. Teknoloji, çevre, sosyal ve ekonomik dengenin insan için kent yaşamını katılımcı, paylaşımcı ve kolay yaşanılabilir olmasını sağlar (Caragliu vd., 2011; Kaya ve Susan, 2020).

İlgili literatür kapsamında incelenen bu temel noktalar, değer esasına dayanan arazi ve arsa düzenlemeleri ile akıllı kentlerin oluşumu, işleyişi ve sürdürülebilirliğinin başarılı bir şekilde hayata geçirilmesini sağlayabilir.

DEĞER ESASINA DAYALI İMAR UYGULAMALARININ AKILLI KENTLER İÇİN OPTİMİZASYONU

Dünya şehirlerinin hızla gelişmeleriyle birlikte, daha sürdürülebilir ve yaşanabilir bir ortam oluşturmak önemli bir hedef haline gelmiştir. Bu bağlamda, akıllı şehirler konsepti ortaya çıkmış ve kent kullanımını daha verimli, çevre dostu ve insan odaklı olmasını sağlamayı hedeflemiştir. Akıllı şehirlerin yapısında, kalkınma amaçlı yapılan mekânsal planlamayı ve kullanımın etkili bir şekilde gerçekleştirilmesi gerekliliği bulunduğundan, arazi ve arsa düzenlemeleri büyük bir öneme sahiptir.

Değer esasının benimsendiği bir düzenleme çalışması ile özellikle yapılacak uygulama öncesi ve sonrası arazi ve arsaların mevcut durumu, kullanım, altyapı erişimi, kullanım özellikleri gibi faktörleri dikkate alarak bir alan değeri belirlenir. Bu analiz, arazi ve arsaların en uygun yönetim ve dağıtımını belirlemek için temel verileri sağlar. Böylelikle taşınmaza ait mevcut ve potansiyel değerleri analiz edilir. Bu yöntem, taşınmazların etkin bir şekilde değerlendirilmesini sağlayarak şehirlerdeki ulaşım ve altyapı maliyetlerini azaltabilir. Yöntem, düzenleme sınırının içinde bulunan taşınmaz özelliklerine göre esnek modeller geliştirebilme ve optimize etme özelliğine sahiptir. Arazi yönetimini en verimli hale getirmek için bina yoğunluğu, yeşil alan miktarı, ulaşım erişimi gibi temel sorunları ele alarak en ideal dağılımı belirler. Parklar, bahçeler, su sistemleri ve ağaçlandırmalar gibi yeşil alanların düzenlenmesine önem verilir. Bu durum biyoçeşitliliği artırır, hava ve su kalitesini iyileştirir ve şehirlerin çevre dostu bir yapıya kavuşmasına katkıda bulunur.

Eşdeğerlilik ilkesinde yapılacak arazi ve arsa düzenlemesi çalışmaları; teknolojik gelişmelerden yararlanarak, taşınmazların düzenleme öncesi ve sonrası değerlerinin tahminini ve dağılımını belirlemek için elde edilen verilerin analizini yaparak, daha iyi kararların alınmasını sağlayabilir. Alınacak kararlarda toplum ve kullanıcı fikir ve görüşleri dikkate alınır. Böylece adil bir dağıtım ile katılım ve şeffaflık sağlanır.

FULL TEXTS BOOK

SONUÇ

Akıllı ve sürdürülebilir kentlerin oluşumunda değer esasına dayalı arazi ve arsa düzenlemeleri önemli bir rol oynamaktadır. Bu düzenlemeler, şehirlerin sürdürülebilirlik hedeflerine ulaşmasına ve akıllı kent kavramının gerektirdiği teknolojik altyapıyı etkin bir şekilde kullanmasına yardımcı olur.

Değer esaslı arazi ve arsa düzenlemeleri, şehir planlamasında insan odaklı bir yaklaşımı temsil eder. Şehirlerin nüfusunun hızla arttığı ve kullanılabilir kaynakların kısıtlı olduğu günümüzde, arazi ve arsa kullanımının etkin ve verimli bir şekilde yönetilmesi gerekmektedir. Değer esaslı düzenlemeler, şehirlerdeki altyapı, konut, ticaret ve yeşil alanların dengeli bir şekilde dağıtılmasını sağlar. Böylece, şehirler daha yaşanabilir ve çevre dostu hale gelir. Bu düzenlemeler aynı zamanda kentsel yayılmayı kontrol altına alarak verimsiz ve plansız şehirleşmeyi engeller. Şehirlerdeki altyapı, ulaşım ve hizmetlerin etkin kullanılmasını teşvik eder. Bu da trafik sıkışıklığını azaltır, enerji tüketimini optimize eder ve çevre dostu ulaşım seçeneklerinin yaygınlaşmasına katkı sağlar.

Değer esasına dayalı arazi ve arsa düzenlemeleri aynı zamanda sosyal bütünleşmeyi teşvik eder. Farklı gelir gruplarına ve yaş gruplarına yönelik çeşitli konut seçenekleri sunarak sosyal dengenin sağlanmasını hedefler. Ayrıca, katılımcı yönetişimi destekler ve şehir sakinlerinin kent yönetimine etkin bir şekilde katılmasını sağlar. Ekonomik açıdan değerlendirildiğinde, değer esaslı düzenlemeler, şehirlerin ekonomik büyümesini ve yatırım çekiciliğini artırmada önemli bir rol oynar. Verimli arazi kullanımı ve altyapının etkin kullanımı, iş fırsatlarından yararlanma ve şehirlerin ekonomik potansiyelini artırma imkânı sunar.

Sonuç olarak, akıllı ve sürdürülebilir kentlerin oluşumunda değer esasına dayalı arazi ve arsa düzenlemeleri, şehirlerin sosyal, ekonomik ve çevresel açıdan daha sürdürülebilir ve planlı hale gelmesini sağlar. Bu düzenlemeler, şehir planlamasında akıllı teknolojilerin kullanımıyla birleşerek, insanların ihtiyaçlarını karşılayan, çevre dostu, teknolojik açıdan ileri düzeyde ve toplumsal bütünleşmeyi teşvik eden akıllı kentlerin inşasına katkı sağlar. Bu nedenle, mevcut mevzuatımız kapsamında yaşanan sıkıntıların giderilerek rekabetçi, güçlü ve dinamik yapıda akıllı kentlerin oluşumu için arazi ve arsa düzenlemeleri uygulamalarında "değer esası" yöntemi benimsenmelidir.

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OKULLARDA HAYAT BOYU ÖĞRENME KÜLTÜRÜNE İLİŞKİN ÖĞRETMEN GÖRÜŞLERİ

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ÖZET
Bu araştırmanın sebebi, okullarda hayat boyu öğrenme disiplinine ilişkin öğretmen görüşlerini belirlemektir. Bilgi çağı ile birlikte, öğrenme yalnızca meslek edinme veya örgün eğitim kurumlarıyla sınırlı kalmayıp, "beşikten mezara" kadar süren bir eylem haline gelmiştir. Hayat boyu öğrenme (HBÖ) yaklaşımı, bireylerin sürekli öğrenme ve gelişim süreçlerini kapsayan önemli bir kavramdır.
Bu araştırma, Kırıkkale ilinde görev yapan ortaokul sosyal bilgiler öğretmenlerinin hayat boyu öğrenme konusundaki görüşlerini ortaya koymak amacıyla yapılmıştır. Araştırmada olgu bilim yöntemi kullanılarak, öğretmenlerin HBÖ hakkındaki düşünceleri derinlemesine incelenmiştir. Veriler, öğretmenlerle yapılan derinlemesine görüşmeler yoluyla toplanmış ve bu sayede öğretmenlerin perspektiflerinin kapsamlı bir şekilde anlaşılması sağlanmıştır.
Araştırma bulguları, öğretmenlerin hayat boyu öğrenme eğilimlerinin ve bu konudaki olumlu tutumlarının, eğitim sürecinde ve topluma katkı sağlama açısından önemli olduğunu göstermektedir. Öğretmenler, hayat boyu öğrenmenin bireysel gelişim ve toplumsal uyum açısından kritik bir rol oynadığını belirtmişlerdir. Öğrenmenin, örgün, yaygın ve enformel eğitim ortamları da dahil olmak üzere çeşitli biçimlerde ve ortamlarda gerçekleşen sürekli bir süreç olduğunu vurgulamışlardır.
Ayrıca, öğretmenler eğitim sistemlerinin toplumun değişen ihtiyaçlarına uyum sağlayabilmesi için hayat boyu öğrenmeyi teşvik etmesi gerektiğini belirtmişlerdir. Okullarda hayat boyu öğrenme kültürünün yaygınlaştırılmasının, öğrencilerin geleceğe hazırlıklı olmalarını ve değişimlere uyum sağlayabilme yeteneklerini artıracağını ifade etmişlerdir.
Elde edilen sonuçlar, eğitim sisteminde HBÖ kültürünün yaygınlaştırılmasına yönelik stratejilerin geliştirilmesinde yol gösterici olacaktır. Öğretmenlerin görüşlerini anlamak, politika yapıcılar ve eğitimcilerin, hayat boyu öğrenmeyi destekleyen daha etkili programlar ve girişimler tasarlamalarına yardımcı olacak ve bu da daha bilgili ve uyumlu bir toplumun oluşumuna katkıda bulunacaktır. Bu nedenle, araştırma sonuçları, eğitimde hayat boyu öğrenme kültürünün önemini vurgulamakta ve bu alandaki çalışmalara ışık tutmaktadır.
Anahtar Kelime: Hayat Boyu Öğrenme, Öğretmen Görüşleri, Eğitim Sistemi

GİRİŞ
Problem Durumu
Bilginin değişim süreciyle birlikte öğrenme yöntemleri de evrilmektedir. Artık öğrenme, yalnızca meslek edinme veya eğitim kurumlarında geçirilen süreyle sınırlı değildir. Bireylerin hayatında önemli bir yer tutan öğrenme süreci, "beşikten mezara" kadar süren ve hayatı boyunca devam eden bir eylem haline gelmiştir (Çolakoğlu 2002) akt. (Konokman & Yelken, 2014).
Bilgi çağının getirdiği bilgi yığınları ile başa çıkmak için bir dizi beceriye sahip olunması gerekmektedir. Bu beceriler arasında araştırma, sorgulama ve problem çözme yer almakta olup, günümüzde bu becerilerin işgücüne dönüştürülmesi beklenmektedir. Hayat boyu öğrenme (HBÖ) yaklaşımı, bilgi çağı becerilerinin geliştirilmesinde önemli bir kıymet olarak öne çıkmaktadır (Epçaçan, 2013). Öğrenen bir topluluğun üyeleri olarak hayat boyu öğrenme becerilerine sahip bireyler, öğrenmeyi öğrenme konusunda uyum sağlarlar ve duygularını ve kaynaklarını etkili şekilde kullanırlar (De la Harpe ve Radloff, 2000. akt Çalişkan Toyoğlu & Dogan, 2020).

FULL TEXTS BOOK

Türkiye'de hayat boyu öğrenme (HBÖ) yaklaşımının yaygınlaştırılması ve hayat boyu öğrenen bireyler yetiştirilmesi amacıyla, 2009 yılında "652 Sayılı Millî Eğitim Bakanlığı'nın (MEB) Teşkilat ve Görevleri Hakkında Kanun Hükmünde Kararname" ile HBÖ Genel Müdürlüğü kurulmuştur. Kuruluşundan bu yana Genel Müdürlük, "Okullar Hayat Olsun", "Öğrenme Şenlikleri", "Öğrenen Hastane Projesi", "Bağımlılıkla Mücadele Eğitimi" gibi yerel finansman destekli projeleri hayata geçirmiştir. Ayrıca, "Hayat Boyu Öğrenmenin Geliştirilmesi Projesi", "Türkiye'de Hayat Boyu Öğrenmenin Desteklenmesi Projesi 2" ve "Türkiye Yetişkin Öğrenme Projesi" gibi Avrupa Birliği finansmanlı pek çok projeye imza atmıştır (HBÖGM, 2014; Akt: (Doğan & Kavtelek, 2015).

Eğitim sisteminde yapılacak düzenlemelerle hayat boyu öğrenen kişilerden oluşan bir toplumu yapılandırmak mümkündür (Gencel, 2013). Eğitim, bireylerin yaşam boyu öğrenme becerilerini kazanmalarına yönelik olarak, ihtiyaçlara göre şekillendirilmelidir. Bu süreçte, eğitim sisteminin önemli unsurlarından olan öğretmenlerin, hayat boyu öğrenmeye ilişkin olumlu davranışları ile öğrencilerine ve topluluğa örnek olmaları beklenmektedir (Konokman & Yelken, 2014).

Bu nedenle ilk etapta öğretmenlerin hayat boyu öğrenme disiplininde ne düşündüklerinin araştırılıp daha sonra yapılması önerilen faaliyetlere yönelik sistemler geliştirmek faydalı olacaktır (Gedik & Sarpkaya Aktaş, 2016).

Problem Cümlesi

Okullarda hayat boyu öğrenme disiplinine ilişkin öğretmen görüşleri nelerdir?

Amaç ve alt amaçlar

Bu araştırmanın genel amacı okullarda hayat boyu öğrenme disiplinine ilişkin öğretmen görüşlerinin belirlenmesidir. Bu doğrultuda aşağıdaki sorulara yanıt aranmıştır;

1. Öğretmenlerin hayat boyu öğrenme disiplinine ilişkin görüşleri nelerdir?
2. Öğretmenlerin hayat boyu öğrenen bireylerin özellikleri hakkındaki görüşleri nelerdir?
3. Öğretmenlerin hayat boyu öğrenme ortamları hakkında neler düşündükleri hakkındaki görüşleri nelerdir?

2. YÖNTEM

2.1. Araştırma modeli

Araştırmada öğretmenlerin yaşam boyu öğrenme durumundaki düşüncelerini tespit etmek gayesinden dolayı nitel araştırmalar kapsamında olgubilim (fenomenoloji) yöntemi kullanılmıştır. Olgular yaşadığımız dünya da durumlar, deneyimler, algılar, yönelimler, disiplinler ve durumlar gibi çeşitli biçimlerde karşımıza çıkabilmektedir. Farkında olduğumuz ancak derinlemesine ve ayrıntılı bir anlayışa sahip olmadığımız durumlara odaklanan olgubilim yöntemi, birçok kişinin bir fenomen veya kavramla alakalı yaşanmış deneyimlerinin ortak anlamını tanımlamak amacıyla kullanılmaktadır (YILDIRIM vd., 2014).

Olgubilim çalışmalarında olgulara ilişkin yaşantıları ve anlamları ortaya çıkarmak için görüşmeler yapılır. Görüşmenin araştırmacıya sağladığı etkileşim ve esnek ortam olguya derinlemesine görüşme fırsatı vermektedir (Ömeroğlu vd., 2014).

2.2. Evren ve Örneklem / Çalışma Grubu

Araştırma kapsamında Kırıkkale ilinde ortaokullarda görev yapmakta olan 4 sosyal bilgiler öğretmeni ile görüşme yapılacaktır. Araştırmaya gönüllü öğretmenler katılım sağlayacaktır.

FULL TEXTS BOOK

2.3. Veri Toplama Araçları

Okullarda yaşam boyu öğrenme disiplinine ilişkin öğretmen görüşlerinin belirlenmesi amacıyla araştırmacı tarafından geliştirilen "Hayat Boyu Öğrenme Öğretmen Görüşme Formu (HBÖÖGF)" kullanılacaktır.

"Öğretmen Görüşme Formu",

GÖRÜŞME *SORULARI*

1. Hayat boyu öğrenme dendiğinde aklınıza neler geliyor?
2. Sizce hayat boyu öğrenen olarak nitelendirilen kişilerin özellikleri neler olabilir?
3. Hayat boyu öğrenme ortamları hakkında neler düşünüyorsunuz?

BULGULAR

Tablo 1

Katılımcılar	Kodlar
1. Hayat boyu öğrenme dendiğinde aklınıza neler geliyor?	
Katılımcı 1 Öğrenmenin zamandan ve bulunulan ortamdan bağımsız olarak gerçekleştirilmesi, öğrenmenin tüm türlerini (forma, informal, örgün, yaygın, sargın) içerisine alan **eğitsel etkinlik**. Öğrenme denildiğinde 4 duvar arasında meydana gelen öğrenmeler hep akla gelir ama evde, işte, sokakta hayatın her alanında her an devam eder.	Beşikten mezara, Eğitsel etkinlik
Katılımcı 2 Hayat boyu öğrenme bireyin yetenek ve yeterliliklerini **yaşam boyu geliştirme**sidir. Dolayısıyla akla gelen ilk şey, yine bireyin yaşadığımız bilgi ve teknoloji toplumuna **uyum sağlamak** amacıyla yaptığı çalışmalar olabilir.	Yaşam boyu geliştirme Uyum sağlamak
Katılımcı 3 Bireylerin yaşam boyu kaybedilmeyen **bilgi toplama süreci**, toplum içerisinde ki uyum, süreç kontrolü gibi becerilerin aşamalı olarak geliştirilmesine verilen isimdir	Bilgi toplama süreci
Katılımcı 4 Hayat boyu öğrenme, bir insanın yaşamı boyunca **yeni bilgi ve beceriler edinme**ye, geliştirmeye hazırlıklı olmasıdır. Eğitim sadece okulla sınırlı değildir. **Her yaşta öğrenme sürecine dahil olabilmek**tir. Bireyin istediği eğitimleri alabilmesidir.	Yeni bilgi ve beceriler edinme Her yaşta öğrenme sürecine dahil olabilmek

Katılımcılar	Kodlar

FULL TEXTS BOOK

2. Sizce **hayat boyu öğrenen** olarak nitelendirilen kişilerin özellikleri neler olabilir?	Hayat boyu öğrenen,
Katılımcı 1 Her an öğrenmeye açık ve hazır, belli kalıpları olmayan, her yeni bilgiyi içselleştiren, yaşa, bulunduğu ortama vs. takılmadan her an **öğrenmeye istekli**, **kendini sürekli yenileyen**, çevresine de öğrenmelerini, yeni bilgilerini aktaran, çok gezen, çok okuyan	Öğrenmeye istekli Kendini yenileme Öğrenme merak
Katılımcı 2 Hayat boyu öğrenen kişiler öğrenmeye istekli ve özellikle de **öğrenme merak** ve motivasyonu yüksek olan kişilerdir.	Açık öğrenme İstekli öğrenme
Katılımcı 3 Toplum içerisinde hayat boyu öğrenen kişilerin ortak özellikleri öğrenme motivasyonuna sahip, kendilerini her daim geliştirmeye **açık, istekli, öğrenme** süreçlerini planlayan ve meraklı kişiler olmasıdır.	
Katılımcı 4 Benim için hayat boyu öğrenmeye sahip kişiler de bulunan özellikler ilk olarak öğrenmeye isteklilik, meraklı olması, öz yönetimi güçlü, **eleştirel düşünebilen**, her koşula uyum sağlayabilen, geleceğe yönelik çalışmalar yapan, farklı bakış açılarını dinleyen, teknolojiyi takip eden ve **eğitimin her zaman her yerde** olabileceğinin farkında olan bireylerdir.	Eleştirel düşünebilen Her zaman her yerde eğitim

Tablo 2

Tablo 3

FULL TEXTS BOOK

3. Hayat boyu öğrenme ortamları hakkında neler düşünüyorsunuz?	Kodlar
Katılımcı 1 Belirli bir ortam ve yer olarak nitelendirilemez, bireyin olduğu her yerde, **her an gerçekleşebilen öğrenme**lerdir. Kendimizi belli kalıplar içerisinde sokmadan hayatın içerisinde her anı öğrenerek ve kendimizi geliştirerek değerlendirmeliyiz. **Öğrenmenin yaşı**, statüsü, maddiyatı yoktur, hiç tahmin bile etmeyeceğimiz anlarda, hiç beklemediğimiz kişilerden bile çok şeyler öğrenebilir, ufkumuzu geliştirebiliriz.	Öğrenme yaşı Her an gerçekleşebilen öğrenme Öğrenme durumu
Katılımcı 2 Hayat boyu öğrenme ortamı kişiye göre farklılık gösterebileceği gibi bu **öğrenme durumu** her ortamda gerçekleştirilebilir. Bence bireyin bulunduğu ortamın önemi olmadığı gibi öğrenmeye ne kadar istekli olduğu daha önemlidir.	Ortamın önemi Hayat boyu öğrenme Yaşam boyu öğrenme
Katılımcı 3 Öğrenme süreçlerinde **ortamın önemi,** öğrenme düzeyine etkisiyle bizlere ne kadar önemli olduğunu kanıtlamaktadır. Fakat **hayat boyu öğrenme**de kişiler bu motivasyona fazlasıyla sahip olduklarından dolayı öğrenme yüz-yüze olmasa dahi yüksek bir öğrenme düzeyi gerçekleşeceği kanaatindeyim. **Yaşam boyu öğrenme**de bu bağlamı yer mekândan bağımsız olarak sosyal ve duygusal kültür ortamı olarak değerlendirebiliriz.	
Katılımcı 4 Hayat boyu öğrenme ortamları belli bir alanda sınırlı değildir. Bireylerin her yaşta, her yerde ve çeşitli platformlarda öğrenmelerini destekler. Eğitim sadece dört duvarla çevrili ve bir tahtası olan yer değildir. Öğrenme ortamı hayat boyu öğrenme için çeşitlilik sağlar ve bu ortamlar bireylerin ihtiyaç ve tercihlerine yöneliktir. **Uzaktan eğitim**, seminerler, konferanslar hatta kitaplar bile hayat boyu öğrenme için bir ortam oluşturur. Yeter ki bireyin isteği ve kolay erişimi olsun.	Uzaktan eğitim

SONUÇ

Araştırma da öğretmen adaylarının yaşam boyu öğrenme eğilimlerine yönelik görüşlerini belirlemek amacıyla görüşmeler yapılmıştır. Öğretmen adaylarının hayat boyu öğrenme kavramına yükledikleri anlam, kişisel gelişim kavramına yükledikleri anlam, kişisel gelişimin önemi ve bu konudaki yeterliliklerine dair görüşlerine yer verilmiştir.

Görüşmelerin analizi sonucunda öğretmen adaylarının yaşam boyu öğrenme eğilimlerinin olumlu seviyede olduğu söylenilebilir.

Araştırmaya katılan öğretmen adaylarının yaşam boyu öğrenme eğilimlerinin iyi düzeyde olduğu saptanmıştır. Elde edilen bulgular öğretmen adaylarının öğrenme çabasına sahip meraklı bireyler oldukları düşünülmektedir.

FULL TEXTS BOOK

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FULL TEXTS BOOK

MİMARİ TASARIM SÜRECİ İÇİN BİR ARA SÜREÇ ÖNERİSİ : DİJİTAL ANALİZ YÖNTEMİ
EXPLORATION OF A IN-BETWEEN STAGE IN THE ARCHITECTURAL DESIGN PROCESS: DIGITAL ANALYSIS

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ÖZET
Bu araştırma, geçmişten günümüze tasarım metodolojilerine ilişkin kapsamlı bir inceleme olup; analiz aşamasında toplanan verilerin görselleştirilmesi için ön tasarım aşaması olarak 'ara tasarım aşaması' önerisi sunmaktadır. Çalışmada geçmişten günümüze bilinen, özellikle ‘analiz-sentez-değerlendirme’, tasarım metodolojileri sunulmuştur. Böylece çalışma, küresel dijitalleşme araçlarına ve bilgisayar uygulamalarına paralel olarak tasarım metodolojilerine çağdaş bir katkı sunmaktadır. Günümüzde dijital araçlar ve bilgisayar uygulamaları kullanılarak analiz aşamasında toplanan veriler görsel olarak sade bir şekilde sunulabilmektedir. Metinsel verilerin görsel bir sunuma dönüştürülmesi, fikirlerin, kavramsal düşüncelerin ve ilk tasarım skeçlerin ifade edilmesi sırasında büyük bir anlam yaratır. Bu nedenle araştırmada analiz ve sentez arasındaki bu aşama araştırılmış ve günümüz teknolojisinin bilgisayar uygulamaları kullanılarak dijital ortamda oluşturulan tasarım öncesi aşama: bir ön tasarım araştırması olarak adlandırılmıştır. Araştırmanın amacına yönelik, ilk olarak geçmişten günümüze 'tasarım metodolojileri'nin gelişimine ilişkin akademik kaynaklardan kapsamlı bir literatür taraması gerçekleştirilmiştir. İkinci olarak, yazar tarafından geliştirilen ve dijital başlıklı bilgisayar uygulamaları kullanılarak temsil edilen iki vaka çalışması yapılmıştır; Proje-1: Modernist İkonlar: Mies Van Der Rohe, Le Corbusier, Sedat Hakkı Eldem ve Proje-2: Pablo Picasso'nun Evi. Özetle, bu çalışma temel olarak dijital araçlarla tasarım metodolojilerine yönelik önerilerde bulunmayı, konsept geliştirme becerilerini geliştirmeyi amaçlamaktadır.
Anahtar Kelimeler: Dijital Analiz, Tasarım Metodolojileri, Konsept Geliştirme, Mimari Proje, Mimari Mood-board

ABSTRACT
This research is a comprehensive investigation into design methodologies from the past to the present and contributes a new design methodlogy in the study titled as; ‘in-between design stage’ as the preliminary design study to visualize the data that is collected at the analysis stage. In the study, famous design methodologies from the past to the present have been presented such as; ‘analysis-synthesis-evolution’. Thus, the study introduces a contemporary contribution to design methodologies, in paralel to global digitalization tools and computer apps. Today, by using digital tools, and computer apps, the data that is collected at the analysis stage can be presented visualy simply. The transformation of textual data into a visual presentation creates a big sense during the expression of the ideas, conceptual thoughts, and design inspirations. Thus, in the research this stage between analysis and synthesis has been researched and titled as ‘in-between design stage: a preliminary design exploration’ which is created by today’s technology digitally by using computer apps. For the aim of the research, a comprehensive literature survey has been realized from academic sources on the development of ‘design methodologies’ from the past to the present. Secondly, two case studies have been developed by the author and represented by using computer apps digitaly titled; Project-1: Modernist Icons: Mies Van Der Rohe, Le Corbusier, Sedat Hakkı Eldem, and Project-2: House for Pablo Picasso. To sum up, this study mainly aims to make suggestions for the design methodologies with digital tools, to improve concept-development skills.
Keywords: Digital Analysis, Design Methodlogies, Concept Development, Architectural Project, Architectural Mood-board

FULL TEXTS BOOK

1.THE IMPORTANCE OF DATA VISUALIZATION IN ARCHITECTURAL DESIGN PROCESS

This paper mainly aims to explore the contemporary approaches and new trends for the visualization of the data of an architectural design project during the conceptual creation stage. Data visualization is an important process in architectural design phase, which is itself, is much related to visual perception in our cities and living environments, as buildings. Thus, the conceptual phase carries out an important step during the design stages, which is connected, to analysis where all data about the problem is collected.

In this scope, the traditional design phase that consists of 'analysis-synthesis-evaluation' is still an effective method in architectural design, but today by the help of digital technologies and computer based apps such as; architectural design map, etc… It is easier for an architect to express his/her ideas, and communicate with the client, and create visual data presentations at the analysis phase, at the beginning of the conceptual design, which makes a stronger preliminary design stage.

Thus, 'analysis' as the main data collection phase of an architectural design project that consists of data about; context, site, environment, function, programme, spatial requirements, client's character, lifestyle, etc. creates the preliminary design stage and concept creation period. So, analysis phase is the most important phase where all data has been collected through the problem from all sorts of sources such as; maps, cataloques, magazines, architectural journals, books, architectural web pages (arkitera, arch-daily, arkiv), to prepare visual presentations of the analysis.

In this paper, contemporary style of visual presentation techniques has been presented and current data visualization methods have been researched and digital tools/computer programs and apps have been explored such as; mood boards, tree graphics, architectural concept map tools.

1.1. Problem statement

This study seeks answers to research questions related with architectural design processes both at educational and professional enviorments, indicated above;

Question-1: How can an architect make a better communication with his/her instructor or client during the development of design concept and preliminary concept phases?

Question-2: Especially during the design of private projects, house projects, which digital techniques can be helpful to express client's character that will help to create best atmosphere for the spaces and design?

1.2. Aims and objectives

The aim of the study is to investigate and explore digital data visualization techniques that can be used during architectural design phases especially at analysis phase, where data is big, confused, non-visual and complex commonly.

1.3. Literature Review

The literature study consists of basicly two parts; at first part a comprehensive presentation have been realized on chronological development of design methodologies from the past to the present by books, journals of Nigel Cross, Bruce Archer, French&Bonatz&Pahl's on design methodologies. Second part consists of a comprehensive literature on the contemporary digital data visualization methodologies from academic sources such as; Bige Tunçer's studies on Architectural Information Map, Christina Portugal's study on 'Design and the Creation of an Interactive Academic Space'.

1.4. Methology

Methodology of the paper consists of two parts mainly, the theorethical part that consisting a comprehensive literature on design methodolohies from past to present. Second part is the application part, that two projects have been presented in the paper, which are prepared digitaly with computer apps

FULL TEXTS BOOK

visually by the author ; the 'modernist icons' project-1, and 'the house of Pablo Picasso' project-2 as the outputs of the paper content&topic.(Fig.1)

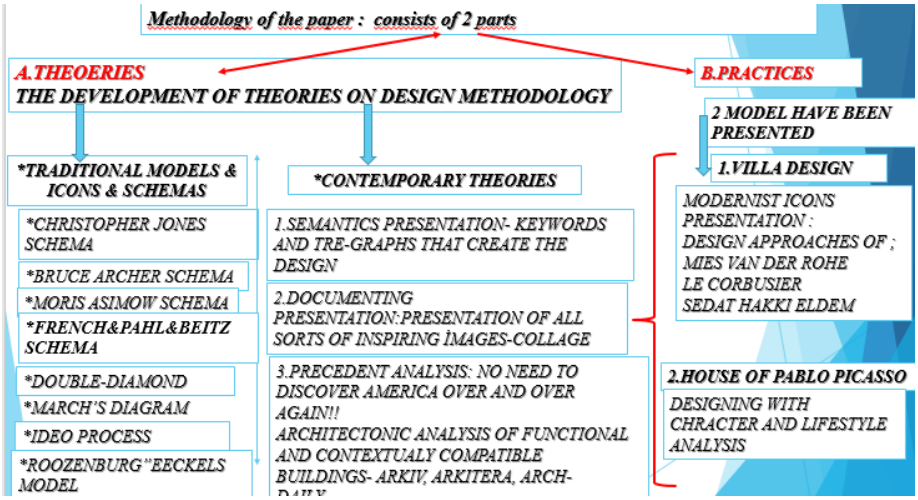


Figure 1. Methodology of the paper

2.DESIGN METHODOLOGIES FROM THE PAST TO THE PRESENT: TRADITIONAL MODULES

This part introduces design methodologies from the past to the present within a choronological order and represents the development of design methodologies from simple linear form to complex forms such as; diamond form, circle form, and cubic forms.

The design methology studies began in the 1950's by the increased complexity in industrial products. And the linear schemes of the first models evolved to more systematic representations of the design process. (Linden & Lagerda&Aguiar,2021)

2.1.Two Basic Types of Design Methodologies: Descriptive and Presciptive

Descriptive models

From the past to the present, many design metholodies have been described and schematized by academics, and however some of these methodologies concentrate on describing the activity stages, some of them commonly focused to determine more clear and prescriptive stages. Descriptive models focuses on more solution-based design thinking and define a problem at the very early beginning of the design process. (Cross, 2000)

Prescriptive models

As indicated by Cross (2000); prescriptive models are based on 'analysis-synthesis-evaluation' stages, a more analytical way and presents solution concepts. It is aimed to understand the design problem very clearly. These stages were defined by Jones (1984) in an early example of a systematic design methodology as follows:

-analysis: listing of all design requirements and the reduction of these to a complete set of logically related performance specifications.

-synthesis: finding possible solutions for each individual performance specification and building up complete designs from these with least possible compromise.

-evaluation: evaluating the accuracy with which alternative designs fulfill performance requirements for operation, manufacture and sales before the final design is selected. (Cross, 2000)

2.2.Development of design methodologies

There quite a lot of researchers, designers, and philosphers have been worked on the schemes of design methodologies from the past to the present and there are master names that also give his/her name to the scheme of the methodology diagrams such as; Jones' schema, Cross' schema, Archer' schema, French'&Bontz' scheme, etc. (Linden & Lagerda&Aguiar,2021)

FULL TEXTS BOOK

In the paper firstly the choronological development of the design methodologies, which approxiamately maps the dates between 1950's and 2000's have been introduced by table-1 given below.

Table 1. Development of design methodologies

Name of the idea	**The idea**	**The schema/The aim**	**Years**
Rene Descartes	Systematic approach	Divide each difficulty into as many parts as possible	1637
Christopher Alexander	The cartesian principle	Breaking down the problem in min. units	1950
Kuhn&Karl Popper	The structure of scientific revolutions. The knowledge is progressive and cumulative	Linearity	1962
Paul Feyerbend	The variety of strategies for dealing with product development complexity	Humanistic view	1970
Herman Kahn and Alvin Toffer	Scenarious model	İnvestigates;'How people interact with products ?'	1980
Christopher Jones	Design activity: the division of the process in well-defined steps. (ıts rooted to the Cartersian method)	-understand the problem -define the problem -gather information -analyse information -develop concepts -evaluate alternatives and elect solutions, -test and implement	1960
Bruce Archer	Combination of 'intuition with cognition'. A more creative process tends to transform it in a more scientific practice.	-analysing phase -subjective phase -deductive (reasoning)phase	1963
Morris Asimow	Life cycle of the product: -Preliminary design phase -Life-cycle phases	Primary needs: Phase1:feasibility study Phase2:preliminary design Phase3:Detailed design Phase4:Planning for manufacturing Phase5:Planning for distribution Phase6:Planning for consumption Phase7: Planning removal	
French's&Pahl's &Beitz' model	The activities related to: -production, -distribution, -consumption and, -disposal	Basic steps: -clarification of the task -conceptual design -embodiment design -detail design	

FULL TEXTS BOOK

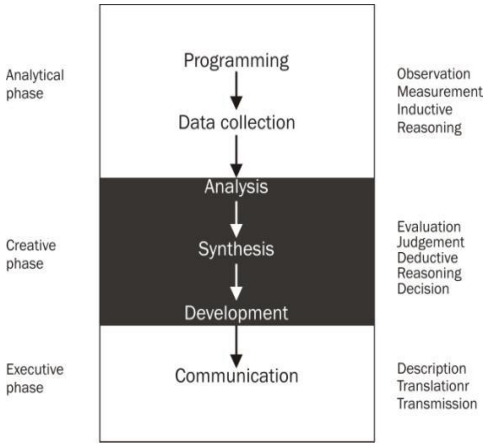
Kahn's & Popper's &Feyerband's	A new paradigm in the design methodology	-ideas and in a reaction to critics -new tools: mind maps, scenario techniques, usability testing, cooperative design.	1970s'
Jone's idea against to Kahn's& Popper's & Feyerband's	End of functionalism, the design process has changed, studies on new specific tools became more common	-mind maps -scenario -techniques -usability testing -cooperative/participatory design	
Design Council in UK	Double diamond: -divergence versus -convergence	-discover -define -develop -deliver	1980s'
March'scomplex diagram	-induction -deduction -production	Abductive thinking (reasoning): -production (synthesis) -induction and deduction are related to research (analysis)	
IDEO'sdesign process	A system of steps rather than a predefined series of orderly steps	-inspiration -ideation -implementation	
Victor Papanek	Sustainability	-sustainable product design process	1970
Nigel Cross	Prescriptive module	-analysis -synthesis -evaluation	2000

2.3.Iconic Design Methodologies

This part introduces well known and accepted design methodologies.

2.3.1.Archer's Model of the Design Process: Analytical Phase + Creative Phase + Executive Phase (prescriptive model)

Bruce Archer presented a design process in 1963 with a sequence of articles published in design magazine which combines intuition and cognition during the design process. He aimed to formalize the creative part of the design in a more scientific basis. The design process model proposed by Archer predicts the need for different approaches in different moments: systematic observation and inductive reasoning in the analytical phase, and subjective-deductive reasoning in the creative phase. (Linden & Lagerda&Aguiar,2021) (Fig.2)



FULL TEXTS BOOK

Figure 2. Archer's model of the design proces

Archer summarized this process as dividing into three broad phases: analytical, creative and executive. He suggested that: ''one of the special features of the process of designing is that the analytical phase with which it requires objective observation and inductive reasoning, while the creative phase the heart, requires involvement, subjective, judgement and deductive reasoning' (Cross,2000, (quoted from Archer))

2.3.2. Asimow's Method (prescriptive model)

Moris Asimow proposed a representation that considered the life cycle of the product. The method starts with analysis of requirements, followed by a feasibility study, prior to joining the preliminary design and detailed design phase. Next three activities related to the production, distribution, consumption and disposal. This method is considered as a predecessor of all the product development methods organized in separated phases. (Linden & Lagerda & Aguiar, 2021) (Fig.3)

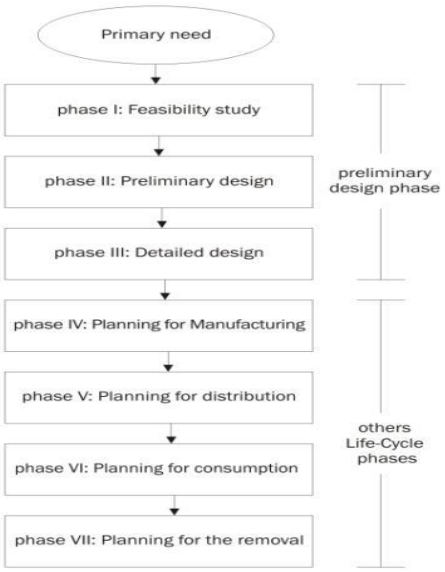


Figure 3. Asimow's model

2.3.3.French's & Pahl's & Beitz's Model- (descriptive model)

French's, Pahl and Beitz's methods were developed concurrently in business and academic environments to reduce the uncertainity in the development of new products before the competition. They aim to draw the general picture of the design stages by creating the final detail of the numerous tasks and activites. (Cross,2000)

It is based on the following design stages:

*clarification of the task: collect information about the requirements to be embodied in the solution and also about the constraints.

*conceptual design: establish function structures; search for suitable solution principles; combine into concept variants.

*embodiment design: starting from the concept, the designer determines the layout and forms, devleops a tehnical product or system in accordance with technical and economic considerations.

*detail design: arrangement, form, dimensions, and surface properties of all the individual parts finally laid down, material specified, technical and economic feasibility re-checked; all drawings and other production documents produced. (Cross, 2000) (Fig.4)

FULL TEXTS BOOK

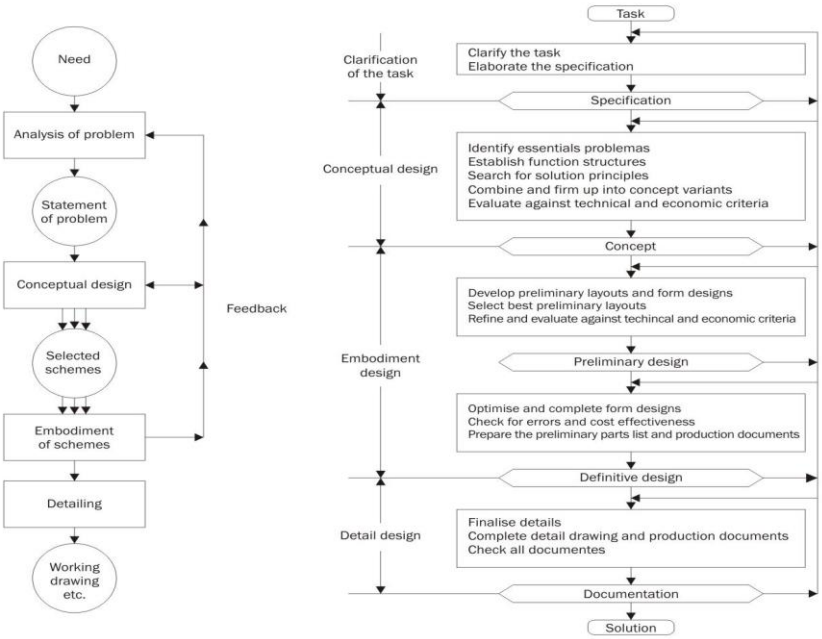


Figure 4. French's & Pahl's & Beitz's Model

2.3.4. The Design Council from UK: DOUBLE DIAMOND discover+define+develop+distribute

The form originated it's name from a double diamond. In this diagram, the process of divergence and convergence are associated with key moments in the design process. Discover and develop phases correspond to divergent process, while defines and distribute phases are convergent. To complement and extend this representations, the elements arranged inside the diagram indicate explanatory and focus activities on the left diamond, and cycles of prototyping testing and refinement in the right diamond.

Linearity was a common characteristics of the first representations. Even though many authored included the possibility of returns and feedbacks, this was seen as a problem or an opportunity to correct errors. Another way of understanding the process embraces the nature of uncertainity as part of the design activity. The path was no longer linear, simply because successive iterations are needed to frame the problem and the solution. (Cross, 2000) (Fig.5)

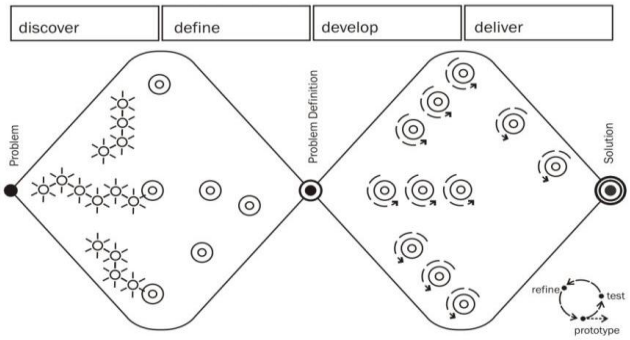


Figure 5. Double diamond diagram

2.3.5. March's diagram to the design methodologies- PDI: production-deduction-induction (prescriptive model)

A more radical model of the design process, which recognizes the solution-focused nature of design thinking has been suggested by March (1984). He argues that two conventionally understood forms of reasoning: inductive and deductive, only apply logically to evaluate analytical types of activity in

FULL TEXTS BOOK

design. Deductive proves that something must be, induction shows that something actually is operative, abduction suggest that something may be. The act of synthesis, that is central to design, which designs are generated and produced. March prefers to call it productive reasoning. Thus, his model for a rational design process is PDI model: production-deduction-induction. (Cross, 2000) (Fig.6)

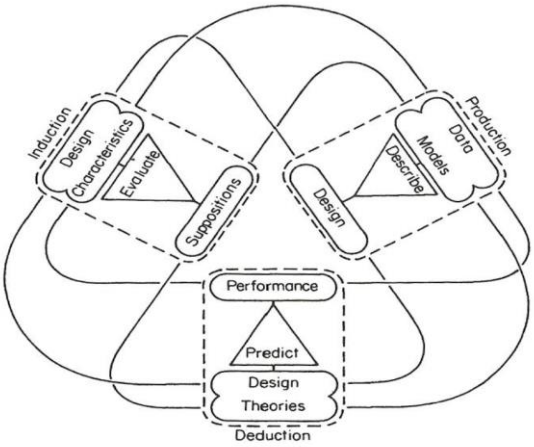


Figure 6. FrenchMarch's diagram

2.3.6. IDEO'S Design Process

Non-linearity can be found in IDEO's design process, defined by Brown as 'a system of steps rather than a predefined series of orderly steps'. Figure 6 demonstrates a modus operandi that is beyond the classic models. The process, or the design space, involves three areas: inspiration, ideation, and implementation.

-Inspiration: corresponds to the circumtances that motivate the search for a solution

-Ideation involves the generation, development and testing of ideas that could lead to a solution.

-İmplemantation deals with the product launch. Throughout a project, the three spaces can be explored, in particular the first two, in order to refine ideas and take new paths. It is important to notice that the design in IDEO is done in close collaboration professionals with diverse backgrounds. (Linden & Lagerda & Aguiar, 2021)

This ensures that many activities can be done simultanouesly, saving time in comparison with linear processes. The process, or the design space involves three areas: inspiration, ideation and implementation. (Linden & Lagerda&Aguiar,2021) (Fig.7)

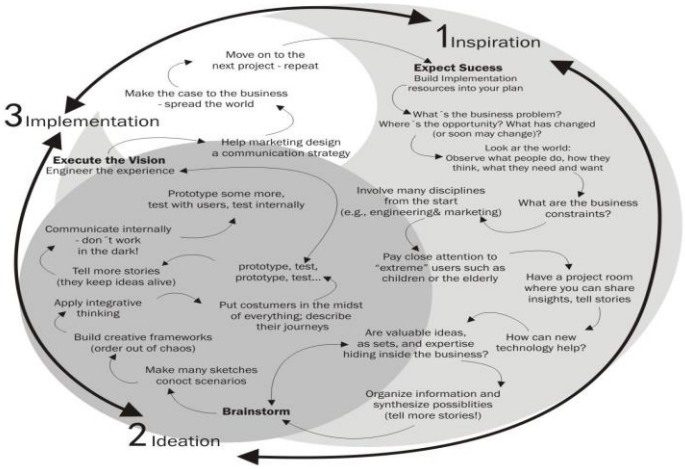


Figure 7. Ideo's process

FULL TEXTS BOOK

2.3.7. Roozenburg and Eeckels' Method

Since 1960s, the role of designers in new products development process has changed to encompass other activities, not only restricted to the project itself. An example of possibilities for design scope can be found in Roozenburg and Eeckels, who defines design as a process of goal-directed reasoning that flows from the product function to it's form. Traditionally the core of design activities is related with the left side of the figure, the product designing process, not with the right side, the product planning process. But as the authors indicate, 'the more to right we start… the more open-ended the product development process will be'. (Linden & Lagerda & Aguiar, 2021) (Fig.8)

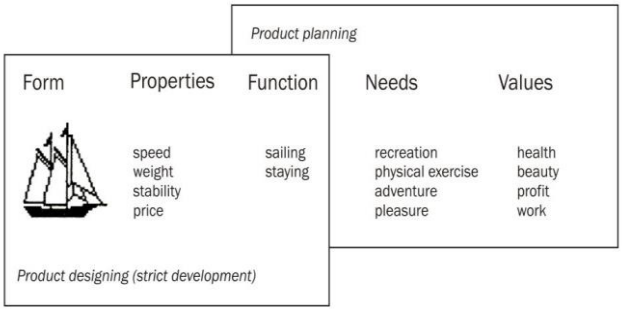


Figure 8. Roozenburg and Eeckels' method

3. DATA VISUALIZATION METHOD IN ARCHITECTURAL DESIGN- CONTEMPORARY METHODS

This part introduces the contemporary presentation techniques that are created digitally and the development of design methodologies from traditional to digital ways. (Fig 9)

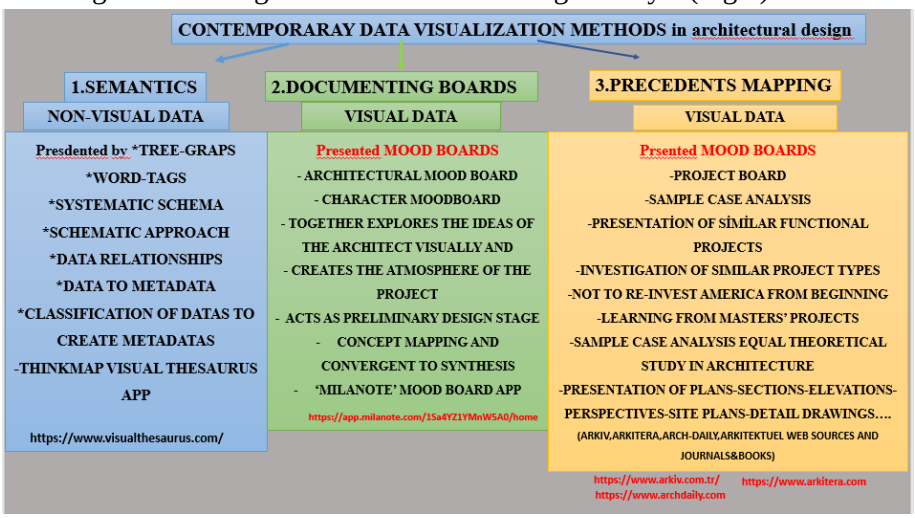


Figure 9. Contemporary data visualization methods

The paradigm of design as a rational problem solving activity that follows this view proposes that design is a process of defining a series of stable problems and respectively searching for design solutions in a solution space. (Dorst, 1997) Schön (1983) criticizes the approach to design as primarily a problem solving activity, and argues that considering the design process as ruled by explicit and rational problem solving knowledge is not accurate. All of these approaches to design and design research fully acknowledge the need for information gathering throughout the design process, and especially in the conceptual design phase. In the conceptual design phase, there is no ready information about the problem or the solution, and the operations in between are also not known yet. (Tunçer, 2009)

Designers collect, browse, use and reuse, learn from and get inspired by collections of (visual) information especially in the conceptual phase of design. They browse through magazines, scan through or read books, surf the web and are in general mindful about interpreting what they see within the context

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of the project they are working on, just waiting to be inspired. (Tunçer, 2009). Here the **mood board** concept is a key to problem. (Fig.10)

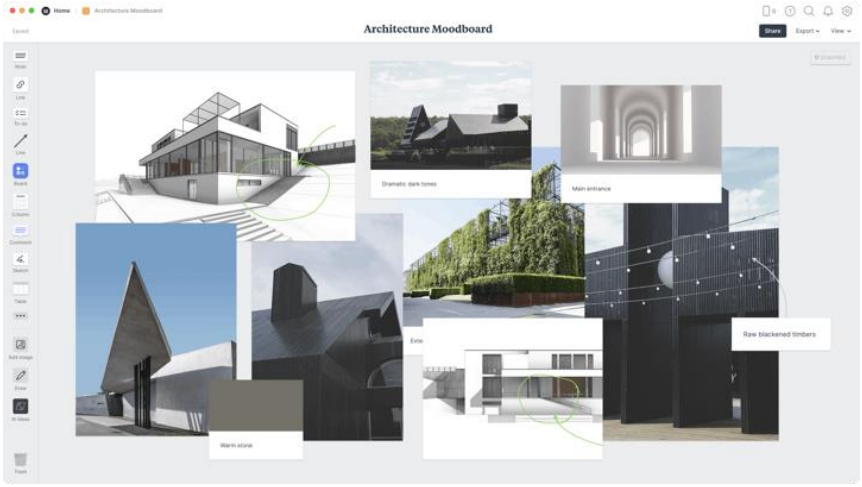


Figure 10. Architectural mood board template (source:URL-5)

An architectural mood board is a visual tool to gather and curate inspirational images, color palettes, and design elements that capture architectural projects' desired style and ambience. Drag photos of architectural elements, building plans, materials and texture samples, and arrange them on the free-form canvas'.With milanote you can easily add videos, animated GIF's, colour swatches, PDF's, design files, fonts and more when you create a mood board. A moodboard may seem like a sample tool, but it is an excellent solution to boost and express the development of ideas and concepts. A moodboard may seem like a sample tool, but it is an excellent solution to boost and express the development of ideas and concepts. A moodboard feeds the creative atmosphere and gives meaning to interior design project. (Fig.11)



Figure 11. Interior space mood board template (source:URL-5)

Accordingly to Tunçer (2009); *''the aim of this research is to enable the design and creation of digital environments where a design community can collectively organize and correspond on collections of visual information in a meaningful way. Visual, flexible and extensible environments needed in order to support designers in the conceptual phase of design. Such environments are useful both in educational and practical contexts''* (Tunçer, 2009).

As indicated by Tunçer; *''Designers collect design documents in order to gain knowledge and inspiration in the conceptual phase of design. The design concepts that tag and classify the information entities are Metadata''*(Tunçer,2009). Such keywords, denoting concepts are collected in a complex

FULL TEXTS BOOK

information structure and further related through semantic relationships. Some examples of such relationships allow for subjective information as well (tree graphs). It is important that metadata and semantic relationships allow for subjective information as well. Being able to freely define associative relations between concepts allows users to record personal associations in their knowledge structures, enabling the recording of internalized procedural knowledge and possibly even tacit knowledge.(Tunçer, 2009)

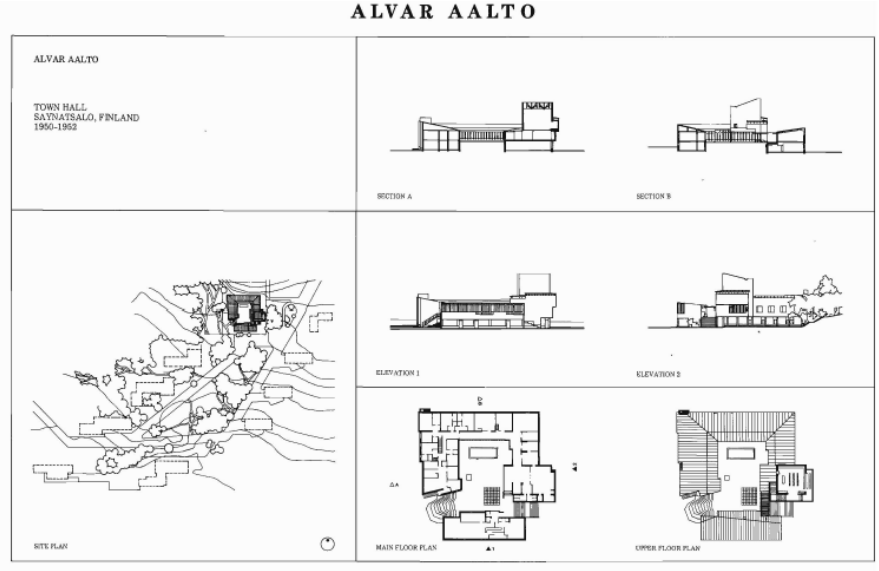
3.1. Precedents and Design Process

Precedents are 'specific designs or buildings, which are examplary in some sense, so that what architects and students glean from these examples can support their own designs. These precedents are very often past solutions to specific design problems' (Akin, 2002). Precedents contain design knowledge that can be accessed and reused in the context of the design problem at hand. The knowledge that precedents provide to designers is both physical and conceptual.

Students usually have analysis tasks in design studios in order to understand and extract precedent knowledge from documents: plans, sections, elevations, pictures, etc. of precedent buildings. Precedent-based design is the selection of relevant ideas from prior designs in current design situations. Precedent-based learning is the common method used in the architectural education system. In order not to reinvent the wheel over and over again, we learn from our elders and adopt their successful solutions to situations similar.(Goldschmidt, 1995)

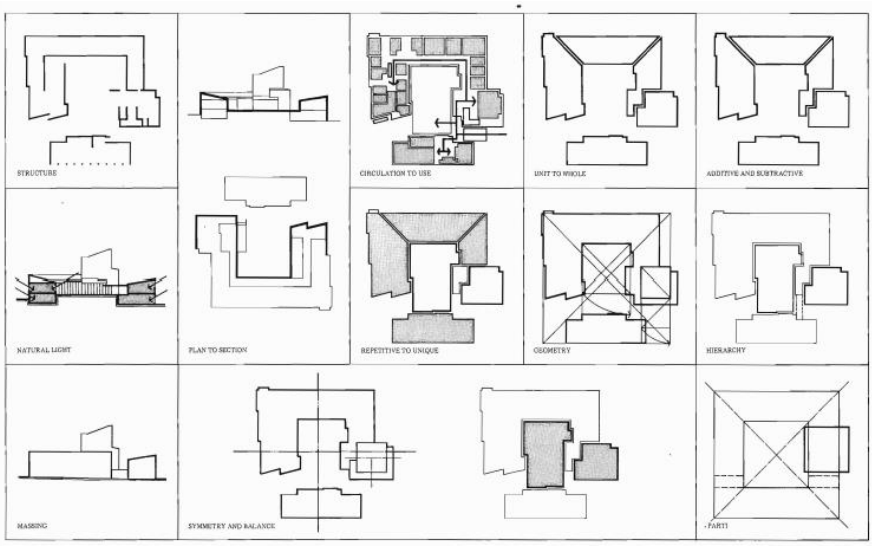
Design studio instruction aims at helping students learn to understand design principles, formulate, isolate, and define design problems, and to use this knowledge in their design. Precedents have been the subject of numerous design research related investigations (Quoted from Tunçer; 'Tzonis, and White,1994; Oxman and Oxman, 1994; Kolodner,1993;Maher,1995; Heylighen,2000; Schmitt,1994; Fang,1993')

Precedents analyses may include, Project drawings, plans, sections, elevations, site plans at first part. And secondy may indicate design properties suchas ; structure,natural light, massing, plan to section, symmetry-asymmetry, circulation to whole,hierarchy, parti, geomerty, uit to whole,etc.(Fig.12 a-b)



a

FULL TEXTS BOOK



b

Figure 12. a-b) Precedent analysis of a Project of Alvar Aalto,Town Hall Finland, Source:Clark&Pause, (1996). Precedents in Architecture.VNR

3.2. Classification and Document Collection for Analysis Stage:

As discussed before, the process of correspondence in initiated when a user creates a document in the system and makes a number of claims about this document. Metadata is generally described as 'data about data'. The document structure of a complex information structure consists of a collection of multi-media design documents that are used in the conceptual design phase. Documents in this collection initially do not have semantic relationships with each other.

As indicated by Tunçer (2009); *''Complex information structures are comprised of a collection of abstractions, an organization of these abstractions, metadata describing the abstractions, and a specification of the relationships between these abstractions''*(Tunçer,2009). An architectural abstraction has been defined as an abstraction of the content of a design object, such as; function, acousitcs, structure, process, form generation, space, and organizational relationships. An abstraction itself can be understood in a syntactic manner as a composition of components, their metadata, and relationships between these components. (Mitchell,1994) (Fig.13-14).

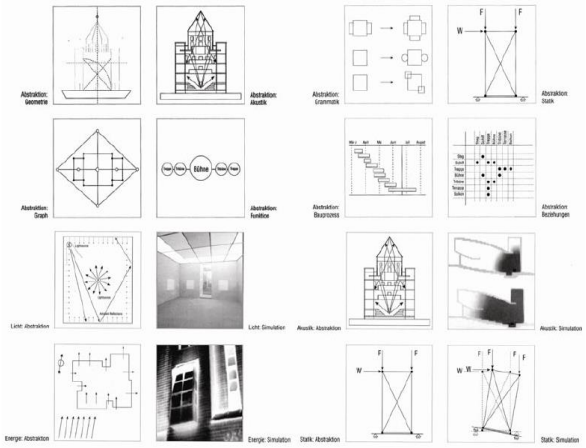


Figure 13. A demostration of a collection of abstractions. These abstractions define various aspects of the buildings they depict. Diagram by Schmitt (1993)(source: Tunçer,2009)

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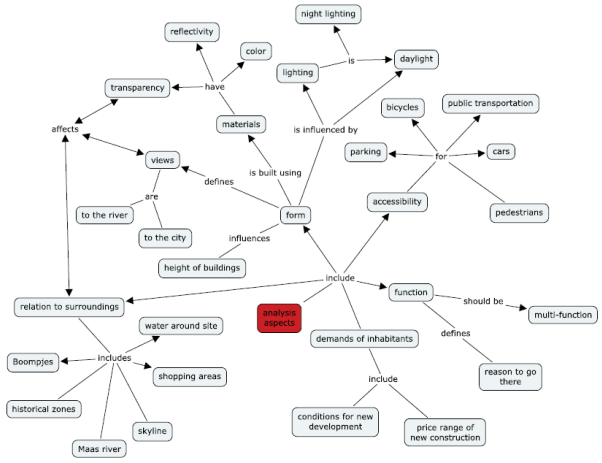


Figure 14. The final concept map defined by a group of third year students at the faculty of Architecture. Delft University of Technology. This concept map was developed in a design analysis process.

3.4.The Semantic Presentation

A semantic is made up of concepts and their relationships organized as a flexible and extensible semantic network. Concept mapping is an excellent medium for creating semantic structures within a complex information structure.(Fig.15)

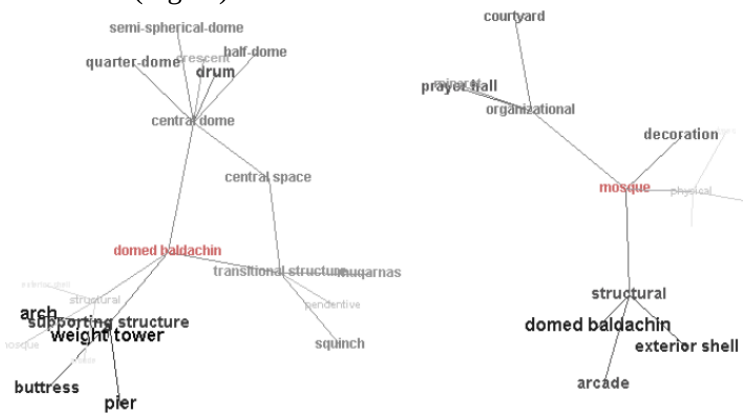


Figure 15. An examplary semantic structure developed within the context of a design information environment with the purpose of organizing a collection of documents of three Ottomon mosques from the classical period. The interactive visualization has been developed using the Thinkmap application.(source: Tunçer,2009)

4.DATA VISUALIZATION AT THE ARCHITECTURAL DESIGN PROCESS

In the research, it's observed that 'data visualization process' can make a bridge between analysis and synthesis steps of a design as 'preliminary design phase'. In fact which is more important than the final design being the root design of the project. In the process, between analysis and synthesis, the data visualization method ensured that the analyzes became more convergent to the synthesis and turned into the preliminary design phase and was included in the concept development process in architectural design. (Fig 16)

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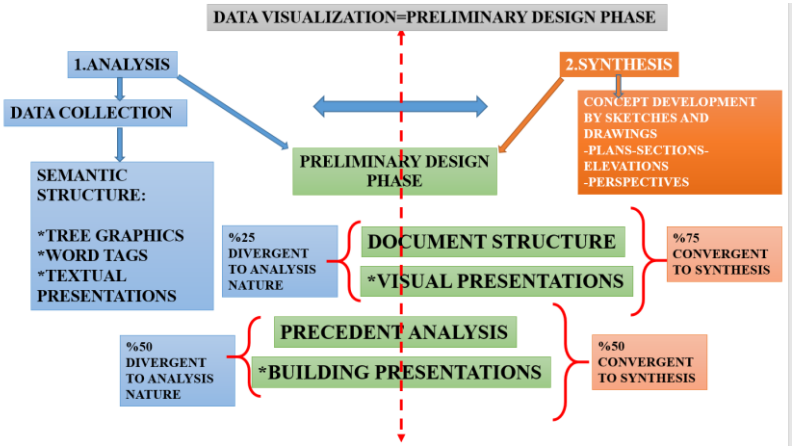


Figure 16. Data visualization process

The scheme given below that has been formulated by the author expresses the visualization of data collected at analyses stage, and which creates the preliminary design stage of an architectural project. By transforming semantic presentation in other words keywords of the design into a visual presentation, makes a strong exploration of the idea of the design process at the beginning stage. Thus, this stage gains strong importance for an architectural design to be successful and rooted.(Fig.17)

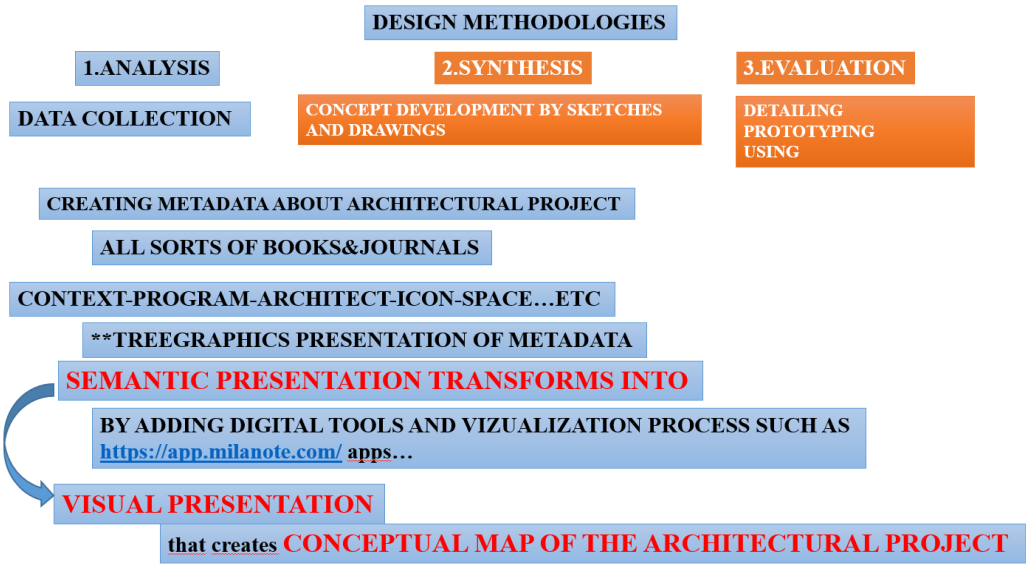


Figure 17. Methodology developed by the author to demonstrate the transformation of semantic presentation of 'Modernist Icons' Project to visual presentation

4.1. Project -1: Concept of Modernist Icons

(Digitializing architectural preliminary design phase: visualization of the analysis of the context & programme & topic)

This is a sample mood board that is created for the architectural design of a modern villa. Mood boards are one of the best ways to visualize design ideas before starting to design. Mood board is the creation of concept process, in other words creation of the visual data of the concept phase. By making a mood board schematic process and keywords of ideas transform into visual data which enlarges the creativity phase of the concept development process of an architectural design project.

Project 1: Analysis of Modernist Icons: Mies Van Der Rohe-Le Corbusier-Sedat Hakkı Eldem

A.Semantic Presentation of Analysis Phase of the Archıtectural Design Project (Fig.18)

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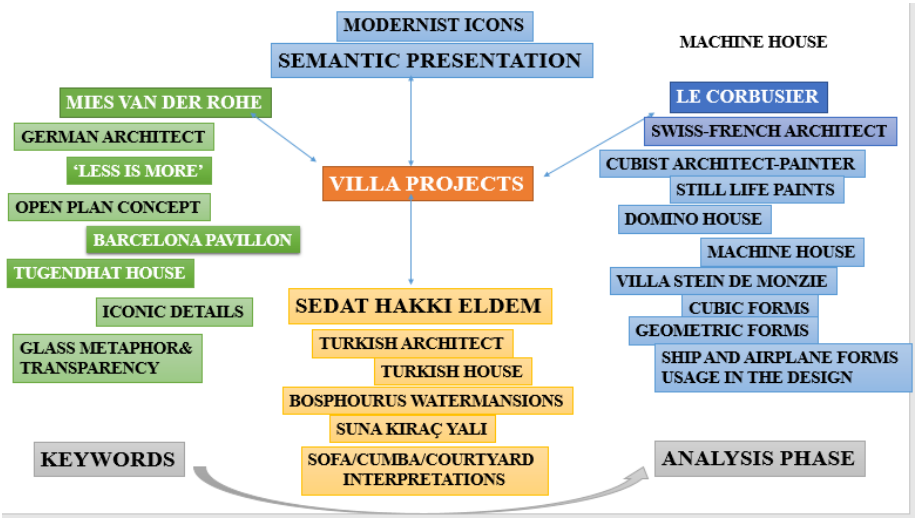


Figure 18. Semantic presentation of 'Modernist Icons' Project

B.Visualization of the Data Coming From Semantic Presentation-Digitalizing the Data (Fig.19)



Figure 19. Visualization of 'Modernist Icons' project –Mood Board

In architectural design, the main design methodologies as indicated at the previous chapter such as the best famous one comes from Cross (2000); 'analysis-synthesis-evaluation' stages there are both textual schematic represenations especially at the analysis phase and visual representations at the synthesis and evaluation phases. In the paper, it is mainly aimed to visualize all data processes from beginning to end, from analyses to synthesis and evaluation. Thus, architects especially talk visually such as; drawings, plans, sections, sketches, etc. And preliminary design phase is one of the most important part of an architectural design. Preliminary stage or phase of architectural design consists of basicly analysis… analysis of the site, of the programme, of the topic, of the context, of the client… thus, the analysis stage is very important due to its' rooted style and, which the basicly collect all correct data at the beginning of the design stage is very important.

Design stage begins with the synthesis of the analysis which is a connected proecedure, that synthesis are **concept-maps** of what designer interpret through the analysis. And begins to draw, make sketches and communicate in visual and graphic ways of design with plans, sections, elevations and perspectives. Then, after creating different concepts through analysis in the synthesis phase, a selection of the best concept occurs and evaluation phase begins at this step. This evaluation phase is also requires strong

FULL TEXTS BOOK

visual representations with all detailed drawings, plans, sections, elevations, perspectives, material applications, etc. Thus, the three main stages of the architectural design process : 'analysis-synthesis-evaluation', analysis phase is more related to schemas, texts, documentations, and synthesis & evalution phases are more related to drawings, exploration of visual ideas on sketches, perspectives and etc.

At this point; 'VISUALIZING OF DATA' which is the main problem of the this study, appears as a creative process by the new digital technologies, artificial intelligence, and computer applications today, by the help of the digitalization in design. Today, we, architects, and interior designers and product designers can easily visualize our data at the preliminary design phase, at the analysis phase, before starting the conceptual design by drawings, that enlarges the representation of data visually.

By using digitalization, computer programs, mobile apps, designers can express themselves within a much more expressive ways to their clients. Or it is also same for the educational stage, students can express their ideas, their analyses, their first concepts on the given architectural design project in a more strong, aesthetic and creative ways. In addition, by visualizing the data they collect also will enlarge their ideas and develop their conceptual creations. This 'architectural mood board' looks like digitializing the ideas within a kolage format.

4.2.Project -2: House of Pablo Picasso

(Digitializing Scenario and Client's Character of the Project by Using Data Visualization Method)

This even a much more difficult task for both architectural students and architects working with clients professionally in their design offices. For example, there is a 'villa project and a client', which the design must suit with the client and this one the main task of the architect, to make client happy. These private projects commonly more difficult to deal with in order to being more private, more customer demands are at the forefront, such as, the mood of the client, is an important element affecting the design. These private projects such as house, villa.. instead of educational building, or commercial building, or a theather, hospital, otel, etc. which functional and formal approaches of the project is much more important.

Thus, to deal with these private projects, data visualization is very important on both to express preliminary design ideas visually and communicate with the client whom she/he don't understand much verbal and textual presentations, but much more happy with the visual digital presentations. Thus, the character of the client creates the atmosphere of the house. It is very important. If you don't design a house in relation with the client's character, the project will fail because she/he can not live in the house you design.

This digitializing data, data visualization process, is the best way to explore phenemonological design stage, to explore aesthetic and artistic part of a design and m more importantly to explore the best atmosphere to the client through his /her characteristics.

To analyze client's character is such an abstract process and the best way to communicate with the character in architectural design process is to make visualize as much as possible to deal in a better way. Thus, in your architectural mood board, there will colors, textiles, 3d modules, things she/he likes, things that expresses hobies of the client, a bicycle, or a car, etc. or a shoe, furniture, etc.

By visualization the data reflects clients' chracter, hobbies, lifestyle, his/her likes and unlikes, will be very effective and expressive with digital tools such as; Architecture Moodboard-Template & Example-Milanote. For example to design a house for; Agatha Cristie, Sean Connery, Pablo Picasso, Gene Kelly the singer of the 'singing in the rain', Marilyn Monroe, etc. to design a house for a icon, using data visualization by digital tools, is very beneficial both for educational and professional environments.

In addition to MODERNIST ICONS presentation both from semantic and visualized materials, the second precedent in the paper is concentrates on an icon person, icon artist, architect, scientist, president, singer, novelist, painter, etc… Thus, in the paper, the analysis of the character which is very hard to express in the architectural process, today can be visualized and digitalized by the usage of articifial intelligence and computer apps. The analysis of a character during the architectural design process is

FULL TEXTS BOOK

one of the most important part to create atmosphere of the building within a phenomological approach which connects the client with his/her personal space. Otherwise client may not like his/her house or space, and do not want to live there normally.

A. Project 2: Analysis of an Iconic Person: Pablo Picasso

This part consists of exploration of an architectural design project titled as;'Pablo Picasso House' at the analysis phase of the project within three steps;

Data collection and presentation the collected data within a semantic manner.

Tree graphs and wordtags. In the project the data collection is concentrated on the main character of the design as the house owner; Pablo Picasso. (Fig.20)

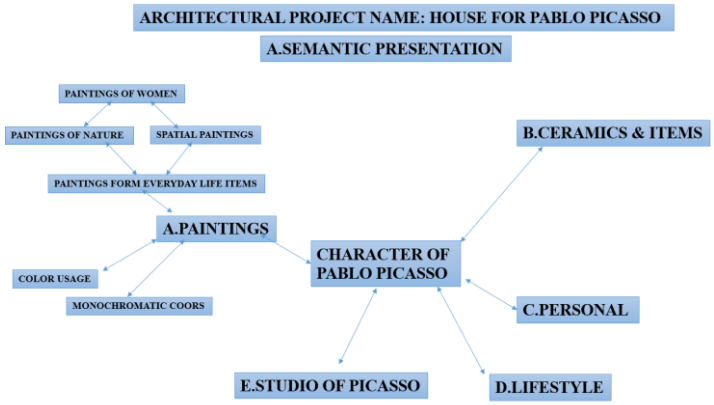


Figure 20. Semantic Presentation of the House of Pablo Picasso

Visualization of the data, and presenting Pablo Picasso's character and lifestyle with a architectural mood board as an icon.(Fig.21)



Figure 21. Visualization of Character and Lifestyle of House of Pablo Picasso

Precedents' analysis, is the research of previous architectural buildings of an artist houses.

In this project Joan Miro Foundation has been presented as precedent analyses with the building's drawings, plans-sections-elevations-perspectives' and pictures. Joan Miro foundation has been selected as precedent case, due to being an iconic artist building, and due to it's location which is in Barcelona, Spain. The location compramises an important part of the architectural design stage, a meditterranean building, with its' local color, materials, daylight usage, exterior envelope design.(Fig.22)

FULL TEXTS BOOK



Figure 22. Precedent analysis of the house of Pablo Picasso

4.3. Chapter Evaluation

In this chapter, two projects have been presented, Project-1: 'Modernist Icons''Mies Van Der Rohe-Le Corbusier-Sedat Hakkı Eldem', and Project-2: House for Pablo Picasso. These two projects have been demonstrated that the stage between analysis and synthesis, has an important value by its preliminary design stage role and the strongest this stage, will be resulted as the best design proposal at the end both at synthesis and evoluation process. This in-between stage, between analysis-synthesis, consists of three steps as indicated by the scheme given above; i) semantic presentation of an iconic person: Pablo Picasso, ii) Vizualization of the character and lifestyle of the user of the project, iii) Precedent analysis of the project, which in this case is Joan Miro's foundation in Barcelona, Spain due to its contextual and conceptual architectural features; a Mediterranean style architecture and an artist house.

Therefore, in the study these two projects have been demonstrated that the data gained from analyses stage, when transformed into a visual presentation by computer apps digitaly become much more effective in architectural field, and create a much better communication with the client or instructor in the studio. (Fig.23-24)

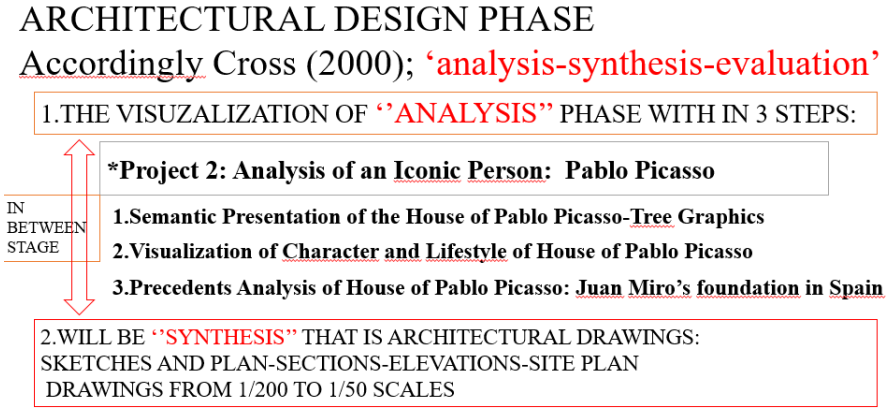


Figure 23. Three steps of preliminary design process for Picasso house

FULL TEXTS BOOK



Figure 24. Three steps of preliminary design process for modern villa project

5. CONCLUSIONS

The communication of an architect with his/her client compromises a prior importance for the success of an architectural design project from a conceptual and aesthetical point of views. Thus in the paper it is investigated that how a better communication skills can be developed today for an architectural concept and design, that an architect can express him/her self in a better way , and expression of the design ideas , which is the most important part, as the root of the project. Thus, the visualization of the data and preliminary ideas come forward, which can be achieved easily today by the developed technology and digitalization techniques such as; architectural mood boards.

In addition, precendent analysis, as the second important data collection method on a specific topic in architectural design process, to not to discover America from the beginning, has been gained big importance today, by the developing digital archives of building projects and web pages such as; Arkitera, Arkiv, Arch-daily, etc.

To sum up, today developing digital techniques and computer tools have been enabling architects to make better communication skills in their both educational and professional lives to express their ideas, designs and projects by data visualization.

(Important note: this mood board method, digitalization of data and data visualization process has been experimented by author within a design course at Split University, Civil Engineering, Architecture and Geotechnik Faculty, 2.nd year architectural design course students between the dates 13-17 may 2024 within the Erasmus+academic personel mobility/Teaching) (and found very effective by the author)

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Murat YORULMAZ[2]

Giriş

''Enerji arz güvenliği'' kavramı, günümüzün enerji konularına ilişkin tartışmalarında her zaman güncelliğini korumaktadır. Kavram, mikro ve makroekonomik gelişmelerle yakından ilgili olmakla birlikte enerji fiyat artış oranları ve bir devletin ekonomik sisteminin küresel rekabetçi konumu gibi hususlar da kavramın küresel açıdan önemini sürdürmesine etkendir. ''Güvenlik'' kavramsal açıdan siyasi, askeri, sosyal, ekonomik ve çevresel alanlara atıfta bulunarak çeşitli çağrışımlar yaparken; ''enerji güvenliği'' tüm bu gruplamaları içine alan kapsamlı bir tanıma sahiptir. Enerji ücretleri, dünya genelinde devletler adına ekonomik güvenlik açısından ''enerji arz güvenliği'' zorbalığını sürdüren kaçınılmaz bir tehdit olmaya devam etmektedir. Zira ''enerji güvenliği'' ya da ''enerji arz güvenliği'' konusundaki mevcut ekonomik tehdit algılamaları, tek bir kaynak üzerinden enerji bağımlılığı ya da tek bir tedarikçi üzerinden enerji ithalatı bağımlılığı ile giderek artmaktadır. Dünyanın bazı bölgelerinde son derece yoğun bir şekilde bulunan kömür, petrol ve doğal gaz gibi öngörülebilir fosil yakıt kaynaklarının tükenmesi; son yirmi yıl içinde meydana gelen sosyal ve ekonomik gelişme nedeniyle hızla artan küresel enerji talebi ve enerji kaynakları üzerindeki mücadele, enerji ücretlerinin artmasına neden olan en önemli etkenlerdir. Enerji arz güvenliğine ilişkin deneysel araştırmalar, makul enerji ücretlerinin yerel ekonomik sistem için uygun büyümesine ulaşmanın ön koşulu olduğunu ortaya koymaktadır. Artan petrol ücretleri, dünya çapında petrol kullanımı ve kısa vadede doğal gaz gibi petrol ikamelerinin faturaları üzerinde beklenmeyen olumsuz bir sonuç doğurmaktadır. Diğer bir ifade ile petrol krizlerinin ardından artan enerji ücretleri, uzun vadede enerji kullanımında bir azalmaya neden olmakla birlikte enflasyon, dış ticarette eşitsizlik, ödemelerde istikrarsızlık, yüksek işsizlik, şirketler için iş kaybı ve müşterilerin güvensizliği gibi olumsuz sonuçları beraberinde getirmektedir (Erdal, 2015: 153-154). Bu bağlamda enerji ücretlerinin, tüm enerji talebinin ve arzının tetikleyici özelliği olduğunu söylemek mümkündür.

Dünya ekonomisi içerisindeki etkin varlığı her geçen gün artan Çin'in doğru orantılı olarak enerji talebi de artmaktadır. Bununla birlikte Çin'in enerji güvenliği, ulusal güvenlik ve ekonomik güvenlik açısından oldukça önem arz etmektedir. 19. yüzyılın sonlarından itibaren Çin'in siyasi ve ekonomik olarak çökmüş olması, emperyalist güçler açısından kendisinin jeopolitik bir istila ve hâkimiyet alanına dönüşmesine sebep olmuştur. 1 Ekim 1949'da Çin Halk Cumhuriyeti'nin kurulması ile 1839 Afyon Savaşları ile başlayan ''aşağılanma yüzyılı'' sona ermiş ve Mao Zedong liderliğindeki yönetim, Sovyetler Birliği (SSCB) modelini örnek alarak devlet merkezli sanayi gelişimini temel alan ekonomik kalkınma modeli uygulamaya koymuşlardır. Bu doğrultuda 1953-1957 yılları arasında uygulamaya konan Birinci Beş Yıllık Plan belirli ölçütte başarılı olmuştur. Ancak 1958-1961 döneminde sürdürülen ''Büyük İleri Atılım'' kampanyası, Çin'in modern tarihindeki en yıkıcı kıtlığa neden olan ekonomik bir felaketle sonuçlanmıştır (Boyle, 2022). Buna ek olarak SSCB yardımlarının da eş zamanlı azalması, ''Üçüncü Beş Yıllık Plan''ın ilerlemesini olumsuz etkilemiş ve Çin'in sosyoekonomik gelişimi daha da kötüleşmiştir. ''Büyük İleri Atılım''ın ekonomik açıdan olumsuz sonuçlarını ise ''Büyük Kültür Devrimi''nin siyasi ve sosyal açıdan olumsuz sonuçları ve yarattığı derin sistemsel kriz takip etmiştir. Mao Zedong'un 1976'da ölümü sonrası ikinci nesil lider olarak yönetime gelen Deng Xiaoping ve

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FULL TEXTS BOOK

yönetimi, sürekli devrim yaklaşımından uzaklaşarak Çin karakteristiği temelli sosyalizme geçiş sağlamıştır. Sürekli reform ve dışa açılma yaklaşımları ile Çin, yaklaşık kırk yıl içerisinde ekonomik göstergelerini yükselterek standart bir seviye yakalayarak dünya ekonomisinde adından söz ettirmeye başlamış, uluslararası politikada etkin bir güç olarak görünüm sağlamış ve sürdürülebilir bir dış politika ve ekonomik yapı elde etmiştir. Ancak, Çin'in söz konusu çok yönlü büyüme seyri dışında sürdürülebilir çevre, kaynak ve enerji temalarında sorunları da dikkat çekmiştir. Bu noktada gelişim seyrine paralel olarak Çin'in artan enerji tüketimi enerji güvenliği çerçevesinde önem arz etmektedir. Çalışmanın amacı bağlamında Çin'in enerji arz güvenliği dolayısıyla enerji güvenliği hususu, Çin hükümeti için günümüze değin ulusal güvenlik adına öncelikli konular arasında yer almaktadır.

Çin'in çok yönlü kalkınma modeli bağlamında enerji güvenliği, Çin adına her geçen gün önemi giderek artan bir sorun olarak ortaya çıkmaktadır. Çin'in kuruluşundan bugüne enerji kaynakları, ulusal güvenlik meselesi ve kronik bir kırılganlık kaynağı olarak algılanmaktadır. Çin, 1950'li yıllardan itibaren kendi kendine yeterlilik politikası uygulayarak önemli ölçüde ihracat kaynağı elde etmiş ve bu durum zaman içerisinde Çin'in modernleşme sürecine katkı sunmuştur. Ancak modernleşmeye paralel olarak teknoloji ve sanayideki gelişmeler, 1990'lardan itibaren Çin'i başta enerji olmak üzere birçok alanda ithalata bağımlı hale getirmeye başlamıştır. Nitekim Çin 2002 yılında kömür ithalatçısı, 2007 yılında ise doğal gaz ithalatçısı konumuna gelmiştir. Bu değişim kendisini özellikle petrol üretimi ve tüketiminde göstermiştir. 1980'lerde Çin'in petrol üretimi, tüketiminden %35 daha fazla iken 2003'ten bugüne tüketilen petrolün yarısından fazlası ithal edilmektedir (IEA, 2021; Statista, 2024). 2000-2010 döneminde Çin sanayi sektörü ülkedeki toplam enerji tüketiminin %70'ini oluşturmuştur. Çin'in artan petrol tüketim hızının sanayi ve endüstrideki hızlı gelişim ile doğrusal bir ilişkisi bulunmamaktadır çünkü petrol tüketimi diğer sektörlerde daha hızlı bir seyir izlemektedir (Pan vd., 2020). Hatta sanayi sektörünün toplam petrol tüketimindeki payı 1990 yılında %59 iken 2014 yılında %41'e düşmüş, Çin sanayi sektörü 1980-2012 döneminde %2.09 oranında artan ulaştırma sektöründeki petrol talebini yönlendirerek toplam petrol tüketimine katkıda bulunmuş ve petrolün toplam sanayi enerji yakıt karışımındaki payı 1990'ların başında %15-16 civarında iken ulaştırma sektörü yakıt karışımındaki payı 2000'lerin ortasında %90'a yükselmiştir (Leung, 2010: 937).

Çin'de 2000'li yıllardaki sosyoekonomik değişiklikler de petrol tüketimini arttıran etkenler arasında yer almaktadır. Çin'in kentsel nüfusu, 2000 yılında %35,4 iken 2016 yılında %57,35'e yükselmiş ve aynı zamanda kentli nüfusta kişi başına düşen gelir yıllık %10 artış göstererek hızla yükselmiştir (NBSC, 2017). Çin'in önlenemeyen dinamik tüketim kültürü, ekolojik açıdan yıkıcı ve temelde yenilenemeyen enerji kaynaklarına bağımlı bir yaşam tarzını zorunlu kılmaktadır. Çin'in kent ve kırsal nüfus yapısındaki yoğun fosil yakıt tüketimi ve karbon yoğun davranışlar ülkede temel tüketim anlayışı haline gelmiştir. Çin 1950'lilerden günümüze ''kendine güven, dışa açılma ve bilimsel gelişme'' üçgeninde kendi kendine yeten bir enerji üretim potansiyeli yakalamış olsa da 1990'lı yıllardan itibaren çoğu sektördeki hızlı gelişim ile küresel açıdan en önemli enerji ithalatçısı konumuna gelmiş ve bu durum, Pekin'in ulusal güvenlik bağlamında öncelikli meselesi olmuştur. Pekin, ulusal ölçekte devlet ile özel sektör arasında dengeyi koruyacak, uluslararası pazarda da tedarik zinciri bağlamında enerji ithalatını ekonomik açıdan sürdürülebilir kılacak devlet merkezli pazarlama stratejisi uygulamaktadır. Diğer bir ifade ile enerji güvenliği, Çin'in ulusal güvenliği açısından öncelikli konumdadır.

Enerji güvenliği enerjinin her zaman istenilen türde, talep edilen miktarda ve uygun fiyatta bulunabilirliği olarak tanımlanmaktadır. Enerji güvenliğinin ülkeler açısından önemi ülkelerin ekonomileri açısından enerjiye uygun fiyatlı ve güvenilir ulaşım sağlanmasından, enerji arzındaki olası kesintilerin ve enerji fiyatlarındaki dalgalanmaların ulusal güvenlik, kamu sağlığı ile ekolojik sistem üzerinde dolaylı etkiler yaratmasından kaynaklanmaktadır. Bu sebeple enerji güvenliği her ülke için öncelikli konuma sahiptir. Uluslararası sistemde büyük güçler arasında yer alan Çin açısından ise enerji güvenliği gelişen ekonomik gücü ve üretimi bağlamında daha da önemlidir. Bu noktada Çin, enerji güvenliği stratejisini ekonomik büyüme, enerji güvenliği ve çevrenin korunması denkleminde inşa

FULL TEXTS BOOK

etmektedir. Söz konusu denklemin birinci ayağında uygun fiyatlı enerjiye ulaşım yer almakta ve bu durum iktidarın meşruiyeti ile ekonomik büyümenin ana bileşenini oluşturmaktadır. İkinci ayakta enerji kaynaklarının çeşitliliği ve kapasitesi yer almaktadır. Çevrenin korunması bu aşamada enerji verimliliğinin artmasına ve enerji kullanım türüne olumlu katkı sağlamaktadır. Üçüncü ayakta ise çevrenin korunmasının çoğu gelişmekte olan ülkelerde ekonomik büyüme ile ters bir orantıya sahiptir ve bir çatışma söz konusudur. Çin'in enerji güvenliği stratejisinin inşa sürecinde başta hükümet olmak üzere yerel yönetimler, ilgili bakanlıklar, STK'lar ve sektör temsilcileri gibi çeşitli yapılar yer almaktadır. Ancak temel aktör hükümet olup kendisi enerji endüstrisi ile diğer endüstriler arasında denge kurma sorumluluğuna sahiptir. Bu bağlamda hükümetin yani Çin Komünist Partisi'nin (ÇKP), devletin içeride ve dışarıda enerji güvenliği stratejisinin belirlenmesinde ve devlet ile iç-dış piyasa arasındaki sınırların çizilmesinde önemli pay sahibi olduğunu söylemek mümkündür. Dünyanın en büyük enerji tüketicisine konumuna sahip olarak Çin'in enerji kaynaklarına artan talebi ve yaratılan çevre kirliliği ile uluslararası enerji gündeminin ana başlığında yer alması, devlete ait enerji şirketlerinin uluslararası enerji piyasasında önemli rekabetçi aktörler olmalarına ve enerji güvenliği stratejisinin belirlenmesinde hükümetin aktif rolüne sebep olmaktadır. Bilindiği üzere enerji güvenliği günümüzde küresel rekabet alanlarının başında gelmektedir. Devletler çok yönlü ulusal çıkarları bağlamında yoğun rekabet içerisindedirler. Çin'in enerji güvenliği inşasına ilişkin hükümet temelinde devletin aktif rol aldığı bir yapıya sahip olması kuşkusuz kendisine özgü bir durum değildir. ABD, Rusya, Hindistan vb. ülkelerde de hükümetlerin devlet ile iç-dış enerji piyasası arasında aktif ve dengeleyici rol aldığı ve müdahil olduğu gözlemlenmektedir. Fakat hükümetlerin yani devletin rolü açısından ülkeler arasında rol ve uygulamalar açısından farklılıklar gözlemlenmektedir. Bu bağlamda çalışmanın amacı, Çin'in enerji güvenliği stratejisinde hükümet temelinde devletin rolünün hangi araçlarla ne şekilde ortaya çıktığını ve uygulamaların ABD ve Hindistan temelinde nasıl farklılık teşkil ettiğini karşılaştırmalı olarak analiz etmektir. Bu amaç doğrultusunda çalışmanın birinci bölümünde enerji güvenliğine kavramsal açıdan yer verilirken, ikinci bölümde Çin, ABD ve Hindistan'ın enerji güvenliği stratejileri değerlendirilecektir. Çalışmanın son bölümünde ise söz konusu üç devletin enerji güvenliği stratejileri devletin aktör rolü bağlamında karşılaştırmalı olarak analiz edilecektir.

1. Kavramsal Açıdan ''Enerji Güvenliği''

Enerji güvenliği kavramının iktisadi yönü; yarışmacı, açık ve de güven içeren bir enerji pazarını hedeflemektedir. Siyasi yöne bakıldığında ise enerji rezervlerini ellerinde tutan ülkelerin bahse konu rezervleri güvenli yollardan satmalarını, bunları alan ülkelerin ise bu kaynaklara güvenilir bir biçimde erişmesini kapsamaktadır. Enerjiyi piyasaya sunan, bu enerjiyi talep eden ve aradaki geçiş ülkelerinin farklılığı, ulus-devletlerin bahse konu kavramı farklı şekilde tanımlamalarına ve buna dönük değişik enerji siyasaları tatbik etmelerine sebebiyet vermektedir. Ülkeler yönünden enerji farklılaştırmasını ve devamlılığını çoğaltmak uluslararası düzlemde güçlü olmanın bir işareti şeklinde kıymetlendirilebilmektedir. Çevresel yönden ele alındığında ise ekolojiye verilen zararın asgariye düşürülmesi, karbondioksit/sera gazı salımı gerçekleştiren enerji rezervlerinin kullanımının düşürülmesine ilaveten enerji tasarrufu gerçekleştirilmesine dönük faktörleri içermektedir. Enerji güvenliği aynı zamanda zaman unsuru göz önünde bulundurularak uzun ve kısa dönemli enerji güvenliği biçiminde ayrıma tabi tutulabilmektedir. Uzun dönemli enerji güvenliği ölçeğinde iktisadi gelişmelere ek olarak sürdürülebilir ekolojik gereksinimler bağlamında enerji rezervlerinden istifade edilmesine yönelik gerçekleştirilen yaptırımlar öneme sahiptir. Kısa vadeli enerji güvenliği konusunda ise arz-talep dengesi ölçeğindeki ansızın dönüşümlere karşılık olarak sistemsel tepki yeteneğine ağırlık verilmektedir. Kısa dönemli güvenlik meydan okumaları; teknik meseleler, olumsuz hava şartları veyahut politik kesintileri barındıran kesilme tehlikelerini içermekteyken uzun dönemli güvenlik tehlikeleri ise enerji stoklamalarının yükselen ihtiyaca cevap vermek amaçlı tam zamanında devreye

FULL TEXTS BOOK

alınamaması tehlikelerine yoğunlaşmaktadır. Enerji güvenliği, gelecek yıllarda enerji krizleri tecrübe edilmesi ve dış tedarikçilere bağımlılıkta artış yaşanmasıyla doğrudan alakalıdır (Polat, 2022: 304).

Petrol, gaz ve kömür yenilenmeyen enerji rezervleri olarak ara malı, hammadde, güç ve de enerji kaynağı olarak küresel ekonomik sistemin can damarları şeklinde nitelendirilebilmektedir. OPEC ve onun fiyat artırımı neticesinde vuku bulan küresel petrol kriziyle mücadele etmenin yanı sıra enerji güvenliğini gerçekleştirmeye dönük olarak Ekonomik Kalkınma ve İşbirliği Örgütü (OECD) içerisinde teşkil edilen Uluslararası Enerji Ajansı (UEA) benzeri yapılanmalar çok yönlü enerji siyasalarını takip etmekte ve enerji güvenliğinin teminine yardımcı olmaktadırlar. UEA tarafından enerji güvenliği "uygun bir fiyata her türlü petrol ve enerji kaynaklarının kesintisiz kullanılabilir olması" şeklinde tanımlanmaktadır. Ulus-devletler karşılıklı bağımlılığı barındıran devletlerden meydana gelen karmaşık bir uluslararası sistemde bir taraftan politik, iktisadi, güvenlik ve de ekolojik amaçlarına erişebilmek maksadıyla faaliyetler gerçekleştirirken öte taraftan da amaçlarına ulaşabilmek maksadıyla gereksinim duydukları enerji rezervlerinin kontrolünü sağlayabilmek arayışındadırlar. Enerji siyasalarının teşkilinde küresel pazarlara bağımlılık ve enerji siyasası dengelerini idare etmek çok gelişmiş bir yaklaşımı zorunlu kılmaktadır. Enerji güvenliği, enerji rezervini satan devletler bakımından talep güvenliği anlamındayken, enerji ithal eden devletler bakımından arz güvenliği biçiminde görülmektedir. Arz güvenliği, birçok devlet bağlamında öncelikli olarak gelişmiş sanayi iktisadi sistemleri ve lider askeri kuvvetler bakımından kritik önemde bir milli çıkar konusu olarak değerlendirilmektedir (Polat, 2022: 305).

Ulus-devletlerin enerji ihtiyaçlarına barış ve de savaş dönemlerinde kesinti olmadan cevap verilebilmesi, taktiksel düzlemde sürdürülebilir gelişme ve de rekabetin, toplumsal barış ve huzurun ana faktörlerindendir. Enerji güvenliği, iktisadi faaliyetler bakımından elzem olmasına ilaveten birçok devletin öncelikli gündem maddeleri arasındadır. Enerji güvenliğindeki ana konu "makul maliyetlerde yeterli kaynağın uygunluğu ve güvenliğidir." Enerjiye karşı olan gereksinimin önemli bir kısmının son senelerde vuku bulan iktisadi farklılaşmalardan dolayı OECD üyesi olmayan ülkelerden meydana geleceği öngörülmektedir. İktisadi gelişmeye destek sağlamak amacıyla tüm ulusların enerji rezervlerine kesinti yaşamadan ulaşmasına yönelik kuvvetli bir niyeti söz konusudur. Enerjideki karşılıklı bağımlılık küresel iktisadi sistemin bir gerçeği konumundadır. Enerji güvenliği aynı zamanda kendi kendine yeterlilik anlamına gelmemektedir. Uluslararası ticarete tabi olan her meta için devletler, enerji güvenliklerini yalnızca açık küresel piyasalar yoluyla temin edebilmektedir. Enerji güvenliği tanımı şu unsurları içermelidir: *"Nüfusun temel ihtiyaçlarını karşılamaya yetecek enerjiyi sağlamak ve gelişme hedeflerine mutlak katkıda bulunacak şekilde, ulusal ve bölgesel şartlara bağlı olarak, ithalat azaltmayı ve enerji kaynaklarının çeşitlendirilmesi gibi arz güvenliği kaygıları"* (Kısacık, 2020: 231-235).

Enerji güvenliği kavramının ortaya koyulmasında teorik seviyedeki iktisadi bakış açısı şu unsurları içermektedir: • Bulunabilirlik- availability", • "Ekonomik tercih edilebilirlik-affordibility", • "Erişilebilirlik-accesibility", • "Kabul edilebilirlik- acceptibility" ve • "Sürdürülebilirlik-sustainability". Enerjinin değişik elde etme kaynaklarından (hidrokarbon, hidroelektrik, nükleer, termik, yenilenebilir, vb.) temini göz önünde bulundurulduğunda, enerji güvenliğinin ana faktörlerini ivedi olarak • Enerjinin mevcudiyeti, • Erişilebilir olması, • Yakıt olarak kabul edilebilir (güvenli ve çevre ile uyumlu) olması ve • Maliyetlerinin düşük olması, şeklinde ifade edilebilir. "İkinci ölçüt ise, enerji güvenliğinin • Arama, sondaj, AR-GE çalışmaları, • Üretim, iletim, çevrim, ulaşım (boru hatları, deniz ve kara ulaşım araçları) • Dağıtım, pazarlama, tüketim ağı faaliyetlerinin, her türlü ve askerî ve terör saldırılarına karşı, sürekli olarak korunması şeklinde belirtilebilir. • Bu durumda, enerji kesintisini kısıtlayacak yeterli, alternatif kaynak ve de depolama sistemleri geliştirmeyi gerektirmektedir. Enerji güvenliği kavramsallaştırmasının enerji temelli içeriği ele alındığında enerji rezervlerinin varlığı, erişilebilirliği ve benimsenebilirliği söz konusudur. Öte taraftan enerji güvenliği kavramının güvenlik odaklı tanımlanmasında ise enerjinin bulunması, geliştirilmesi, üretimi, iletimi, çevrimi, dağıtımı, piyasaya sunumu ve tüketim zincirindeki tesislerin her çeşit riske karşın fiziksel olarak muhafazasını

FULL TEXTS BOOK

içermektedir. Enerji güvenliği kavramı enerji odaklı biçimde farklı şekillerde ifade edilebilmektedir: ***Enerji güvenliği**; enerjinin sürekli bir biçimde güvenli, temiz ve değişik kaynaklar yoluyla uygun ücretlerle temini ve bundan yüksek verimlilikte istifade edilmesi, ***Enerji güvenliği**; yeterli seviyelerdeki enerji rezervlerine kabul edilebilir fiyatlama ve istikrarlı bir rezerv kanalıyla, de facto risk altında olmayan transfer araçları kanalıyla ve adaletli bir dağılım çerçevesinde erişilebilmesi, ***Enerji güvenliği;** dünyadaki enerji kaynaklarının rasyonel ve tasarruf odaklı kullanımı, ***Enerji güvenliği**; ekonomik sistemin ihtiyacı durumundaki enerji hizmetlerinin daimi mevcudiyetidir. Enerji güvenliği ve iklim değişikliği, metal bir paranın iki tarafına benzemektedir. 2000'li yılların başından beri enerji güvenliği kavramsallaştırmasının içerisine iklim krizi mevzusu da dâhil edilmiştir. Enerji arz rezervlerinde farklılık olması, enerji siyasalarının merkezindedir. Enerji rezervlerine sahip olan ve bunları üreten ülkeler sosyo-ekonomik kalkınmalarını gerçekleştirebilmek amacıyla talep eden ülkelerin farklılığına ağırlık verirken (pazar çeşitlemesi), enerji ithalatı gerçekleştiren ülkeler ise tedarikçi çeşitlendirmeye ağırlık vermektedirler. Bu metotla enerji güvenliklerini temin eden ikinci gruptaki devletlerin ilgili stratejileri sayesinde herhangi bir ekonomik ve politik kriz halinde son kullanıcılar enerjisizliği yaşamamakta ve sadece bir kullanıcı ülkeye bağımlı olmayan üretici devletler ise enerji rezervlerinin ihracından gelir sağlamaya devam edebilmektedirler (Kısacık, 2020: 238-240).

2. Çin, ABD ve Hindistan Enerji Güvenliği Stratejileri

2.1. Çin Halk Cumhuriyeti'nin Enerji Güvenliği Stratejisi

Çin'de enerji güvenliği ulusal önceliklerin başında gelmektedir. Örneğin 2019 yılında Çin'in toplam ana enerji tüketiminde %58'lik pay ile kömür ilk sırada gelmiştir (Tür, 2021: 197). Petrol ürünleri ve diğer sıvılar %20'lik bir paya sahip olup hidro enerji ve doğal gazın her birinin %8'lik payı olmuştur. Nükleer enerjinin %2'lik bir payı bulunup yenilenebilir enerjideki pay ise %5 olmuştur. Bu enerji karışımı, Çin'in kaynak tabanını yansıtmaktadır (Ulatowski, 2023: 209). Çin, kömür rezervleri açısından zengin olmasına karşın petrol ve doğal gaz rezervleri açısından yetersiz durumdadır. Ülkenin enerji politikalarının üç ana hedefi vardır. Bunlardan ilki, tedarik güvenliğini sağlamaktır. İkincisi ise istikrarı ve hızlı ekonomik büyümeyi desteklemek maksadıyla ucuz enerji kaynaklarını güvence altına almaktır. Üçüncü olarak çevresel olarak tarafsız olan enerji politikaları ortaya koymaktır. Bu üç hedef arasında gerilimler söz konusudur. Doğal gaz yerel olarak üretilen kömürden daha çevre dostu bir yakıt olarak görülse de daha pahalıdır ve onun tedarik güvenliği bağlamında endişeler bulunmaktadır. Çin'in enerji sektörü durumu için önemli bir rehber ise ''On Üçüncü Beş Yıllık Kalkınma Planı'' olup ülkenin enerji sektörü için üç seviyede hayati olarak görülmektedir. Birincisi, Çin ekonomisinin tüketici odaklı bir sisteme dönüşümü meselesi söz konusudur. İkinci olarak Çin ekonomisi yeniden bir dengelenme içerisindedir ki hafif petrol ürünleri olan jet yakıtı, gazolin ve petrokimyasallara yönelik talep artıştadır öte yandan dizele yönelik eğilimler ya da yaklaşımlar olumsuzdur. Üçüncüsü ise Pekin açısından çevre koruması yüksek bir önceliktedir. On Üçüncü Beş Yıllık Kalkınma Planı'ndaki yirmi beş sayısal hedefin onu çevreyle ilgilidir. Hükümet, 2010-2015 döneminde ekonominin enerji yoğunluğunu %15 düşürmeyi hedeflemiştir ve bu hedef %18,2 olarak gerçekleştirilebilmiştir. Plan aynı zamanda ülkenin taşımacılık sektöründe petrol temelli yakıtlardan alternatif enerji kaynaklarına geçiş arzusunu da yansıtmaktadır. Araştırmacılar, On Dördüncü Beş Yıllık Planı'nın temiz enerjiye öncelik vereceğini beklemektedirler. Yenilenebilir enerji kaynakları, Çin'in enerji ve ekonomik dönüşümünde ön plana doğru gelmektedirler (Ulatowski, 2023: 209-210).

Çin'in enerji diplomasisinde iki yaklaşım bulunmaktadır. Bunlardan ilki gerçekçi yaklaşım olup buna göre Çin'in enerji diplomasisi, kaynak zengini İran ve Rusya gibi ülkeleri ABD'ye karşı dengelemeyi amaçlamakta ve Çin'in artan küresel varlığıyla bağlantılıdır. İkincisi ise liberal bütünleşmeci yaklaşımdır ki bu bakış açısı Çin'in piyasa güçleri bağlamında artan rolünü tanımlamaktadır. 1970'li ve 1980'li yıllarda Çin önemli miktarlarda petrol ihraç edebiliyorken artan tüketim ve yavaşlayan üretimden ötürü 1993 yılı itibariyle Çin bir petrol ithalatçısı haline dönüşmüştür. Endüstrinin

FULL TEXTS BOOK

verimliliğini artırmak, onu küresel ölçekte rekabetçi bir hale getirmek ve hükümet fonksiyonlarını ana endüstrilerden ayırmak için Çin hükümeti 1982'nin başında başlayan altı turluk sanayi reformları gerçekleştirmiştir. Üç adet ulusal petrol şirketi kurulmuştur: China National Petroleum Corporation (CNPC), China Petroleum and Chemical Corporation (Sinopec), and China National Offshore Oil Corporation (CNOOC). Bunlar dikey bütünleşik firmalar olarak iç piyasa üzerinde hakimdirler. Çin'in enerji diplomasisinin tarihçesi 1992 yılına kadar gitmektedir ki bu tarihte CNPC, Peru'da yaşlanan Talala Petrol Sahası'nı geliştirme haklarını satın almıştır. 1990'lı yılların ortalarında CNPC aynı zamanda Sudan ve Kazakistan'a da yatırımlar yapacaktır ancak 1990'lı yılların başında Çin üst yönetimi, deniz aşırı yatırımlar yapmayı makul bir strateji olarak görmemiş ve bunun yerine iç yatırımlara devam etme kararı almışlardır. Bu durum, Çin'in petrol ithalatlarına bağımlılığı artınca değişmiştir. Bunun sonrasında Pekin, CNPC, Sinopec ve CNOOC firmalarına küresel oyuncular haline dönüştürme yönünde kararlılık göstermiş ve ülkenin enerji diplomasisinin yönünü Orta Doğu, Afrika, Latin Amerika, Rusya ve Orta Asya'ya çevirmiştir. Afrika'daki birçok Çin yatırımı Angola, Sudan, Demokratik Kongo Cumhuriyeti ve Gabon'da gerçekleşmiştir ki buralar petrol firmalarının ana hedefi olmuştur. Çin, insan haklarını ihlal eden demokratik olmayan hükümetlerle iş birliği geliştirdiği için sıklıkla eleştirilmiş ve Çinli firmalar kurumsal eksiklikleri olan ülkelerde yüksek riskli yatırımları tercih eder görülmüşlerdir. Bu durum, uluslararası yatırımcıların siyasi riski düşüren ve istikrarlı bir iş çevresini destekleyen ülkeler arayışında olması gerekliliğini içeren konvansiyonel yatırım çerçevesine aykırılık teşkil etmektedir. 2008 sonbaharındaki küresel finansal kriz emtia fiyatlarının düşmesi ile sonuçlanmış ve birçok petrol üreticisi ülke kendilerini mali zorluk içerisinde bulmuşlardır. Çin, bu fırsatı petrol tedarikleriyle güvence altına alınan borç teklifleriyle değerlendirmiştir. Örneğin, 2009 ve 2010 yıllarında dokuz ülkeye teklif edilen petrol karşılığı borçlar sisteminin toplam tutarı yaklaşık 77 milyar dolar değerindedir. Ödünç alan tüm ülkeler, Orta Doğu'nun dışında olup o sözleşmelerin Çin'in kaynak çeşitlendirmesine yardımcı olmasını sağlamıştır (Gholz vd., 2017: 42-50; Ulatowski, 2023: 212-213).

Çin aynı zamanda doğal gaz tedarikini çeşitlendirme konusunda da başarı sağlamıştır. Buradaki ilk kilometre taşı, 2006 yılında LNG ithalatlarına başlanması olmuştur. Bunu 2010 yılında Orta Asya'dan ve 2019 yılında Rusya'dan doğal gaz ithalatları izlemiştir (. 2017 yılından bu yana Çin, Japonya'nın ardından ikinci en büyük LNG ithalatçısı olmuştur. Çin, doğal gaz tedarikçilerini çeşitlendirmiştir. Söz konusu ithalatların %38'i boru hattıyla doğal gaz, %62'si ise LNG yoluyla olmuştur. Bu hususta Avustralya (%29), Türkmenistan (%25) ve Katar (%9) ana kaynak ülkeler arasında yer almaktadır (Grigas, 2017: 236-241, 257-263). Çin'deki ulusal petrol şirketlerinin başarılı büyümelerine rağmen strateji küresel desteği barındırmamaktadır. Buna karşı dört argüman bulunmaktadır. Bunlardan ilki, ulusal petrol şirketleri küresel piyasada kendi yabancı ortakları tarafından üretilen petrolü ağırlıklı olarak satmakta ve bunu Çin'e göndermemektedirler. İkincisi ise ulusal petrol şirketleri, ortakları tarafından üretilen petrolü sattıklarında piyasa fiyatlarını talep etmeleri ve küresel bir kesinti durumunda üretilen petrolün Çin için var olup olmayacağı konusunda bir garantinin olmamasıdır. Üçüncüsü ise ulusal petrol şirketlerinin küresel ölçekte büyümeleri adına yabancı varlıklar için aşırı ödeme yapmalarıdır. Dördüncüsü ise ulusal petrol şirketleri, ABD ve Batı Avrupa ülkeleri ile anlaşmazlık yaşayan ülkelerde yatırımlar yapmışlardır ki bu, Çin açısından dönem dönem bir dış politika sorumluluğu ya da meselesi haline dönüşebilmektedir. Çin, 2017 yılından günümüze en fazla ham petrol ithalatçısı konumundadır. En büyük tedarikçileri, sırasıyla %16 ve %15'lik oranlara sahip Suudi Arabistan ve Rusya'dır (Ulatowski, 2023: 213-214).

Çin, son on yılda Orta Doğu ve Kuzey Afrika bölgesinde daha etkili bir aktör haline gelmektedir. Çin'in Orta Doğu'daki siyasi ve güvenlik açısından meydan okumalara yönelik yaklaşımı geleneksel olarak temkinli olmuştur. Bölgeye yeni gelen bir oyuncu olarak ekonomik varlığını ve ilişkilerini kısa sürede geliştirmeyi başarırken Arap devletleri ile çok boyutlu ilişkilerini geliştirememiştir. Pekin'in MENA ülkeleriyle ilişkileri esasında bölgede keşfedilen enerji kaynaklarına yönelik Çin'in küresel talebinin yanı sıra 2013 yılında geniş ölçekli olarak ilan edilen ''Tek Kuşak-Tek Yol Girişimi''ni temel

FULL TEXTS BOOK

almaktadır. 2017 yılından bu yana Çin dünyanın en büyük ham petrol ithalatçısıdır ki petrol dış alımlarının yarısı Orta Doğu kaynaklıdır. Buna ilaveten Asya-Avrupa-Afrika arasında stratejik açıdan lojistik bir kesişim noktası olarak Orta Doğu, Çin'in hırslı Tek Kuşak-Tek Yol Girişimi çerçevesinde çok önemlidir. Bu durum Çin'i ticaret ve ekonomik ağ bağlantıları bakımından anahtar oyuncu haline dönüştürecektir. Asya-Pasifik bölgesi dışında Orta Doğu, barındırdığı zengin hidrokarbon kaynaklar ve jeostratejik konumundan ötürü Pekin bakımından en önemli bölge olarak düşünülebilir (Savicheva vd., 2022: 182).

2022 yılı itibariyle Çin'in nüfusu 1.4 milyara ulaşmıştır ve hızlı büyüyen ekonomisi bu ülkeyi dünya genelinde lider enerji tüketicisi olarak konumlandırmıştır. BP'ye göre 2021 yılında Çin, küresel enerji tüketiminin %26,5'inden sorumlu olmuştur (Sun vd. 2023: 1). Çin'deki hidrokarbon üretimi ve tüketimi arasındaki farktan ötürü, bu ülke yabancı ülkelerdeki enerji kaynaklarını araştırmalıdır. Çin, kendi ekonomisinin sürdürülebilir büyümesini gerçekleştirmek için enerjiye ihtiyaç duymaktadır. Çin, yabancı ülkelerden kendi taleplerindeki kesintileri ithal etmelidir. Pekin'in kendi ekonomisi tarafından ihtiyaç duyulan enerji akışını güvence altına alma konusunda ciddi endişeleri bulunmaktadır. Çünkü güvenilir enerji kaynaklarına erişim, Çin'in dünyanın en büyük ekonomisi olma yönelik hareketinin sürdürülebilirliğine katkı sağlamaktadır. Nihayetinde Çin, petrol ve LNG ithalatında farklı meydan okumalarla karşılaşmaktadır çünkü bu emtialar Malakka Boğazı boyunca geçmek zorundadır. Malakka Boğazı hidrokarbon taşımacılığı ve büyük ölçekli kargo için kritik bir su yolu görevi görmektedir. Bundan dolayı Malakka Boğazı doğal bir stratejik geçiş noktasıdır. Düşman bir ülke olarak ABD, herhangi bir çatışma durumunda Malakka Boğazını kolaylıkla kapatabilir ve böylece Çin'in kritik enerji kaynaklarına erişimini kesebilir. Çin, kaliteli kalkınma programının bir parçası olarak düşük karbonlu gelişme stratejisi ile 2060 yılı itibariyle sıfır karbon hedefine ulaşma taahhüdünde bulunmuştur (Luo, 2022). Bunu başarabilmek için Pekin, fosil yakıt kullanımını azaltan ve tedarik tarafında yenilenebilir kaynakları geliştirmeyi içeren bir kapsamlı politika ortaya koymuştur. Ülke aynı zamanda petrol, biomass ve kömür gibi çevreyi daha çok kirleten enerji kaynakları seçeneklerinin yerine doğal gaz kullanımını artırmayı öncelemiştir. Doğal gazın daha fazla kullanımına ağırlık verilmesi Pekin'deki şehir havası kirliliğini azaltmaya yardımcı olmuştur ki bu dünyanın gelişen diğer şehirleri için bir örnek teşkil etmektedir (Moghani & Maleki, 2024: 2282-2284).

Fosil yakıtları kontrol etme ağırlıklı olarak fosil olmayan yakıtların geliştirilmesine bağlı olacaktır ki Çin dünyada yenilenebilir enerji geliştirme ve nükleer enerjide lider durumdadır (Hilton, 2024; Nuclear Engineering International, 2024; Clifford, 2023). Gelecekte fosil yakıt kullanımının düşebileceği beklenmektedir. Çin'de enerji güvenliği ve güç üretiminde kömür kullanımı kritik önemdedir ve kömür kullanımı daha öncesinde talep kaynaklı olmuştur. Ancak hava kirliliği gibi çevresel konularla ilgili artan endişeler, Çinli karar alıcıların dikkatlerini tedarik tarafını kontrol etmeye yöneltmeye yol açmıştır. Çin kömür kullanımını azaltmaya ve temiz kömür kullanmaya yönelik politikalar uygulamaktadır. Burada amaç, On Dördüncü Beş Yıllık Kalkınma Planı ile kömür kullanımını azaltmayı ve On Beşinci Beş Yıllık Kalkınma Planı ile bunu daha da düşürmeye amaçlamaktadır. Buna ilaveten sürdürülebilir kalkınma planları, Çin'in enerji diplomasisinde önemli rol oynamaktadır. Pekin, dünyanın en büyük solar panel ve rüzgâr türbinleri üreticisi olup bunları diğer ülkelere ihraç etmektedir. (Izumi & Suzuki, 2024; Hawkins, 2023). Aynı zamanda Çin, Uluslararası Yenilenebilir Enerji Ajansı'nın yenilikçilik birimine katılmış ve ülkesinde yenilenebilir enerji araştırma ve geliştirmeyi desteklemek için bir teknoloji merkezi kurmuştur. Çin'in enerji diplomasisi girişimleri bir yandan sürdürülebilir kalkınma hedeflerini gerçekleştirmeyi amaçlarken diğer yandan da enerji güvenliğini sağlamak niyetindedir. Yenilenebilir enerjiyi destekleyerek enerji verimliliğini geliştirerek ve altyapı projelerine yatırımlarda bulunarak Çin kendisi ve ortak ülkeleri için daha sürdürülebilir bir gelecek oluşturulmasına yardımcı olmaktadır (Moghani & Maleki, 2024: 2282-2284).

FULL TEXTS BOOK

2.2. ABD'nin Enerji Güvenliği Stratejisi

ABD, 2010'ların başına kadar net bir enerji ithalatçısı konumunu korumuştur. Ancak sonrası süreçte ülke içerisindeki değişik bölgelerde kaya gazı ve petrolünün keşfi, Washington'ın enerji güvenliği siyasalarında devrimsel dönüşümlere yol açmıştır. Bu rezervlerden yararlanılmasıyla birlikte ABD, enerji ithalatçısı konumundan enerji ihracatçısı konumuna yükselmiştir. Yabancı enerji sağlayıcılarından kaynaklı yüksek bağımlılıktan kendisini kurtarmayı başaran Washington dünya enerji piyasasında kaya gazı ve petrolünün devriminin yardımıyla öncü bir enerji ihracatçısı olmayı başarmıştır. Bahse konu devrimin sağladığı 'know-how' kanalıyla Washington, dünyanın sayısız bölgesine sıvılaştırılmış doğal gaz (LNG) ihraç edebilmektedir. Buna ilaveten mevcut kaya gazı devrimi sayesinde ABD, dünyanın öncü doğal gaz kaynak sahibi ve üreticilerinden birisi olarak bu sektörde dünya listesinde ilk on ülke içerisindedir (Iran Oil Gas Network, 2024). 2022 Rusya-Ukrayna savaşı sebebi ile Rus doğal gaz alımını kademeli olarak düşürmeyi amaçlayan Avrupa açısından da öngörülen seçenekler arasında ABD'den LNG ithalatı yer almıştır (Yorulmaz vd., 2024: 79-80). Beyaz Saray tarafından 26 Ocak 2024 tarihinde yapılan açıklamaya göre, ABD hâlihazırda dünyada enerji ihracatında birinci sırada yer almakta ve bu on yılın sonu itibariyle ABD'nin LNG ihracatlarının ikiye katlanması beklenmektedir (Corbeau, 2024;Rodriguez, 2023). Yine bu açıklamaya göre, Washington müttefiklerini destekleme konusunda taahhüdüne sıkı sıkıya bağlıdır ve ABD'nin yakın zamanda müttefiklerine sıvılaştırılmış doğal gaz teminine devam edebilecektir. 2023 yılında ABD, LNG ihracatlarının yaklaşık olarak yarısını Avrupa'ya gerçekleştirmiş ve AB ile birlikte tüketimi ekonomikleştirmek ve depolama kapasitelerini yönetmeye çalışmıştır. Ayrıca 2022 yılında ABD ve AB, Birlik piyasasına ek LNG miktarları sağlanması taahhüdünde bulunmuşlardır. ABD'nin geçtiğimiz son iki yılın her birinde AB piyasasına yönelik yıllık teslimat hedeflerini aşmıştır. ABD'ye göre var olan LNG üretim ve ihracat altyapısıyla müttefiklerine yönelik teslimatları sürdürmeye devam edecektir (The White House, 2024). Sıvılaştırılmış Petrol Gazı (LPG) ve LNG üretimleri/satışları 2024 yılında yüksek miktarlara ulaşmıştır. Artan üretimler aynı zamanda LNG ve LPG ihracatlarına da bir temel sağlamıştır. ABD'nin LNG ihracatları, 1 Ocak 2024-29 Nisan 2024 arasında S&P Global Commodities at Sea taşımacılık verisine göre 2024 yılında toplamda 20.2 milyon tona ulaşmıştır. Bu miktar, ABD ihracat verilerinin başladığı yıl olan 2017 yılından bu yana Ocak-Nisan dönemi için kaydedilen tüm zamanların en yüksek LNG ihracatları olmuştur. Buna kıyasla 2023 yılında ABD LPG ihracatları, 19 milyon ton iken 2022 yılında aynı dönem içinde 16.6 milyon ton olarak kayıt edilmiştir. ABD LPG üretiminin çoğunluğu, istikrarlı Asya talebinden ötürü Doğu'ya yönelmektedir ki bu pazara ek varillerin girişini olanaklı kılmaktadır. Fakat, istikrarlı üretim ve yeterli tedarik Avrupa talebine cevap verebilmek için yeterli olandan daha fazla üretim yapılabileceği anlamına gelmektedir (Kiddie vd., 2024). İleri bakacak olursak Asya ve özellikle Çin'in kömürden çıkması ve yerel gaz üretiminin düşmesi sonucu küresel LNG talebi artabilecektir. Bir LNG oyuncusu olan Shell, 2040 itibariyle küresel talep büyümesinin %50'yi aşacağını öngörmektedir. 2023 yılında ABD Enerji Bakanlığı verilerine göre, 2023 yılında ülke ortalama olarak günde 11,9 milyar m^3 LNG ihraç etmiştir. Uygun ve maliyeti karşılanabilir doğal gaz tedarikiyle ABD, LNG projeleri geliştirmekte ve ihracat kapasitesinin artırılması hedeflenmektedir. Mevcut şartlarda ABD'de geliştirilen altı adet LNG projesi yer almaktadır. Bu projeler, toplam kapasiteyi %80'lik bir artışla 2024 yılındaki günde 14 milyar m^3 küpten 2028'de günlük 25 milyar m^3'ün üzerine taşıyabilecektir. ABD LNG satışları, üretim kapasitesi ile sınırlandırılmaktadır. Nihayetinde büyüme, devreye alınacak ek tesislere bağımlıdır. 2024 yılı sonu itibariyle iki adet LNG projesinin tamamlanması beklenmektedir. Bunlar Louisiana'daki Phase 1 of Venture Global's Plaquemines Projesi ve Teksas'taki Cheniere Energy's (LNG) Corpus Christi Liquefaction Stage 3 projesidir. Söz konusu projeler, mevcut kapasiteye günde 3,1 milyar m^3 katkı sağlayacaktır. Bu aynı zamanda mevcut seviyelerin %22'sine tekabül etmektedir. Bu projeler devreye alındıkça 2025 yılında ABD'nin LNG satışlarının %18 artması beklenmektedir (Segal, 2024).

FULL TEXTS BOOK

ABD'nin 20. yüzyılın son on yıllık döneminden bugüne kadar görevde bulunan farklı başkanların yönetimlerince kararlılıkla uygulanmaya çalışılan stratejilerinden birisini öncelikli olarak Avrasya enerji jeopolitiği ve güvenliği stratejileri çerçevesinde Rusya-İran tarafından geliştirilen Kuzey-Güney Enerji Koridoru'nun karşısına Doğu-Batı Enerji Koridoru'nu çıkartmıştır. Washington kendisinin enerji güvenliğini doğrudan ilgilendirmese de Avrupalı ortaklarının ivedi şekilde enerji güvenliğini gerçekleştirmek ve de Sovyetler'in parçalanmasının ardından bağımsızlıklarına kavuşan Orta Asya Türk devletleri ve Azerbaycan'ın güçlendirilmesine yönelik politikalar bütün yumuşak güç stratejilerinden istifade edilerek egemenliğini devam ettirmek için uygulanmıştır. Bahse konu düzlemde, ABD, 1990'lardan günümüze öncelikli olarak Bakü'nün zengin hidrokarbon rezervlerini Rusya'yı devre dışı bırakarak Türkiye ve Gürcistan vasıtasıyla Batı pazarlarına iletmeyi planlayan Bakü-Tiflis-Ceyhan Ham Petrol Boru Hattını, Bakü-Tiflis-Erzurum (Güney Kafkasya) Doğal gaz Boru Hattını ve Güney Gaz Koridorunu (Anadolu Geçişli Doğal gaz Boru Hattı ve Adriyatik Geçişli Doğal gaz Boru Hattı) faaliyete geçirmek için diplomatik çabalarını arttırmış ve bunlarda başarı elde etmiştir (Caşın, 2022: 11-15; Telli, 2022: 319-333).

ABD, Nabucco Doğal gaz Boru Hattı ve Hazar Geçişli Doğal gaz Boru Hattı projelerini devreye almada başarısız olmuştur. Bahse konu kapsamda 2000'li yıllarda Moskova-Kiev kaynaklı enerji anlaşmazlıkları kapsamında Avrupalı ortaklarının enerji güvenliğinin tesisine ağırlık veren ABD, yukarıdaki başarılı girişimlerine ilaveten Rusya'nın Avrupa ve dünya enerji pazarlarındaki mukayeseli avantajını sürdürmek maksatlı ortaya koyduğu Türk Akım ve Kuzey Akım doğal gaz boru hatlarının faal olmasını engelleme çabalarını arttırmıştır (Blank, 2021). Fakat ABD'nin yaptırım tehdidine karşın Rusya ve Türkiye, Türk Akımı'nı başarılı bir biçimde işletebilmektedirler. Buna karşın, Moskova'nın bütün yapım aşamalarını ve Berlin haricinde tüm onay safhalarını tamamlamasına karşın Kuzey Akım 2 Doğal Gaz Boru Hattı Projesi (Lefebvre, 2022; The White House, 2022), Washington'ın engelleme girişimleri ve yaptırım uyarısı sonucunda Berlin tarafından askıya alınmıştır (Appunn & Wettengel, 2022). Şubat 2022'den bugüne süren Rusya-Ukrayna savaşında Kuzey Akım 2 Projesi merkezli engelleme, sabotaj ve saldırı girişimleri kapsamında Moskova ve Washington arasında bir bilek güreşi yaşanmaktadır (Örmeci vd., 2023: 454-455).

2.3. Hindistan'ın Enerji Güvenliği Stratejileri

Güney Asya ülkeleri arasında en çok petrol üreten ülke, kanıtlanmış en çok petrol rezervini barındırmasından ötürü Hindistan'dır. Dünyanın üçüncü en büyük petrol tüketicisi olarak Hindistan'ın petrol üretimi 1990-2015 arasında düzenli olarak artmışken, 2015 sonrasında düşmüştür (Abdi, 2020). 2019 itibariyle Hindistan'da faaliyet gösteren on iki petrol firması yaklaşık 360 milyon varil petrol üretmişlerdir. Petrolde olduğu gibi Güney Asya ülkelerinin doğal gaz rezervleri talebini de karşılamak için yeterli değildir. 2019 verisine göre Güney Asya'da en fazla doğal gaz rezervine sahip ülke yaklaşık 1,3 trilyon m^3 ile Hindistan'dır. Bu miktar, 1990 yılındaki 673 milyar m^3'lük toplam gaz rezervinden yaklaşık %97 daha fazladır. Hindistan'daki doğal gaz rezervlerinin çoğunluğu, ülkenin kuzey kıyı bölgesindeki alanlardadır. Bu kaynaklar, toplam rezervlerin %41'ni oluşturmaktadır. Ülkenin batı kıyıları toplam rezervlerin %23,4'üne ev sahipliği yapmaktadır (Yüksel & Özdemir-Daşcıoğlu, 2021: 262-264).

Uluslararası Enerji Ajansı tarafından hazırlanan Hindistan Enerji Görünümü 2021 Raporu'na göre Hindistan'ın enerji taleplerinin %80'inden fazlası kömür, petrol ve katı biyokütle yakıtlar tarafından karşılanmaktadır. Kömür, elektrik üretiminin ve endüstrinin genişlemesini desteklemiştir ve enerji karışımındaki temel yakıttır. Petrol kullanımı ve alımları araç sayısının ve karayolu taşımacılığı kullanımının hızlı artışından ötürü yükselmiştir. Doğal gaz ve modern yenilenebilir enerji kaynakları gelişmeye başlamış ve 2020 yılındaki COVID-19 salgınından asgari düzeyde etkilenmiştir. SolarPV'nin özellikle artışı çok önemli olmuştur ve kaynak kapasitesi yüksektir. Hindistan kişi başı CO_2 salınımlarında düşük bir seviyede olsa da dünyanın en büyük üçüncü CO_2 salımcısı konumundadır.

FULL TEXTS BOOK

Hindistan'ın elektrik sektörünün karbon yoğunluğu özellikle uluslararası ortalamanın üzerindedir. Hindistan, güvenilir ve sürdürülebilir bir enerji geleceği yaratmayı hedefleyen yürürlükte olan geniş kapsamlı stratejilere sahiptir. 2010-2020 arasında Hindistan, yenilenebilir enerji oranını %16'dan %22'ye çıkartmıştır. Gelecek yıllarda Hindistan'ın yenilenebilir enerji oranının %50'ye çıkartılması hedefi, ülkenin enerji dönüşümünün hızlandırılmasını gerektirmektedir. Hindistan, elektrik üretiminin %77'sini fosil yakıtlardan (%72,5'si kömür, %4,2'si doğal gaz ve %0,3'ü petrol) karşılamaktadır (Buchholz, 2022). Sadece elektrik elde etmede değil aynı zamanda yenilenebilir ve nükleer güç 2020 yılında ülkenin enerji karışımında %4'lük bir paya sahip olmuştur. Biyoyakıtlar, Hindistan'ın enerji karışımının %20'sini teşkil etmektedir. Bunların %13'ü geleneksel biyoyakıtlardır. Bunlar odun yakılması ve tarımsal kaynaklı ürünlerdir (International Energy Agency, 2021).

2022 yılında Hindistan dünyanın en büyük üçüncü sera gazı salıcısı olmuştur. 2070 yılında sıfır karbonlu bir sisteme ulaşmayı hedeflemektedir. Bu bağlamda iklim hedeflerini başarabilmesi için hızlı bir enerji dönüşümüne/geçişine ihtiyacı vardır. Fakat 2022 senesinde Yeni Delhi, yazın aşırı sıcak hava dalgaları ve ülkenin kuzeyinde beklenenden daha soğuk kışların yaşanması üzerine kesintilerin önüne geçmek için kömür merkezli santrallerden ve güneşten üretimi artırma zorunda kalmıştır. Hindistan'ın 2022 yılında enerji büyümesindeki artışta %22'lik oranla kömür ilk sırada yer almıştır. Kömür hâlihazırda ülkenin enerji ihtiyacının yaklaşık %70'ini karşılamakta ve 2023 itibariyle ek bir %8'lik kömür yakımı olabileceği öngörülmekteydi. 2023 yılının başında hükümet enerji üreten firmalardan 2030 yılına değin kömür merkezli üretim tesislerinde üretimleri durdurmamalarını talep etmiştir. Yenilenebilir enerji gücü de hala yükselmektedir. Hindistan, kurulu elektrik gücü, rüzgar ve de güneş enerjisinde dünyada dördüncü sıradadır. 2028 yılı itibariyle yeşil enerjiye 250 gigavatlık bir kapasite daha ekleyerek emisyon salınımlarını 2005'teki seviyesinin %45 altına düşürme konusunda umutludur. Yine bu bağlamda 2030 yılı itibariyle toplam enerji karışımının yarısını yenilenebilir enerjilerden oluşturmayı hedeflemektedir. Ülkenin enerji bakanı Alok Kumar, Hindistan'ın hızlıca temiz güç santralleri inşa etmesi gerektiğini vurgulamıştır. Bunlar ülkenin iklim hedeflerine ulaşmasına da yardımcı olacaktır. Kumar, Hindistan'ın enerji üretimindeki karışımda temiz enerji kaynaklarının oranını 2047 itibariyle günümüzdeki mevcut miktarın iki katı olacak %90'a çıkarmanın gerekliliğine vurgu yapmıştır (Frost, 2023). 2023 yılında Hindistan'ın Rusya'dan petrol ithalatları 2022'nin başında çok küçük bir oranda o yıl boyunca önemli oranda artmıştır. Örneğin Hint devlet bankası Bank of Baroda'ya göre 2021 yılında sadece %2'lik bir artışla bu ülkenin yıllık ham petrol alımlarının yaklaşık %20'ye ulaşmaktadır (Kısacık, 2024: 166).

Hindistan'ın deniz kaynaklı petrol alımları Çin'inkini geçmiştir. Hindistan, 2022 Rusya-Ukrayna Savaşı'ndan sonra Urallar ham petrolünü azalma da olsa almaya başlamıştır. Yeni Delhi'nin petrol rafinerileri aynı zamanda Rusya'nın ESPO Karışımı'nı (Doğu Sibirya-Pasifik Okyanusu Petrol Boru Hattı) almaya gittikçe artan bir ilgi göstermişlerdir. Bu durumdan ABD rahatsız olmasına rağmen Washington, Yeni Delhi'nin Moskova'dan petrol tedarik edebileceğini kabul etmektedir. Bahse konu bağlamda Rus petrolü kaynaklı rafine edilmiş yakıtların ABD ve AB'ye ticaretinin yapıldığına yönelik aynı zamanda endişeler de olmuştur. Hint hükümeti, Rusya'dan mevcut petrol alımlarını ekonomik ve uygun gördüğü her yerden petrol sağlamak zorunda olması gerekçesiyle açıklamıştır. Hindistan'ın toplam doğal gaz tedariklerinin neredeyse %50'si dış kaynaklardan sağlanmaktadır. Bunun çok küçük bir bölümü Rus kaynaklı olup birçoğunun menşei Körfez devletleridir (Menon, 2023).

Nisan 2023 itibariyle doğal gaz ithalatları % 6,5 artmışken, gazın yurt içi kullanımı % 1'lik artış yaşamıştır. Hindistan aynı zamanda bir önceki yılın aynı dönemindeki 1,3 milyar dolar kıyasla toplam 1.4 milyar dolarlık doğal gaz alımı yapmıştır. Ham petrol ithalatları ise Nisan 2023'te 2022'deki 16,8 milyar dolarlık miktardan 10,8 milyar dolara düşmüştür. Kapasite bağlamında Hindistan'ın ham petrol dış alımları Nisan 2023'te %8 düşmüştür. Petrol ürünleri çıktısı aynı zamanda %1 düşmüşken bunun kullanımı % 0,2 azalmıştır (The Economic Times, 2023; Kısacık, 2024: 167-168). Rusya Federasyonu Başbakan Yardımcısı Aleksandr Novak tarafından 10 Temmuz 2024 tarihinde Moskova'da Rusya Devlet Başkanı Vladimir Putin ile Hindistan Başbakanı Narendra Modi arasında yapılan görüşme

FULL TEXTS BOOK

sonrasında yaptığı açıklamada Rusya'nın Hindistan'a yılda 3 milyon ton LNG sağladığını ve iki ülkenin doğal gaz mevzusundaki ortaklığını daha da güçlendirme niyetinin bulunduğunu ifade etmiştir. Buna ilaveten Hintli firmaların Rus firmalarıyla ortak enerji projeleri gerçekleştirdiğini ve bunun ağırlıklı olarak Kuzey Kutbu ve Sahalin bölgelerinde vuku bulduğunu vurgulamıştır. Novak ayrıca şu hususlara da dikkat çekmiştir: *''Uzun vadeli iş birliğine gelince hem Rusya hem de Hindistan bu tür ilişkilere ilgi duyuyor. Zaten ortak bir petrol rafinerisi projemiz var. Tedarik konusunda da uzun vadeli iş birliğiyle ilgileniyoruz ve bu tür anlaşmalar şu anda kesinlikle değerlendiriliyor.''* Rusya ile Hindistan arasındaki toplam ticaret tutarı başta özellikle enerji kaynaklarının yükselen oranıyla 2023 yılında 2022'ye kıyasla % 60 artışla 65 milyar dolara ulaşmıştır (HaberTurk, 2024).

3. Aktör Olarak Devletin Rolü: Çin, ABD ve Hindistan Üzerine Karşılaştırma

Çin'in artan enerji tüketimi ve dolayısıyla yabancı enerji kaynaklarına olan bağımlılığı kendisinin küresel enerji piyasasında önemli bir aktör olmasını da sağlamaktadır. Çin dünyanın en büyük petrol ithalatçısı olarak 2023 yılında günlük 11.3 milyon varil ithal ederek 2022 yılına göre %10 artış göstermiştir (EİA, 2024). Çin'deki rafineriler, ülkenin ulaşım yakıtı ihtiyacını desteklemek ve büyüyen petrokimya endüstrisi için hammadde üretmek amacıyla ülkenin artan rafinaj kapasitesini karşılamak için 2023 yılında rekor hacimlerde ham petrol ithal etmiştir (Kool, 2024). Rusya, Suudi Arabistan ve Irak 2023 yılında Çin'in başlıca ham petrol ithalat kaynakları olmuştur. 2022 ile karşılaştırıldığında, Çin'in 2023 ham petrol ithalatı en çok Rusya, İran, Brezilya ve ABD'den artmakla birlikte Çin'in 2023 yılında ham petrol ithalatındaki en büyük hacimsel artış Rusya'dan gerçekleşmiştir (EİA, 2024). Çin, 2019'dan 2021'e kadar ham petrol ithalatının %15'ini Rusya'dan gerçekleştirerek Suudi Arabistan'dan sonra ikinci sırada yer almıştır (Statista, 2024). 2023 yılında Rusya, Çin'in ham petrol ithalatının %19'unu (2,1 milyon varil/gün) karşılayarak Çin'in en büyük ham petrol ithalat kaynağı haline gelmiştir (EİA, 2024). Bu artış, 2022'de Ukrayna'yı tamamen işgal etmesinin ardından Rusya'dan alınan ham petrole uygulanan yaptırımlar ve fiyat sınırlamalarıyla ilgili indirimlerin bir sonucudur. Çin aynı zamanda doğal gaz tüketiminde dünyada üçüncü sırada, ithalatında da ise ilk sırada yer almaktadır (Zang, Nie ve Downs, 2023). Üretim notasında ise her geçen yıl artış gözlemlenmektedir. Fosil yakıtlardan kömür ithalatı açsından ise sahip olduğu yüksek rezervler sayesinde petrol ve doğal gaza kıyasla yüksek bağımlılıktan söz etmek mümkün değildir. Çin, artan enerji talebi karşısında ortaya çıkan bağımlılığını enerji güvenliği stratejisine ilişkin 2050 vizyonu ve devlet merkezli pazarlama modeli ile üretimini arttırarak ve iç-dış pazarda denge sağlayıcı rol üstlenerek düşürmektedir.

Çin ve Hindistan başta olmak üzere gelişmekte olan ekonomilerin, dünya enerji talebindeki artışın en büyük pay sahibi oldukları ve küresel enerji sektöründe önemli birer aktör haline geldikleri görülmektedir. Endüstri, sanayi ve kentleşme üçgeninde Çin'in artan enerji talebinin durması neredeyse mümkün değildir. Bu durum karşısında Çin'in enerji güvenliğine ilişkin uluslararası kurallara riayet edip etmeyeceği ve enerji güvenliği stratejisinde nasıl bir değişikliğe gideceği temel sorular arasında yer almaktadır. Bu noktada temel tartışma konusu, Çin'in enerji güvenliği stratejisinin uluslararası enerji piyasasını istikrarsızlaştırıp istikrarsızlaştırmayacağı veya başta ABD olmak üzere diğer ülke ve bölgelerin enerji güvenliğine tehdit oluşturup oluşturmayacağıdır. Çin, ulusal ölçekte devlet ile özel sektör arasında dengeyi koruyacak, uluslararası pazarda da tedarik zinciri bağlamında enerji ithalatını ekonomik açıdan sürdürülebilir kılacak devlet merkezli pazarlama stratejisi uygulamaktadır. Pekin özellikle bu stratejisini yoğun şekilde petrol sektöründe uygulamaktadır. Bu yaklaşımın temelinde Çin hükümetinin petrol ve diğer sektörleri istikrar temelli kontrol altında tutma isteği yatmaktadır.

Çin'in devlet merkezli pazarlama stratejisinin ayırt ediciliğine ilişkin soruyu yanıtlamak için iki nokta dikkat çekmektedir. İlki, dünyadaki her ülke için geçerli standart uluslararası kuralların olmaması ve Çin'in stratejisinin temel dayanaklarının net şekilde saptanmasıdır. Öte yandan her ülke enerji güvenliği stratejisini kendi ulusal çıkarları, talepleri ve mevcut enerji kaynakları potansiyeline göre oluşturmakta ve bu durum da küresel ölçekte ortak değerlendirme ilkelerinin oluşturulamamasına yol açmaktadır.

FULL TEXTS BOOK

Çalışmada Çin, ABD ve Hindistan karşılaştırılmasına yer verilmesinin nedeni, ABD'nin serbest piyasa ekonomisinin küresel başat örneği olması iken Çin ve Hindistan'ın benzer nüfusa, enerji talebine ve her iki ülkenin de yükselen ekonomiye sahip durumda olmalarıdır. Dikkat çeken ikinci nokta ise Çin'in devlet merkezli pazarlama stratejisinin devinim halinde olmasıdır. Enerji güvenliğine ilişkin istikrar sahibi gelişmiş ülkelerin aksine Çin'in her yıl artarak devam eden enerji talebine ilişkin enerji güvenliği stratejisi de zaman için değişiklik arz etmektedir. Bu bağlamda Pekin de enerji güvenliği hususunda reformist yaklaşım sergilemektedir. Bu noktada akla gelen temel soru, Çin'in devlet merkezli pazarlama stratejisinin ve enerji güvenliği algısının ABD'den ve Hindistan'dan hangi açılardan farklılık taşıdığıdır. Devletlerin enerji güvenliği stratejileri birbirlerinden farklılık arz etmektedir. Son yıllarda dünya genelinde enerji kullanımında verimliliğin arttırılması ve çevrenin korunmasına ağırlık verilse de Çin'in enerji güvenliği algısında yeterli petrol arzının sağlanması sürekli olarak ön planda tutulmaktadır. Bunun yanında Pekin'in enerjiye yönelik güvensizlik algısı, hala öncelikli olarak petrol arzının kesintiye uğramasından ve petrol fiyatlarındaki artışlardan kaynaklanmaktadır. Bu tür algılamalara dayanarak Çin'in daha fazla petrol imtiyazını kontrolü altına almak için her türlü çabayı gösterdiği anlaşılmaktadır. Bu durum Çin'in enerji güvenliğinin arz tarafına verdiği önemin ABD ya da Hindistan'dan farklı olup olmadığı sorunu gündeme getirmektedir. Küresel açıdan 1970 yılında petrol üretiminin zirve yapmasına rağmen ABD'nin o yıllardan 2000'lerin başına değin tüketiminin sürekli artması ve bu sebeple ABD'nin ithalatının da artarak enerji güvenli açısından bağımlı hale gelmesi, Çin açısından benzer bir örnek oluşturmaktadır. Çin de 1970'lerden 2000'lerin başına hatta günümüze değin artan enerji talebi karşısında enerji güvenliği adına bağımlılık ile karşı karşıya kalmaktadır. Bu durum karşısında devletlerin enerji güvenliğini kendi perspektiflerinden nasıl tanımladıkları ve algıladıkları önem taşımaktadır. ABD açısından bakıldığında, ilk olarak petrol arz güvenliği anahtar role sahip iken ikinci olarak enerji güvenliği, ABD'nin ulusal güvenliğini ve süper güç statüsünü korumanın önemli bir yapıtaşı ve son olarak da ABD'nin enerji güvenliği çabası demokrasiyi teşvik etmenin ve korumanın aracı olarak görülmektedir (Yergin, 2024; McCown, 2024; Shepard & Pratson, 2022: 462-464). Diğer bir ifade ile ABD'nin enerji güvenliğinin petrol sorunu temelinde ulusal güvenliğin bir bileşeni olduğu algısı üzerinde vücut bulmaktadır. 1973 petrol krizinin ABD'deki enerji güvenliği algıları üzerinde derin bir etkisi olmuş ve dolayısıyla enerji güvenliğine ilişkin algı, enerji piyasalarındaki arz kesintilerini karşılayabilme yeteneği üzerine odaklanmıştır. Söz konusu arz kesintileri jeopolitik, askeri veya sivil gelişmelerden kaynaklanabilir ve kısa vadede telafisi mümkün olmayabilir. Enerji bağımlılığı, devlet yönetim mekanizması dışında bireyler açısından da bir tehdit olarak algılanmaktadır. Enerji arzının kesintiye uğramasını önlemek ve doğabilecek sorunlara çözüm üretmek adına genel olarak en makul yol, enerji bağımsızlığı adına diğer ülkelerden petrol ve diğer enerji türlerinin ithalatını azaltmak ve alternatif enerji kaynaklarına ulaşarak iç üretimi çeşitlendirmek ve arttırmaktır. ABD, Nixon dönemi ile olası OPEC ambargosuna karşılık bu süreci başlatarak enerji güvenliği stratejisinde ulusal bağımsızlık hedefini belirlemiş ve bu hedef doğrultusunda enerji güvenliğini, istikrarsız veya dostane olmayan ülke ve bölgelerden petrol ithal etmemek olarak ifade etmiştir (Grossman, 2023; Barbaccia, 2012).

Dünyanın üçüncü büyük enerji tüketicisi olan Hindistan artan enerji talebi, ithalatı, üretimi arttırma ve alternatif enerji kaynaklarına yönelim gibi enerji adına birçok konuda Çin ile benzerlik göstermektedir. Hindistan da Çin gibi yeterli kaynaklara sahip olmaması sebebi ile enerji güvenliği adına dışa bağımlılık ile yüz yüzedir. Uluslararası Enerji Ajansı'nın (IEA) (2021) verilerine göre Hindistan'ın enerji tüketiminde petrol ve türev ürünleri %32.4, kömür %16.9, doğal gaz %6, elektrik %16.4 ve biyoyakıtlar ve katı yakıtlar %28.1 pay sahibi iken tedarik açısından kömür %44.6, petrol %23.7, doğal gaz %5.8 ve biyoyakıtlar ve katı yakıtlar %21.6 pay sahibi olmuştur. Ekonomik ve endüstriyel gelişimi ile enerji tüketimi 2000 yılına göre iki kat artan Hindistan'ın enerji tüketiminin %80'ini sırasıyla kömür, petrol ve biyoyakıtlar oluşturmaktadır. 2023 mali yıl verilerine göre Hindistan'ın enerji tüketimi toplamda %10.4 artış gösterirken özellikle fosil yakıt artışı %8'e ulaşmıştır (Livemint, 2023; The Economic Times, 2024). Petrol ithalatına bağımlılığı giderek artan Hindistan'ın 2021 petrol ithalatı 9070412 TJ'ye

FULL TEXTS BOOK

ulaşırken aynı zamanda kömür ithalatı da 2023 mali yılına göre 2024 mali yılında %8 artış göstermiştir (IEA, 2021; The Economic Times, 2024). Hindistan dünyada üçüncü büyük petrol ithalatçısı ve ikinci büyük kömür ithalatçısı konumundadır (Nair, 2024; Tradeimex, 2024). Hindistan petrol ithalatını ağırlıklı olarak Rusya, Irak, Suudi Arabistan ve Birleşik Arap Emirleri ve yeni rota olarak Nijerya'dan gerçekleştirmektedir. Hindistan'ın enerji güvenliği stratejisi enerji kaynaklarının çeşitlendirilmesi, arama ve üretim faaliyetlerinin arttırılması, alternatif enerji kaynakları ile gaz bazlı ekonomi ve yeşil hidrojen ile elektrikli araçlar yoluyla enerji dönüşümünün sağlanması temeline dayanmaktadır (Government of India Press Information Bureau, 2023). Bu bağlamda Hindistan'ın enerji güvenliği stratejisinin Çin'in enerji güvenliği stratejisi ile benzerlik gösterdiğini söylemek mümkündür. Gıda güvenliğinden sonra Hindistan adına ikinci önemli sorun enerji güvenliğidir. Petrol ve Doğal Gaz Bakanı Dharmendra Pradhan, Hindistan'ı enerji kaynakları bakımından kendi kendine yeterli hale getirme hedefini vurgulayarak Hindistan'ın entegre enerji politikasına göre vatandaşların ve tüm sektörlerin ulaşabilir, ucuz ve güvenli doğal gaza sahip olmalarının temel hedefleri olduğunu belirtmektedir (The Economic Times India, 2024). Diğer bir ifade ile, Hindistan da Çin gibi enerjide dışa bağımlılığı azaltmak ve ulusal anlamda alternatif enerji kaynakları ile kendi kendine yeterliliği amaçlamaktadır. Bu amaç doğrultusunda Yeni Delhi yönetimi, enerji güvenliği adına politikaların uygulanmasında ve devlet-özel sektör arasında dengenin oluşturulması ve ekonomik açıdan fiyat istikrarı adına aktif rol üstlenmektedir.

Yukarıdaki belirtilenler çerçevesinde Çin, Hindistan ve ABD'nin enerji güvenliği stratejilerinin ve algılarının benzer tarafları şunlardır: (a) Genel olarak, enerji güvenliği algıları zaman içinde ulusal çıkarlar temelinde değişkenlik gösterebilmektedir; (b) Üç ülke açısından da petrol güvenliği, enerji güvenliğinin özü olmaya devam etmektedir; (c) Enerji arz güvenliği, ulusal güvenlik ve ekonomik kalkınma açısından üç ülke için de enerji güvenliği stratejisinin odağını oluşturmaktadır; (d) Enerji fiyatlarındaki istikrarsızlıkların ve düzensiz değişikliklerin olumsuz sonuçları noktasında üç ülke de çözüm arayışı içindedir. Enerji güvenli algılamalarındaki farklılıklara gelindiğinde, Hindistan'ın enerji güvenliği algılamasında nüfusunun çoğunun enerji (elektrik) yoksulluğundan kurtarılması hedeflenmektedir. Nüfusunun neredeyse yarısının elektriğe erişiminin olmaması nedeni ile hayvansal atıkların yemek pişirme ve ısınmada kullanılması, toplum sağlığı ve çevre kirliliği sorunlarını etkilemektedir. ABD'nin enerji güvenliği algısının temeli ise ulusal güvenlik ve süper güç konumunun sürdürülmesi noktasında petrol arzındaki kesintilerin olmaması üzerine dayanmaktadır. 11 Eylül saldırıları sonrası Washington ve ABD kamuoyunda petrol arzındaki kesintilere ilişkin hassasiyetin artması ve Ortadoğu'dan petrol ithalatına bağımlılığın sorgulanmaya başlanarak alternatif arama çabaları, ABD'nin enerji güvenliği algılamalarına önemli bir örnek teşkil etmektedir. Bu durum, ABD'de de bağımlılık yerine bağımsızlık düşüncesini daha da fazla tetiklemektedir. Çin'in enerji güvenliği algısı ise enerji talebinin artmasının sonuçlarından ziyade talebin karşılanması adına iç ve dış piyasada alternatifler üzerinde durulmakta ve Pekin, ekonomik büyüme, sürdürülebilir çevre ve enerji tasarrufu arasında denge kurmanın öneminin altını çizmektedir. Bu noktada devlet merkezli pazarlama modeli ile stratejiye ilişkin aktif rol üstlenilmektedir. Ancak, merkez yönetimin kararları ile yerel uygulamalar arasında ayrılıklar dikkat çekmektedir. Ne var ki Çin açısından devletin tüm uygulamalardaki baskın gücü, enerji güvenliği stratejisi bağlamında enerji verimliliği konusunda da kendini gösterse de toplumsal algıda istenilen oluşum sağlanamadığı için hedefe ulaşmamaktadır. Diğer bir ifade ile Pekin yönetimi ekonomik ve enerji güvenliğinde aktif role ve güce sahip olmasına rağmen enerji güvenliği stratejisinin hedeflenen çıktılarına henüz ulaşmış değildir. Enerji güvenliği ve çevre kirliliği denkleminin doğrusal bir yapıya kavuşamaması, bu durumu açıklar niteliktedir. ABD ise Çin ve Hindistan'a göre toplumsal yapıdaki bilinç ve kazanımlar açısından oldukça ileri aşamadadır. Washington'ın uygulamaları, yerel yönetim açısından olumlu bir karşılık bulmaktadır. 1973 krizi sonrası ABD sadece merkezi yönetim açısından değil yerel yönetim ve toplumsal bilinç açısından önemli kazanımlar elde etmiştir. Bu noktada ABD'de de devletin aktör olarak rol oynadığı ancak Çin

FULL TEXTS BOOK

ve Hindistan kadar etken role sahip olmadığı ve uluslararası petrol şirketlerinin aktif rolünün ve rekabetinin öne çıktığı görülmektedir. ABD özelikle aktif rolünü, ülke dışındaki tedarik yapılarında hegemonik gücü ekseninde ortaya koymaktadır. Devletin aktör rolü bağlamında Hindistan açısından durum, devletin artan enerji talebini karşılamak ve ekonomik büyümeyi desteklemek misyonu üzerinedir. Yeni Delhi, gıda güvenliği üzerine birincil olarak yoğunlaşırken enerji güvenliği ve sürdürülebilir çevre algısından henüz hedeflenen sonuçlara ulaşmış değildir.

Sonuç

Birçok farklı tanıma sahip olan ‘‘enerji güvenliği’’ kavramı, genel olarak uygun fiyatlarda yeterli arz sorununa vurgu yapmaktadır. Daniel Yergin (1988: 112), bulunabilirlik ve satın alınabilirliğin yanı sıra enerji elde etme yolunun ‘‘ulusal değerleri ve hedefleri tehlikeye atmaması’’ gerektiğini vurgulamaktadır. Devletler adına önemli bir kavram olarak günümüzde yer eden enerji güvenliği, devletlerin tedarik süreci ile sınırlı kalmayıp aynı zamanda ulusal güvenlik ve ekonomileri, ulusal çıkarları ve gelecek projeksiyonları ile de yakından ilgilidir. Diğer bir ifade ile enerji güvenliği siyasi, ekonomik, askeri ve diğer birçok unsuru içinde barından çok boyutlu bir kavramdır.

Enerji güvenliği kaynak sahibi ülkelerden nihai kullanıcı olan tüketicilere petrol, doğal gaz ve kömürün çeşitli taşımacılık yollarıyla ucuz, güvenilir ve kesintisiz bir biçimde taşınması olarak da tanımlanabilmektedir. Söz konusu çerçevede ele alındığında hidrokarbon sahibi ülkeler müşteri ya da alıcı çeşitliliği olarak nitelenebilecek istikrarlı pazarların varlığını öncelerken enerji talep eden ülkeler ise tek bir tedarikçiye bağlı kalmadan farklılaştırılmış tedarikçilerden enerji sağlamayı tedarik güvenliği çerçevesinde öncelemektedirler. Bir başka ifade ile tedarikçiler yüksek, orta ve düşük akış seyri içinde geçiş ülkeleri ve nihai kullanıcı ülkeler arasında karmaşık ilişkiler kurulabilmektedir. Zaman zaman siyasi ve ticari anlaşmazlıklardan ötürü enerji akışı durabilmekte bu da alıcı-satıcı ülkelerde ciddi krizlerin yaşanmasına sebep olabilmektedir. Yükse, orta ve düşük akış seyrinde vuku bulan jeopolitik gerginlikler, terör faaliyetleri, savaşlar ve çatışmalar enerji akışında sıkıntılar yaratabilmekte, ilgili ülkelerin sosyo-ekonomik sistemlerini sürdürmede elzem bir rol üstlenmekte ve ülkelerin kalkınmasında ana besleyici güçlerden birisi olan enerji sistemlerinin çökmesine ya da zarar görmesine sebep olmaktadır. Bu durum, alan yazında ‘‘kritik enerji alt yapı güvenliği’’ olarak ifade edilmektedir. 1990’lı ve 2000’li yıllarda yaşanan ve etkileri dünyanın her yerinde güçlü bir biçimde hissedilen iklim değişikliği/krizi özellikle fosil yakıtların yoğun kullanımından kaynaklanmaktadır. Çevresel felaketler, artan seller ve sıcaklıklar dünyanın ekolojik dengesini bozmakta ve bunun önüne geçebilmek için petrol-doğal gaz-kömür üçlüsünün kullanımının aşama aşama ortadan kaldırılarak rüzgâr, güneş, biyoyakıt ve nükleer gibi daha temiz ve çevresel enerji teknolojileriyle ikame etme çalışmaları 21. yüzyıl enerji güvenliği politikaları bağlamında ulus-devletlerce ve uluslararası örgütlerce yoğun bir biçimde gerçekleştirilmektedir. Önümüzdeki yıllarda bu konulardaki çabaların daha da yoğunlaşacağı öngörülmektedir.

Bu çalışmamız bağlamında ele alınan Çin, ABD ve Hindistan özelinde konuyu analiz edecek olursak Çin, 1990’lı yıllarına başına kadar önemli ve kendi kendine yeterli bir enerji üreticisiyken mevcut siyasal sistemini koruyarak serbest piyasa ekonomisine geçme kararıyla birlikte liberal ekonomi yönünde reformları neticesinde ciddi büyüme oranları kaydederek sosyo-ekonomik yönden büyük bir gelişme kaydetmiştir. Bu sürecin bir neticesi olarak kendi enerji kaynaklarının kendi sosyal ve ekonomik yapılarını desteklemede yetersiz kalması üzerine Çin 1990’lı yılların ortasından itibaren net bir hidrokarbon ithalatçısı konumuna yükselmiştir. Bundan sonraki süreçte ülke içerisindeki enerji karışımını istikrarlı bir hale getirip güvence altına almak maksadıyla dışarı açılma stratejisi çerçevesinde proaktif bir dış (enerji) ilişkiler geliştirmeyi öncelemiştir. Buna yönelik olarak aralarında Rusya, Afrika, Latin Amerika ve Orta Asya ülkeleri ile petrol, doğal gaz ve kömür alışverişi temelli yoğun ilişkiler geliştirmeye başlamış ve bunları da günümüzde çeşitlendirerek sürdürmektedir. Çin, bu coğrafyalarla yakın münasebetler geliştirirken enerji tedarik güvenliğini ilk plana almış ve bu ülkelerin siyasi

FULL TEXTS BOOK

rejimlerinin içerikleri ile ilgilenmeyerek sadece kendisine yönelik enerji akışının sorunsuz olmasına önem atfederek sıfır kilometre iş birlikleri kurmaya ulusal enerji şampiyonları olan Sinopec, CNOOC, CNPC aracılığıyla devam etmektedir. 2060'lı yıllar itibariyle karbonsuz bir ekosistem kurmayı hedefleyen Pekin, yenilenebilir enerji ve nükleer enerjiye de önemli yatırımlar yapmakta ve her geçen gün dünyada öncü ülkeler arasındaki yerini hızla yükseltmektedir.

ABD'ye geldiğimizde ise, 2010'lu yıllara kadar net bir hidrokarbon ithalatçısı olan bu ülke söz konusu zaman zarfında keşfettiği kaya gazı ve petrolü sayesinde dışa bağımlılıktan büyük ölçüde kurtulmuş ve böylece dünyanın en önde gelen enerji ihracatçılarından birisi haline dönüşmüştür. Birçok ülkeye büyük miktarlarda LNG satışı yapabilen ABD, bu yönüyle de dünya enerji piyasasının lider ve karar verici oyuncularından birisi durumdadır. 2022 Rusya-Ukrayna Savaşı/Özel Askeri Operasyonu bağlamında Avrupa'nın yaşadığı ve de yaşayabileceği enerji tedarik kesintilerine karşı ön planda yer alan seçeneklerden birisi de ABD'den LNG ithalatı olmuştur. 1990'lı yıllardan günümüze dünyanın en büyük enerji kaynağı sahibi/üreticisi ülkeleri arasında yer alan Rusya ile enerji nakil projeleri bağlamında geniş ölçekli bir rekabete giren ABD, Doğu-Batı Enerji Koridoru'nu Rusya-İran eksenli Kuzey-Güney Enerji Koridoru'na karşı ortaya atmış ve bunun gerçekleştirilmesine dönük olarak elindeki tüm yumuşak güç araçlarını kullanmayı sürdürmektedir. Güney Gaz Koridoru ve Bakü-Tiflis-Ceyhan Ham Petrol Boru Hattı gibi başarı hanesine yazılabilecek girişimler bulunsa da Hazar Geçişli Doğal gaz Boru Hattı, Nabucco gibi başarısızlık örnekleri bulunmaktadır. Öte yandan 2010'lu ve 2020'li yıllarda Rusya tarafından Ukrayna'yı Avrupa'ya enerji gönderiminde devreden çıkartmayı önceleyen Türk Akımı ve Kuzey Akım 2 Doğal gaz Boru Hatları gibi projeleri engellemede kısmen başarı sağlamış durumdadır. Öncelikli olarak enerji dış politikasında Rusya'yı engelleyici ve oyun dışı bırakıcı uygulamalara ağırlık veren ABD'nin bu alanda Rusya ile olan geniş kapsamlı rekabetinin önümüzdeki yıllarda da artarak devam edeceği söylenebilir.

Hindistan ise ekonomik açıdan sürekli gelişen ve yüksek nüfusa sahip bir ülke olarak enerji gereksiniminin her geçen gün yükseldiği görülmektedir. Enerji karışımında ağırlıklı olarak petrol-doğal gaz-kömür üçlüsü olan Hindistan, artan talebi doğrultusunda giderek önemli bir ithalatçı konuma yaklaşmaktadır. Buna ek olarak enerji karışımında yenilenebilir enerjinin payını artırmak da Yeni Delhi'nin mevcut ve geleceğe dönük politikalarında dikkat çekici bir yer işgal etmektedir. Petrol ve doğal gaz bağlamında bulunduğu bölge itibariyle lider durumda olmasına karşın halkının enerji gereksinimlerine anında cevap verebilmek maksadıyla önde gelen enerji üreticileriyle yakın ortaklıklar geliştirmeye çalışmaktadır. Bunlardan en önemlilerinden birisini Rusya ile gerçekleştirilen enerji ağırlıklı ekonomik ilişkiler oluşturmaktadır. 2050'li yıllarda enerji karışımında yenilenebilir enerjinin payını arttırarak daha sonrasında karbonsuz bir ekosistem kurmayı hedefleyen Yeni Delhi'nin mevcut şartlarda ve gelecek yıllarda bu yöndeki girişimlerini arttırabileceği öngörülmektedir.

Çalışmanın temel konusu bağlamında üç devletin karşılaştırılması adına şunları söylemek yerinde olacaktır. Enerji güvenliği stratejileri ve algıları açısından üç ülke de petrolü merkezi konuma alarak istikrarlı petrol arzının önemini ve yerli enerji üretiminin arttırılmasını vurgulamaktadır. Ayrıca üç ülke de petrol sonrası doğal gaza dikkat çekmektedir. Aldıkları önlemler ve politikalar hem arz hem de talep tarafını kapsaması bakımından önem taşımaktadır. Arz yönlü tedbirler arasında enerji kaynaklarının çeşitlendirilmesi öne çıkan stratejidir; talep yönlü tedbirler arasında ise çevrenin korunması ve enerji dönüşümüne önem verildiği anlaşılmaktadır. Belirgin farklılık ise petrol ve doğal gaz sektörlerindeki başlıca piyasa aktörlerinin ve piyasa yapısının türünde yatmaktadır. Çin ve Hindistan açısından bakıldığında devletin aktör rolünün varlığı, devlet merkezli pazarlama modelinin enerji güvenliği stratejisinin temel argümanı olduğu ve ulusal petrol şirketlerinin bazı ayrıcalıklara sahip olduğu görülmektedir. ABD'de ise devletin aktör rolü Çin ve Hindistan'daki kadar etkin olmamakla birlikte uluslararası petrol şirketlerinin sektörde hâkim etkisi söz konusudur. Devletin aktör rolü ve devlet-iş dünyası ilişkisi söz konusu olduğunda, ABD hükümeti petrol ve doğal gaz sektörüne Çin ve Hindistan hükümetleri kadar derinlemesine müdahale etmemektedir. Çin ve Hindistan, ticari olmayan amaçlara

FULL TEXTS BOOK

hizmet etmek için genellikle kamu iktisadi teşekküllerinden yararlanmakta, kaynakları farklı sektörler arasında paylaştırmakta ve hatta petrol endüstrisinin yönetimine doğrudan dâhil olmaktadır. Bu durum, Washington'ın petrol endüstrisini düzenlemek için daha az kaldıraca sahip olduğu anlamına gelmemektedir. Washington, diğer bölge ve ülkelerdeki petrol çıkarlarını korumak için hegemonik gücünü sıklıkla kötüye kullanmaktadır. Dahası, üç büyük güç arasında farklı şekillerde de olsa hükümet desteği yaygındır. ABD'nin Çin ve Hindistan'dan bu noktada farkı, ülke içinden ziyade tedarik noktasında ülke dışındaki yapılara yönelik aktif rolüdür. Genel olarak bakıldığında, söz konusu üç ülkedeki enerji şirketleri özel ya da devlet olması fark etmeksizin hükümetlerinin talimatlarını ivedilikle uygulamak ve ulusal çıkarları dikkate almaktadırlar. Ne var ki söz konusu şirketlerin ticari çıkarlarını ön planda tutma ve hatta bazen kendi hükümetlerinin iradesine karşı hareket etme gibi eğilimleri olduğu da gözlemlenmektedir. Bu bağlamda uluslararası ve ulusal petrol şirketleri arasında ticari hedefler açısından önemli ölçüde benzerlikler yer alırken kamu çıkarlarına hizmet etme güdüleri açısından az da olsa farklılıklar bulunduğu söylenebilir. ABD'nin uluslararası petrol şirketlerine yaptırım noktasında elinde yeterli araç yok iken Pekin ve Yeni Delhi yönetimleri özellikle ulusal petrol şirketlerini kontrol, yönlendirme ve disipline noktasında açık ve örtülü birçok araca sahiptirler. Sonuç olarak, devletler her geçen gün artan enerji talepleri doğrultusunda enerji güvenliği stratejilerini yenilemekte ve alternatif enerji kaynaklarına yönelim sağlamaktadırlar. Ancak, petrol ve ikinci olarak doğal gaz neredeyse tüm devletlerin enerji güvenliğinin merkezi konumunda olup arzın kesintiye uğramaması adına ulusal ve uluslararası ölçekte devletlerin aktör olarak rol aldığı ve arz-talep ve ekonomik/ulusal çıkarlar adına müdahil olmayı sürdürdüğü görülmektedir. Her geçen gün artan enerji talebi ile Çin'in de enerji güvenliği stratejisinde devletin aktör olarak etkin rol aldığı ve ulusal ve uluslararası şirketler arasında iç ve dış enerji piyasasına yönelik denge koruyucu, yönlendirici ve disipline role sahip olduğunu söylemek mümkündür. Ayrıca, Pekin yönetiminin enerji güvenliğine yönelik gelecek projeksiyonunda da bu rolünü sürdürmesi beklenmektedir.

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FULL TEXTS BOOK

CELLULAR STRESS CAN LEAD TO ABNORMAL CELL MORPHOLOGY AND GENOMIC INSTABILITY ALTERING THE EXPRESSION OF *CCNE1, PARP1, IGF1R, EEF1A1, AURKB, EIF4E* AND *CDK4* GENES

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ABSTRACT
Cellular stress is a condition that causes morphological and physiological deteriorations in cells due to various factors. In this study, the effect of mechanical stress on the expression of 10 stress-related genes as well as its influence on cell morphology and genomic instability was investigated. The morphological examination of Du145 cells was examined using a light microscope at 10x magnification. Micronucleus (MN) assay was performed to make a comparison in terms of DNA damage. Genes reported to be related to stress in the literature were investigated and the expression analysis of ten genes was investigated through qRT-PCR. It was observed that the morphology of Du145 cells exposed to mechanical stress changed dramatically over time when compared to the control group. It was determined that the number of micronuclei increased by 80% in DU145 cells exposed to mechanical stress. Up-regulation of *CCNE1, PARP1, IGF1R, EEF1A1, AURKB* and *EIF4E* genes and down-regulation of *CDK4* gene expression were detected ($p<0.05$) stress group cell. However, no significant change was detected in *CDK6, CCND2* and *CCND1* gene expressions ($p>0.05$). Various cellular stressors can cause false positive or negative outcomes in *in vitro* studies. We expect that our research will be valuable in bringing attention to this critical issue that may occur during cell culture investigations.
Keywords: Cellular stress, micronucleus, stress-related gene expression

INTRODUCTION
Cellular stress is a condition that causes morphological and physiological deterioration in cells due to various factors and has been reported in the literature as one of the causes of various diseases, including cancer. (Mensch & Zierz, 2020). The amount of micronuclei is an important indicator in determining stress-induced cell damage. Micronucleus (MN) is one of the signs that represent DNA damage caused by numerous cellular factors during cell division (Bhatia & Kumar, 2013). Stress-induced chromosomal instability in the cell may cause a rise in MN formation (Torres-Bugarín et al., 2015). Furthermore, the literature reports that the expression of several cell cycle genes and expression of regulatory genes changes in stressed cells (Frenk & Houseley, 2018). In the experimental phase of our project, where Du145 prostate cancer cells were seeded in different culture plates, morphological differences were detected between the cells in 6-well plate (control group) and petri dish (stress group). Therefore,in our present study, we aimed to perform comparative MN analysis and stress-related gene expression analysis of cells in these two different culture conditions.

MATERIALS AND METHODS
Culture of DU145 and morfological examination
Du145 cells were cultured at 37 °C and 5% CO_2 in RPMI1640 cell culture medium containing 10% FBS and 1% antibiotics. The cell cultivation was performed on petri dishes and 6-well plates. Morphological examinations of the cells at 24h, 72h and 120h were carried out using a light microscope at 10x magnification.
Cytokinesis block micronucleus (CBMN) assay

FULL TEXTS BOOK

For DNA damage determination, CBMN assay was applied according to the protocol. 1000 cells/per culture were counted for cytotoxicity evaluation (Farabaugh et al., 2023).

Selection of the genes and determination of protein-protein interactions

In our work, the literature on cellular stress was reviewed using the keywords 'cell, stress, gene' in Pubmed, and 10 genes were chosen. The gene expression of the selected genes were investigated utilizing the qRT-PCR method and the STRING tool was used to show the interactions between the genes evaluated by expression analysis.

cDNA synthesis and expression analysis

cDNA was produced using Revertaid First Strand cDNA Synthesis Kit (Thermo Fisher Sci.) using a total of 1000ng RNA from each of the RNA samples isolated from the cells using Trizol reagent (Thermo Fisher Sci.). For relative quantification of stress related genes, qRT-PCR was performed on the LightCycler 480 device using SYBR Green Master mix (Roche).

Statistical analysis

Statistical analysis was performed with Student's t-test and $2^{-\Delta\Delta CT}$ methods. A p-value less than 0.05 was considered to be statistically significant. Figures were created using the GraphPad Prism 9.5.1 software.

RESULTS

It was observed that DU145 cells cultured by seeding into a 6-well plate (control group) had the expected morphology and there were no adhesion problems. It was determined that Du145 cells were more adaptive in adherence to the surface of the 6-well plate. On the other hand, both adhesion problems and deterioration in cell shape were detected in the cells seeded in the petri dish (stress group) over time. It has been determined that this deterioration gradually increases over time (Figure 1).

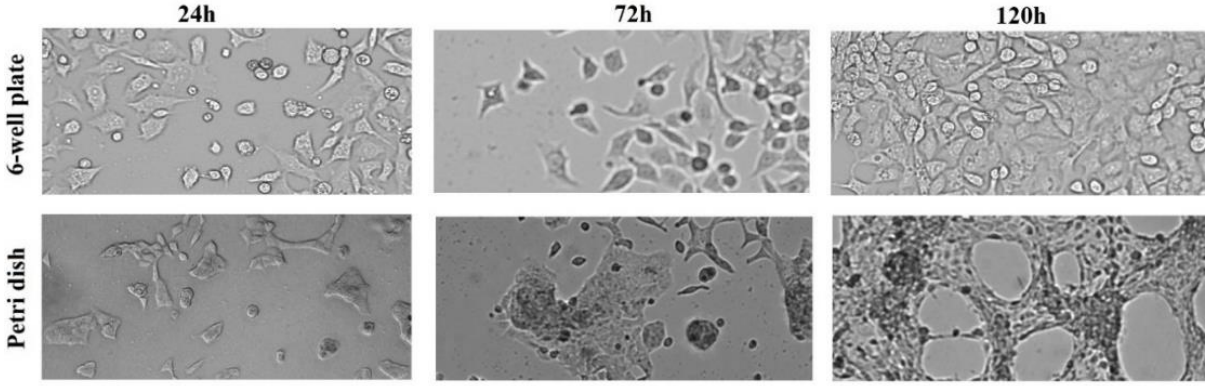
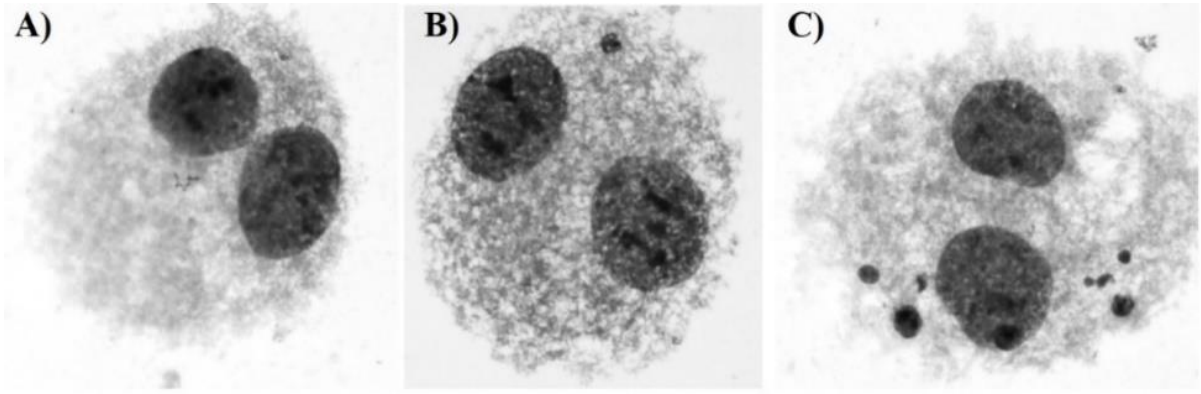


Figure 1. Morphological images of cells at 24h, 72h and 120h (x10 magnification)

A significant increase in the number of micronucleus was detected in the cells seeded in the petri dish compared to the cells in the 6-well (80%) ((Figure 2).



FULL TEXTS BOOK

Figure 2. Results of the cytokinesis block micronucleus (CBMN) assay A) binucleated cell B) binucleated cell with mono micronuclei C) binucleated cell with four micronuclei

Up-regulation of CCNE1 (p=0,028), PARP1 (p=0,002), IGF1R (p=0,033), EEF1A1 (p=0,021), AURKB (p=0,002) and EIF4E (p=0,0004) genes and down-regulation of CDK4 (p=0,012) gene expression were detected in cells in the petri dish (stress group) compared to cells in the 6-well plate (control group). However, no significant change was detected in CDK6, CCND2 and CCND1 gene expressions (p=0,078); (p=0,608); (p=0,131), respectively) (Figure 3).

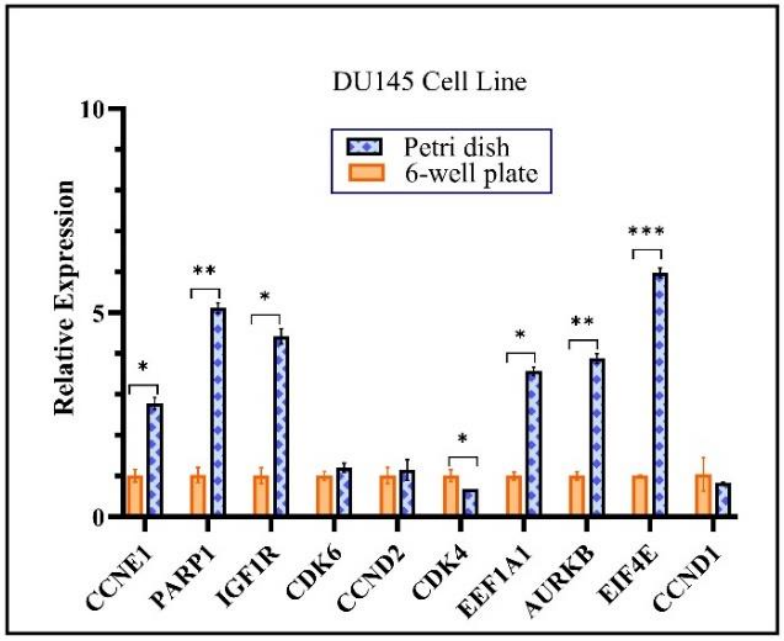


Figure 3. The expression level of the stress related genes (***p<0.05, ****p<0.01, and *****p<0.001).

These genes, whose expression levels were assessed in this study and which play significant roles in the cell cycle and checkpoints, were shown to interact closely with each other.

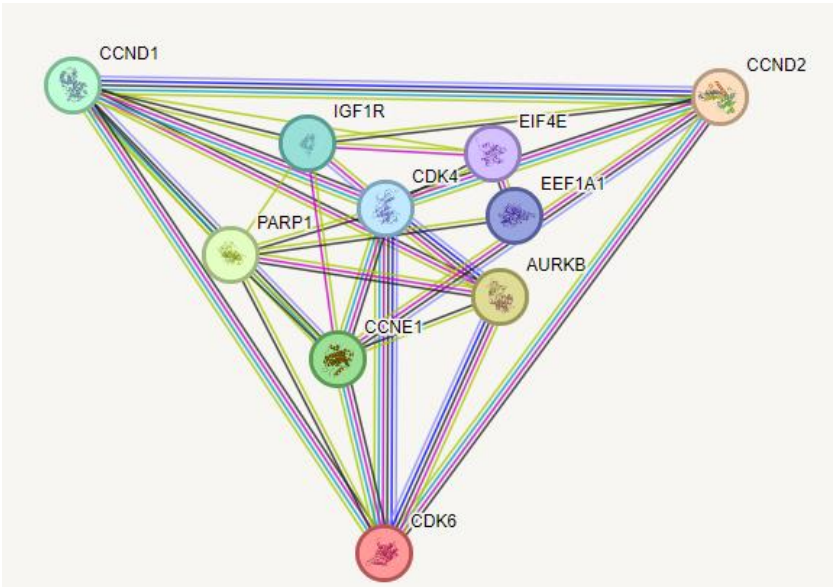


Figure 4. The interactions between genes assessed by expression analysis (created using the https://string-db.org/ tool).

Although it was determined that the change in the culture area of the cells caused stress on the cells, an improvement in the adhesion of the cells was observed when the cells seeded in the Petri dish were

FULL TEXTS BOOK

placed back into the 6-well plate before the 5th day. It was observed that after 5 days, the cells were unable to tolerate the stress and would not attach even when a 6-well plate was seeded.

DISCUSSION

Cellular stress is known to alter a wide range of cellular functions via a large number of genes. In line with the literature, it was found that the expression of six of selected genes increased in the stress group, while one was downregulated. MN formation as a result of chromosomal damage may impact cellular adhesion and proliferation. As a result, the expression patterns of numerous genes vary, particularly those involved in the cell cycle and checkpoints (Franzke et al., 2015). In the current investigation, the micronucleus rate in the stress group increased dramatically compared to the control group, showing that genomic instability was altered in the stress group. Heat, adhesion, chemical agents, and other stressors on the cell could affect the direction of the study's findings (Franzke et al., 2020). As a result, it is critical to closely track any cellular stress conditions that could occur during *in vitro* studies. In our work, stress-related morphological changes, MN formation, and expression differences in some important genes were detected in cells that had difficulty adhering. Through the data we have obtained, we aim to enable cell culture researchers to look at it from this perspective.

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FULL TEXTS BOOK

YUTMA BOZUKLUKLARININ TANILAMASINDA/DEĞERLENDİRİLMESİNDE YAPAY ZEKANIN KULLANILMASI
THE USE OF ARTIFICIAL INTELLIGENCE IN THE DIAGNOSIS/EVALUATION OF SWALLOWING DISORDERS

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ÖZET

Amaç: Yapay zeka, hızla gelişen ve gün geçtikçe önemi artan bir teknolojik ilerlemedir. Özellikle sağlık sektöründe, sağlık hizmetlerinin kalitesini artırma potansiyeli nedeniyle giderek daha fazla önem kazanmaktadır. Yapay zekanın yutma bozuklukları alanında yer edinmesi dil ve konuşma terapistler açısından önem arz etmektedir. Yapay zeka yutma bozukluklarının tanılanmasında, müdahale yöntemleri geliştirilmesinde ve sonuçların iyileştirmesinde dil ve konuşma terapistlerine yardımcı olabilir. Bu çalışmada, dil ve konuşma terapisi alanında gerçekleştirilen yutma bozuklukları ve yapay zekayla ilgili çalışmalar incelenerek dil ve konuşma terapistleri açısından mevcut durumun ortaya konulması ve gelecekteki çalışmalara ışık tutması planlanmıştır.

Yöntem: Çalışmada, doküman incelemesi tekniği kullanılarak nitel araştırma yöntemlerinden yararlanılmıştır. Veri toplama sürecinde PubMed veri tabanı esas alınarak "yutma bozuklukları ve yapay zeka'' anahtar kelimeleri ile yutma terapisinde yapay zeka alanı ile ilgili Türkçe ve İngilizce çalışmalar taranmıştır.

Bulgular: İncelemenin sonucunda 2012- 2024 yıllara arasında yapılan 28 çalışmaya ulaşılmıştır. 2020 sonrası yıllarda yapılan çalışmalara bakıldığında en fazla çalışmanın 2022 yılında yapıldığı (n=9) görülmektedir. 2021 yılında 3, 2023 yılında 6 çalışma yapılmıştır. 2024 yılının ilk yarısında 8 çalışmanın yayınlandığı görülmektedir. Çalışmaların yapıldığı ülkelere bakıldığında 8 çalışmayla Amerika Birleşik Devletleri birinci sırada yer almaktadır. 6 çalışmayla Japonya ikinci sırayı takip etmektedir. Çalışmaların 20'si tıp alanında yapılmış ve yayınlanmıştır, 4'ü mühendislik alanı kapsamında hazırlanmıştır ve 2'si diş hekimliği alanında 1'i nörobilim alanında ve 1'i fizyoterapi ve rehabilitasyon alanında hazırlanmıştır.

Sonuç: Elde edilen bilgiler ışığında, yutma bozukluklarının tanısı ve değerlendirilmesinde yapay zekanın kullanımıyla ilgili çalışmaların gün geçtikçe daha çok önem kazandığı görülmektedir. Dil ve konuşma terapisi alanında yutma ve yapay zekayı bizzat konu alan herhangi bir çalışmaya rastlanılmamıştır. Bu çalışma ile dil ve konuşma terapistlerinin primer alanlarından olan yutma bozukluklarında yapay zekayla ilgili daha fazla araştırmaya ihtiyaç olduğunu göstermektedir. Bu bağlamda dil ve konuşma terapistleri teşvik edilmeli ve bu konuya değinen çalışmalara destek verilmelidir.

Anahtar Kelimeler: Dil ve Konuşma Terapisi, Yapay Zeka, Dijitalleşme, Yutma, Teknoloji

ABSTRACT

Objective: Artificial intelligence is a rapidly developing and increasingly important technological advancement. Especially in the health sector, it is gaining more and more importance due to its potential to improve the quality of health services. The use of artificial intelligence in swallowing disorders is important for speech and language therapists. Artificial intelligence can help speech and language therapists diagnose swallowing disorders, develop intervention methods, and improve outcomes. In this

FULL TEXTS BOOK

study, it is planned to reveal the current situation in terms of speech-language therapists and shed light on future studies by examining the studies on swallowing disorders and artificial intelligence in the field of speech-language pathology.

Method: In the study, qualitative research methods were utilized by using document review techniques. In the data collection process, the PubMed database was used as the basis, and Turkish and English studies related to the field of artificial intelligence in swallowing therapy were searched with the keywords "swallowing disorders and artificial intelligence.".

Findings: As a result of the review, 28 studies conducted between 2012 and 2024 were found. Looking at the studies conducted in the years after 2020, it is seen that the most studies were conducted in 2022 (n = 9). Three studies were conducted in 2021 and six in 2023. It is evident that eight studies were published in the first half of 2024. Looking at the countries where the studies were conducted, the United States ranks first with 8 studies. With six studies, Japan follows in second place. 20 of the studies were conducted and published in the field of medicine; 4 were prepared within the scope of engineering; 2 in the field of dentistry; 1 in the field of neuroscience; and 1 in the field of physiotherapy and rehabilitation.

Conclusion: In the light of the information obtained, it is seen that studies on the use of artificial intelligence in the diagnosis and evaluation of swallowing disorders are gaining more importance day by day. In the field of speech-language therapy, there is no study on swallowing or artificial intelligence. This study shows that there is a need for more research on artificial intelligence in swallowing disorders, which is one of the primary fields of speech and language therapists. In this context, speech and language therapists should be encouraged, and studies addressing this issue should be supported.

Keywords: Speech and Language Therapy, Artificial Intelligence, Digitalization, Swallowing Disorders, Technolog

GİRİŞ

Teknoloji, yutma bozukluklarının teşhis ve değerlendirilmesinde önemli bir rol oynamaktadır. Teknolojik yenilikler, yutma bozukluklarının tedavisinde de etkili çözümler sunmaktadır. Yapay zeka, büyük veri analizi, makine öğrenimi ve derin öğrenme gibi teknolojiler aracılığıyla sağlık sektöründe devrim yaratma potansiyeline sahiptir. Yapay zeka, günümüz teknolojik ilerlemelerinin ön safhalarında yer almakta ve pek çok sektörde devrim yaratma potansiyeli taşımaktadır. Sağlık sektörü, bu teknolojik gelişmelerden büyük ölçüde faydalanan alanlardan biridir ve yapay zekanın sağlık hizmetlerinin kalitesini artırma potansiyeli nedeniyle önem kazanmaktadır (Topol, 2019).

Yapay zekanın dil ve konuşma terapisi alanındaki potansiyeli, son yıllarda büyük bir ilgi görmüştür. Dil ve konuşma terapisi alanında, özellikle yutma bozukluklarının tanılanması, müdahale yöntemleri geliştirilmesi ve müdahale sonuçlarının iyileştirilmesinde yapay zekanın kullanımı büyük bir öneme sahiptir. Yapay zekanın, yutma bozukluklarının tanısında büyük veri analizi kullanarak daha doğru ve hızlı sonuçlar sağlaması mümkün görünmektedir (Park C.,2024)

Yutma, ağızda başlayan ve mideye kadar devam eden kompleks bir süreçtir. Bu süreç, dört ana aşamadan oluşur: oral hazırlık, oral itme, faringeal, ve özofageal aşamalar (Kahrilas, 1992). Her aşama, belirli kas gruplarının ve sinirlerin koordineli çalışmasını gerektirir. Bu aşamalardan herhangi birinde meydana gelen bozukluklar, yutma bozukluklarına yol açabilir.Disfaji, yutma sürecinin herhangi bir aşamasında meydana gelen aksaklıklar sonucu ortaya çıkan yutma güçlüğü olarak tanımlanır (Ekberg, 1986). Yutma bozuklukları, nörolojik hastalıklar, kas hastalıkları, yapısal anomaliler ve yaşlanma gibi çeşitli nedenlerden kaynaklanabilir (Logemann, 1998). Disfaji, hem çocuklarda hem de yetişkinlerde görülebilir ve hayat kalitesini ciddi şekilde etkileyebilir.

Yutma bozukluklarının değerlendirildiği videofloroskopik yutma çalışmaları (VFSS) ve fiberoptik endoskopik yutma değerlendirmesi (FEES) gibi tekniklerde, yapay zekanın kullanımı sayesinde daha hassas ve doğru teşhisler konulabilir (Martin-Harris et al., 2008). VFSS, yutma bozukluklarının teşhisinde en yaygın kullanılan görüntüleme tekniklerinden biridir. Bu teknik, yutma sürecinin detaylı

FULL TEXTS BOOK

bir şekilde incelenmesine olanak tanır ve yutma bozukluklarının yerini ve nedenini belirlemekte kullanılır (Logemann, 1998). FEES, yutma bozukluklarının değerlendirilmesinde kullanılan bir diğer önemli görüntüleme tekniğidir. Bu teknik, yutma sürecinin doğrudan gözlemlenmesine olanak tanır ve yutma bozukluklarının nedenlerini belirlemekte kullanılır (Martin-Harris et al., 2008). Yapay zeka, VFSS ve FEES görüntülerinin analizinde kullanılarak, yutma bozukluklarının daha hızlı ve doğru teşhis edilmesine yardımcı olabilir (Bishop, 2018)

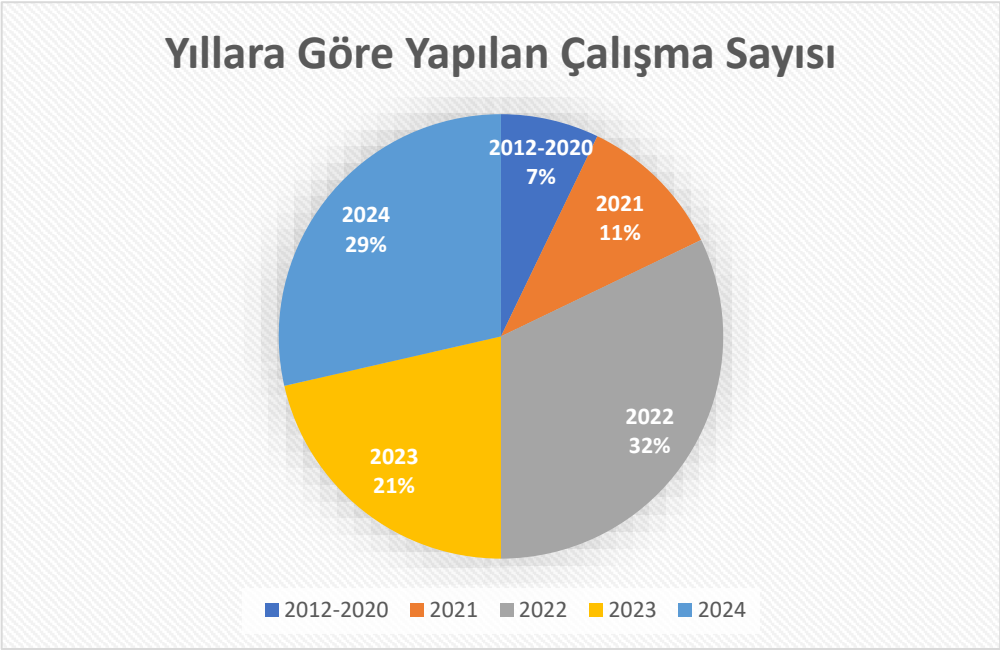
Yapay zekâ, yutma bozukluklarının tedavisinde kullanılan müdahale yöntemlerinin geliştirilmesinde de önemli bir potansiyele sahiptir. Yapay zeka, yutma bozukluklarının tedavisinde bireyselleştirilmiş tedavi planları oluşturulmasında önemli bir rol oynayabilir. Bu sayede, tedavi süreçlerinin etkinliği artırılabilir ve hastaların iyileşme süreci hızlandırılabilir (Topol, 2019). Yapay zeka, yutma bozukluklarının tedavisinde kullanılan müdahale yöntemlerinin etkinliğini artırmak ve tedavi süreçlerini optimize etmek için kullanılabilir. Yapay zeka, yutma kaslarının güçlendirilmesi ve koordinasyonunun artırılması için kullanılan; biyo-geribildirim ve nöromüsküler elektrik stimülasyonu (NMES) gibi müdahale yöntemlerinde ile kullanılabilmektedir (Crary et al., 2004; Chen et al., 2018).Ayrıca yapay zeka yutma müdahale süreçlerinin sürekli olarak izlenmesi ve analiz edilmesi için kullanılabilir (Esteva et al., 2017). Bu sayede, tedavi süreçlerinde meydana gelebilecek sorunlar hızlı bir şekilde tespit edilerek çözülebilir ve tedavi süreçlerinin etkinliği artırılabilir (Chen et al., 2018).

Yapay zekanın dil ve konuşma terapistleri için önemi; yutma bozukluklarının tanılanması, müdahale yöntemleri geliştirilmesi ve tedavi sonuçlarının iyileştirilmesi konularında kendini göstermektedir. Yutma bozukluklarının tanılanmasında yapay zekanın kullanımı, doğru teşhis ve etkili tedavi yöntemlerinin geliştirilmesi açısından büyük önem taşımaktadır. Yapay zekanın, yutma bozukluklarının tanılanmasında kullanılan çeşitli araç ve teknikleri geliştirerek, teşhis süreçlerini daha hızlı ve doğru hale getirebilir (Park C.,2024) dil ve konuşma terapistlerinin eğitiminde ve araştırmalarında da önemli bir rol oynayabilir. Dil ve konuşma terapistlerinin mesleki bilgi ve becerilerini geliştirmek için kullanılabilir (Topol, 2019). Ayrıca, yapay zeka, yutma bozuklukları ve diğer dil ve konuşma bozuklukları konusundaki araştırmalarda kullanılabilir ve bu alanlardaki bilgi birikiminin artırılmasına katkıda bulunabilir (Chen et al., 2018). Bu nedenle; bu çalışmada yapay zekanın yutma bozuklukları alanındaki uygulamalarını ve dil ve konuşma terapistleri üzerindeki etkilerini detaylı bir şekilde incelemek amaçlanmıştır.

ARAŞTIRMA VE BULGULAR

Çalışmada, doküman incelemesi tekniği kullanılarak nitel araştırma yöntemlerinden yararlanılmıştır. Veri toplama sürecinde PubMed veri tabanı esas alınarak “yutma bozuklukları ve yapay zeka’’ anahtar kelimeleri ile yutma terapisinde yapay zeka alanı ile ilgili Türkçe ve İngilizce çalışmalar taranmıştır. İncelemenin sonucunda 2012- 2024 yıllara arasında yapılan 28 çalışmaya ulaşılmıştır. 2020 sonrası yıllarda yapılan çalışmalara bakıldığında en fazla çalışmanın 2022 yılında yapıldığı (n=9) görülmektedir. 2021 yılında 3, 2023 yılında 6 çalışma yapılmıştır. 2024 yılının ilk yarısında 8 çalışmanın yayınlandığı görülmektedir (Şekil 1)

FULL TEXTS BOOK



Şekil 1: Yutma bozukluklarında yapay zeka ile yapılan çalışmaların yıllara göre dağılımı

Çalışma sayılarına bakıldığında 2024 yılının yalnızca ilk yarısında en çok çalışmanın yapıldığı 2022 yılına çok yakın bir sayıda çalışma çıkarıldığı görülmektedir. Bu sebeple ilerleyen yıllarda bu alanda daha fazla çalışma yapılacağı öngörülmektedir. (Tablo1)

Çalışmanın İsmi	Çalışmanın Alanı	Çalışmanın yayınlandığı Tarih	Çalışmanın Yapıldığı Ülke
The performance of artificial intelligence large language model-linked chatbots in surgical decision-making for gastroesophageal reflux disease	Tıp	2024	Amerika Birleşik Devletleri
Artificial Intelligence Tools for Improving Manometric Diagnosis of Esophageal Dysmotility	Tıp	2024	Amerika Birleşik Devletleri
Bedside Ultrasound to Identify and Predict Severity of Dysphagia Following Ischemic Stroke: Human Versus Artificial Intelligence	Tıp	2024	Amerika Birleşik Devletleri
Automated Laryngeal Invasion Detector of Boluses in Videofluoroscopic Swallowing Study Videos Using Action Recognition-Based Networks	Tıp	2024	Güney Kore
Machine learning analysis with population data for the associations of preterm birth with temporomandibular disorder and gastrointestinal diseases	Tıp	2024	Güney Kore
The Development of an Artificial Intelligence Video Analysis-Based Web Application to Diagnose Oropharyngeal Dysphagia: A Pilot Study	Mühendislik	2024	Güney Kore
Effectiveness of FEES with artificial intelligence-assisted computer-aided diagnosis	Tıp	2024	Japonya

FULL TEXTS BOOK

Effectiveness of FEES with artificial intelligence-assisted computer-aided diagnosis	Tıp	2024

Tablo1: 2024 Yılında Yutma ve Yapay Zekayla İlgili Yapılan Çalışmalar

Çalışmaların yapıldığı ülkelere bakıldığında 8 çalışmayla Amerika Birleşik Devletleri birinci sırada yer almaktadır. 6 çalışmayla Japonya ikinci sırayı takip etmektedir.
Çalışmaların 20'si tıp alanında yapılmış ve yayınlanmıştır, 4'ü mühendislik alanı kapsamında hazırlanmıştır ve 2'si diş hekimliği alanında 1'i nörobilim alanında ve 1'i fizyoterapi ve rehabilitasyon alanında hazırlanmıştır (Şekil 2).



Şekil 2: Bilim alanlarına göre yutma bozukluklarında yapay zeka ile ilgili yapılan çalışmaların dağılımı

SONUÇ

Bu çalışmada, yapay zekanın yutma bozuklukları alanında dil ve konuşma terapistlerine nasıl yardımcı olabileceği detaylı bir şekilde incelenmiştir. Yapay zekanın sağlık sektöründeki önemi giderek artmakta olup, yutma bozukluklarının tanı ve tedavisinde bu teknolojinin potansiyel avantajları belirgin hale gelmiştir. Yapılan literatür taraması, yapay zekanın yutma bozukluklarının tanı, değerlendirme ve tedavisinde giderek daha önemli bir rol oynadığını göstermektedir. Yapay zeka, dil ve konuşma terapistlerinin işlerini daha etkin bir şekilde yapmalarına yardımcı olma potansiyeline sahiptir. Ancak, dil ve konuşma terapisi alanında, özellikle yutma bozuklukları ve yapay zeka üzerine odaklanmış spesifik çalışmaların sınırlı olduğu görülmüştür. Bu durum, dil ve konuşma terapistlerinin bu konuda daha fazla araştırma yapmaları ve yapay zekanın yutma bozuklukları üzerindeki potansiyelini keşfetmeleri gerektiğini ortaya koymaktadır. Dil ve konuşma terapistlerinin yapay zeka teknolojilerini daha etkili bir şekilde kullanabilmeleri için bu alandaki eğitim ve bilgilendirme faaliyetlerinin artırılması gerekmektedir. Terapistlerin yapay zeka konusunda bilgi ve becerilerinin artırılması, yutma bozukluklarının teşhis ve tedavisinde daha etkili sonuçlar elde edilmesine katkıda bulunabilir. Yapay zekanın dil ve konuşma terapisi alanında daha yaygın bir şekilde kullanılması için teknolojik gelişmelerin desteklenmesi gerekmektedir. Özellikle yapay zeka tabanlı teşhis ve tedavi sistemlerinin geliştirilmesi ve bu sistemlerin dil ve konuşma terapistleri tarafından etkin bir şekilde kullanılabilmesi için gerekli altyapının oluşturulması önemlidir.

FULL TEXTS BOOK

Gelecekte, dil ve konuşma terapisi alanında yapay zekanın etkinliğini ve güvenilirliğini değerlendiren daha fazla araştırma yapılmalıdır. Bu araştırmalar, yapay zekanın klinik uygulamalardaki rolünü daha iyi anlamamıza ve bu teknolojilerin potansiyel faydalarını en üst düzeye çıkarmamıza yardımcı olabilir. Özellikle yutma bozukluklarının teşhis ve tedavisinde yapay zekanın kullanımı konusundaki araştırmaların artırılması önemlidir. Bu araştırmalar, Yapay zekanın dil ve konuşma terapistlerine nasıl daha iyi hizmet sunabileceğini ve tedavi süreçlerini nasıl iyileştirebileceğini ortaya koyabilir. Son olarak, yapay zekanın başarılı bir şekilde uygulanabilmesi için multidisipliner bir yaklaşımın benimsenmesi gerekmektedir. Tıp, mühendislik, bilişim ve dil ve konuşma terapisi gibi farklı disiplinlerin işbirliği, yapay zeka tabanlı sistemlerin daha kullanıcı dostu, güvenilir ve etkili olmasını sağlayabilir. Bu işbirliği, yapay zekanın klinik uygulamalardaki başarısını artırabilir ve dil ve konuşma terapistlerinin işlerini daha etkin bir şekilde yapmalarına yardımcı olabilir. Bu bağlamda, yapay zekanın dil ve konuşma terapisi alanında daha yaygın bir şekilde kullanılması ve bu alandaki araştırmaların artırılması, yutma bozukluklarının teşhis ve tedavisinde daha etkili sonuçlar elde edilmesine katkıda bulunacaktır. Yapay zekanın sunduğu imkanlar, dil ve konuşma terapistlerinin iş süreçlerini destekleyebilir ve hastaların yaşam kalitesini arttırabilir.

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FULL TEXTS BOOK

COMPARISON OF OLD AND NEW WASTE CONCRETE POWDER AS CEMENT REPLACEMENT MATERIAL

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ABSTRACT
Each year, millions of tons of concrete become waste due to the end of their service life, urban renewal projects, earthquakes, and laboratory tests. Recycling and utilization of waste concrete significantly contribute to environmental sustainability and economical development. This study aims to compare the effects of waste concrete powder obtained from old and new concrete on the workability and strength of mortars. For this purpose, waste concrete powder obtained from a building that collapsed in the February 6th Kahramanmaraş Earthquakes, approximately 30 years old (old waste concrete powder), and waste concrete powder obtained from 3-month-old laboratory waste (new waste concrete powder) were used as cement replacement materials in mixtures. Samples with 10%, 20%, and 30% by weight of new and old waste concrete powder were subjected to flow table tests, compressive strength tests, and flexural strength tests. The compressive and flexural strength tests were conducted on the 2nd, 7th, and 28th days. The effects of waste concrete powder on early and final strength were observed. The flow table test results show that both waste concrete powders exhibited similar behavior. The flow diameters of the samples containing equal amounts of waste concrete powder were the same. The flow diameter of the sample with the highest replacement rate of 30% waste concrete powder decreased by 15% compared to the reference sample. The flexural and compressive strength test results indicated that when OWCP was replaced at a rate of 10%, it reduced compressive strength by approximately 8% at all ages. When OWCP was replaced at a rate of 30%, it reduced compressive strength by approximately 30%. It was observed that mixtures containing 10% NWCP increased compressive strength by approximately 4% at all ages compared to the reference sample. When NWCP was used at a rate of 30%, it reduced compressive strength by approximately 25%.
Keywords: Waste Concrete Powder, Cement, Sustainability, Supplementary Cementitious Material, Waste Management

INTRODUCTION
Millions of tons of concrete become waste every year (Kim and Choi, 2012; Ye and Yuan, 2014; Yuan and Shen, 2011). This waste is sometimes generated due to buildings reaching the end of their service life and urban renewal projects (Zhang et al., 2022), and sometimes due to demolitions caused by major earthquakes (Wu et al., 2014). In addition, there are laboratory wastes obtained to inspect structures and whose tests have concluded. These wastes bring storage problems (Ajayi et al., 2016), environmental pollution (Wu et al., 2014), and consumption of natural resources (Yuan and Shen, 2011). Almost all of the waste concrete is used only as filling material (Kim, 2017). Although this method offers a solution for waste disposal, it is not a priority in terms of effective waste utilization. The replacement of cement with waste concrete powder (WCP) contributes to sustainability and economy as well as waste disposal by reducing the consumption of cement, which is responsible for about 7% of global carbon dioxide emissions (Du Plessis, 2002; Meyer, 2009; Turner & Collins, 2013). Therefore, studies have focused on the recycling and utilization of waste concrete (Yuan and Shen, 2011; Zhang et al., 2022; Xiao et al., 2016).

FULL TEXTS BOOK

There are obstacles to the widespread use of WCP, such as low activity and high water demand (Bu et al., 2023). Therefore, various activation processes are applied to WCP before it is included in concrete and mortar mixtures. Among the activation methods are alkaline activation (Liu et al., 2016), mechanical activation (Yang et al., 2022), and thermal activation at different temperatures (Sui et al., 2020; Zhang et al., 2022). Studies on the use of waste concrete powder as a cement replacement material have examined how it affects the rheology, setting time, strength, and microstructure of mortars (Kim and Choi, 2012; Kim, 2017; Zhang et al., 2022; Lin et al., 2023). Although the chemical composition of WCPs obtained from different sources varies, as a result of chemical analysis, it was concluded that WCP contains $Ca(OH)_2$ (Kim and Choi, 2012), unhydrated cement particles, tobermorite and SiO_2 (Yang et al., 2022). Therefore, it is considered that WCP could be a potential cement substitute material (Yang et al., 2022).

This study aimed to compare the effects of WCPs obtained from old and new waste concrete masses on mortars. The old waste concrete powder was obtained from the waste of buildings that collapsed as a result of earthquakes of magnitude 7.7 and 7.6 that occurred in Turkey on February 6, 2023. New waste concrete powder was obtained from laboratories for building inspection and R&D purposes. With this study, it is thought that waste concrete will be disposed of and storage problems will be solved and sustainable and economical mortar mixtures will be obtained by reducing the use of cement.

2. MATERIAL AND METHOD

2.1. Materials

In this study, CEM I 42.5 R type Portland cement produced by Konya Cement was used. The mixing water component in the study is of drinking water quality. Tap water from the Selçuklu district of Konya province was used. Standard sand was preferred as the aggregate. Two different raw material sources were used to prepare WCP: one from a concrete mass estimated to be approximately 30 years old that collapsed in the earthquake, and the other from a new concrete mass produced in the laboratory 3 months ago.

Although thermal activation has high activation potential, the simple and low-cost mechanical activation method was adopted in this study due to its high energy consumption. The optimal grinding time for WCP, in terms of activation and energy consumption, was determined to be 60 minutes (Zhang et al., 2022). WCPs ground in a ball mill for 60 minutes were sieved through a 0.75 µm sieve, and approximately 50% passed through the sieve. Mortar mixtures containing 10%, 20%, and 30% of new and old WCP by cement weight were prepared.

Table 1. Mixture proportions

Mixture	Cement (kg/m^3)	Sand (kg/m^3)	Water (kg/m^3)	NWCP (kg/m^3)	OWCP (kg/m^3)
Reference	586	1758	293	0	0
NWCP1	527.4	1758	293	58.6	0
NWCP2	468.8	1758	293	117.2	0
NWCP3	410.2	1758	293	175.8	0
OWCP1	527.4	1758	293	0	58.6
OWCP2	468.8	1758	293	0	117.2
OWCP3	410.2	1758	293	0	175.8

FULL TEXTS BOOK

First, the cement and waste concrete powder, which comprise the binder system, were weighed and then mixed for 1 minute using a cement mixer. After dry mixing the binders for 1 minute, the mixing water was added and mixed for 60 seconds. Subsequently, sand was gradually added to the mixture over 30 seconds. Then, the mixer was stopped, and the sides and bottom of the container were scraped with a spatula. The mixture was then mixed for another 60 seconds at high speed.

2.3. Flow Table Test

The mortar mixtures were placed into the cone shown in Figure 1, made of brass, with a base diameter of 100 mm, an upper diameter of 70 mm and a height of 60 mm, and then the cone was pulled upwards. The table was then dropped 15 times using the arm under the table. The spreading diameter of the material spread on the table in two perpendicular directions was measured and the arithmetic average was taken. The spreading diameters of the mixtures were determined.

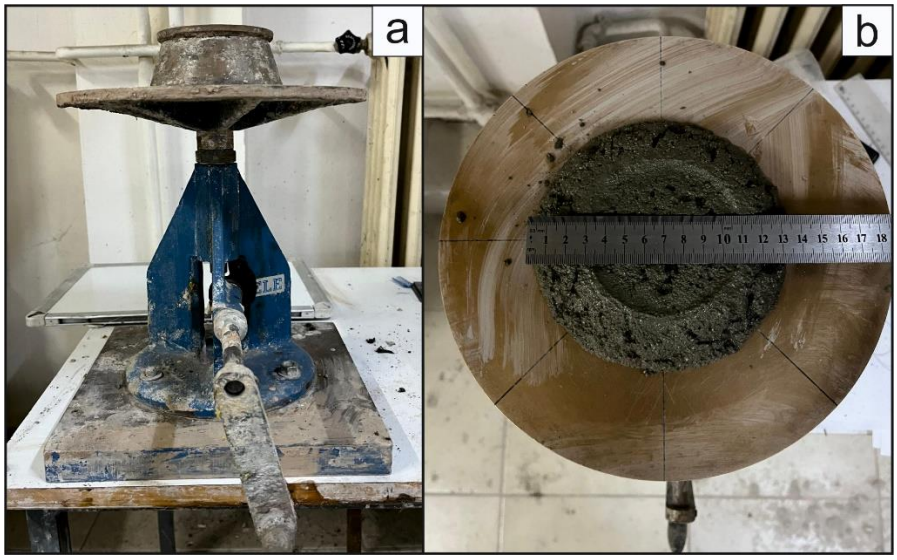
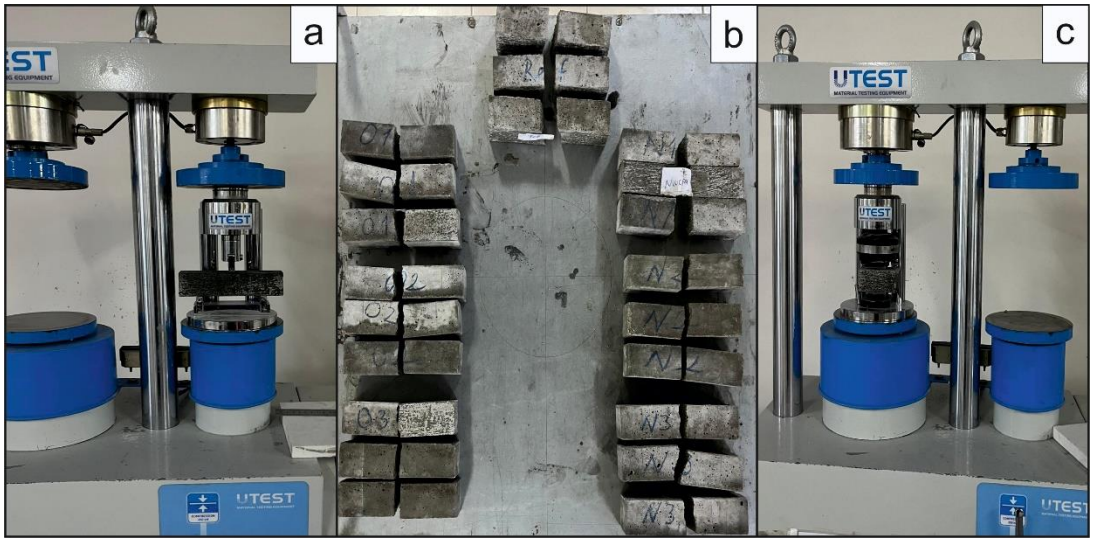


Figure 1. Flow table test (a) before the mould is removed (b) the spread of the material after dropping the table for 15 times.

2.4. Flexural and Compressive Strength Test

To determine the mechanical properties of hardened mortars, the mortar mixtures were placed in molds of 40x40x160 mm and kept at room temperature for 24 hours. The samples were first subjected to 3-point bending and then compressive strength tests on days 3, 7 and 28 (Figure 2).



FULL TEXTS BOOK

Figure 2. Flexural and compressive strength test a) flexural strength test b) samples after flexural strength test c) compressive strength test

3. Results and Discussion

3.1. Flow table test results

The flow diameters of the mortars are presented in Figure 3.

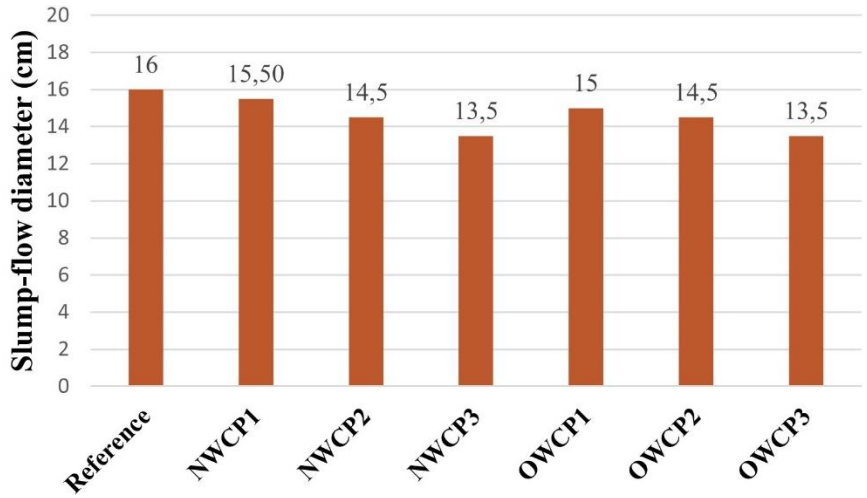


Figure 3. Flow diameters of mortars

Both waste concrete powders caused a decrease in the spreading diameter of the mortars. The spreading diameter decreased as the amount of waste concrete powder used increased. Mortars containing the maximum amount of waste concrete powder (30%) showed a 15% reduction in spread diameter compared to the reference sample. These results are consistent with the literature. The decrease in the spreading diameter was attributed by previous studies to the surface shape of WCP, high water absorption capacity, high specific surface area, and the filling effect of WCP, which increases the friction between cement particles (Ji et al., 2022; Bu et al., 2023; Lin et al., 2023).

3.2. Flexural and Compressive Strength

The 3, 7 and 28-day flexural strength results of the mortar samples are presented in Figure 4.

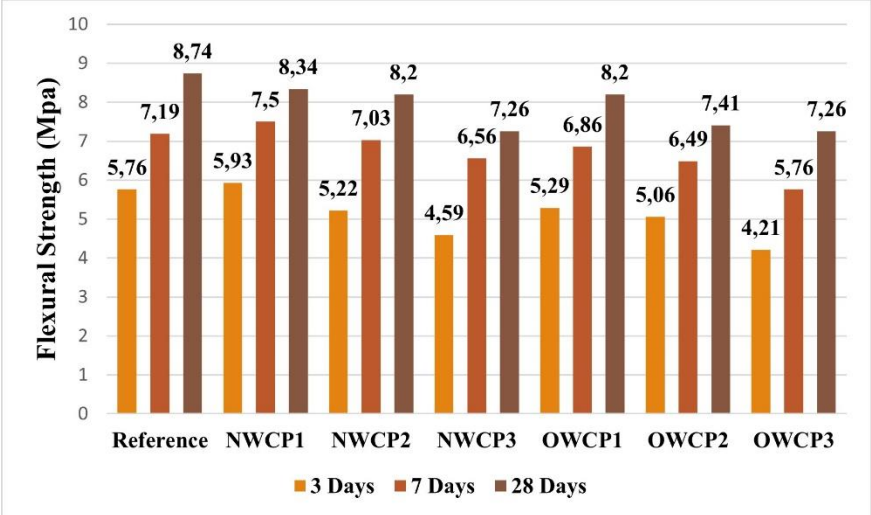


Figure 4. Flexural strength of mortars

Both types of WCP caused a decrease in flexural strength. As the amount of WCP increased, the decrease in strength also increased. No dramatic reduction in strength was observed in mortar mixtures containing 10% WCP.

The 3, 7 and 28-day compressive strength results of the mortar samples are presented in Figure 5.

FULL TEXTS BOOK

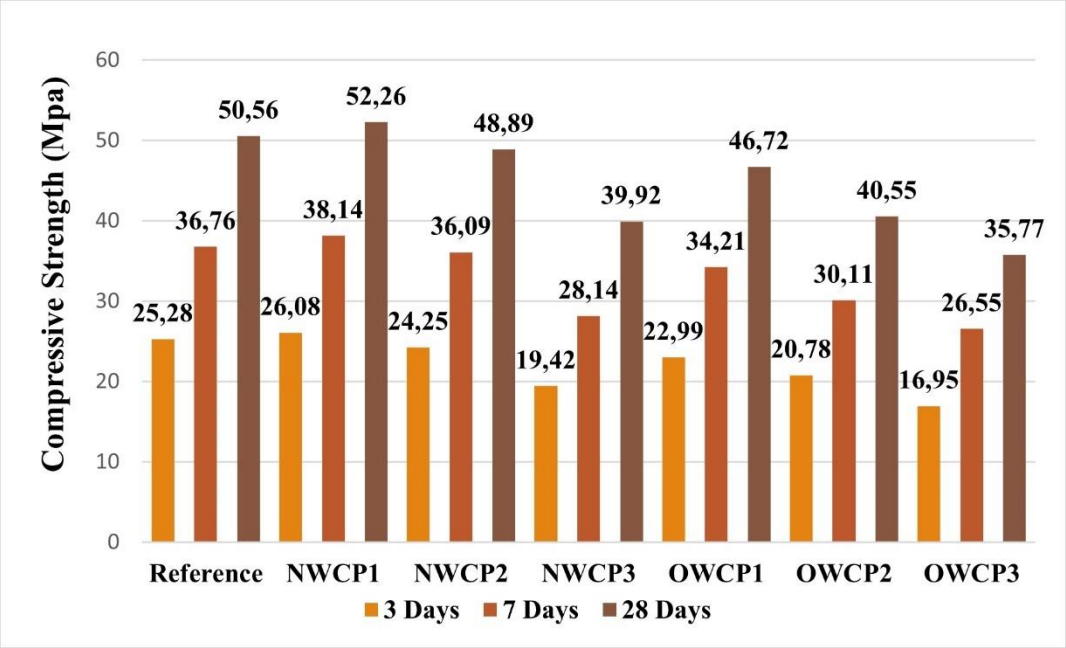


Figure 5. Compressive strength of mortars

The use of new waste concrete powder at the minimum dose (10%) increased the compressive strength of the mortars by approximately 3.5% at all ages. When new waste concrete powder was used as a 20% replacement, it achieved approximately 97% of the compressive strength of the reference sample at all ages, thus meeting the requirements. At higher replacement dosages, however, a decrease in compressive strength was observed.

WCP contains $Ca(OH)_2$, unhydrated cement particles, tobermorite, and other components. Therefore, waste concrete powder is thought to have the ability to show pozzolanic activity and continue hydration (Yang et al., 2022). In addition, waste concrete powder has a filling effect, filling the pores (Duan et al., 2020; Zhang et al., 2022) and creating a more compact structure. It strengthens the aggregate-cement interface by adhering to the surface of aggregates (Lin et al., 2023).

When old waste concrete powder was used at 10%, it provided approximately 92% of the compressive strength of the reference sample. However, when used in higher doses, it caused a dramatic decrease in compressive strength. The reason for this may be that old waste concrete powder contains fewer unhydrated particles compared to new waste concrete powder, and concrete produced in accordance with old regulations may contain less cement due to the mixing ratios.

The reason for the decrease in compressive strength of both waste concrete powders, when used at high replacement rates, could be their content of non-reactive particles, the reduction in clinker content, and the high water absorption of WCPs, which may retain water necessary for cement hydration (Bu et al., 2023).

4. CONCLUSION

Recycling waste concrete, which is the focus of many studies, and using it as a cement replacement material has great potential application value. In this study, unlike the literature, old and new waste concrete powder were compared. The results of the study are as follows:

1) The effect of old and new waste concrete powders on the workability of mortars is the same. Both resulted in a decrease in the spread diameter of the mortars, as expected.

2) Both waste concrete powders caused a decrease in flexural strength.

3) When new waste concrete powder was used at a 10% replacement rate, it increased compressive strength at all ages compared to the reference sample. At a 20% replacement rate, it reached approximately 97% of the compressive strength of the reference sample.

FULL TEXTS BOOK

4) When old waste concrete powder was used at a 10% replacement rate, it achieved approximately 92% of the compressive strength of the reference sample.
5) New waste concrete powder provided better results than old waste concrete powder due to its content of unhydrated particles.
6) There is no obstacle to the substitution of up to 20% of new waste concrete powder. The utilization of laboratory waste as a cement substitute is an economic and environmentally friendly approach with high potential.

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FULL TEXTS BOOK

BİPOLAR BOZUKLUK TANISI BULUNAN VE BULUNMAYAN KİŞİLERDE DUYGUSAL YEME, ALGILANAN STRES VE ALGILANAN SOSYAL DESTEK ARASINDAKİ İLİŞKİNİN İNCELENMESİ

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ÖZET
Bipolar bozukluğa sahip popülasyonda obezite, depresyon, dürtüsellik gibi duygusal yeme ile ilişkili olduğu tespit edilen birçok özellikle sıkça karşılaşılmaktadır. Literatürde bipolar bozukluğa sahip kişilerin stresli yaşam olaylarına daha duyarlı olduğu yönünde bazı bulgular bulunmakta, kimi araştırmalar algılanan stres ile duygusal yeme arasında pozitif yönlü bir ilişki olduğunu ortaya koymaktadır. Bu araştırmanın amacı bipolar bozukluğa sahip olan ve olmayan kişilerde duygusal yeme, algılanan stres ve algılanan sosyal destek arasındaki ilişkinin incelenmesidir. Araştırmanın örneklemleri 105 bipolar bozukluğa sahip katılımcı (53 erkek, 52 kadın) ile bipolar bozukluğa sahip olmayan, daha önce psikiyatrik tedavi almamış 105 katılımcıdan (51 erkek, 54 kadın) oluşmaktadır. Verileri toplamak için Algılanan Stres Ölçeği, Çok Boyutlu Algılanan Sosyal Destek Ölçeği, Hollanda Yeme Davranışı Anketi'nin Duygusal Yeme Alt Ölçeği ve bilgi formları kullanılmaktadır. Veriler "Bağımsız örneklemler t testi", "Pearson Korelasyonu", "Mann-Whitney U Testi", "Spearman Korelasyonu" kullanılarak analiz edilmektedir. Bipolar bozukluğa sahip kişiler ile sahip olmayan kişiler arasında duygusal yeme açısından anlamlı bir fark yoktur. Bulgular bipolar bozukluğa sahip erkek katılımcıların bipolar bozukluğa sahip olmayan erkek katılımcılardan anlamlı bir şekilde daha çok duygusal yemeye başvurduğunu göstermektedir. Bipolar bozukluğa sahip katılımcılar daha az sosyal desteğe sahiptir ve 20-40 yaş grubuna ait katılımcılar için algılanan sosyal destek ile duygusal yeme arasında anlamlı ve negatif yönlü bir korelasyon bulunmaktadır. Bipolar bozukluğa sahip olmayan katılımcılar için duygusal yeme düzeyi cinsiyete göre farklılaşmaktadır, kadınlar duygusal yeme örüntüsüne daha çok sahiptir. Bipolar bozukluğa sahip erkeklerin duygusal yeme düzeyi bipolar bozukluğa sahip olmayan erkeklerinkinden daha yüksektir. Bu farkın kaynağı bipolar bozukluğa sıkça eşlik eden kimi özellikler ve/veya hastalıkla ilişkili sürecin kişiler üzerindeki etkisi ile ilgili olabilir.
Anahtar kelimeler: Bipolar bozukluk, duygusal yeme, algılanan stres, algılanan sosyal destek

GİRİŞ
Bipolar bozukluk ciddi ve kronik bir psikiyatrik hastalıktır. Yaşam boyu yaygınlık oranı bipolar I bozukluğu için %0,6, bipolar II bozukluğu için %0,4'tür (Merikangas ve ark., 2011). Bipolar I bozukluğuna sahip kişilerin büyük çoğunluğu tekrarlayan mani ve depresyon epizodları yaşamaktadır (World Health Organization, 2006:5).

Bipolar bozukluğa sahip kişilerde tıkınırcasına yeme (McElroy ve ark., 2016; Craba ve ark., 2021), dürtüsellik (Santana ve ark., 2022; Muhtadie ve ark., 2014; Swann ve ark., 2001), depresiflik (American Psychiatric Association, 2013:130-137), obezite (McElroy ve Keck Jr, 2012) stresli yaşam olaylarına duyarlılık (Lex ve ark., 2017), kaçıngan başa çıkma stili (Goossens ve ark., 2008) gibi özellik ve belirtilere sıkça rastlanmaktadır.

Duygusal yeme; fizyolojik açlık ipuçlarından ziyade duygusal tetikleyicilere tepki olarak yiyecek tüketme davranışıdır (Ford ve ark., 2017; van Strien ve ark., 2007; Sharma ve Padwal, 2010). Ayrıca olumsuz duyguları yönetmek için kullanılan bir başa çıkma mekanizması olarak da görülebilmektedir (Ozier ve ark., 2008; Bennett ve ark., 2013). Duygusal yeme sırasında kişiler kendilerini üzüntü, kaygı ve stres gibi olumsuz duygulardan uzaklaştırmak veya bu duygulardan kaynaklanan rahatsızlıklarını geçici olarak yatıştırmak için yiyecekleri kullanmaktadır (Macht ve Simons, 2011).

FULL TEXTS BOOK

Tıkınırcasına yeme (Ricca ve ark., 2009; Eldredge ve Agras, 1996), dürtüsellik (Yang ve ark., 2023), depresiflik (Ouwens ve ark., 2009; Lazarevich ve ark., 2016; Cordero, 2021; van Strien ve ark., 2016), algılanan stres (Carpio-Arias ve ark., 2022; Van Strien ve ark., 2012), obezite (Dakanalis ve ark., 2023) ve kaçıngan başa çıkma stilinin (Deroost ve Cserjési, 2018) duygusal yeme ile ilişkili olduğu saptanmaktadır.

Sosyal destek, sosyal ilişkilerin işlevselliği ve kalitesi ile ilişkilidir (Schwarzer ve ark., 2004). Sosyal desteğin bipolar bozuklukta hastalık seyri üzerinde önemli etkileri bulunduğu ortaya konmaktadır (Johnson ve ark., 1999; Davis ve Kallivayalil, 2023; Kazan Kızılkurt ve ark., 2019; Cohen ve ark., 2004). Buna karşın araştırmalar bipolar bozukluk tanısına sahip kişilerin sağlıklı kişilere kıyasla aldıkları sosyal desteği daha fazla yetersiz olarak algıladıklarını göstermektedir (Studart-Bottó ve ark., 2023). Olumsuz yeme tutum ve davranışların ortaya çıkmasının sosyal destekle negatif ilişkisi bulunduğu (Pace ve ark., 2018) ve strese bağlı yemenin algılanan sosyal destekle negatif yönlü bir ilişkisinin olabileceği (Darling ve ark., 2017) yönünde bulgular mevcuttur.

Bipolar bozukluk tanısı bulunanların stresli yaşam olaylarına sağlıklı kişilerden duyarlı olduğu (Lex ve ark., 2017), şizofreni ve şizoaffektif bozukluk tanısı bulunanlara kıyasla daha çok stresli yaşam olayı yaşadıklarını bildirdikleri (Parmigiani ve ark., 2021) ve stresin epizodların yinelenmesi ile ilişkili olduğu (Cohen ve ark., 2004) gibi bulgular literatürde yer almaktadır.

Bulgular stresin duygusal yemeyle ilişkili olduğu yönündedir (Nguyen Rodrigueza ve ark., 2008; Carpio-Arias ve ark., 2022). Duygusal yeme örüntüsü sergileyenler stres altında aşırı yeme davranışı göstermektedir (Wallis ve Hetherington, 2004). Örneğin Kuijer ve Boyce (2012) Richter Ölçeği'ne göre 7,1 şiddetinde olan bir depremin öncesinde ve sonrasında bir grup orta yaşlı ve yaşlı kadını duygusal yeme konusunda değerlendirmektedir. Depremin öncesinde yüksek duygusal yeme puanı alan kadınlar, depremin ardından aşırı yeme davranışlarının arttığını bildirmektedir. Düşük duygusal yeme puanı alanlar ise böyle bir artış bildirmemektedir.

Boulanger ve arkadaşları (2018) bipolar bozukluk popülasyonunda tıkınırcasına yeme davranışının ilişkili olduğu faktörlerden birinin duygusal yeme olduğunu ortaya koymaktadır. Martin ve arkadaşları (2016) ise ergenler ve genç yetişkinlerle yaptıkları araştırmada bipolar bozukluğa sahip kişilerin kontrol grubuna göre anlamlı miktarda daha fazla duygusal yemeye başvurduğunu raporlamaktadır.

YÖNTEM

Örneklem

Bipolar bozukluğa sahip örneklemin seçilmesinde kriter örnekleme yöntemi kullanılmaktadır. Toplum Ruh Sağlığı Merkezlerinden hizmet almakta olan 105 bipolar bozukluğa sahip katılımcı (53 erkek, 52 kadın) araştırmaya dahil edilmektedir.

Bipolar bozukluk tanısına sahip olmayan örneklemin seçilmesinde ise uygun örnekleme kullanılmaktadır. Bipolar bozukluğa sahip olmayan ve daha önce psikiyatrik tedavi almamış 105 katılımcıya (51 erkek, 54 kadın) internet aracılığıyla ulaşılmakta ve veriler internet üzerinden toplanmaktadır.

İşlem

Bipolar bozukluğa sahip kişilerden veriler, Sultangazi ve Fatih Toplum Ruh Sağlığı Merkezlerinde bilgilendirilmiş onam formunun alınmasının ardından Duygudurum Bozuklukları Ölçeği, Algılanan Stres Ölçeği (ASÖ), Çok Boyutlu Algılanan Sosyal Destek Ölçeği (ÇBASDÖ), Hollanda Yeme Davranışı Anketi'nin Duygusal Yeme Alt Ölçeği (DYAÖ) ve kişilerden birtakım bilgilerin alınmasını sağlayan bir bilgi formu aracılığıyla toplanmaktadır. Veri toplama aşaması 02.10.23 ile 15.03.24 tarihleri arasında sürmektedir.

Bipolar bozukluğa sahip olmayan kişilere ilişkin veriler ölçeklerin (Duygudurum Bozuklukları Ölçeği, ASÖ, ÇBASDÖ, DYAÖ) ve kişilerden birtakım bilgilerin alınmasını sağlayan bir bilgi formunun

FULL TEXTS BOOK

Google Forms'a aktarılmasıyla oluşturulmuş bir bataryanın yardımıyla internet üzerinden toplanmaktadır. Veri toplama 11.12.23 ile 13.03.24 tarihleri arasında sürmektedir.

Veri Toplama Araçları

Duygudurum Bozuklukları Ölçeği (DBÖ)

Bipolar bozukluk taraması için kullanılan Duygudurum Bozuklukları Ölçeği Hirschfeld ve arkadaşları (2000) tarafından geliştirilmektedir. Konuk ve arkadaşları (2007) tarafından Türkçe uyarlamasının bipolar bozukluk taramasındaki geçerlik çalışması yapılmaktadır. Konuk ve arkadaşları (2007) söz konusu tarama aracının kişide ilgili belirtilerin bulunup bulunmadığının sorgulandığı 1. sorusunun alt maddeleri için optimum kesim noktasının 7 olduğunu tespit etmekte, bu değer için duyarlılığın %64 özgüllüğün ise %77 olduğunu bulgulamaktadır. Araştırmada belirtilerin kesme noktası 7 kabul edilmektedir. Tarama aracı 3 sorudan 38 oluşmakta, 1. sorunun 13 alt maddesi bulunmaktadır. İlk sorudan 7 ve üzeri alt maddeye "Evet" yanıtını vermesi halinde eğer 2. soruya "Evet" ve 3. Soruya "Orta derecede"/"Ciddi" yanıtlarını vermişse bu durum kişinin bipolar bozukluğa sahip olduğuna işaret etmektedir.

Bilgi formu

Araştırmada katılımcılar hakkında bilgi toplamak için bilgi formları kullanılmaktadır. Bipolar bozukluk tanısı olan ve olmayan kişilere uygulanan formlarda bazı sorular farklılık göstermektedir. Bilgi formlarındaki ortak maddeleri yaş, cinsiyet, boy, kilo, sigara bırakma durumu söz konusuysa ne kadar süredir sigara kullanmadığı oluşturmaktadır. Bipolar bozukluk tanısı bulunan katılımcılara ortak maddelere ek hastalıklarına (bipolar bozukluk) ilişkin sorular yöneltilmektedir. Bipolar bozukluğa sahip olmayan katılımcılara, ortak maddelere ek olarak, eğitim durumu, hiç psikiyatrik ilaç tedavisi görüp görmedikleri, hiç psikolojik destek alıp almadıkları konularında soruları yanıtlamaları istenmektedir. Bipolar bozukluğa sahip katılımcılara yönelik formda 9 madde, bipolar bozukluğa sahip olmayan katılımcılara yönelik formda 8 madde bulunmaktadır.

Algılanan Stres Ölçeği (ASÖ)

ASÖ Cohen ve arkadaşları (1983) tarafından geliştirilmekte; ölçeğin Türkçe geçerlik ve güvenirlik çalışmasını Eskin ve arkadaşları (2013) yapmaktadır. Eskin ve arkadaşları (2013) yapı geçerliliğini test etmek için yaptıkları faktör analizi sonucunda orijinal ölçeğe benzer bir şekilde ölçeğin 10 maddelik ve 14 maddelik formlarında 2 faktör bulunduğu ortaya konmaktadır. Yetersiz öz-yeterlik alt ölçeği kişinin kendine yetme, kendi başının çaresine bakabilme algısının yetersiz olup olmadığını ölçme yönünde maddeler içermektedir. Stres/rahatsızlık algısı alt ölçeği yaşanan olaylar konusunda kontrol kaybı karşısında kişinin yaşadığı olumsuz hislere odaklanan maddeler 39 içermektedir. Eskin ve arkadaşları (2013) tarafından yapılmış çalışmada ölçeğin 10 maddelik formunun Cronbach's Alpha katsayısı .82 bulunmaktadır. 10 maddelik formunun alt ölçeklerinin Cronbach Alpha katsayıları yetersiz öz-yeterlik alt ölçeği için .69, stres/rahatsızlık algısı için .80'dir. Ölçekten ve alt ölçeklerden alınan daha yüksek puanlar kişinin daha yüksek algılanan strese sahip olduğuna işaret etmektedir.
Ölçeğin bu araştırmadaki Cronbach Alpha katsayısı bipolar bozukluk örneklemi için ,826, bipolar bozukluğa sahip olmayan örneklem için ,743 bulunmaktadır.

Çok Boyutlu Algılanan Sosyal Destek Ölçeği (ÇBASDÖ)

ÇBASDÖ Zimet ve arkadaşları (1988) tarafından geliştirilmekte; Türkçe geçerlik ve güvenirlik çalışmasını Eker ve arkadaşları (2001) yapmaktadır. ÇBASDÖ'nün "Aile", "Arkadaş" ve "Özel Bir İnsan" olmak üzere 3 alt ölçeği bulunmaktadır. Eker ve arkadaşlarının (2001) çalışmasında ölçeğin Cronbach's alpha katsayısı psikiyatrik örneklem için .86 normal örneklem için .83 olarak bulunmaktadır. Alt ölçeklerin Cronbach alpha katsayıları psikiyatrik örneklem için aile, arkadaş, özel

FULL TEXTS BOOK

bir insan alt ölçekleri bakımından sırasıyla .83, .84 ve .88; normal örneklem için aile, arkadaş, özel bir insan alt ölçekleri bakımından sırasıyla .80, .85 ve .92'dir (Eker ve arkadaşları, 2001). Ölçekten alınan daha yüksek puanlar daha yüksek düzeyde algılanan sosyal desteğe işaret etmektedir.
Bu araştırmada ölçeğin Cronbach Alpha katsayısı bipolar bozukluğa sahip örneklem için ,832, bipolar bozukluğa sahip olmayan örneklem için ,896 olarak bulunmuştur.

Hollanda Yeme Davranışı Anketi Duygusal Yeme Alt Ölçeği (DYAÖ)
Hollanda Yeme Davranışı Anketi van Strien ve arkadaşları (1986) tarafından geliştirilmekte; Bozan (2009) ölçeğin Türkçe geçerlik ve güvenirlik çalışmasını yapmaktadır. Araştırmamızda bu ölçeğin alt boyutu olan Duygusal Yeme Alt Ölçeği kullanılmaktadır. Bozan'ın (2009) çalışmasında söz konusu alt ölçeğin Cronbach's alpha katsayısı .97 olarak bulunmaktadır. Ölçekteki daha yüksek puanlar daha şiddetli bir duygusal yemeye işaret etmektedir.
Ölçeğin bu araştırmadaki Cronbach Alpha katsayısı bipolar bozukluğa sahip örneklem için ,909, bipolar bozukluğa sahip olmayan örneklem için ,968 olarak bulunmuştur.

Veri Analizi
Verilerin analizinde SPSS 29.0.2.0 paket programından yararlanılmakta ve "Bağımsız örneklemler t testi", "Pearson Korelasyonu", "Mann-Whitney U Testi", "Spearman Korelasyonu" kullanılmaktadır.

BULGULAR
Araştırmaya katılmaya gönüllü olmuş 105 bipolar bozukluğa sahip katılımcının 52'si (%49,5) kadın, 53'ü (%50,5) erkek; 105 bipolar bozukluğa sahip olmayan katılımcının 54'ü (%51,4) kadın, 51'i (%48,6) erkektir. Bipolar bozukluğa sahip katılımcıların yaş ortalaması 39,91 (std. sapma 10,62) iken bipolar bozukluğa sahip olmayan katılımcıların yaş ortalaması 43,62'dir (std. sapma 12,64). Vücut kitle indeksine (VKİ) ilişkin bipolar bozukluğa sahip katılımcıların sıra ortalamaları (129,40) bipolar bozukluğa sahip olmayan katılımcılarınkinden (81,60) anlamlı bir şekilde daha yüksektir (U= 3002,50, z=-5,701, p<,001).
Algılanan sosyal destek açısından, bipolar bozukluğa sahip olan katılımcıların ortalaması (52,809) ile bipolar bozukluğa sahip olmayan katılımcıların ortalaması (62,105) arasında anlamlı bir fark vardır (t(208)=4,349, p<,001). Hesaplanan etki değeri (d=,60) farkın orta büyüklükte olduğunu göstermektedir. Bipolar bozukluğa sahip kadın katılımcıların ortalaması (53,269) ile bipolar bozukluğa sahip olmayan kadın katılımcıların ortalaması (65,074) arasında anlamlı bir fark vardır (t(104)=4,168, p<,001). Hesaplanan etki değeri (d=,81) farkın büyük olduğunu göstermektedir. Bipolar bozukluğa sahip olmayan kadın katılımcıların arkadaş alt boyutuna ilişkin sıra ortalamaları (66,41) bipolar bozukluğa sahip kadın katılımcıların sıra ortalamalarından (40,10) anlamlı bir şekilde farklılaşmaktadır (U= 707,00, z= -4,431, p<,001).
Bipolar bozukluğa sahip erkek katılımcıların ortalaması (52,358) ile bipolar bozukluğa sahip olmayan erkek katılımcıların ortalaması (58,960) arasında anlamlı bir fark vardır (t(102)=2,078, p=,040). Hesaplanan etki değeri (d=,40) farkın orta büyüklükte olduğunu göstermektedir. Bipolar bozukluğa sahip olmayan erkek katılımcıların arkadaş alt boyutuna ilişkin sıra ortalamaları (59,94) bipolar bozukluğa sahip erkek katılımcıların sıra ortalamalarından (45,34) anlamlı bir şekilde farklılaşmaktadır (U= 972,00, z= -2,473, p=,013).
Bipolar bozukluğa sahip 20-40 yaş arası katılımcıların ortalaması (53,641) ile bipolar bozukluğa sahip olmayan 20-40 yaş arası katılımcıların ortalaması (63,750) arasında anlamlı bir fark vardır ($t_{(95)}$=3,374, p<,001). Hesaplanan etki değeri (d=,69) farkın orta büyüklükte olduğunu göstermektedir. Bipolar bozukluğa sahip olmayan 20-40 yaş katılımcıların arkadaş alt boyutuna ilişkin sıra ortalamaları (58,18) bipolar bozukluğa sahip 20-40 yaş katılımcıların sıra ortalamalarından (41,38) anlamlı bir şekilde farklılaşmaktadır (U= 762,00, z= -2,935, p=,003). Bipolar bozukluğa sahip 41-65 yaş arası katılımcıların

FULL TEXTS BOOK

ortalaması (51,961) ile bipolar bozukluğa sahip olmayan 41-65 yaş arası katılımcıların ortalaması (60,918) arasında anlamlı bir fark vardır ($t_{(111)}$= 2,931, p=,004). Hesaplanan etki değeri (d=,55) farkın orta büyüklükte olduğunu göstermektedir. Bipolar bozukluğa sahip olmayan 41-65 yaş katılımcıların arkadaş alt boyutuna ilişkin sıra ortalamaları (68,36) bipolar bozukluğa sahip 41-65 yaş katılımcıların sıra ortalamalarından (43,67) anlamlı bir şekilde farklılaşmaktadır (U= 893,00, z= -4,015, p<,001).

Algılanan stres açısından, bipolar bozukluğa sahip katılımcıların ortalaması (18,048) ile bipolar bozukluğa sahip olmayan katılımcıların ortalaması (17,438) arasında anlamlı bir fark yoktur (t(208)=-,633, p=,527).

ÇBASDÖ ile ASÖ arasında anlamlı bir ilişki yoktur ve alt boyutlarının ilişkileri incelendiğinde de anlamlı bir korelasyona rastlanmamaktadır. Ancak bipolar bozukluğa sahip 20-40 yaş grubuna ait katılımcılar için ÇBASDÖ'nün Aile alt boyutu ile ASÖ'nün Stres/Rahatsızlık Algısı alt boyutu arasında negatif yönlü ve anlamlı bir korelasyon bulunmaktadır (rho=-,34, p=,012).

DYAÖ puanları açısından, bipolar bozukluğa sahip katılımcıların sıra ortalamaları (110,86) ile bipolar bozukluğa sahip olmayan katılımcıların sıra ortalamaları (100,14) arasında anlamlı bir fark yoktur (U=4950,00, z=-1,280, p=,201). Bipolar bozukluğa sahip katılımcılar için cinsiyete göre DYAÖ puanları farklılaşmamaktadır (U= 1339,00 , z= -,250 , p=,802). Bipolar bozukluğa sahip olmayan katılımcılar için cinsiyete göre DYAÖ puanları arasında anlamlı bir fark vardır (U= 919,50, z= -2,943 , p=,003). Bu farklılık kadınların sıra ortalamalarının (61,47), erkeklerin sıra ortalamalarından (44,03) yüksek olmasından kaynaklanmaktadır. Bipolar bozukluğa sahip erkek katılımcıların puanları ile bipolar bozukluğa sahip olmayan erkek katılımcıların puanları arasında anlamlı bir fark vardır (U=970,00, z=-2,487, p=,013). Bu farklılık bipolar bozukluğa sahip erkek katılımcıların sıra ortalamalarının (59,70) bipolar bozukluğa sahip olmayan erkek katılımcıların sıra ortalamalarından (45,02) yüksek olmasından kaynaklanmaktadır. Bipolar bozukluğa sahip katılımcıların yaş gruplarına göre DYAÖ puanları arasında anlamlı bir fark vardır (U= 977,00, z= -2,573 , p=,010). Bu farklılık 20-40 yaş grubundaki katılımcıların sıra ortalamalarının (60,57), 41-65 yaş grubundaki katılımcıların sıra ortalamalarından (45,29) yüksek olmasından kaynaklanmaktadır.

Bipolar bozukluğa sahip katılımcıların yaşları ve DYAÖ puanları arasında negatif yönlü ve anlamlı bir korelasyon gözlenmektedir (Spearman's *rho* = -.24, p= .012). Bipolar bozukluğa sahip katılımcıların VKİ değerleri ve DYAÖ puanları arasında pozitif yönlü ve anlamlı bir korelasyon gözlenmektedir (r =,25, p=,010).

Bipolar bozukluğa sahip katılımcılar için algılanan stres puanları ve DYAÖ puanları arasında anlamlı bir ilişki yoktur (r=,16, p=,104). Bipolar bozukluğa sahip olmayan katılımcılar için algılanan stres puanları ve DYAÖ puanları arasında anlamlı bir ilişki vardır (r=,30, p=,002). Bipolar bozukluğa sahip olmayan katılımcılar için ASÖ'nün Stres/Rahatsızlık Algısı alt boyutu ile DYAÖ puanları arasında pozitif yönlü anlamlı bir korelasyonun bulunduğu (rho=,38, p<,001); ASÖ'nün Yetersiz Özyeterlik Algısı alt boyutu ile DYAÖ puanları arasında ise anlamlı bir ilişkinin bulunmadığı (rho=,02, p=,846) gözlenmektedir. Bipolar bozukluğa sahip olmayan 41-65 yaş grubuna (n=61) ait katılımcılar için ASÖ'nün Stres/Rahatsızlık Algısı alt boyutu puanları ile DYAÖ puanları arasında pozitif yönlü ve anlamlı bir korelasyonun bulunmaktadır (rho=,48, p<,001).

Bipolar bozukluğa sahip olmayan katılımcılar için algılanan sosyal destek puanları ile DYAÖ puanları arasında ilişki bulunmamaktadır (r=,02, p=,840). Bipolar bozukluğa sahip katılımcılar için algılanan sosyal destek puanları ile DYAÖ puanları arasında anlamlı bir ilişki bulunmamaktadır (r=-,15, p=,133). Ancak bipolar bozukluğa sahip 20-40 yaş katılımcılar için algılanan sosyal destek puanları ile DYAÖ puanları arasında negatif yönlü anlamlı bir ilişki tespit edilmektedir (rho=-,27, p=,048).

TARTIŞMA

Bipolar bozukluğa sahip katılımcılar hem kendi cinsiyetlerindeki hem akranları bipolar bozukluğa sahip olmayan katılımcılardan daha düşük düzeyde algılanan sosyal desteğe sahiptir ve farkın kaynağı büyük

FULL TEXTS BOOK

ölçüde Arkadaş alt boyutudur. Bu sonuçlara göre katılımcıların algıladığı sosyal desteğin üzerinde bipolar bozukluğa sahip olmanın bir etkisinin bulunduğu söylenebilir. Bipolar bozukluğa sahip katılımcılar bu hastalığa sahip olmayan katılımcılara göre daha az sosyal destek almaktadır veya en azından algıladıkları sosyal destek daha azdır. Bu bulgular sağlıklı kontrollere göre bipolar bozukluğa sahip kişilerin algıladığı sosyal desteğin daha düşük seviyede olduğunu raporlayan çalışmalarla uyumludur (Studart-Bottó ve ark., 2023).

DYAÖ puanları bipolar bozukluğa sahip olmayan katılımcılar için cinsiyete göre farklılaşmaktadır. Kadınların erkeklerden daha çok duygusal yeme örüntüsüne sahip olduğu bulgusu literatürü desteklemektedir (Hadar-Shoval ve ark., 2022; De Lauzon-Guillain ve ark., 2009). Araştırmamızdaki bipolar bozukluğa sahip erkekler ve kadınlar arasında duygusal yeme açısından anlamlı bir fark bulunmamaktadır ve bipolar bozukluğa sahip erkekler, bipolar bozukluğa sahip olmayan erkeklerden daha yüksek düzeyde duygusal yemeye sahiptir. Bu durumda bipolar bozukluğa sahip erkeklerin bipolar bozukluk veya bipolar bozukluğa sıklıkla eşlik eden obezite, dürtüsellik, depresyon ya da başka bir özellik nedeniyle duygusal yeme düzeylerinin yüksek olduğu söylenebilir.

Bipolar bozukluğa sahip katılımcılar için yaşa göre DYAÖ puanları farklılaşmakta, 20-40 yaş grubu 41-65 yaş grubundan anlamlı bir şekilde daha çok duygusal yeme örüntüsü sergilemektedir. Ayrıca bipolar bozukluğa sahip katılımcılar için yaş ile duygusal yeme arasında negatif yönlü anlamlı bir ilişki bulunmaktadır. Bu durumda duygusal yemenin bipolar bozukluğa sahip genç katılımcılarda daha çok gözlendiği ve yaşla birlikte azalma eğiliminde olduğu söylenebilir. Duygusal yemenin yaşla birlikte azaldığına ilişkin bulgu literatürdeki benzer sonuçları desteklemektedir (Samuel ve Cohen, 2018; Güner ve Aydın, 2022).

Literatürle uyumlu bir şekilde bipolar bozukluğa sahip olan katılımcıların VKİ ile DYAÖ puanları arasında pozitif yönlü anlamlı bir ilişki bulunmaktadır (Dakanalis ve ark., 2023). Bipolar bozukluğa sahip olmayan katılımcılar için böyle bir ilişki tespit edilememiştir.

ASÖ'nün Stres/Rahatsızlık Algısı alt boyutu yaşanan olaylar konusunda kontrol kaybı karşısında kişinin yaşadığı olumsuz hislere odaklanmaktadır. Araştırmamızda bipolar bozukluğa sahip 20-40 yaş grubuna ait katılımcılar için ÇBASDÖ'nün Aile alt boyutu ile ASÖ'nün Stres/Rahatsızlık Algısı alt boyutu arasında negatif yönlü ve anlamlı bir korelasyon tespit edilmektedir. Buna göre kişilerin ailelerine ilişkin algıladıkları sosyal destek arttıkça Stres/Rahatsızlık Algısı puanları azalmakta, Aile alt boyutuna ilişkin algılanan sosyal destek azaldıkça Stres/Rahatsızlık Algısı puanları artmaktadır. 20-40 yaş aralığı bipolar bozukluğun genellikle ortaya çıktığı dönemdir (Hays ve ark., 1998), bu yaş döneminde kişilerin pek çok stresli olay yaşadığı ve ailenin sosyal desteğinin bu dönemde birey için kritik olduğu söylenebilir.

Araştırmamızda bipolar bozukluğa sahip olmayan katılımcılar için algılanan stres puanları ve DYAÖ puanları arasında anlamlı ve pozitif bir korelasyon gözlenmektedir Literatürde duygusal yemenin stresle ilişkili olduğuna yönelik bulgular bulunmaktadır (Nguyen-Rodrigueza ve ark., 2008; Carpio-Arias ve ark., 2022).

Bipolar bozukluğa sahip 20-40 yaş katılımcılar için algılanan sosyal destek puanları ile DYAÖ puanları arasında negatif yönlü anlamlı bir ilişki tespit edilmektedir. Bu bulgudan hareketle belki sosyal desteğin; algılanan stresi zayıflatmak, başa çıkma konusunda tutum ve beceriler edinmeyi sağlamak ve diğerlerinin teşviği sayesinde yararlı etkinliklerde bulunmak gibi kazanımlarla duygusal yeme durumu üzerinde etkili oluyor olabileceği söylenebilir. Araştırmamızın bu bulgusu Kirsch ve arkadaşlarının (2016) geç ergenlikte ailesel sosyal destek düzeyinin düşüklüğünün yeme bozukluğu ile ilişkili olduğu yönündeki bulgusu ile uyumludur.

SONUÇ

Bipolar bozukluğa sahip erkekler bipolar bozukluğa sahip olmayan erkeklerden daha çok duygusal yemeye başvurmaktadır. Bipolar bozukluğa sahip kişiler bipolar bozukluğa sahip olmayanlardan daha

FULL TEXTS BOOK

düşük algılanan sosyal desteğe sahiptir. 20-40 yaş grubu bipolar bozukluğa sahip kişiler için algılanan sosyal desteğin duygusal yeme ile anlamlı ve negatif yönlü bir ilişkisi vardır.

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İNSAN HAKLARI VE ADALETİN GÖLGESİNDE: BATI'NIN İSRAİL VE UKRAYNA POLİTİKALARI

IN THE SHADOW OF HUMAN RIGHTS AND JUSTICE: WESTERN POLICIES TOWARDS ISRAEL AND UKRAINE

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ÖZET

Batı dünyasının uluslararası ilişkilerde sergilediği tutarsızlıklar ve çifte standartlar, Ukrayna-Rusya Savaşı ile İsrail-Filistin çatışması arasındaki farklar üzerinden açıkça görülebilir. Bu iki olay, Batı'nın insan hakları, uluslararası hukuk ve adalet konularındaki söylemleri ile pratikteki davranışları arasındaki derin uçurumu gözler önüne sermektedir. Rusya'nın 2022 yılında Ukrayna'ya karşı başlattığı askeri müdahale, uluslararası arenada büyük bir şok etkisi yarattı ve Batı dünyasının hızla harekete geçmesine neden oldu. Bu dönemde, Batı'nın tepkisi çok yönlü ve kararlı bir şekilde şekillendi, çeşitli diplomatik, ekonomik ve askeri adımlar atıldı. Batı medyası, Ukrayna-Rusya Savaşı'nı geniş çapta ve detaylı bir şekilde haberleştirdi. Ukrayna'nın direnişi, Rusya'nın saldırıları ve sivillerin yaşadığı acılar, dünya genelinde büyük yankı uyandırdı. Batı'da, kamuoyu Ukrayna'nın yanında yer aldı ve birçok ülkede Ukrayna'ya destek gösterileri düzenlendi. Bu kamuoyu desteği, Batılı hükümetlerin Ukrayna'ya yönelik yardımlarını artırmalarında önemli bir rol oynadı. Öte yandan, İsrail'in Filistin halkına yönelik politikaları konusunda Batı'nın tutumu daha karmaşık ve çelişkili bir tablo çizmektedir. İsrail'in yerleşim politikaları, Filistin topraklarının genişletilmesi ve Gazze'deki askeri operasyonlar, insan hakları ihlalleri ve uluslararası hukuk açısından ciddi sorunlar teşkil etmektedir. Ancak, Batılı ülkeler genellikle İsrail'in güvenlik endişelerini gerekçe göstererek güçlü bir siyasi ve askeri destek sağlamaktadır. Batı medyası, İsrail-Filistin çatışmasını ele alırken genellikle dengeli ve tarafsız bir tutum sergileyemez. İsrail yanlısı bir yaklaşım benimseyen medya organları, Filistinlilerin yaşadığı insan hakları ihlallerini ve yapılan soykırımı yeterince gündeme getirmez. Bu durum, Batı'nın insan hakları ve adalet ilkelerine olan bağlılığını sorgulattırmaktadır. Bu çalışma Batı dünyasının uluslararası politikalarda sergilediği çifte standartları ve stratejik çıkar odaklı yaklaşımları, İsrail-Filistin çatışması ve Ukrayna-Rusya savaşı bağlamında detaylı bir şekilde incelemeyi, insan hakları, uluslararası hukuk ve adalet ilkeleri açısından Batı'nın tutumlarındaki tutarsızlıkları ortaya koyarak, bu durumun Batı'nın güvenilirliği ve meşruiyeti üzerindeki etkilerini değerlendirmeyi amaçlamaktadır. Çalışma, Batı'nın insan hakları ve adalet ilkelerini evrensel olarak savunurken, uygulamada nasıl seçici davrandığını ve bu seçiciliğin altında yatan stratejik çıkarları vurgulamayı hedeflemektedir.

Anahtar Kelimeler: İnsan Hakları, Ukrayna, İsrail, Soykırım, Filistin.

ABSTRACT

The inconsistencies and double standards of the Western world in international relations can be clearly seen in the differences between the Ukraine-Russia War and the Israeli-Palestinian conflict. These two events illustrate the profound gap between the West's rhetoric on human rights, international law and justice and its behavior in practice. Russia's military intervention against Ukraine in 2022 shocked the international arena and caused the Western world to take swift action. During this period, the West's response was multifaceted and decisive, with various diplomatic, economic and military steps taken. Western media covered the Ukraine-Russia war extensively and in detail. Ukraine's resistance, Russia's

FULL TEXTS BOOK

aggression and civilian suffering were widely reported around the world. In the West, public opinion sided with Ukraine and demonstrations in support of Ukraine were organized in many countries. This public support played an important role in Western governments increasing their aid to Ukraine. On the other hand, the Western position on Israel's policies towards the Palestinian people is more complex and contradictory. Israel's settlement policies, the expansion of Palestinian territories and military operations in Gaza pose serious problems in terms of human rights violations and international law. However, Western countries provide strong political and military support, often citing Israel's security concerns. Western media coverage of the Israeli-Palestinian conflict is often not balanced and impartial. Media outlets that adopt a pro-Israel approach do not adequately cover the human rights violations and genocide of Palestinians. This situation calls into question the West's commitment to the principles of human rights and justice. This study aims to examine in detail the double standards and strategic interest-oriented approaches of the Western world in international politics in the context of the Israeli-Palestinian conflict and the Ukraine-Russia war, to reveal the inconsistencies in Western positions in terms of human rights, international law and principles of justice, and to evaluate the effects of this situation on the credibility and legitimacy of the West. The study aims to highlight how the West, while universally upholding the principles of human rights and justice, has been selective in practice and the strategic interests underlying this selectivity.
Keywords: Human Rights, Ukraine, Israel, Genocide, Palestine.

GİRİŞ

Küresel siyasette sürekli dile getirilen konular arasında Batı dünyasının uluslararası ilişkilerdeki tutarsızlıkları ve çifte standartları önemli bir yer tutmaktadır. Batılı ülkeler insan hakları, uluslararası hukuk ve adalet konularında güçlü söylemler dile getirmekte ve bu değerlerin koruyucusu rolünü üstlenmektedir. Bununla birlikte, bu değerlerin söylemi ve pratikteki uygulamaları büyük tutarsızlıklar ve çifte standartlar ortaya koymaktadır. Bu makale, Ukrayna-Rusya Savaşı ve İsrail-Filistin çatışması örnekleri üzerinden Batı dünyasının uluslararası ilişkilerdeki tutarsızlıklarını ve çifte standartlarını net bir şekilde ortaya koymayı amaçlamaktadır.

Ukrayna-Rusya Savaşı ve İsrail-Filistin çatışması, Batı'nın uluslararası ilişkilerdeki politika ve davranışlarının uyumluluk derecesini incelemek için uygun örneklerdir. Ukrayna-Rusya Savaşı ile ilgili olarak Batı, Ukrayna'nın toprak bütünlüğünü ve egemenliğini savunmuş, Rusya'ya ağır yaptırımlar uygulamış ve uluslararası hukuk ihlallerini kınamıştır. Buna karşılık, İsrail-Filistin çatışması söz konusu olduğunda, Batı'nın İsrail'in işgal ve yerleşim politikalarına tepkisi daha yumuşak ve çelişkili bir yol olmuştur. Bu husus, Batı'nın uluslararası hukuk ve insan hakları söylemi ile fiili eylemleri arasındaki önemli farklılığa işaret etmektedir.

Bu araştırmanın temel amacı, Batı'nın insan hakları, uluslararası hukuk ve adalet söylemi ile pratikteki davranışları arasındaki büyük uyumsuzluğu ortaya koymaktır. Bu amaçla, Ukrayna-Rusya Savaşı ve İsrail-Filistin çatışması farklılıkları açısından karşılaştırılacak ve Batı'nın bu olaylar karşısındaki tutumları yan yana getirilecektir. Araştırma literatür taraması, doküman analizi ve karşılaştırmalı analiz yaklaşımını benimseyecektir.

Çalışmada, Batı'nın uluslararası ilişkilerdeki tutarsızlıklarının ve çifte standartlarının küresel barış ve istikrar üzerinde zararlı etkileri olduğu iddia edilmektedir. Böylece makale, politika yapıcılara, akademisyenlere ve uluslararası ilişkiler alanında çalışan diğer paydaşlara değerli ve güvenilir bir kaynak sağlayacaktır.

KAVRAMSAL ÇERÇEVE

Batı'nın Uluslararası İlişkilerdeki Tutarsızlıkları

Bu konu on yıllardır Batı'nın uluslararası ilişkilerinde hararetli tartışmalara konu olmuştur. Batılı ülkelerin uluslararası sahnede uyguladıkları politikalar, ulusal çıkarlarına ve stratejik hedeflerine

FULL TEXTS BOOK

bağlıdır. Bu da Batı'nın insan hakları, uluslararası hukuk ve adalete ilişkin temel beyanlarının fiili eylemleriyle çelişmesine yol açmaktadır.

Realist ve Liberal Teorilerin Perspektifleri

Realizm, devletlerin uluslararası ilişkilerdeki temel kaygısının ulusal çıkarlarını maksimize etmek olduğunu vurgulayan bir teoridir. Batı, çıkarlarına fayda sağladığı sürece uluslararası norm ve değerlerin korunmasından yanadır, dolayısıyla bu teori bu fikri desteklemektedir (Morgenthau, 2005). Realist teorisyenler, Batı'nın tutarsızlıklarının devletlerin rasyonel ve çıkar odaklı davranışlarının bir sonucu olduğunu savunmaktadır. Öte yandan, liberal teoriler uluslararası işbirliğinin ve normların önemine odaklanmaktadır. Bu amaçla liberal teorisyenler, Batı'nın uluslararası norm uygulamasındaki pozisyonundaki tutarsızlıklara işaret etmekte ve bunu çifte standarda bağlamaktadır. Örneğin Keohane (1984) ve Nye (2020) gibi liberal teorisyenler, Batı'nın insan hakları ve uluslararası hukuk konusundaki söylemlerinin uygulamada stratejik ve ekonomik çıkarların peşinde koşulması nedeniyle zayıfladığını savunmaktadır.

Geçtiğimiz yıllarda, Batı'nın uluslararası ilişkilerdeki sorunları her zamankinden daha kapsamlı bir şekilde incelenmiştir. Bu çalışmalar, Batılı ülkelerin politikalarının dünyanın farklı bölgelerinde ve vakalarında nasıl değiştiğini ve bu değişikliklerin arkasındaki nedenleri incelemektedir. Örneğin Barkin ve Sjoberg (2019), Batı'nın uluslararası müdahalelerdeki tutarsızlıklarını insani müdahalelerin maliyet ve faydaları üzerinden incelemiştir. Bu çalışma, Batı'nın stratejik çıkarlarının olduğu bölgelerde insan hakları ihlallerine, stratejik çıkarlarının düşük olduğu zamanlara kıyasla daha şiddetle karşı çıktığını ortaya koymaktadır. Benzer şekilde, Weiss (2018) Batı'nın uluslararası hukuk söylemi ve uygulamasındaki sorunları araştırmıştır. Weiss, Batı'nın çıkarlarına uygun olduğu sürece uluslararası hukuku desteklediğini, ancak uygun olmadığında göz ardı ettiğini belirtmektedir. Ukrayna-Rusya Savaşı ve İsrail-Filistin çatışması gibi vakalar bunu açıkça göstermektedir.

Batı'nın uluslararası ilişkilerle ilgili felsefesi çoğunlukla bölgesel ve stratejik çıkarlarla ilgilidir. Örneğin, Batı'nın Ortadoğu'daki politikaları enerji kaynakları ve jeopolitik dengeler gibi stratejik faktörlerden türetilmiştir. Dolayısıyla, Batı'nın İsrail-Filistin çatışmasına yönelik tutumu, uluslararası hukuk ve insan hakları retoriği yerine ağırlıklı olarak stratejik hesaplar tarafından belirlenmektedir (Chomsky, 2015). Öte yandan, Doğu Avrupa'daki politikalar Batı'nın Rusya ile olan stratejik rekabeti tarafından belirlenmektedir. Ukrayna-Rusya Savaşı'nda Batı'nın Ukrayna'ya verdiği güçlü destek, Rusya'nın bölgedeki etkisini sınırlamaya yönelik stratejik bir hamle olarak anlaşılabilir (Mearsheimer, 2014). Batı, çifte standartlarında bir tarafı diğerine tercih ederek küresel barış ve istikrarı olumsuz yönde etkilemektedir. Batı'nın tutarsızlıkları, uluslararası toplumda küresel güvensizlik ve hoşnutsuzluğun ana nedenidir ve aynı zamanda Batı'nın insan hakları ve adalet konusundaki güvenilirliğini zayıflatmaktadır. Ayrıca, ahlaki ikiyüzlülük diğer devletlerin uluslararası normlara bağlı kalma konusundaki isteksizliğinin nedeni olabilir (Krasner, 1999).

İnsan Hakları ve Uluslararası Hukuka İlişkin Batılı Söylemler

Batı, İkinci Dünya Savaşı'nın sonundan bu yana insan hakları ve uluslararası hukuk konusunda çok güçlü söylemler üretmektedir. Diğer Batılı devletler de bu değerlerin küresel olarak korunması ve desteklenmesi konusunda Avrupa Birliği ile güçlerini birleştirmiştir. Bunu yaparak kendilerini insan hakları ve uluslararası hukukun savunulmasında ön plana çıkarmışlardır. Bu bölüm, insan hakları ve uluslararası hukuka ilişkin Batılı söylemlerin tarihsel gelişimine ve mevcut durumuna odaklanmaktadır. İkinci Dünya Savaşı sonrası dönemde Batı dünyası insan hakları ve uluslararası hukuk alanında önemli adımlar atmıştır. Bunların başında 1948 yılında kabul edilen BM Evrensel İnsan Hakları Beyannamesi gelmektedir. Batılı ülkeler bu bildirgenin varlığının ve hatta oluşturulmasının en önemli destekçileri olmuştur (Moyn, 2014). Ayrıca, Nürnberg ve Tokyo mahkemeleri, savaş suçları ve insanlığa karşı işlenen suçlarla ilgili uluslararası hukukun uygulanmasına yönelik ilk ciddi adımlardır.

Soğuk Savaş dönemi, Batı'nın insan hakları ve uluslararası hukuka ilişkin söylemlerinin ideolojik rekabetin bir parçası olarak şekillendiği bir dönemdir. Batılı devletler, özellikle de Amerika Birleşik

FULL TEXTS BOOK

Devletleri, Sovyetler Birliği'ne karşı insan hakları konularının savunuculuğunu yapmıştır (Hoffmann, 2011). Bu dönemde Batı'nın insan hakları söylemleri siyasi ve ideolojik çıkarlarla yakından ilişkiliydi ve kimi zaman bu çıkarları meşrulaştırmak için kullanılıyordu.

Soğuk Savaş'ın sona ermesiyle birlikte Batı'nın insan hakları ve uluslararası hukuka ilişkin söylemleri daha fazla ön plana çıkmıştır. 1990'larda Bosna, Ruanda ve Kosova'da yaşanan krizler Batı'nın insani müdahaleler ve uluslararası hukuk söylemleri konusundaki pozisyonunu test etmiştir. Bu müdahalelerle Batı, insan hakları ve uluslararası hukuka bağlılığını göstermiş gibi görünebilirdi, ancak aynı zamanda çatışan çıkarların kanıtı da çok önemliydi (Forsythe, 2012). Batı'nın insani yardım müdahaleleri, insan hakları ve uluslararası hukuka bağlılığının bir göstergesiydi; ancak çıkar çatışmalarının ana neden olduğu da açıktı (Forsythe, 2012).

Günümüzde, Batılı insan hakları ve uluslararası hukuk söylemleri küresel düzeyde hala önemli roller oynamaktadır. Bununla birlikte, uygulamada bu söylemler yaygın bir eleştiri konusudur. Şöyle ki, Batı'nın insan hakları ve uluslararası hukuka olan yükümlülüğünün, Batı'nın stratejik çıkarlarıyla çeliştiği durumlarda zayıfladığına dikkat çekilmektedir. Örneğin, Batı'nın Ukrayna'nın toprak bütünlüğü arayışını desteklemesi ve Rusya'ya yaptırım uygulaması, Batı'nın insan hakları ve uluslararası hukukun sadık bir destekçisi olmasıyla açıklanabilir (Menon & Rumer, 2015). Bununla birlikte, bu pozisyon aynı zamanda Batı'nın hayati stratejik çıkarlarının olduğu bir bölgede alınan bir pozisyon olarak görülmektedir. Sonuç olarak, Batı'nın bu konudaki söylemlerinin stratejik çıkarlarıyla ne derece uyumlu olduğu şüphelidir (Mearsheimer, 2014).

İsrail-Filistin çatışması açısından bakıldığında İsrail tarafından işgal edilen topraklardaki yerleşim politikaları ve insan hakları ihlalleri uluslararası hukuk üzerinde ciddi şüpheler yaratmaktadır (Chomsky, 2015). Bununla birlikte, Batılı devletlerin İsrail'e tepkisi Ukrayna-Rusya Savaşı'na kıyasla daha az şiddetli olmuştur. Bu da Batı'nın insan hakları ve uluslararası hukuka ilişkin söylemlerinin, stratejik çıkarlarla karşı karşıya kaldıklarında daha zayıf ve farklı hale geldiğini göstermektedir (Finkelstein, 2012).

Ukrayna-Rusya Savaşı Konusunda Batı'nın Tutumu

24 Şubat 2022 tarihinde Rusya Devlet Başkanı Vladimir Putin Ukrayna'da "özel askeri operasyon" ilan etti ve Ukrayna'ya karşı geniş çaplı bir askeri operasyon başlattı. Dünyada yeni bir şeylerin olduğu gerçeği, Batılı ülkelerle birlikte hızlı ve güçlü bir şekilde tepki veren uluslararası toplum için sürpriz oldu. Avrupa Birliği (AB), Amerika Birleşik Devletleri (ABD) ve NATO, Ukrayna'nın egemenliğini ve toprak bütünlüğünü savunmak için bir dizi diplomatik ve ekonomik önlem aldı.

Batı'nın Ukrayna meselesine tepkisi, Rusya'ya karşı kapsamlı ekonomik yaptırımların uygulanması, Ukrayna'ya askeri ve insani yardım sağlanması ve Rusya'nın diplomatik olarak izole edilmesi şeklinde olmuştur. ABD Başkanı Joe Biden Rusya'nın saldırganlığını şiddetle kınamış ve Ukrayna'ya olan desteğini de güçlü bir şekilde ifade etmiştir (Beyaz Saray, 2022).

Rusya'ya yönelik ekonomik yaptırımlar Batı'nın en güçlü tepkilerinden biri oldu. AB ve ABD, Rusya'nın finans, enerji ve savunma sektörlerine kapsamlı yaptırımlar uygulamıştır. Rus bankalarının uluslararası ödeme sistemlerine erişimi engellendi, Rus oligarkların mal varlıkları donduruldu ve Rusya'ya yüksek teknoloji ürünlerinin ihracatı yasaklandı (Avrupa Komisyonu, 2022). Bu yaptırımlar Rus ekonomisini ciddi şekilde etkilemeyi ve Rusya'nın uluslararası ticari ilişkilerini sınırlamayı amaçlıyordu.

Diplomatik cephede ise Rusya uluslararası örgütlerden ve forumlardan atıldı. Batılı ülkeler Birleşmiş Milletler Güvenlik Konseyi'nde Rusya'nın saldırgan eylemlerini kınayan kararlar aldılar ve Rusya'yı uluslararası alanda izole etmeye çalıştılar (UN, 2022).

Batı'nın Ukrayna'ya desteği farklı askeri ve insani yardımlar aracılığıyla da kendini göstermiştir. ABD ve AB'nin silah sistemleri moderndi ve ayrıca Ukrayna'ya mühimmat ve askeri teçhizat sağlandı. Bu yardımlar sayesinde Ukrayna savunma kapasitesini arttırmış ve Rus saldırılarına karşı koyabilmiştir (NATO, 2022). Bunun yanı sıra, Batılı ülkeler savaşta zarar gören sivillere destek olmak amacıyla Ukrayna'ya insani yardım göndermiştir.

FULL TEXTS BOOK

Batı'nın Ukrayna ve Rusya'daki savaşa verdiği tepkiler medyada geniş yer buldu ve kamuoyunda büyük yankı uyandırdı. Batı medyası savaşın başlamasından bu yana Ukrayna'da yaşananları yakından takip etmiş ve kamuoyunun bu konudaki görüşlerini dünyaya taşımıştır. Medyanın işbirliği, Batılı hükümetlerin Ukrayna'ya desteğinin güçlenmesinde ve kamuoyu desteğinin sağlanmasında önemli bir etken olmuştur (BBC, 2022).

Son zamanlarda araştırmacılar Batı'nın Ukrayna'ya verdiği desteğin stratejik ve jeopolitik hesaplarla ne kadar uyumlu olduğunu bulmaya çalışmışlardır. Örneğin Menon ve Rumer'in (2015) makalesi, Batı'nın Ukrayna'ya verdiği desteğin temelde Rusya'nın bölgedeki etkisini sınırlandırmaya yönelik olduğunu ve bu desteğin altında bazı stratejik çıkarların da yattığını vurgulaması açısından oldukça önemlidir.

Batı'nın Ukrayna-Rusya savaşına verdiği tepki, Batı'nın uluslararası hukuka ve egemenlik ilkesine olan bağlılığının bir yansımasıydı. Aynı zamanda Batı'nın stratejik çıkarlarının da bir tezahürüydü. Ukrayna'nın ayrılmasını sağlamak, Rusya'nın Avrupa'ya hakim olmamasını sağlamak ve NATO'nun doğu kanadını güçlendirmek gibi stratejik nedenler, Batı'nın Ukrayna'yı desteklemesinin ana faktörleridir.

İsrail-Filistin çatışması, Batı'nın uluslararası ilişkilerdeki tutum ve politikalarını anlamak için kritik bir vakadır. Bu çatışma yıllar boyunca tüm dünyayı endişelendiren en önemli uluslararası meselelerden biri olmuştur. Başta ABD olmak üzere Batılı ülkeler, bu çatışmanın en önemli aktörleri olarak hareket etmiş ve İsrail'e verdikleri destek nedeniyle en çok tartışılan ülkeler olmuşlardır (Gordon, 2020).

İsrail'in 7 Ekim 2023'te Gazze Şeridi'ne karşı başlattığı savaş tüm dünyada büyük tepkilere neden oldu. İsrail, Hamas'ın roket saldırılarına karşı kendini savunmaya çalıştığını itiraf etmiştir. Bu operasyonlar çok sayıda sivilin hayatını kaybetmesine ve büyük bir insani krize yol açmıştır (Al Jazeera, 2023). Farklı Batılı ülkeler bu olaylara farklı tepkiler göstermiştir.

7 Ekim 2023 saldırılarının ardından ABD, İsrail'in eylemlerini desteklemiş ve İsrail'in kendini koruma hakkı olduğunu yinelemiştir. Başkan Joe Biden, ABD'nin İsrail'in yanında duracağını ve ülkeye askeri ve diplomatik yardım sağlayacağını kesin bir dille ifade etmiştir. ABD, BM Güvenlik Konseyi'nde İsrail'i eleştiren kararları veto etmiş ve ülkeyi desteklemeye devam etmiştir (Beyaz Saray, 2023). Avrupa Birliği, 7 Ekim 2023'ten sonraki olaylara ilişkin tutumunda daha tarafsız olmak için çaba sarf etmiştir. AB, İsrail'in meşru müdafaa hakkını tanımış ancak aynı zamanda aşırı güç kullanımını ve sivillerin öldürülmesini de kınamıştır. AB, İsrail ve Filistinli grupları çatışmaları durdurmaya ve çatışmaya barışçıl bir çözüm bulmaya çağırdı. Ancak bu eleştiriler somut yaptırım ve baskılarla desteklenmediği için etkisiz kalmıştır (Avrupa Komisyonu, 2023).

Batı'nın İsrail-Filistin çatışmasına yönelik tutumu, Ukrayna-Rusya Savaşı'ndaki davranışlarıyla karşılaştırıldığında, Batı'nın çifte standardını oldukça açık bir şekilde ortaya koymaktadır. İsrail, 7 Ekim 2023'ten bu yana Gazze'de uluslararası hukuka uymaksızın askeri operasyonlar yürütmektedir (HRW, 2023). Ancak Batılı devletlerin İsrail'e yönelik tepkileri Ukrayna-Rusya Savaşı'nda olduğu kadar katı ve sürekli olmamıştır. Bu durum, Batılı insan hakları ve uluslararası hukuk söylemlerinin stratejik çıkarlarla çatıştığında zayıfladığını göstermektedir (Finkelstein, 2022).

Batı'nın İsrail-Filistin anlaşmazlığına ilişkin tutumu, son gelişmeler nedeniyle yeniden tartışma gündemine gelmiştir. İnsan hakları örgütleri ve bazı araştırmacılar, Batı'nın İsrail'i desteklemesini uluslararası hukuk ve insan hakları standartlarına aykırı olduğu gerekçesiyle kınamıştır (B'Tselem, 2023). Bu eleştirilerin temel noktası, Batı'nın stratejik ve siyasi çıkarlarının insan hakları ve adalet söylemlerinin önüne geçmesidir.

Batı, İsrail'in Gazze'deki operasyonlarını uluslararası hukukun ihlali olarak algılasa da İsrail'e yönelik yaptırım ve baskılar çoğunlukla sınırlı kalmaktadır. Bu durum, Batı'nın stratejik ve siyasi çıkarlarının insan hakları ve uluslararası hukuk söylemini gölgede bıraktığını göstermektedir (Qumsiyeh, 2020).

Batı'nın İsrail-Filistin mücadelesine bakışı, insan hakları ve uluslararası hukuk söyleminin temel ilkesiyle çelişir görünmektedir. Batı'nın İsrail'e verdiği sarsılmaz destek, hem bölgesel hem de küresel politikaların belirlenmesinde önemli bir etken teşkil etmektedir. Öte yandan, bu tür bir destek Batı'nın

FULL TEXTS BOOK

insan hakları ve adalet söylemleri açısından tehlikeli ve uluslararası toplumda var olan güvensizliğin başlıca nedenidir (Abunimah, 2022).

İnsan hakları örgütleri ABD'nin İsrail'e verdiği desteği çifte standart ve tutarsızlıklarla dolu olarak nitelendirmiştir. İnsan Hakları İzleme Örgütü (2023), ABD'nin İsrail'in uluslararası hukuk ihlallerine seyirci kalamayacağını ve bunun da uluslararası hukukun korunmasını etkilediğini gündeme getirmiştir. Bu eleştiriler, ABD'nin stratejik çıkarlarının insan hakları ve uluslararası hukuk söylemini gölgede bıraktığını açıkça ortaya koymaktadır.

SONUÇ VE TARTIŞMA

7 Ekim 2023 tarihinde İsrail'in Gazze Şeridi'ne yönelik başlattığı geniş çaplı askeri operasyonlar, Batılı ülkelerin uluslararası ilişkilerdeki tutumlarının yeniden gözden geçirilmesine neden olmuştur. İsrail'in askeri operasyonları sırasında Gazze'de çok sayıda sivilin hayatını kaybetmesi ve büyük bir insani krizin yaşanması Batılı devletlerin tepkisini çekmiştir. Yine de bu tepkiler çoğunlukla retorikle sınırlı kaldı ve gerçek bir ceza hala uygulanmadı.

Batı'nın insan hakları ve uluslararası hukuka ilişkin söylemi Gazze'deki gelişmeler söz konusu olduğunda tekdüze ve çifte standartlı olmuştur. Batılı devletler İsrail'in meşru müdafaa hakkını vurgulamakta ve orantısız güç kullanımını ve sivil kayıpları eleştirmekten kaçınmaktadır. Bu durum, Batı'nın stratejik çıkarlarının insan hakları ve uluslararası hukuk söyleminin üzerinde olduğunu yansıtmaktadır.

Batı'nın Gazze'deki duruma yaklaşımı, insan hakları ve uluslararası hukuk söyleminin çizgileriyle örtüşmemektedir. Batılı devletler İsrail'in haklarından ve meşru müdafaasından bahsetmiş olsalar da, aslında sivil kayıpları kınamamış ya da çok fazla güç kullanmamış ve herhangi bir pratik önlem almamışlardır. Batı'nın bu tutumu bölgenin uluslararası gücüne zarar vermektedir. Batı, önümüzdeki günlerde insan hakları ve uluslararası hukuka ilişkin açıklamalarında daha yeknesak bir duruş sergilemelidir. İsrail'in Gazze'deki tutumuna karşı daha dengeli ve adil bir tutum takınılması, Batı'nın uluslararası hukuka ve insan haklarının korunmasına verdiği desteğin bir kanıtı olacaktır.

Batılı devletler uluslararası hukukun korunması ve uygulanması yönünde daha fazla adım atmalıdır. Bu tür eylemlerin uluslararası hukuk ışığında analiz edilmesi ve gerekirse yaptırım uygulanması esastır. Bu, uluslararası hukuk normlarının evrenselliğinin güçlü bir göstergesi olacaktır. Batılı devletler ve Müslüman ülkeler İsrail ve Filistin arasında barış sürecinin yeniden başlatılmasında öncü olmalıdır. İki devletli bir çözümün hayata geçirilmesi için her iki tarafın da iletişim kurmasına acil ihtiyaç vardır. Gazze'deki insani krizi çözmek ve zarar gören altyapıyı yeniden inşa etmek için Batılı devletler insani yardım ve yeniden inşa projelerine daha fazla destek vermelidir. Bu yardım sadece mevcut ihtiyaçların karşılanmasına yardımcı olmakla kalmayacak, aynı zamanda Gazze'nin uzun vadeli kalkınmasında da kritik bir rol oynayacaktır.

Batı'nın Ukrayna ve Gazze vakalarına verdiği tepkiler, uluslararası toplumda çifte standart iddialarına yol açmıştır. İnsan hakları örgütleri ve bazı devletler, Batı'nın Ukrayna'ya verdiği katı desteğin ve Rusya'ya karşı uyguladığı sert yaptırımların Gazze'deki durumla karşılaştırıldığında açık bir çifte standart olduğunu gözlemlemiştir. Ukrayna-Rusya Savaşı ve Gazze'deki durum, Batı'nın uluslararası ilişkilerde gözlemlenen ikiyüzlülüğü ve karakteriyle birebir örtüşmektedir. Ukrayna-Rusya Savaşı, 24 Şubat 2022 tarihinde başlamış ve Batı'nın Rusya'ya karşı çok ciddi ekonomik yaptırımlar uygulamasına ve Ukrayna'ya oldukça kapsamlı askeri ve insani yardım sağlamasına yol açmıştır. Bununla birlikte, Batı'nın 7 Ekim 2023'ten sonra Gazze'deki olaylara verdiği tepki aynı kararlılık ve sertlikte olmamıştır. Batılı devletler, İsrail'in Gazze'ye yönelik geniş çaplı askeri operasyonlarına ve bu operasyonlardaki yüksek sayıdaki sivil kayıplara yönelik eleştirilerinde yeterince güçlü olmamıştır. Amerika Birleşik Devletleri ve Avrupa Birliği İsrail'in meşru müdafaa hakkını vurgulamış, ancak aşırı güç kullanımını ve sivil kayıpları güçlü bir şekilde kınamamıştır. Ayrıca belirli yaptırımlar uygulamaktan da kaçınmışlardır

FULL TEXTS BOOK

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FULL TEXTS BOOK

INVESTIGATION OF QUALITY CHARACTERISTICS OF INTERMEDIATE MOISTURE DRIED TOMATO SNACK ENRICHED WİTH BAY AND FIG LEAF EXTRACTS

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ABSTRACT

In recent years, studies on snacks with high nutritional value have gained popularity. Medium moisture products and especially dried tomatoes are among the products that attract the attention of consumers. Fig (*Ficus carica L*), one of the aromatic plants, has attracted the attention in the field of health due to its biological activities. Bay fruit and leaves also have been known and used since ancient times until today. It is widely used in our country and also has an important place in our foreign trade. Bay leaf (Laurus nobilis L) is used in the food industry to make spices or sweeteners. Dried leaves are used especially in food canning, in the proper storage of olives, and in the packaging of various fruits such as dates, plums, grapes and so on to have fresher and more delicious tastes.

In this research, it was aimed to make a functional snack food with these extracts. Ultrasonic extraction was used. The effects of addition of bay and fig leaves extract (800 ppm), rich in phenolic and flavonoid contents, to sun-dried tomato samples, which were made medium humidity with the desired properties (SO<100 ppm; 2.34% salt) by using the immersion method, on the quality parameters were investigated during production and 4-month storage.

At the end of the production, no statistically significant change was observed in the water activity, moisture, pH, titrimetric acid, salt and water-soluble dry matter contents and it was determined that the raw material properties were preserved after the application. Phenolic and flavonoid contents were protected better compared to control group during storage. Redness, which is important for tomatoes in the final product was found to be higher in the group with bay leaf extract added during storage. When the textural properties were examined, it was determined that the chewiness and durability did not change after 4 months of storage. In the sensory analysis results, it was determined that the groups enriched with bay and fig extracts were more liked compared to the control sample group. As a result, functional product enriched with valuable components for health was produced.

Key words: Functional snacks, intermadiate moisture tomato, bay, fig leaves, quality, fenolics.

INTRODUCTION

The increasing consumer demand for healthy, convenient, and natural foods has led to the development of food products with higher levels of bioactive compounds. Therefore, food technology experts are focusing on developing food products with higher phenolic content and maintaining these compounds at maximum levels during processing (Purkayastha et al., 2013). From this perspective, the use of spices and aromatic plants as preservatives in foods has become widespread due to their natural antioxidant properties and antimicrobial characteristics. The antioxidant and antimicrobial properties of spices and plants are attributed to the phytochemicals they contain, such as vitamins, flavonoids, terpenoids, and

FULL TEXTS BOOK

carotenoids (Gök, 2006). Phenolic-based compounds found in plants can be extracted through various methods and used as natural antioxidants (Bozkurt, 2006b). The extraction process is applied to ensure the highest yield of substances with the best quality in terms of the concentration of target compounds and the antioxidant strength of the extracts. Typically, plant material is cleaned, dried, and ground into a fine powder, followed by solid-liquid extraction. Different solvents are used for the extraction process either separately or in combination (Biswas et al., 2012). For instance, the use of various aromatic plant extracts such as bay leaf, basil, thyme, clove, ginger, and mint is increasing day by day.

The largest group in the chemical structure of the leaves and fruits of bay laurel (*Laurus nobilis L.*) consists of terpenes. Terpenes are known as a broad and diverse class of hydrocarbons. The derivatives formed by the oxidation of terpenes are substances with aromatic, flavorful, and therapeutic properties. Additionally, they have gained significant attention in recent years due to their content of alcohols, aldehydes, esters, phenols, and compounds containing nitrogen and sulfur (Avcı, 2019). A study investigating the antioxidant activities of Turkish bay laurel populations found that bay leaves have high phenolic capacities, making them a good source of antioxidants. Consequently, they can be used as natural antioxidants in cosmetics, pharmaceuticals, food, and chemical industries, replacing synthetic antioxidants (Avcı, 2019). Furthermore, they are used to prevent infestation in foods such as lentils, chickpeas, and dried beans. Dried leaves are especially utilized in the preservation of animal food cans, the proper storage of olives, and the packaging of dried fruits such as dates, plums, and grapes to keep them fresher and more flavorful (Özer et al., 2019).

Similarly, the fig (Ficus carica L), an aromatic plant, has attracted attention in the health field due to its biological activities (Yüksel et al., 2020). Not only the fruit but also the leaves and latex (white sap) of the fig are used for food and medicinal purposes. In developing countries, they are particularly used alongside medicines to treat traditional diseases. Additionally, fig leaves have been included in the therapeutic guides of herbal medicines in Spanish and British pharmacology (Yüksel et al., 2020).

Among dried products, 'semi-dried' or 'intermediate moisture' products, which have less difference in texture and taste compared to fresh products, have become increasingly important in consumer preferences recently. Semi-dried fruits are defined by the Food and Agriculture Organization (FAO) as having more than 25% moisture content and can be consumed without rehydration. Recently, the most focused-on intermediate moisture vegetable is the tomato. It is also the most commercially sold product today (Seçkin and Taşeri, 2015).

Sun-dried tomato exports have held the top position among Turkey's dried vegetable export items for many years, both in terms of quantity and sales value. Among the vegetables grown in Turkey, tomatoes had the highest production in 2020, with a yield of 13.2 million tons. As a crucial food for human consumption, tomatoes accounted for 42% of vegetable production in 2020, making them the leading crop in vegetable farming (TEPGE, 2021). However, tomatoes spoil very quickly when fresh, leading to significant waste and loss during peak harvest periods. Preventing these losses and waste is crucial, especially when there are subsequent imbalances in supply and demand outside the harvest season. The growing market opportunities have necessitated making tomatoes more accessible, leading to the development of technologies for preserving and selling the product, particularly in dried form (Purkayastha et al., 2013).

Taking all of this into consideration, the aim is to produce a new functional snack product by enriching intermediate-moisture tomatoes with extracts from fig and bay leaves, which are rich in phenolics and flavonoids. For this purpose, valuable components were first extracted from fig and bay leaves. The intermediate-moisture tomatoes were then treated with these extracts using the dipping method, packaged, and stored for 4 months. During the storage period, physicochemical (color, pH, acidity, water-soluble dry matter, moisture, water activity, salt, total flavonoid and phenolic content), sensory,

FULL TEXTS BOOK

and textural analyses were conducted to examine the effects of the extracts on the intermediate-moisture tomatoes.

MATERIALS AND METHODS

Raw Material

Natural dried tomatoes with a salt content of 2.34% and a sulfur content below 100 ppm were obtained from Silare Phoenix Domestic and Foreign Trade Company, which operates in Torbalı-İzmir, TURKEY. The tomatoes were brought to the Fruit and Vegetable Processing Pilot Plant at the Department of Food Engineering at Ege University, and stored at 4°C under refrigeration conditions until processing.

All reagents used were analytical grade and Folin-Ciocalteu reagent, silver nitrate, sodium carbonate (Na_2CO_3), sodium hydroxide (NaOH), methanol, potassium acetate, aluminum chloride, sodium nitrat were supplied from Sigma-Aldrich (St. Louis, MO, USA).

Methods

Extraction Process

Fresh fig and bay laurel leaves were collected and shade-dried at 23±2°C for 7 days (Yüksel et al., 2020). Dried fig and bay laurel leaves were ground using a grinder (Sinbo-SCM 2934, Turkey). Subsequently, 1 gram of the dried and ground leaves was added to 50 ml of distilled water for the extraction process. The extraction process was carried out using an Ultrasonic water bath (Everest, Turkey) at 30°C for 30 minutes. After extraction, centrifugation was performed at 4°C for 15 minutes at 4500 rpm using a branded centrifuge to separate the extract. The desired extract was obtained through filtration. Two different extracts were prepared with fig and bay laurel leaves: 400 ppm and 800 ppm concentrations. Preliminary trials were conducted at three different durations (30, 60, 120 minutes) to optimize the extraction process.

Treatment with Extracts

To enrich medium-moisture tomatoes with phenolic and flavonoid compounds, the medium-moisture tomato samples were divided into three groups: Control Group (C) without any extract treatment. Fig Leaf Extract Group (FE) and Bay Leaf Extract Group (BE). The addition of extracts involved soaking the medium-moisture tomatoes in cooling water containing 800 ppm of fig and bay leaf extracts for 30 minutes. Tap water was used as the cooling water, and the temperature of the solution during soaking was maintained at 20±2°C. After 30 minutes in the cooling water, excess moisture was removed from the samples, which were then placed in crates and incubated in a climate chamber for 72 hours. Subsequently, the samples were stored under refrigeration conditions at 4°C for 4 months.

Methods of Analysis

Each production batch was conducted with 2 replicates, and the analyses were performed in 3 parallels.

Physical and Chemical Analyses

Color

To determine the color of dried tomatoes, a Konica Minolta Chroma Meter (CR-400, Japan) color measurement device was used. According to Vujovic (2015), CIE L*, a*, and b* values were measured using 15 tomatoes from each batch. These values are important quality parameters for tomato products. The L* value in the CIE L*a*b* color coordinate system represents brightness, ranging from 0 to 100. The a* and b* values indicate color characteristics: a* represents redness when positive and greenness when negative, while b* represents yellowness when positive and blueness when negative (Anonim, 1996; 1996b).

pH

A 10 g sample of dried tomatoes was mixed with 90 ml of distilled water using an IKA Ultra Turrax (T25, Germany) until being homogeneous. The pH value was then measured by immersing a calibrated pH meter (Thermo Scientific Orion 3 Star, UK) into the prepared homogeneous mixture (AOAC, 1990).

FULL TEXTS BOOK

Titration for Titratable Acidity

A 10 g sample of dried tomatoes was mixed with 90 ml of distilled water using an IKA Ultra Turrax (T25, Germany) until being homogeneous. The prepared homogeneous mixture was then filtered, and 10 ml of the filtrate was titrated with 0.1 N NaOH solution using phenolphthalein indicator until a persistent pink color was obtained. The amount of 0.1 N NaOH solution used in titration represented the total acidity value in 100 g of dried tomatoes was calculated (AOAC, 1990).

Soluble Solids Content (°Brix)

The soluble solids content was measured as °Brix using a digital refractometer (Models HI 96801, 0-85 °Brix, Hanna) (Cemeroğlu 2007).

Moisture Content

Moisture content was determined using an infrared moisture analyzer (MOC63u, Shimadzu Inc., Japan). 5-gram sample was heated at 105°C, and the moisture content was calculated as a percentage AOAC (1990).

Water Activity

Water activity values were determined using a water activity measurement device (Testo AG 400, Germany) with a sensitivity of ±0.001.

Salt Content

To detect chloride ions, dried samples were taken and ground in a blender. A 10 g sample was taken and diluted to 250 ml with distilled water, mixed in the blender, and filtered through coarse filter paper. A 5 ml aliquot of the filtrate was taken and titrated with 0.1 N silver nitrate solution using a 5% potassium chromate indicator. Titration was stopped when the color changed from yellow to reddish-orange. Calculations were done according to Equation 1 (Cemeroğlu, 2007):

$$\% \text{ Salt (g)} = (0.00585 \times V) \times m / SF \times 100 \quad \text{Eq. 1.}$$

Where: V = Volume of $AgNO_3$ solution used (in mL),m = Mass of the sample taken (in g), SF = Dilution factor

Total Flavonoid Content

Total flavonoid content was determined using the aluminum chloride method. One milliliter of methanol extract was added to a test tube, followed by 1.5 ml of pure methanol, 0.1 ml of 10% aluminum chloride, 0.1 ml of potassium acetate solution, and 2.8 ml of distilled water. The mixture was thoroughly mixed and the absorbance was measured at 415 nm using a spectrophotometer (UV-1700, Shimadzu, Kyoto, Japan). The total flavonoid content was calculated equivalent to quercetin based on a standard curve drawn using a 500 ppm 100 ml stock solution of quercetin (Ebrahimzadeh et al., 2008).

Total Phenolic Content

Total phenolic content was determined using the Folin-Ciocalteu method. Methanolic extract (0.5 mL) was taken into a test tube, followed by the addition of 5 ml of 10% (w/v) Folin–Ciocalteu reagent. After 5 minutes, 4 mL of saturated sodium carbonate was added to the mixture. The solution was allowed to stand in the dark for 15 minutes. A calibration curve for gallic acid was prepared using stock solutions in the range of 50-250 ppm, and the total phenolic content was calculated as gallic acid equivalents (Vasco et al., 2008).

Sensory Analysis

Sensory analysis was evaluated by 6 panelists at specified intervals. Samples were randomly coded with three-digit numbers and presented to panelists on white plates at room temperature. Evaluation criteria included color, texture, aroma, taste, and overall liking (1: poor, 9: excellent) to assess sensory qualities (Altuğ and Elmacı, 2005).

Texture Analysis

Texture analysis was conducted to determine factors such as hardness, elasticity, stickiness, gumminess, chewiness, and resilience in the product. Samples were analyzed tı mneasure hardness using a texture

FULL TEXTS BOOK

analysis device (TA.XT Plus, UK) equipped with a 2 mm diameter cylindrical probe, operating at a speed of 5 mm/s with a penetration distance of 7 mm (Mosayabi et al., 2018).

Statistical Analysis

Medium moisture tomatoes (including the control group and all other groups) were stored for 4 months, and physicochemical analyses were conducted at 0, 2, and 4 months. Analysis results were subjected to analysis of variance (ANOVA) with a 95% confidence interval using the SPSS statistical softwarepackage (SPSS, 2011, Version 20.0 for Windows; SPSS Inc., Chicago, Ill). Duncan's multiple range test was applied.

RESULTS AND DISCUSSION

After production and during storage, two different color measurements were provided for the samples: inner and outer parts. The color values of the samples' inner parts measured during storage are presented in Table 1. Medium moisture tomatoes stored at 4°C showed higher brightness values initially in the L* values of the FE (31.95) and BE (35.71) groups compared to the control group (37.27). No statistically significant changes were observed in color values during the storage period ($p>0.05$).

The color values of the samples' outer parts are presented in also in the Table 1. In the 1st month, when looking at the L* values of the outer parts, it was determined that the control group again had the highest brightness value. During the storage process, the brightness value of the samples' outer parts decreased ($p\leq0.05$). The greatest decrease was observed in the BE group. This is thought to be due to the terpenes present in the bay plant, which can affect brightness through oxidation. Baysal et al. (2009) found in their study that samples coatedwith a film containing ascorbic acid could reduce brightness due to the oxidation of ascorbic acid.

The initial a* values after the medium moisture and aromatic plant extracts were added were highest in the control group for both inner and outer parts. The lower redness value (a* value) in the groups with fig and bay leaves compared to the control group is thought to be due to the color of the extracted plants themselves. No significant change was observed in the a* values of the samples during the storage period ($p>0.05$). b* values representing the yellow color, an increase was observed in the FE group during storage, but no statistically significant difference was found in the BE group in the 2nd month ($p>0.05$), while a statistically significant decrease was detected at the end of the 4th month ($p\leq0.05$). Similar changes were found in literature for example, Giovanelli et al. (2002), dried tomato purees with air up to the same moisture content (medium moisture 23% and dry 9%). Both samples were stored for 5 months at 4, 20, and 37°C. Initially, medium-moisture and dry samples showed similar antioxidant activity, while lycopene remained the same in both, and ascorbic acid decreased in both. During storage, differences emerged between medium-moisture and dry products. Medium-moisture products were found to be more sensitive to decreases in lycopene, rutin, and antioxidants, as well as non-enzymatic browning compared to dry products. Changes in color indices were more pronounced at higher temperatures, with the greatest degradation of lycopene and antioxidant activity observed in products stored at 4°C, resulting in color changes. Toor and Savage (2019), studied three different tomato varieties in a commercial greenhouse in New Zealand, drying tomatoes half-dried at 42°C in a hydroponic environment. Semi-dried tomatoes were found to have low HMF values and were darker and had higher a*/b* values compared to fresh tomatoes. In a study examining the effect of cinnamon and clove essential oils on sun-dried apricots, conducted by Levent (2021), all samples showed a decrease in L*, a*, and b* values during storage.

The samples from the control group exhibited a pH value of 4.47 in the 0th month analysis, statistically different from the FE and BE groups ($p\leq0.05$). There was no significant difference observed in the pH changes of the samples over the months ($p> 0.05$). Similarly, Baysal et al. (2009) found no significant difference in pH values between tomato samples treated to high humidity and coated with edible corn

FULL TEXTS BOOK

zein. Ergün et al. (2020), observed no statistically significant changes in pH values when examining tomatoes dried with different salts.

Post-production acidity values were found to be 0.014, 0.221, and 0.007 for the C, FE, and BE groups, respectively. While acidity increased in the control samples during storage, a decrease was observed in the FE group, an increase at the 2nd month followed by a decrease at the 4th month in the BE group. These changes in values are expected to result from the release of free acids due to the breakdown of some compounds during storage. Additionally, previous studies support these findings. For instance, in a study by Levent (2011), the antimicrobial effects of cinnamon and clove essential oils, known as natural preservatives, were investigated on semi-dried apricots with an average moisture content of 21%, which were rehydrated to achieve medium moisture levels. A consistent decrease in moisture and pH values and a regular increase in titration acidity were observed during storage. Veillet et al. (2009), produced a tomato product from smoked and semi-dried tomatoes with a moisture content of 20%. While pH values were similar between fresh and new products, titratable acidity was higher in the new products compared to fresh ones, particularly in terms of citric acid.

The water-soluble dry matter contents of the samples were found to be 51.00±0.00 for the control, 51.50±0.54 for FE, and 47.50±2.588 for BE, showing a statistically significant difference between the BE group and the other groups ($p \leq 0.05$). Significant increases wereobserved at the end of the 4th month ($p \leq 0.05$). It is believed that this difference is due to the extract contents, and the consistent level of this value throughout storage is considered a positive outcome for product quality.

The moisture values for the control, FE, and BE groups were measured as 39.46±1.62, 37.81±3.04, and 38.761±1.40%, respectively at post-production. No statistically significant change was observed in moisture values during storage, despite increases at the 4th month ($p > 0.05$). The stability of moisture levels indicates a delay in microbial spoilage and protection against potential mold formation. Similarly, Vujovic (2015) examined the changes in quality characteristics during storage with different sodium chloride and potassium chloride ratios. They found that the moisture content of dried tomatoes subjected to different salt treatments and stored for 10 months determined statistically significant differences in the first 4 months, but significant increases were observed from the 6th month onwards.

The water activity values of the samples were 0.82±0.03 for C, 0.82±0.00 for FE, and 0.80±0.01 for BE at the 0th month. Initial water activity values did not change due to the addition of aromatic extracts, and statistically insignificant increases were observed during storage ($p > 0.05$), with water activity values ranging between 0.80 and 0.84. Şahin et al. (2010) compared different methods for tomato drying and found that pre-treated dried samples had lower water activity values compared to untreated samples.

Salt (NaCl) is used to slow down spoilage and extend the shelf life of tomatoes before drying. It was determined that the salt content of the control sample was lower compared to samples with added fig and laurel extracts. Generally, an increase in salt content of the samples was observed during storage.

When examining the changes in phenolic compound contents of the samples over months, it was observed that phenolic levels decreased in the control group samples, while samples with added fig and laurel leaf extracts maintained their phenolic capacities during storage. Kurozawa et al. (2014) suggested in their study that the degradation of phenolic compounds could be linked to polyphenol oxidase enzymes, which may have an association with thermal stability. Additionally, they mentioned that a decrease in water activity would lead to a reduction in molecular diffusion, thereby preventing chemical reactions such as oxidation. Oxidation reactions contribute to the degradation of phenols (Terefe et al., 2009). The changes in phenolic compounds during storage are believed to be related to water activity.

The changes in flavonoid contents of the samples after converting them to intermediate moisture and adding aromatic extracts were changed as expected. Initially, the groups with added bay and fig leaf extracts showed higher flavonoid contents compared to the control group. Over the storage period, the phenolic contents of the control group samples gradually decreased. However, the samples with added fig and bay leaf extracts showed a rapid increase in flavonoid levels at the 2nd month and were found

FULL TEXTS BOOK

to be maintained at the 4th month of storage. Thermal processes induce changes in flavonoid structures, especially in the tendency of glycoside forms to convert to aglycone forms, affecting the activity and bioavailability of flavonoids (Roy et al., 2007). These values have either increased or been maintained throughout storage due to extracts enriched with these components. Supporting the decrease observed in not enriched samples, Toor and Savage (2019) dried tomatoes in a hydroponic environment at 42°C in a commercial greenhouse in New Zealand. Total phenolic contents were lower than in fresh tomatoes, and reductions in total flavonoid and lycopene levels were observed in semi-dried tomatoes compared to fresh ones. The ascorbic acid value also decreased after drying, and the total antioxidant value was lower than in fresh tomatoes. Veillet et al. (2009) found that the total phenolic content in semi-dried products with a final moisture content of 20% at 40°C was lower than in fresh products.

Hardness values are an important criterion for tomatoes. Hardness is defined as the maximum force applied to compress the sample and can also be described as the resistance of the food to any external force. No significant difference was observed in the hardness values of the obtained samples ($p>0.05$). This is thought to be due to the consistent moisture content. Since the moisture content did not change, the textural properties were not compromised. Gök (2006), reported that the hardness values of sucuk (a type of sausage) increased during storage due to moisture loss. After 30 days of storage, the hardness values of the samples increased to 7.959-8.499 kg, and the increase in hardness continued on the 60th and 90th days of storage, reaching 12.825-13.080 kg by the end of storage. Similarly, Pürçüklü (2021) found in a study where different concentrations of laurel leaf extract were added to fermented sucuk that the type of sample did not have a significant effect on hardness values during storage. They suggested that the increase in hardness values during storage was due to moisture loss and drying of the samples. In this study, the absence of moisture loss in tomato products during storage has also improved their textural properties.

Sensory analysis showed that, fig leaf extract attracted the attention of panelists. During storage the scores were decreased specially dor the color and taste but generally they prefer the FE group.

Conclusion

In this study, medium moisture tomato snacks enriched with bay leaf and fig leaf extracts were produced, and their quality attributes were compared with the control group after 0, 2, and 4 months of storage. When comparing the color values of the samples, the group enriched with bay leaf extract exhibited enhanced redness. The L* value, indicating brightness, decreased on the outer surfaces of the samples throughout the storage period, with the greatest decrease observed in the group enriched with bay leaf extract, likely due to the presence of terpenes in bay leaves. According to the findings, there were no significant changes in pH and titratable acidity levels in the groups enriched with fig and bay leaf extracts compared to the control group. It was observed that fig and bay leaf extracts preserved pH and titratable acidity levels. The application effects on hardness, elasticity, stickiness, chewiness, gumminess, and resilience were found to be statistically insignificant even after 4 months. Analysis of soluble solid content (°Brix), changes in water activity and moisture content showed no statistically significant changes in the enriched groups compared to the control group during storage. Results indicated that the salt content of the control group changed less compared to the other groups after 4 months of storage, with the lowest salt content found in the control group. However, these changes were statistically insignificant. Moreover, the changes in salt content were determined not to be perceptible from a consumer perspective. Samples from the control group showed a decrease in phenolic and flavonoid capacities during storage. However, groups enriched with fig and bay leaf extracts preserved their phenolic and flavonoid contents, likely due to the bioactive compounds present in fig and bay leaves. In conclusion, the development of products enriched with bioactive compounds such as phenolics and flavonoids using different aromatic plant extracts is considered effective in maintaining quality during storage.

FULL TEXTS BOOK

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FULL TEXTS BOOK

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FULL TEXTS BOOK

TÜRKIYE'DE DOĞAL REÇINE TÜREVLERININ ÜRETILME POTANSIYELI: KAZDAĞLARI ÖRNEĞI
THE POTENTİAL OF NATURAL RESİN DERİVATİVES PRODUCTİON İN TÜRKİYE: THE CASE OF KAZDAĞLARI

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ÖZET
Doğal reçine, genellikle iğne yapraklı ağaçlardan elde edilen, tarihi ve ekonomik değeri oldukça yüksek olan katma değerli bir orman ürünüdür. Türkiye'de 1950'li yıllardan bu yana doğal reçine üretimi için çeşitli girişimlerde bulunulduğu fakat ekonomik sebepler ve piyasa koşullarına uyum sağlanamaması nedeniyle zaman içinde üretimin azaldığı bilinmektedir. Bugün stratejik bir ürün olarak görülen doğal reçinenin endüstriyel ölçeklerde üretilmesi yeniden teşvik edilmektedir. Diğer taraftan, üretilen doğal reçinenin doğrudan kullanım alanları kısıtlıdır ve günümüz pazar koşullarında rekabet edebilmesi için doğal reçinenin fraksiyonlarına ayrılarak işlenmesi gerekmektedir. Bu nedenle hem kullanım yelpazesini genişletmek hem de ürünü standardize edebilmek için doğal reçinenin türevlendirilmesi önerilmektedir. Bu çalışmanın amacı, Kazdağları'nda bulunan kızılçam ormanlarından elde edilen doğal reçinenin endüstriyel olarak reçine türevlerine dönüştürülebilme potansiyelinin incelenmesidir. Bu kapsamda, bölgede bulunan pilot bir tesiste bütüncül fizibilite analizi yapılarak yaklaşımsal değerlendirmeler yapılmıştır. Ülkemizin reçine üretimine elverişli orman kaynaklarına sahip olduğu ve reçine türevlerinin üretilebilmesi için önünde teknik, örgütsel ve yasal fizibilite bakımından bir engel olmadığı görülmüştür. Diğer taraftan, doğal reçine türevleri alanında girişimci şahıs ve şirket sayısının az olması ve mevcut tesislerde ürün çeşitliliğin arttırılamaması sektörün başlıca sorunları olarak öne çıkmaktadır. Gelecekte bu alanda yapılacak çalışmalar ile Türkiye'de doğal reçine sektörünün gelişmesine yönelik önemli adımlar atılacağı düşünülmektedir.
Anahtar Kelimeler: doğal reçine, odun dışı orman ürünleri, kazdağları, teknik fizibilite, örgütsel fizibilite

ABSTRACT
Natural resin is a value-added forest product obtained from coniferous trees and it has a high historical and economic importance. It is known that various trials have been made to produce natural resin in Türkiye since the 1950s, but production amount has decreased over time due to economic reasons and inability to adapt to global market conditions. Today, natural resin is recognized as a strategic product and its production on industrial scales is being encouraged again. On the other hand, the direct use of natural resin is limited, and it must be fractionated to be competitive in today's market conditions. Therefore, derivatization of the natural resin is recommended both to widen the range of uses and to standardize the product. The aim of this study is to investigate the potential of natural resin obtained from Kazdağları forests to be converted into industrial resin derivatives. In this context, a comprehensive feasibility analysis was carried out based on approachable evaluation at a pilot plant in this region. It has been observed that Turkey has suitable forest resources for natural resin production and there is no

FULL TEXTS BOOK

obstacle in terms of technical, organizational and legal feasibility to produce resin derivatives. On the other hand, the main problems of the sector are the low number of entrepreneurs in the field of natural resin derivatives and the inability to increase product variety in existing facilities. It is thought that future studies in this field will play an important role in the development of the natural resin sector in Türkiye.
Keywords: natural resin, non-wood forest products, Kazdağları, technical feasibility, organizational feasibility

GİRİŞ

Doğal reçine, genellikle iğne yapraklı ağaçlardan elde edilen, tarihi ve ekonomik değeri oldukça yüksek olan katma değerli bir orman ürünüdür (Deniz, 2002; Pekgözlü & Ceylan, 2018). Doğal reçinenin geçmişinin Hz. Nuh dönemine kadar dayandığı ve geminin suya değen kısımlarında çürümeyi ve su almayı önlemek amacıyla kullanıldığı rivayet edilmektedir (Güner, 2015). Günümüzde ise kâğıt endüstrisi, mürekkep, gıda, sağlık, otomotiv gibi birçok alanda doğal reçine kullanılmaktadır (Zinkel, 1975).

2017 yılında yayınlanan Reçine Eylem Planı'na göre Türkiye'de doğal reçinenin tarihi gelişimi dört döneme ayrılmıştır. Birinci dönemde, 1850-1874 yılları arasında plansız bir reçine üretimi yapılmıştır. 1874-1959 yılları arasında doğal reçine üretimi konusunda bir yönetmelik uygulamaya alınmıştır ancak bu dönemde üretim şeklinde henüz bir standardizasyon yapılamamıştır. İlerleyen yıllarda Orman Genel Müdürlüğü (OGM) tarafından "Reçine Talimatı" yayınlanmış ve böylece 1959 yılında planlı bir üretime geçilmiştir. İçinde bulunduğumuz dördüncü dönemde, doğal reçine "odun dışı orman ürünleri" kapsamında değerlendirilmekte ve OGM'nin ilgili yönetmelikleri doğrultusunda üretim süreçleri yürütülmektedir. Bununla birlikte, reçine üretimine elverişli ağaç türlerine sahip Kazdağları ormanları çevresinde, doğal reçine üretimi hususunda geçmiş yıllarda çeşitli özel girişimlerde bulunulduğu fakat zaman içinde fabrikaların kapandığı ve bu alandaki ihtiyacın ithalat yoluyla karşılandığı bilinmektedir (Angın, 2020). Kapanmanın sebepleri ürün geliştirme faaliyetlerinin olmaması, mevsime bağlı hammadde temin zorluğu ve bu nedenle sürekli üretim yapılamaması ve ithal ürünlerle fiyat rekabeti yapılamaması olarak sıralanabilir. Yıllar içinde ülkemizin kalkınma stratejileri değişmiş ve milli kaynakların etkin kullanılması hedefiyle çeşitli kararlar alınmıştır. Bugün stratejik bir ürün olarak kabul edilen doğal reçinenin endüstriyel olarak üretilmesi devlet tarafından yeniden desteklenmektedir (Reçine Eylem Planı, 2017). Diğer taraftan, üretilen doğal reçinenin doğrudan kullanım alanları kısıtlıdır ve günümüz pazar koşullarında rekabet edebilmesi için doğal reçinenin fraksiyonlarına ayrılarak işlenmesi gerekmektedir (Güle, 2019; Pathak & Dorle, 1990; Popova et al., 2021). Bu nedenle hem kullanım yelpazesini genişletmek hem de ürünü standardize edebilmek için doğal reçinenin türevlendirilmesi önerilmektedir (Angın, 2024). Türevlendirmenin ilk basamağı doğal reçineyi terebentin (uçucu faz) ve kolofana (sabit faz) ayırmaktır. Akabinde, nihai kullanım alanına göre seçilen modifikasyon kimyasalları ile her iki faz da türevlendirilmekte ve ekonomik değeri yüksek reçine türevi ürünler elde edilmektedir (Zinkel, 2018).

Bu çalışmanın amacı, Kazdağları'nda bulunan ve fenolik reçine türevi ürettiği varsayılan pilot bir tesiste yaklaşımsal fizibilite analizleri yaparak, doğal reçine türevlerinin üretiminin teknik, örgütsel ve yasal açıdan uygulanabilirliğini bütüncül olarak değerlendirmektir. Ülkemizde doğal reçine türevlerinin üretilmediği göz önünde bulundurulduğunda, bu konuda yapılan araştırmaların literatüre katkı sağlayacağı ve yerli üretimde farkındalık yaratacağı düşünülmektedir.

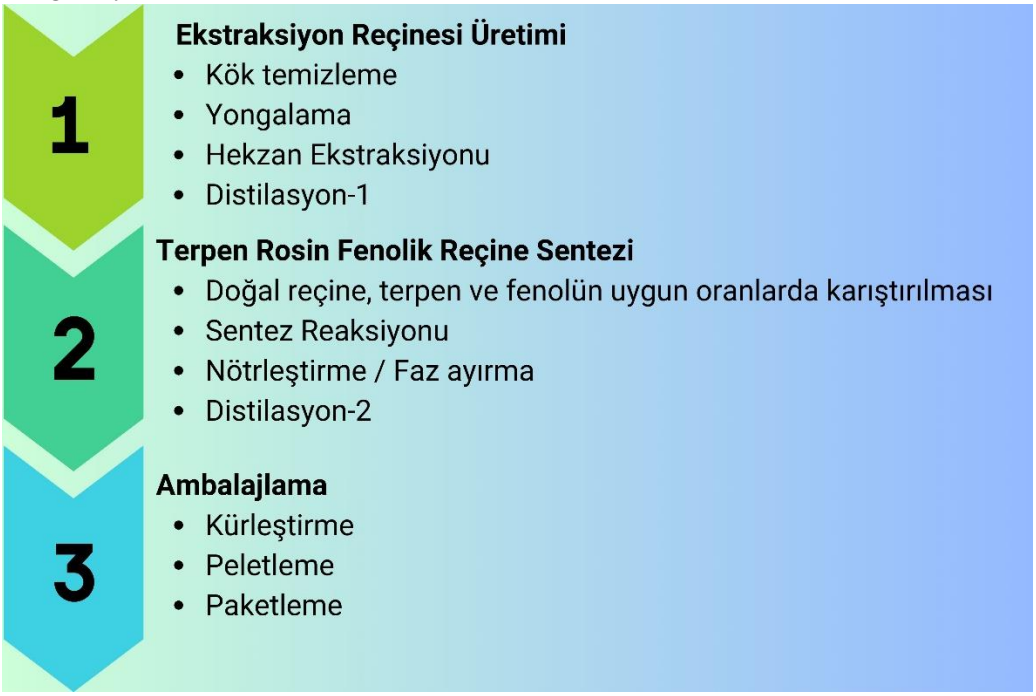
MATERYAL VE YÖNTEM

Fizibilite analizleri olası yatırım kararının isabetli olup olmadığı, kısa, orta ve uzun vadede sürdürülebilirliği açısından kritik önem arz etmektedir. Bu çalışmada, Kazdağları bölgesinde üretim yapan bir tesiste yaklaşımsal olarak teknik, örgütsel ve yasal fizibilite analizi yapabilmek için aşağıdaki sınırlar belirlenmiş ve varsayımlarda bulunulmuştur:

FULL TEXTS BOOK

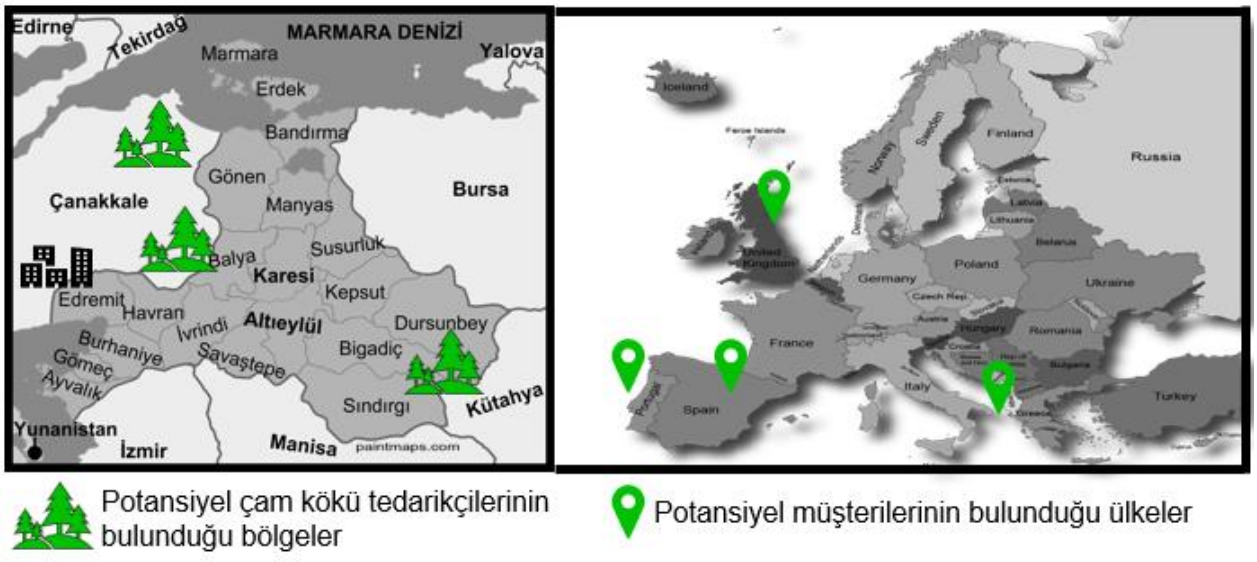
- Doğal reçine, çam köklerinin uygun çözücü ekstraksiyonuyla üretilmektedir.
- Yılda yaklaşık 3000 ton reçineli çam kökü işlenmektedir.
- Tesiste nihai ürün olarak yalnızca Terpen Rosin Fenolik Reçine üretilmektedir.
- Üretilen terebentinin tamamı fenolik türevlendirme prosesinde kullanılmaktadır.
- Tesis üç vardiya çalışmaktadır.
- Çam kökleri yalnızca OGM'nin belirlediği alanlardan ve izin verilen miktarlarda çıkarılmaktadır.

Terpen Rosin Fenolik Reçine üretiminin genel proses akışı Şekil 1'de gösterilmiştir. Buna göre gereken ekipmanlar seçilmiştir ve yukarıda verilen üretim kapasitesi ve sektör araştırması baz alınarak ekipman sayısı ve iş gücü yaklaşımsal olarak belirlenmiştir.



Şekil 1. Terpen Rosin Fenolik Reçine üretimi proses akış şeması

Tesisin Kazdağları civarında reçineli çam kökü tedarik edebileceği potansiyel bölgeler ve olası müşterilerin konumları Şekil 2'de işaretlenmiştir.



FULL TEXTS BOOK

Şekil 2. Potansiyel tedarikçi ve müşterilerin konumları

Yukarıda verilen bilgiler ışığında teknik, örgütsel analizleri yaklaşımsal olarak gerçekleştirilmiştir. Yasal fizibilite analizi için yürürlükte olan mevcut mevzuatlar ve yasalar taranmış, sanayi paydaşının bilgi birikimi ve uzman görüşleri de değerlendirmeye alınmıştır.

BULGULAR ve TARTIŞMA

Doğal reçine kullanarak Terpen- Rosin Fenolik Reçine üreten bir tesisin teknik değerlendirmesi yapıldığında, üretim hattı ve ekipman yerleşimi için yaklaşık 3020 m² kapalı alan öngörülmektedir. Tesiste ihtiyaç duyulacak ekipmanların listesi ve sayısı Şekil 3'te verilmiştir.

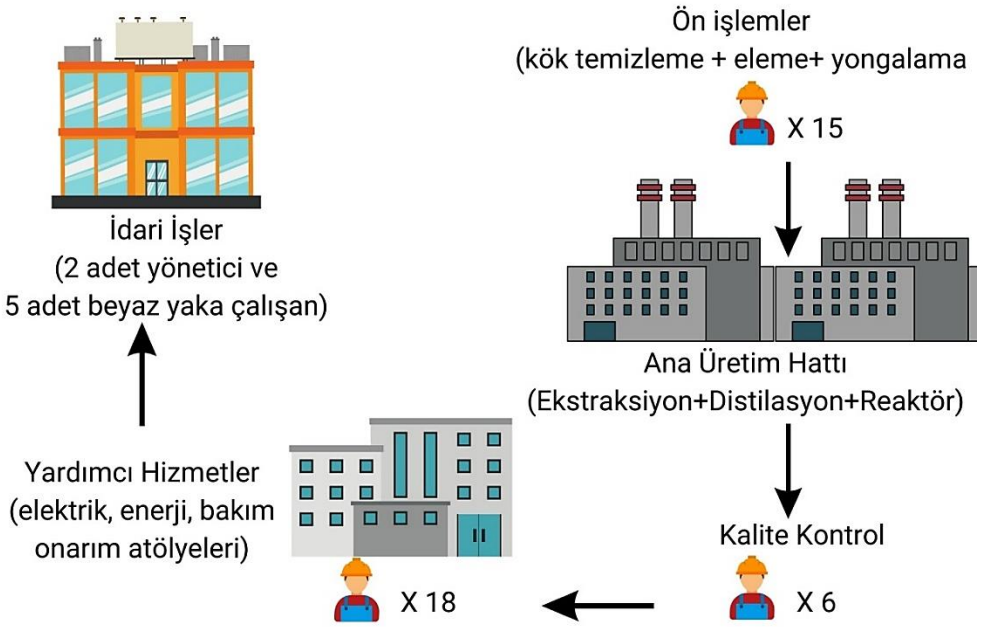


Şekil 3. Terpen Rosin Fenolik Reçine üretiminde kullanılacak ekipman listesi

Teknik fizibilite kapsamında bir değerlendirme yapıldığında, yıllık 500-1000 ton reçine türevi üretilebilmesi için küçük ölçekte bir tesisin yeterli olacağı öngörülmektedir. Bununla birlikte, ihtiyaç duyulan ekipmanlar incelendiğinde özellikle distilasyon ve reaktör ünitelerinde etkin sıcaklık ve basınç kontrolünün gerekeceği tahmin edilmektedir. Bu proseslere yapılacak yatırımların önceliklendirilmesi ve bakım onarım maliyetlerinin de göz önünde bulundurulması tavsiye edilmektedir.

Tesisin üç vardiya üretim yapabilmesi için örgütsel fizibilite kapsamında üretim tesisinde çalışacak personelin yetkinliği ve sayısı belirlenmiştir (Şekil 4). Buna göre toplamda 46 çalışana ihtiyaç duyulmaktadır. Örgütsel fizibilite açısından değerlendirildiğinde reçine sektörünün kırsal kalkınmaya destek sağladığı, orman köylülerine iş fırsatı yarattığından söz edilebilir. Fakat topraktan kök çıkarım işi emek yoğun bir iş olduğu için her zaman istenen sayıda işçi bulanamadığı bilinmektedir. Bununla birlikte, orman köylülerinin reçine ve reçineli dip kütüklerin tespiti ve topraktan doğru bir şekilde çıkarılması konusunda düzenli olarak eğitilmesi gerekmektedir. Bu konuda da gerek reçine üreticilerinin sosyal sorumluluk projelerine gerekse OGM'nin farkındalık eğitimlerine ihtiyaç duyulmaktadır.

FULL TEXTS BOOK



Şekil 4. Personel yetkinliği ve yeterliği

Doğal reçine türevinin üretimi yasal fizibilite kapsamında değerlendirildiğinde üretimin önünde yasal bir engel olmadığı görülmektedir. Ancak, atıl çam köklerini topraktan çıkarma işlemi 6831 sayılı Orman Kanunu'nun ilgili maddeleri ve 310 Sayılı Oduna Dayalı Orman Ürünlerinin Üretim İşlerine Ait Tebliğ uyarınca Orman Genel Müdürlüğü'nün iznine tabidir. Dolayısıyla yasal yıllık üretim kapasitesi verilen izinlerin miktarı kadardır. OGM'nin her yıl bu kapasiteyi artırmak ve reçine üretimini teşvik etmek için çeşitli faaliyetler yürüttüğü bilinmektedir. Bir diğer konu ise ülkemizde ithal reçinelerden gümrük tarife vergisinin alınmamasıdır. Bu durum ithal ürünleri ekonomik anlamda daha cazip hale getirmekte ve yerli üreticinin fiyatlarla rekabetini zorlaştırmaktadır.

SONUÇ ve ÖNERİLER

Bu çalışmada Türkiye'de şimdiye kadar hiç üretilmemiş ve tamamen dışa bağımlı olunan, ülkemiz için yeni ve yerli katma değerli bir reçine türevi olan Terpen Rosin Fenolik Reçine'nin tarafımızca özgün tasarlanan bir yöntem ile Kazdağları civarında yer alan pilot bir tesiste endüstriyel ölçekte üretilebilme potansiyeli teknik, örgütsel ve yasal fizibilite analizleri ile incelenmiştir. İncelemeler neticesinde üretimin önünde teknik veya yasal boyutta bir engel olmadığı ve küçük ölçekli bir işletmede üretimlerin yapılabileceği tespit edilmiştir. Doğal reçine ve türevlerinin üretilmesi katma değerli ve yatırıma değer bir iş kolu olarak değerlendirilmektedir. Bununla birlikte doğal reçine sektörünün bilinirliğinin artmasına, üreticilerin teşvik edilmesine, nitelikli personel sayısının artması için sektörel eğitimlerin düzenlenmesine ve orman köylülerinin doğal reçine konusundaki farkındalığının arttırılmasına ihtiyaç duyulmaktadır. Gelecekte bu alanda yapılacak çalışmalar ile Türkiye'de doğal reçine sektörünün gelişmesine yönelik önemli adımlar atılacağı düşünülmektedir.

TEŞEKKÜR

Bu çalışma Naile Angın'ın, 120O609 numaralı TÜBİTAK projesi ile desteklenen, "Doğal Terpen-Rosin Fenolik Reçinenin Çevreci Bir Yaklaşımla Sentezi ve Yapay Sinir Ağları ile Modellenmesi" başlıklı doktora tezinden türetilmiştir. Destekleri için TÜBİTAK'a teşekkür ederiz. Teknik bilgi ve tecrübe paylaşımı için İVA Reçine Biyokütle A.Ş. yöneticilerine ve Yüksek Kimya Mühendisi Mehmet Emin GÜLE'ye teşekkürlerimizi sunarız.

FULL TEXTS BOOK

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FULL TEXTS BOOK

VISUALIZING TIME: A CINEMATIC EXPLORATION OF TIME-IMAGE IN *"COCOON"*

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ABSTRACT
This study explores Nuri Bilge Ceylan's film "Cocoon" (Koza, 1995) within the framework of Gilles Deleuze's concept of the "time-image." Deleuze's theory posits a shift in cinema after World War II towards a more profound exploration of time and existence, termed the "time-image." "Cocoon" exemplifies this cinematic evolution through its narrative style and thematic exploration, inviting viewers into a contemplative engagement with the complexities of temporality and human experience. By analyzing specific elements of the film through Deleuzian lenses, this study aims to explain how "Cocoon" employs the time-image to reshape cinematic perception and enrich philosophical reflections on time and existence. This research contributes to the understanding of both Ceylan's cinematic aesthetics and Deleuze's philosophical framework, emphasizing the transformative potential of the time-image in contemporary cinema.
Keywords: Gilles Deleuze, Time-image, Nuri Bilge Ceylan, "Cocoon" (1995), aesthetics

INTRODUCTION

Gilles Deleuze, in all his works, aimed to capture the connection between philosophy and life. He believed that philosophy, seen as the sensation and realization of life, is fundamentally a practical part of human existence. In his view, philosophy should be brought closer to life and people. By providing different perspectives and mediating various sensations, philosophy, according to Deleuze, is an activity of creating concepts. "The philosopher is the concept's friend; he is potentiality of the concept" (Deleuze and Guattari, 1994, p. 5). These concepts, once discovered, enrich our ways of living in this world. In developing his philosophy of 'immanence,' Gilles Deleuze created his own concepts, while also evaluating the philosophies and concepts of many other thinkers.

Emphasizing life's constant change, Deleuze believed art had a special role in this regard. While philosophy creates concepts, art creates sensations by materializing virtual differences through creative acts, extracting pure sensory existence through its imagery. The aim of art within the possibilities of its materials is to extract from a mass of sensations, a pure sensory existence (Deleuze and Guattari, 1994, p. 163-179). Each artwork conveys the sensations discovered by the artist to its audience. Art is sensory becoming, liberating us from ourselves to engage with matter, while philosophy is conceptual becoming, reshaping our understanding of thought itself (Colebrook, 2001, p. 70). Art is associated with humanity's struggle with chaos and the search for meaning. This engagement with chaos is shared by philosophy and science, all advancing through crises to challenge fixed opinions and explore new conceptual realms (Deleuze and Guattari, 1994, p. 201-208).

In Deleuze's philosophy, the art of cinema holds an important and privileged place. In his books, "Cinema 1: Movement-Image" (1986) and "Cinema 2: Time-Image" (1989), Deleuze examines the evolution of cinema from a philosophical perspective through two primary concepts: "the movement-image", characteristic of early cinema, and "the time-image", representative of modern cinema. Deleuze asserts that cinema evolved post-World War II and entered a modern era. While the movement-image conveys time indirectly, the time-image directly offers a sense of duration, free from movement. There are different cinematic techniques of these two distinctive periods of cinema. The movement-image in cinema explores how films depict movement and action (Deleuze, 1986). Influenced by Bergson's

FULL TEXTS BOOK

concept of ‘durée,’ ‘the time-image in cinema merges past, present, and future, evoking the sensations of concepts and mental states’ (Deleuze, 1989).

Nuri Bilge Ceylan's debut short film "Cocoon" (Koza, 1995) exemplifies Gilles Deleuze's "time-image" by rejecting traditional narratives for a contemplative exploration of time and existence through long takes, minimalist dialogue, and sensory imagery. This approach emphasizes temporal experience and the subjective nature of existence, fostering philosophical reflections on time's fluidity and multiplicity. Ceylan's aesthetic choices enrich our understanding of time, memory, and identity in contemporary cinema.

METHODOLOGY

Deleuze identifies two distinct periods in cinema, shaped as the world transitioned into the modern era after World War II, fundamentally altering perceptions and sensations of existence. Time in cinema is indirectly presented through the movement-image (Deleuze, 1986), whereas the time-image (Deleuze, 1989), devoid of movement, directly conveys a sense of duration.

Deleuze's (1986) concept of the movement-image in cinema examines how films portray physical, psychological, and emotional movement through perception-images, action-images, and affection-images, offering unique perspectives on reality and time in cinematic storytelling. These images constitute a mobile section of a changing whole, representing a bloc of space-time and providing perspectives on real time, with time-images potentially encompassing various indirect forms resulting from comparisons or combinations of these varieties. (Deleuze, 1986, p. 68). Deleuze believes that until Italian Neorealism, cinema primarily provided the movement-image, where time was reflected as dependent on movement. In the cinema of the movement-image we have frames which organize sets of images” (Colebrook, 2001, p. 45).

He suggests that the changing world postwar period and our way of perceiving it are reflected in modern cinema through the time-image, which conveys time directly, independent of movement and space. In neo-realism, time is liberated from movement, creating a dreamlike quality where actions float rather than drive towards a clear conclusion, engaging the senses optically and auditorily (Deleuze, 1989, p. 4).

In the cinema of the movement-image the flow of time is sensed as that which lies above and beyond any of the divergent movements. In the time-image we sense duration directly, not derived from movement. Unlike the dialectic, its becoming is positive: for we confront becoming itself, not as an indirect whole of all the composed mobile sections (Colebrook, 2001, p. 50).

Modern cinema shows significant similarities with Deleuze's concept of time. Deleuze and Guattari's ontology urges a reorientation towards time as a unified duration, fostering creative solutions to contemporary challenges by emphasizing imagination alongside reason in the postmodern era (Lorraine, 2011, p. 113). When developing his concept of time, Deleuze was greatly influenced by Bergson’s (2000, pp. 226-227) concept of ‘durée’, (duration). In this context, time is not formed by the sequential occurrence of equal intervals of past, present, and future. The past never disappears. Our duration, which defines our existence, integrates past and present, reflecting modern pace of life and the complexities of mental states.

This study examines how Nuri Bilge Ceylan's short film "Cocoon" creatively employs the time-image to evoke a sensory experience of time, thereby enriching our comprehension of Deleuze's philosophical concepts in modern cinema.

"COCOON": VISUALIZING THE TIME-IMAGE

Nuri Bilge Ceylan's short film "Cocoon" employs Deleuze's concept of the "time-image" and reshapes cinematic perception, enriching philosophical reflections on time and existence. It demonstrates the transformative potential of the time-image, highlighting how Ceylan's aesthetic choices cultivate a space

FULL TEXTS BOOK

to reflect on the intricate relationship between time and memory, thereby enriching our understanding of Deleuze's philosophical framework and its application in modern filmmaking. Ceylan's films address the unbearable nature of relationships, the helplessness of connecting with ourselves, others, and the surrounding world, and the painful process of being human (Harvey-Davitt, 2016, pp. 250-252). His films show situations that we have normalized or become accustomed to. In a way, this represents a challenge or confrontation with oneself, one's life, its darker aspects, and one's values; it is an attempt to understand oneself and an ongoing struggle with that understanding.

"Cocoon" uses the time-image to evoke deep emotions and concepts, intertwining themes of lost past, alienation, elusive time, memories' burden, and the existential weight of human existence. The plot centers around a couple isolated from the outer world and from each other, giving a sense of loss and unmet expectations. It depicts an elderly couple in a remote rural setting, revealing their existential reflections and unspoken tensions. There is almost no events or story in the film. With just the images, the meaning is formed in "Cocoon". The short, wordless black-and-white "Cocoon" creates an enigmatic mood through its non-linear narrative, leaving the relationships between an old man, an old woman, and a young boy unspecified, inviting the viewer to construct their own storyline (Diken, Gilloch & Hammond, 2022, 17)

Ceylan's characters often reflect the disillusionment of unmet potential and grapple with existential questions about life, past influences, and the reconciliation of ideals with reality (Andrew, 2010, p. 3). In "Cocoon", the abstract portrayal of the elderly couple's emotional distance prompts us to reconsider their sense of closeness. It gives the moods of the people in it and depicts core of their existence. Ceylan's films feature estranged characters who ironically seek loneliness as a remedy for their inability to form meaningful relationships (Diken, Gilloch & Hammond, 2022, p. 2).

"Cocoon" explores themes of isolation and introspection, life and death through a minimalist style and non-narrative approach. "Cocoon" visualizes the intertwined processes of individual memory and mourning, reflecting on death as both a past event and an inevitable future, encapsulating the sadness of the life cycle's transformation into a "death cycle" (Diken, Gilloch & Hammond, 2022, pp. 24, 25, 33). Without a dialogue, the film gives the feeling temporality and weight of time giving an image of time that merges lived and unlived moments merging the past and future in the present time. How does the film achieve this?

Temporal Experience and Fragmented Narrative

"Cocoon" exemplifies Deleuze's idea of the "time-image" in cinema, reflecting a departure from traditional narrative structures and a deeper exploration of time and existence. The film's narrative eschews conventional linear storytelling, opting instead for a fragmented and contemplative approach that foregrounds the temporal experience. So, it does not tell a story but a state of mind. "Ceylan's cinematic language is fundamentally based on visual aesthetics" (Aliyev, 2019, p. 15). This is accomplished through the multifaceted representation of time in the film. With the time-image, cinema has moved beyond narrative. The time-image utilizes the power of art to generate new sensations and create 'difference.' This stems from the concept of time as 'duration.' Unlike a linear series of past, present, and future, duration is a continuous flow that produces new differences with each moment, embodying a sense of 'togetherness'.

Whereas movement-images were indirectly tied to time through montage, pure optical and sound images directly connect to a time-image that subordinates movement, making time the perspective of movement and creating a new cinema of time (Deleuze, 1989, p. 22). This represents a narrative style that contrasts with the editing approach used in movement-image cinema. The rejection of a cohesive whole created through editing becomes possible in this manner. There are no longer sensory-motor images with extensions, but complex circular links between pure optical and sound images and those from time and thought (Deleuze, 1989, p. 47). In the time-image cinema, there is a destruction of established realities. As the world we believed in collapse, the classical narrative structure in cinema has been shattered. With

FULL TEXTS BOOK

the time-image, cinema transcends action-image constraints by unifying time, image, and thought into a single subjectivity, offering characters detached sensory experiences and a fluid panorama of memories, reflecting a deep temporal freedom like expressionism's unconscious imagery (Deleuze, 1989, p. 55).

The shift in cinematic understanding has disrupted the linearity of time. In the modern era, where mental states are shaped by possibilities and uncertainties, people no longer perceive time linearly. Consequently, films do not progress continuously forward; instead, they exhibit jumps backward and forward in time due to the disruption of causal relationships between events. Like "stream of consciousness" technique in contemporary novels, time is constructed through associations. Time itself seems to have expanded, giving the impression of floating within it. The time-image captures a transient panorama where time appears to float freely among images of the past (Deleuze, 1989, p. 55). To convey this sensation, the time-image employs long shots and depth of field reveal the multi-layered nature of reality.

Post-war cinema, through prolonged stillness and the time-image, shifts focus from character-driven narratives to the heightened presence of time, revealing characters' idle defeat and questioning the possibilities of action and representation (Katsanis, 2015, p. 170). "Cocoon" creatively uses the time-image to evoke a specific emotion and concept. The film successfully conveys the conceptual sense of lost past, elusive time, the burden and ruthlessness of memories, as they merge in the consciousness of two elderly people, making us feel the weight of life, human existence, unfulfilled expectations, and lost hopes in this world. Deleuze argues that cinema liberates image sequencing from everyday perceptual structures, presenting images in their purely optical form, thus challenging conventional narrative and perceptual frameworks (Colebrook, 2001, pp. 31-32). In "Cocoon," Ceylan breaks the linear narrative of time by employing a sense of temporality.

Koza ends with a montage of shots previously seen in the film: the woman sitting on the boat; the man warming his hands; the woman beside the barred window; and the rain plashing on the window. The action fades to black without any apparent dénouement, thereby reminding us that life has no beginning, middle, or end. What we are left with is a kaleidoscope of melancholy memories. Only when we make the effort to escape from our physical or mental cocoons can we understand Mother Anatolia, symbolized in Ceylan's film by the sight of a single bird feather falling slowly to the ground and blown away by a gust of wind (Raw, 2107, p. 142).

Contemporary narrative cinema, rejecting the notion of a definitive story, avoids creating complete or coherent worlds. Unlike traditional cinema, which develops plots through cause-and-effect relationships, contemporary narratives forgo the logical progression of beginning, middle, and end. Modern film aesthetics favor scenarios where unexpected situations arise, and events do not necessarily lead to a conclusion. "Cocoon" is open to different commentary with its fragmented structure and different meanings at a time. For example, numerous interpretations can be made about the couple's relationship or the image of a young boy. The couple might be estranged or reluctantly reunited. The boy could represent their lost child or a child they never had. While various interpretations are possible, the film's atmosphere and the characters' moods can be sensed: they are trapped in a specific moment that continually blends with the present. And the images contribute to the uncanny feeling in the film.

Slow Aesthetics and the Time-image

Nuri Bilge Ceylan's cinema is named as "slow cinema" by some scholars like Çağlayan (2018) and Rattee (2017). The absence of quick scene transitions allows the audience to fully absorb the character's emotional state, connect with the scene's mood, and gauge the character's feelings. Slow films challenge viewers not only due to their somber subjects but also because they restrict movement, dialogue, and spectacle, creating a sense of stillness and emptiness (Jaffe, 2014, pp. 36-37). Ceylan's films generally explore themes of alienation, homelessness, communication breakdown, and rural life. Ceylan's intentional slowness helps form what Deleuze refers to as the 'time-image' (Suner, 2010; Çağlayan,

FULL TEXTS BOOK

2018; Diken, Gilloch & Hammond, 2022). Specific elements such as the deliberate pacing, no dialogue, and the focus on ordinary yet profound moments invite viewers into a meditative engagement with the complexities of temporality and human experience.

“Ceylan’s films are characterized by long takes, featuring static compositions or slow zooms, creating self-contained universes.” (Raw, 2107, p. 138). Through its use of long takes and deep imagery, "Cocoon" disrupts the conventional cause-and-effect progression, emphasizing the pure passage of time and the subjective nature of existence, giving the feeling of Heidegger’s “profound boredom” concept. "Profound boredom" in art cinema through slow aesthetics and empty images to prompt deeper reflection on perception and time, contrasting with mainstream cinema's focus on engagement and emotional investment (Quaranta, 2020, pp. 2-17). This cinematic technique fosters philosophical reflections on the fluidity and multiplicity of time, aligning with Deleuze's notion of the "time-image". Ceylan’s long takes help us grasp their enigmatic qualities and raises questions about accessing others' thoughts and feelings (Rattee, 2017, p. 217). Ceylan’s long takes help us grasp their enigmatic qualities and raises questions about accessing others' thoughts and feelings (Rattee, 2017, p. 217). By transforming boredom into a contemplative state, Ceylan’s films utilize it as an aesthetic virtue, reconfiguring it from a negative emotion to one that fosters creative inspiration and artistic insight (Çağlayan, 2018, pp. 162-163).

“The modern reality is that we no longer fully believe in this world or the events in our lives, including love and death; it feels as though the world itself is a bad film projected at us” (Deleuze, 1989, 171). People in an isolated and alienated world seek to reclaim their reality and reconnect with their lives. As Tarkovsky (1987, pp. 82-82) says as they buy their tickets, the cinemagoer seeks to fill the spiritual void caused by modern life's constant activity, reduced human contact, and materialist education. In cinema, our experiences become creative by merging with our own sense of time, generating new sensations and differences through our connection with the film's duration. This is a way of coping with the existence in modern life. And Ceylan’s focus on images prompts us to question whether our pursuit of material wealth disconnects us from nature (Raw, 2107, p. 139). "Cocoon" portrays a world of isolation, clearly illustrating that everyone exists in their own secluded space, much like a cocoon.

Modern cinema structures its narrative and formal features to reveal and embody the reality it depicts. Like other arts, modern cinema does not present a cohesive, completed aesthetic. "Modern life is marked by paradoxes such as fragmented images, discontinuity, the collapse of order, and inconsistency; therefore, film form must embody and reflect these elements within its structure" (Savaş, 2003, p. 204). Modern cinemas problematize the reality it depicts. "If reality is continually evolving and lacks an absolute essence to guide and determine it, then determined values cannot exist" (Savaş, 2003, p. 196). Modern cinema is a cinema of possibilities, suggesting what a person could be rather than defining them. It highlights the grim aspects of reality, presenting films as open works that viewers reconstruct in their minds. These all contribute to the formation of the time-image.

With its static cameras, long takes, and close-ups, "Cocoon" invites us to ponder the images and feel the inner time of the characters. By this way, it makes us skeptical of both hidden intentions and the visible reality. The lack of cohesive narrative reflects a focus on abstract issues. Slowness and boredom become aesthetic features that evoke the film's concepts, shaping the time-image.

Time and Fragmented Space

With the time-image, space and events transform into a dreamlike reality occurring within our minds. Individuals seek to reclaim their sense of reality and reconnect with their self and life in a desolate and alienated world. In time-image cinema, what we see is the representation of the past and future within the present, emphasizing a specific emotional state as if it were frozen in time. Neo-realism's focus on optical and sound situations diverges from traditional sensory-motor settings, establishing a context in 'any-space-whatever', whether connected or emptied, highlighting a shift towards a more abstract cinematic experience (Deleuze, 1989, p. 5).

FULL TEXTS BOOK

In "Cocoon", the old couple is portrayed as living in a state of solitude, surrounded by an environment that underscores their sense of disconnection from the world. Through long takes and minimal dialogue, the film explores their inner lives and the silent, yet profound, impact of their surroundings on their emotional state. “The time-image gives us time itself, no longer spatialized or derived from movement” (Colebrook, 2001, p. 47). The emphasis is on exploring mental states and layers of real rather than action. Deleuze uses Antonioni’s Eclipse as an example to highlight how limit situations absorb characters and actions into empty, abandoned spaces, emphasizing that space becomes any-space and movement loses its meaning (Deleuze, 1989, p. 5).

In Ceylan’s films, there is minimal causality due to their lack of a narrative focus. In "Cocoon", the independent and timeless spaces convey a dreamlike sensation, with the elderly couple mourning lost time, unfulfilled expectations, and the passage of life. Time merges within these dreamlike spatial fragments, creating a mental image that disrupts chronological time. The non-linear narratives in Ceylan’s films result in an almost non-existent chain of causality. "Cocoon" conveys intertwined memories, longing for the past, and breaks free from the constraints of space.

CONCLUSION

Gilles Deleuze saw philosophy as a dynamic process that shapes and is shaped by the world, fostering creative evolution and deeper exploration (Lorraine, 2011, p. 165). He applied this view to art and cinema, considering art a transformative act that reveals new sensations and confronts chaos. For Deleuze, cinema should focus on creating images and emotions rather than merely telling stories, avoiding clichés and exploring new possibilities through its connection with time to offer unique experiences. Deleuze distinguishes between the movement-image and the time-image to describe how cinema represents movement and time. He asserts that the aftermath of World War II brought about profound shifts in how we perceive and depict reality, which is reflected in the evolution of cinematic art. Deleuze argues that while earlier cinema focused on depicting physical movement through the movement-image, modern cinema, characterized by the time-image, explores a deeper sense of temporal experience. The time-image captures the internal passage of time and existential depth, offering a reflection of modern existence.

Nuri Bilge Ceylan’s "Cocoon" exemplifies Gilles Deleuze’s concept of the time-image by eschewing traditional narrative structures in favor of a contemplative and fragmented approach to cinema. The film’s use of long takes, minimalist dialogue, and timeless spaces underscores its focus on the subjective experience of time and memory, aligning with Deleuze’s theory that cinema can directly evoke a sense of duration beyond mere movement. Through its non-linear narrative and abstract portrayal of existence, "Cocoon" invites viewers to engage with the complexities of temporality and human existence in a manner that challenges conventional cinematic storytelling. The film is notable for its contemplative mood and its focus on the emotional landscape of its characters, reflecting Ceylan’s characteristic style of exploring the human condition. "Cocoon" stands as a significant example of how modern cinema can harness the time-image to offer profound insights into human experience and perception.

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FULL TEXTS BOOK

THE IMPACT OF SOCIAL MEDIA MARKETING ON THE BUSINESSES IN ELBASAN DISTRICT

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ABSTRACT
Social media has become an important aspect of businesses in Elbasan district, offering businesses the opportunity to reach new audiences, engage with customers, and promote their products and services. This paper aims to describe social media platforms, social media marketing and social media management as well and to investigate the impact of social media marketing on businesses in the Elbasan district.
The methodology of the work is based on the collection of quantitative data using online questionnaires. Questionnaires were sent to 200 businesses in the Elbasan district, from which we received 85 positive responses. Data were analyzed using Microsoft Excel software.
The findings of the study show that social media marketing is highly valued by businesses in the Elbasan district, where most participants report that it is very important and positively affects the performance of businesses. Businesses in the Elbasan district are actively using social media for marketing purposes, with Instagram being the most used platform by businesses. The study found that the main reason why businesses use media marketing is to promote their products or services. According to the study, most businesses in Elbasan district neglect the presence of a qualified person who manages their social media.
Keywords: Marketing, Social Media, Social Media Management, Business, Elbasan district.

1. Introduction

The use of social platforms has become an integral part of our daily life since the technological developments that have occurred over the years. Social media has evolved the way we connect and communicate with others. Not only that, they are also used as a tool to engage with businesses, organizations and communities online. Social media has been used by many companies to create marketing opportunities and develop the way they operate and connect with customers. By using social media, businesses find it easier to target the right audience and attract new customers. Social media marketing helps businesses increase traffic on social media platforms and also sales. Social media allows for real-time interaction with customers, enabling businesses to get instant feedback on products or services. It has also opened up new avenues for businesses to sell their products or services online without the need for consumers or customers to come to the business. Social media provides valuable data analytics tools that allow businesses to accurately track the performance of their campaigns.
The purpose of this study is to describe social media platforms, social media marketing and social media management as well and to investigate the impact of social media marketing on businesses in the district of Elbasan.
The methodology used in this paper combines primary and secondary data. Primary data was collected from questionnaire and secondary data was found from books, online articles and online blogs that are focused on social media marketing.
Questionnaires were sent online by communicating with businesses with different online communication platforms to 200 businesses in the district of Elbasan, from which we received 85 positive responses. Data were analyzed using Microsoft Excel software.

FULL TEXTS BOOK

The findings of the study show that social media marketing is highly valued by businesses in the district of Elbasan, where most participants report that it is very important and positively affects the performance of businesses. Businesses in the district of Elbasan are actively using social media for marketing purposes, with Instagram being the most used platform by businesses. The study found that the main reason why businesses use media marketing is to promote their products or services. According to the study, most businesses in Elbasan district neglect the presence of a qualified person who manages their social media.

2. Review of Literature

Many people think of marketing as just selling and advertising. Every day we come across TV commercials, catalogs, articles from retailers and various online campaigns. However, selling and advertising are important elements of marketing. Today, marketing should not be understood in the old sense of making sales in a new sense of understanding and meeting the needs of customers. As the authors say, “The purpose of selling is to satisfy a customer’s need; the goal of marketing is to understand its need” (Kotler, Philip T., Armstrong, Gary, 2017).

Broadly defined, marketing is a social and managerial process by which individuals and organizations get what they need and want through the creation and exchange of value with others. In a narrower business context, marketing involves building profitable and meaningful exchange relationships with customers. Therefore, we define marketing as the process by which companies engage customers, build strong customer relationships, and create customer value to get value from customers in return (Kotler, Philip T., Armstrong, Gary, 2017).

The evolution of marketing is a complex process that has occurred over the past few decades. This evolution is closely related to technological developments, changes in consumer behavior and increased competition in the market.

The evolution of the marketing concept over time can be divided into 6 main phases: the production-oriented period, the sales-oriented period, the marketing-oriented period, the market-oriented period, the relationship marketing-oriented period, and the marketing period online or digital marketing.

Social media is the term often used to refer to new forms of media that involve interactive participation (Manning, 2014).

Social media is defined as "a set of Internet-based applications that are based on the ideological and technological foundations of Web 2.0 and that allow the creation and sharing of user-generated content" (Kaplan, Andreas M., Haenlein, Michael, 2010).

Social media, is part of our daily lives, has evolved the way we connect and communicate with others. With just a few taps on the screen, we can instantly contact friends, family and even strangers across the globe. Social media have become essential tools for sharing ideas and staying informed.

In addition to these, social media are also widely used in business. Social media has been used by many companies to create marketing opportunities and developing the way they operate and connect with customers (Abdullah, Nurul Ain., Jabor, Khata., Ismail, Mohamad Alif., Isa, Ahmad Shobah Mohd, 2019).

By creating engaging content businesses can increase their brand awareness and attract new customers. In addition to brand visibility, social media also offers businesses the opportunity to engage directly with their customers. Through various platforms businesses can answer customer questions, address concerns and gather feedback in real time. This level of interaction not only helps build trust and loyalty, but also provides valuable insights that can be used to improve products or services. Also, businesses have the opportunity to collect various information about the needs and demands of consumers who will enter their work when they launch a new product or service on the market (Polańska, 2014).

Additionally, social media has transformed the way businesses market their products or services. Traditional advertising methods such as print ads or TV commercials are often expensive and have

FULL TEXTS BOOK

limited reach. However, social media advertising allows businesses to target specific demographics, ensuring that their message reaches the right audience. With advanced targeting options and analytics tools, businesses can track the effectiveness of their campaigns and make data-driven decisions to optimize their marketing strategies.

Another important impact of social media on businesses is the rise of influencer marketing. Influencers, who have amassed large followings on social media platforms, have become powerful brand advocates. By partnering with influencers, businesses can tap into their loyal fan base and use their influence to promote their products or services. This form of marketing has proven to be very effective, as consumers tend to trust recommendations from people they admire and follow.

Recently, social media has also opened up new avenues for businesses to sell their products or services online without the need for consumers or customers to come to the business.

Social media platform, or social media channels, are platforms or websites that enable users to interact, share content and communicate with other users online (Pasaribu, 2023).

Some examples of social media platforms include Facebook, Twitter, Instagram, LinkedIn, WhatsApp, Snapchat, TikTok, and YouTube. Each of these platforms offers unique features and functionality that allow users to share different forms of content, such as text, images, videos, and live streams (Shields, 2017).

Social media marketing is a mechanism that empowers people through online social networks to advertise their websites, goods or services and engage and tap into a much wider audience that would not be possible through traditional advertising channels (Ravi, Dr., Sujaya, Mr., Scholar, Kumar., Sabri, Mustafa, 2021).

Social media marketing is presented as a set of tools that taken together can amplify, promote and help others share your message (Evans, 2012).

Social media marketing has become an indispensable tool for businesses looking to expand their reach and engage with customers in today's digital age. With the rise of social media platforms, companies have found new ways to connect with their target audience.

An important advantage of social media marketing is its cost-effectiveness compared to traditional advertising methods.

Additionally, social media allows for real-time interaction with customers, enabling businesses to receive immediate feedback on products or services (Fan, 2023).

Social media provides valuable data analytics tools that allow businesses to accurately track the performance of their campaigns.

With the use of social media, businesses find it easier to target the right audience. They can identify and reach the most appropriate target groups for the products or services they offer. This helps in increasing the efficiency of marketing campaigns and improving return on investment (Nadaraja, Rubathee., Yazdanifard, Rashad, 2013).

Social media marketing helps businesses increase traffic on social media platforms and also sales.

Social media platform management is an important area of digital marketing that involves planning, creating, publishing and monitoring content on social networking platforms, in order to achieve business objectives (Alharrasi, 2023).

Successful social media management requires an integrated and strategic approach, combining content creation, audience engagement and performance measurement to achieve business objectives.

A social media manager Is a professional responsible for planning, implementing and monitoring an organization’s strategy on social media platforms, such as Facebook, Instagram, Twitter, LinkedIn, etc. It plays an important role in building and maintaining the presence of the organization in these digital channels, contributing to the achievement of business objectives (Talentport, 2024).

Social media marketing has a significant impact on consumers’ purchase decision-making process. Advertising, recommendations, and carefully planned marketing activities on social media can stimulate

FULL TEXTS BOOK

consumers' needs and wants, stimulate their interest in specific products or brands, and thus promote purchasing behavior (Mu, 2023).

Some social media marketing strategies that businesses use to influence consumers in purchasing decisions are: digital word of mouth, influencer marketing, targeted advertising, content marketing, search engine optimization (SEO), feedback and reviews, fear of missing out (FOMO) (Zhang, 2023).

3. Methodology

The purpose of this study is to describe social media platforms, social media marketing and social media management as well and investigate the impact of social media marketing on businesses in Elbasan district. In this paper, initial importance will be given to social media and their impact on businesses in the district of Elbasan.

The methodology used in this paper combines primary and secondary data. The primary data were obtained through questionnaires distributed to several businesses or companies in the district of Elbasan, operating in different sectors of the economy.

The primary sources of secondary data collection of information used throughout this paper are taken from books, online articles and online blogs that are focused on social media marketing in order to provide up-to-date and accurate information.

In the questionnaire, 15 questions were formulated where in questions 1 to 3 it is intended to collect data that reflect information about the name of the business, the type of activity that the business performs and the number of employees that the business has.

In other designed questions, information about social media marketing is obtained.

The questionnaire is structured and contains closed questions, dichotomous questions, multichotomous questions and open questions. The questions are formulated in such a way that they are as understandable as possible to the respondent in order to guarantee the validity of the questionnaire.

The questionnaire was designed using Google Forms.

Through a research on the Internet, and simultaneously in the field, we managed to identify a population of 200 businesses. The questionnaire was sent to 200 businesses, of which 85 responded positively to its completion. The respondents were representatives of large, medium, small and family businesses. In order to be as successful as possible, the distribution of the questionnaires was done in such a way that the selected sample of this study was as general as possible.

We carried out the survey or the distribution of online questionnaires through Google Forms in the businesses operating in the district of Elbasan. Businesses are contacted through social networks, e-mails and other communication platforms.

4. Data analysis

The computer program Microsoft Excel was used for data recording and analysis.

Based on the analysis of the data obtained from the questionnaire, the activity of the surveyed businesses was in most cases service-oriented. The surveyed businesses were mainly bars, restaurants, resorts, travel agencies, photo studios, beauty centers, pastry shops, guesthouses, pharmacies, atelier, event agencies, clothing shops, accessories bags and shoes, agricultural products shops, electrical household products shops, bookstores, carpets shops, import and export, pizzeria, foreign language course center, jewelry shops, hydrosanitary, products for babies and children, cosmetic products shops, dental service and furniture.

54% or 46 businesses have 1-3 employees, 14% or 12 businesses have 4-7 employees, 14% or 12 businesses have 8-11 employees, 4% or 3 businesses have 12-15 employees and 14% or 12 businesses have over 15 employees in their businesses.

FULL TEXTS BOOK

Employees number	Frequency	Percent
1-3	46	54
4-7	12	14
8-11	12	14
12-15	3	4
Over 15	12	14
Total	85	100

All surveyed businesses or 85 businesses use social media techniques for their social media marketing strategy.
75% or 64 businesses have used social media since they opened their business, 3% or 2 businesses have been using social media for less than 1 year, 3% or 2 businesses have been using social media for 1 to 3 years, 1 % or 1 business has been using social media for 3 to 5 years and 18% or 16 businesses have been using social media as a marketing strategy in their business for over 5 years.

The moment when they started using social media	Frequency	Percent
Since they opened their business	64	75
Less than 1 year	2	3
1-3 years	2	3
3-5 years	1	1
Over 5 years	16	18
Total	85	100

5% or 4 businesses use facebook more often as the main platform in their marketing activity, 91% or 77 businesses use instagram more often, 2% or 2 businesses use whatsapp more often, 2% or 2 businesses have chosen the other alternative and have responded that they use all the mentioned social media platforms equally.

Social media platform	Frequency	Percent
Facebook	4	5
Instagram	77	91
TikTok	0	0
Twitter	0	0
Whatsapp	2	2
Other	2	2
Total	85	100

71% or 60 businesses have chosen social media marketing over another marketing strategy because through social media marketing it is easier to reach the audience, 1% or 1 business has chosen social media marketing because social media marketing offers cheaper prices in compared to other marketing strategies, 19% or 16 businesses have chosen social media marketing because it is more effective than another marketing strategy, 1% or 1 business have chosen social media marketing because through social media marketing businesses receive analytics in real time, 8% or 7 businesses have chosen social

FULL TEXTS BOOK

media marketing because through social media marketing it becomes possible to engage with customers or consumers.

The reason why they chose social media marketing	Frequency	Percent
Easier to reach the audience	60	71
Cheaper prices	1	1
It is more effective	16	19
Receive analytics in real time	1	1
To engage with customers or consumers	7	8
Other	0	0
Total	85	100

Most businesses, 55% or 47 businesses have a specific budget for social media marketing. Out of 47 businesses that have a specific budget for social media, most businesses, 53% or 25 businesses spend up to 10,000 ALL per month for social media marketing, 32% or 15 businesses spend 10,000 to 15,000 ALL per month for social media marketing. their business, 6% or 3 businesses spend 15,000 to 20,000 ALL per month on social media marketing, 9% or 4 businesses spend over 20,000 ALL per month on social media marketing.

1. Budget for social media marketing	Frequency	Percent
Yes	47	55
No	38	45
2. How much money do they spent per month?		
Up to 10000 ALL	25	53
10000-15000 ALL	15	32
15000-20000 ALL	3	6
Over 20000 ALL	4	9

9% or 8 businesses have stated that the impact of social media marketing on their business performance has been excellent, 64% or 54 businesses have stated that the impact of social media marketing on their business performance has been very good , 27% or 23 businesses stated that social media marketing has had an average impact on their business performance. No business has chosen the negative alternatives badly and very badly.

The impact of social media marketing	Frequency	Percent
Excellent	8	64
Very good	54	27
Avarage	23	9
Bad	0	0
Very bad	0	0
Total	85	100

FULL TEXTS BOOK

Regarding the qualified person who manages the social media or the social media manager, most of the businesses 55% or 47 businesses stated that they do not have a qualified person who manages their social media.

Qualified person who manages their social media	Frequency	Percent
Yes	38	45
No	47	55
Total	85	100

For online deliveries 46% or 39 businesses do online deliveries, while 54% or 46 businesses do not do online deliveries this is because most of these businesses are service oriented and online deliveries are almost impossible.

Online deliveries	Frequency	Percent
Yes	39	46
No	46	54
Total	85	100

5. Conclusions

From the information analyzed from the primary data obtained from the questionnaires sent to the businesses in the district of Elbasan, we reach the following conclusions.

- All businesses surveyed or 85 businesses use social media for their social media marketing strategy.
- Regarding the moment of using social media in business, most of the surveyed businesses, 64 businesses or 75% of businesses have used social media since the moment of opening the business
- The social media platform that the surveyed businesses use most often is Instagram 91% or 77 businesses
- The main reason why businesses use social media as a marketing tool is because it helps to present products or services for 28 businesses or 33% of businesses
- The main reason why businesses use social media and not another marketing strategy for 60 businesses or 71% of businesses use it because it is easier to reach the audience
- Regarding the specific budget for social media, 47 businesses or 55% of businesses have a specific budget for social media
- The amount of budget that businesses spend on social media marketing per month is up to 10,000 ALL for 25 businesses or 53% of businesses
- For 54 businesses or 64% of businesses social media marketing has a very good impact on their business
- Most businesses surveyed, 47 businesses or 55% of businesses do not have a qualified person managing their social media or a social media manager
- Most of the businesses, 46 businesses or 54% of the surveyed businesses do not make online deliveries (this result because most of the surveyed businesses are mainly service oriented)

6. Recommendations

- Choose the right social media
- Create a strategy for your social media
- Hiring a qualified person in social media management (Social Media Manager)

FULL TEXTS BOOK

- Consistency in social media
- Increasing the social media marketing budget
- Use of influencer marketing
- Organizing games on social media

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FULL TEXTS BOOK

HORTİKÜLTÜREL TERAPİNİN PSİKİYATRİ HEMŞİRELİĞİNDE KULLANIMI

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ÖZET

Hortikültürel terapi (bahçecilik terapisi) danışanların terapötik olarak beklentilerini karşılamak amacıyla doğaya karşı hissedilen doğuştan yakınlık ile bahçecilik faaliyetlerini kullanan ve bir profesyonel yönetici ile uygulamaya alınan bir terapi yöntemidir (Toyoda, 2012). Her yaştaki kişilere uygulanabilen bu bahçecilik programlarının amacı kişisel, fiziksel, ruhsal, entelektüel olarak farklılıklar göstermektedir ve uygulamalar amacına uygun olarak değişebilmektedir (Pouya, 2023). Psikososyal müdahale olarak yeni bir yöntem olarak araştırmalarda yer almakta olsa da, tarihsel sürece bakıldığında insanın varlığı ile beraber doğanın iyileştirici gücüne inanma hep vardır (Adevi ve Lieberg, 2012). M.Ö. 3000 yılında var olan Çin halkının bitkilerden bir reçete yazdığı ve adından şifalı otlar olarak bahsettiği kaynaklarda yer almaktadır. Sonraki süreçlerde tarihin verimli toprakları olarak da geçen Mezopotamya'da, Pers bahçelerinde ve eski Roma İmparatorluğu'nda bitki kullanımı olduğu bilinmektedir (Scott, 2017). Hortikültürel terapi tarihte sadece bitkilerin kullanımı ile değil, doğanın görüntüsü ve doğa içinde yapılan fiziksel hareketlerin ruhsal yapıya ve algılanan sağlık düzeyine etki ettiği görülmüştür ve Mısır kraliyet ailesinde uygulanmış, ilk örneklerini göstermiştir. Bu uygulamalar ile tarihin ilk hekimlerine botanikçiler demişlerdir (Yar, 2019; Olszowy, 1978; Lewis, 1976). Günümüz kullanımına gelindiğinde ise Pensilvanya' da bulunan Dr. Benjamin Rush, ruh sağlığı bozukluklarına karşı bir tedavi sürecini Hortikültürel Terapi kavramını kullanarak açıklayan ve kanıtlayan ilk kişi olarak kabul görmüştür (AHTA, 2022).

Değişen dünya ile beraber günümüzde kapalı ortam kullanımının artmış olması (US EPA, 2014), zihinsel ve bilişsel süreçlerde sorunların artmasına neden olan birçok faktör barındırmaktadır (Chaudhury ve Banerjee, 2020; Oh ve ark., 2020; Wright ve ark., 2013). Ayrıca bu durumun dünyada anksiyete ve depresyon oranlarındaki artmayla ilişkili olduğu ortaya konmuştur (Earl, 2022; WHO, 2018). Doğa temelli terapilerin bu sorunların tedavi sürecinde etkili olduğu kanıtlanmıştır (Oh ve ark., 2020). Ayrıca Hortikültürel Terapi uygulaması bireylerde doğa ile iletişimde olma yoluyla kontrol duygusunda ve benlik kavramında gelişme sağlamaktadır (Kabakçı, 2023). Bu uygulama bireylerde algılanan streste azalma, dürtü kontrolünü sağlama, zihinsel işlevsellikte artma, duygusal işlevselliği sağlama ve dilin bilişsel işlevlerini deneyimleme konusunda etkilidir (Toyoda, 2012). Bahçecilik terapisi programı, psikolojik rehabilitasyon, güven ve başarma duygusunu desteklemekte açısından olumlu sonuçlar ortaya çıkarmaktadır (Lee ve ark., 2007). Süreç odaklı olan bu yaklaşımda ortaya çıkan son üründen çok, terapötik süreç önemli olarak Kabul edilmektedir. Terapötik süreç ise danışanın fiziksel ve ruhsal özelliklerine göre terapist tarafından düzenlenmektedir. Bir hortikültürel therapist ile çalışılan bu süreçte terapist danışanın özellikleri doğrultusunda planlama yapmaktadır (Haller ve ark., 2019). Hortikültürel terapi uygulamalarının bu özellikleri psikiyatri hemşireliği uygulamalarında kullanımını elverişli hale getirmektedir. Bu terapi yöntemi psikiyatri hemşireleri tarafından doğa dışında hastanelerde, psikiyatri kliniklerinde, hapishanelerde ve rehabilitasyon birimlerinde de kullanabilmektedir (Lasaater, 2022). Uygulama sürecinde bu tedaviyi uygulayan bahçecilik terapistleri

FULL TEXTS BOOK

bir ruh sağlığı uzmanı değil ise rehabilitasyon süreçlerinde eksiklikler olacağından birimlerde bulunan psikiyatri hemşirelerinin de görevlendirilmesi önerilmektedir (Kim ve ark., 2022).
Anahtar Kelimeler: Hortikültür, Terapi, Psikiyatri Hemşireliği, Ruh Sağlığı

ABSTRACT

Horticultural therapy (horticultural therapy) is a therapy method that uses horticultural activities with an innate affinity for nature to meet the therapeutic expectations of clients and is implemented with a professional manager (Toyoda, 2012). The purpose of these horticulture programs, which can be applied to people of all ages, varies personally, physically, spiritually, intellectually, and applications can vary according to the purpose (Pouya, 2023). Although it is included in research as a new method as a psychosocial intervention, when we look at the historical process, there is always a belief in the healing power of nature with the existence of human beings (Adevi & Lieberg, 2012). It is stated in the sources that the Chinese people who existed in 3000 BC wrote a prescription from plants and referred to it as medicinal herbs. In the following processes, it is known that plants were used in Mesopotamia, which is also known as the fertile lands of history, in Persian gardens and in the ancient Roman Empire (Scott, 2017). Horticultural therapy has been observed in history not only with the use of plants, but also with the appearance of nature and physical movements in nature affecting the mental structure and perceived health level, and it was applied in the Egyptian royal family and showed its first examples. With these practices, the first physicians in history were called botanists (Yar, 2019; Olszowy, 1978; Lewis, 1976). When it comes to today's use, Dr. Benjamin Rush in Pennsylvania was recognized as the first person to explain and prove a treatment process against mental health disorders using the concept of Horticultural Therapy (AHTA, 2022).

Today, with the changing world, the increased use of indoor environments (US EPA, 2014) has many factors that cause increased problems in mental and cognitive processes (Chaudhury & Banerjee, 2020; Oh et al., 2020; Wright et al., 2013). It has also been shown that this is associated with an increase in anxiety and depression rates around the world (Earl, 2022; WHO, 2018). Nature-based therapies have proven to be effective in the treatment of these problems (Oh et al., 2020). In addition, Horticultural Therapy practice improves individuals' sense of control and self-concept through being in contact with nature (Kabakçı, 2023). This practice is effective in reducing perceived stress in individuals, providing impulse control, increasing mental functionality, providing emotional functionality and experiencing the cognitive functions of language (Toyoda, 2012). The horticultural therapy program produces positive results in terms of psychological rehabilitation, supporting confidence and sense of accomplishment (Lee et al., 2007). In this process-oriented approach, the therapeutic process is considered more important than the final product. The therapeutic process is organized by the therapist according to the physical and psychological characteristics of the client. In this process with a horticultural therapist, the therapist makes planning in line with the characteristics of the client (Haller et al., 2019). These features of horticultural therapy practices make it suitable for use in psychiatric nursing practices. This therapy method can also be used by psychiatric nurses in hospitals, psychiatric clinics, prisons and rehabilitation units (Lasaater, 2022). If the horticultural therapists who apply this treatment in the application process are not a mental health specialist, it is recommended that psychiatric nurses in the units should also be assigned, as there will be deficiencies in the rehabilitation processes (Kim et al., 2022).
Keywords: Horticulture, Therapy, Psychiatric Nursing, Mental Health

Giriş

Bahçecilik terapisi, bahçe etkinliklerinin sağlık amacıyla kullanıldığı bir terapi türüdür. Bu terapi yöntemi bahçe ve kültür kelimelerinden türemiştir. Bahçecilik terapisi danışanları bitki ve bahçe merkezli etkinliklere katarak genel sağlıklarını iyileştirmeye amaçlamaktadır. Hortikültürel terapi

FULL TEXTS BOOK

uygulayıcıları bu terapi sürecinde bireylerin stres ve kaygı düzeylerini değerlendirir, azaltmak ve genel refahını artırmak için bu uygulamaları amaçlı şekilde kullanır (Navya ve Rani, 2021; Yar, 2019; Meore ve ark., 2021). Bahçecilik terapisinin tarihi süreci incelendiğinde eski Çin, Yunan ve Roma uygarlıklarının tarihte bahçeleri tedavi amaçlı kullanımının yaygın olduğu görülmektedir. Ayrıca eski Mısır'da sarayda görevli sağlık görevlilerinin ruhsal hastalığı olan kraliyet ailesi mensuplarının bahçe yürüyüşleri yapmasını tavsiye ettiği bilinmektedir. Modern çağa gelindiğinde 1800'lü yıllarda Amerika Birleşik Devletleri'nde bahçecilik terapisi zihinsel engelli bireylerle uygulanmaya başlanmış ve bu yöntemin kullanım alanı giderek artmıştır (Scott, 2017; AHTA, 2012; Olszowy, 1978; Yar, 2019). Dr. Benjamin Rush bu terapötik yöntemin etkinliğini ilk belgeleyen ve literatüre bu kavramı kazandıran kişi olarak bilinmektedir (AHTA, 2022).

Psikiyatri hemşireliği uygulamaları açısından hortikültürel terapi uygulamalarının etki alanları oldukça değerlidir. Hortikültürel terapi fiziksel zihinsel, sosyal ve entelektüel gelişimi desteklemektedir. Bu terapi yöntemi stres azaltma, özgüvenin artması, bilişsel işlevlerin korunması gibi birçok psikiyatrik fayda sağlamaktadır (Pouya, 2023). Araştırmacılar doğa ile temasın stresi, depresyonu ve olumsuz duyguları azalttığını göstermektedir. Bu terapi yönteminin hastaların öz güvenini artırdığı, sosyal becerilerini geliştirdiği belirlenmiştir. Bahçecilik terapisi tıbbi psikiyatrik rehabilitasyon ve hapishane ortamları gibi çeşitli ortamlarda uygulanabilmektedir (Haller ve ark., 2019). Ruhsal sorunları olan bireylere fiziksel ve psikososyal bakım rolü olan psikiyatri hemşireleri, hastaların bireysel olarak topluma uyum sağlamalarına yardımcı olmaktadır. Bu yönleri ile bahçecilik terapisi psikiyatri hemşireleri tarafından etkili bir şekilde uygulanarak, hastaların iyileşme süreçlerini olumlu katkı sağlama, tekrarlı yatışların önüne geçme, psikiyatrik iyi oluşu sürdürmede etki gösterebilir (Oh ve ark., 2020; Lee ve ark., 2007; Kim ve ark., 2022).

1. Hortikültürel Terapi Nedir?

Hortikültürel Terapi kelime anlamı olarak hortikültür yani bahçecilik işleri veya bahçecilik kültürü anlamlarını belirtmektedir. Latin dilinde 'hortus' 'cultus' yani bahçe ve kültür kelimelerinin birleşiminden oluşmaktadır. Bu terapi yöntemi bahçecilik ve rehabilitasyon alanlarını birleştiren nispeten modern bir alandır. Katılımcılar bu terapi yönteminde hortikültürel terapistin uygulamayı kolay hale getirmesi sayesinde bitki ve bahçe temelli faaliyetlere aktif veya pasif katılım yolu ile genel sağlık örüntülerinde iyileşmeyi amaçlar. Bitkiler ve bahçecilik uygulamaları terapide kullanılır ve insanların kendilerini daha iyi hissetmelerine yardım sağlar (Navya ve Rani, 2021; Yar, 2019; Meore ve ark., 2021). Bu terapi yöntemi amaca uygun olarak bitkileri ve bahçeleri kullanarak kişilerin sağlık verilerini olumlu etkilemeyi amaçlan bir örüntüyü tanımlar. Fakat bahçe terapisi, bitki dikme gibi elle yapılan etkinlikleri veya kuş sesini dinlerken pencereden bir bahçeyi izlemeyi de içerebilir (Scott, 2017). Doğal olan çevre ve bulunan unsurlar, dikkati anda tutmada oldukça verimli işlev görebilir, stres ve anksiyeteyi azaltabilir. Bu sayede bütünsel sağlık ile iyileşmeyi destekleyebilir. Yapılan araştırmalarda hastanede yatan hastaların odalarının bulunduğu camlardan baktıklarında büyük bir ağacın gölgesini görenler, bir dalı görenler ile mukayese edildiğinde büyük bir ağaç ve gölgesini görenlerin ameliyat sonrası fizyolojik ve psikolojik iyileşme açısından fayda sağladığını göstermiştir (Ulrich, 1984). Hortikültürel terapi yaklaşımının odak noktası daha çok duyusal deneyimlerde ve tüm duyuların kullanmasında olmaktadır (Scott, 2017).

2. Hortikültürel Terapinin Tarihi Süreci

İnsan dünyaya geldiği ilk andan itibaren doğanın sağlığı iyileştirici gücüne inanmış ve doğayı şifa bulmak, tekrardan yapılanmak yani yenilenmek amaçlı kullanmıştır (Adevi ve Lieberg, 2012). Bahçelerin ve içinde büyütülen bitki türlerinin insanın fizyolojik ve psikolojik sorunlarının tedavisinde kullandıkları en eski yıllardan bugüne bilinmektedir. Bu bahçelerin tedavi amacı ile kullanıma sunulması eski Asya, Roma ve Yunan tarihinde görülmektedir. Çin toplumuna ait olan bilinen şifalı

FULL TEXTS BOOK

otlar listesinin Pen Ts'ao tarafından M.Ö.3000 yılında ipek bir doku üzerine yazıldığı bilinmektedir (Gerlach-Spriggs ve ark., 1998). Sonraki süreçte M.Ö. 2000 civarında Mezopotamya'nın verimli tarım alanlarına ve M.Ö. 500 civarında Pers bahçelerine dayanır. Orta Çağ boyunca manastır bahçeleri, tıbbi bitkilerin yetiştirilmesi ve dinlenme için yer sağlamak amacıyla kullanılmıştır (Scott, 2017). Dicle ve Fırat nehirlerinin arasında bulunan verimli arazilerin, Mezopotamya bölgesinde bulunan 29 bahçeye ilham kaynağı olduğu bilinmektedir. M.Ö. 500 yıllarında ise Perslerin bahçelerinde; koku, görme, müzik ve suyu bir arada toplayarak var olan bütün duyulara hitap etmesi, bahçe tasarımlarını ortaya çıkarmıştır (AHTA, 2012).Bahçeciliğin bir tedavi bağlamında kaydedilen ilk kullanımı, eski Mısır'da, saray hekimlerinin zihinsel olarak rahatsız olan kraliyet ailesi için saray bahçelerinde yürüyüşler önerdiği zamanlarda meydana gelmiştir (Lewis, 1976; Yar, 2019). Bitki türlerinin şifa verici bilgisinin öğrenilmesi tıbbi olarak bilgeliğin başlangıcını var etmektedir. Bu nedenle tarihte ilk hekimler botanikçilerdir (Olszowy, 1978; Yar, 2019). 1800'lerde, Amerika Birleşik Devletleri'nde zihinsel engelli bireylere, dezavantajlı gençlere ve zihinsel engelli çocuklara terapi olarak bahçecilik yapılmıştır (Toyoda, 2012). Bir başka tarafta ise engelli bireylerin tedavi edici rehabilitasyonu, çiftliklerin en önemli parçalarından olan tarıma dayanmaktadır. Bu rehabilite edici tedavi yöntemi ilk başta bireylerin üretim amaçlı çalışması ile başlamıştır. Çiftliklerde konaklama imkânı bulamayan bireyler, çiftliklerin bağlı olduğu arazilerde çalışmaya başlamış ve bu sayede konaklama imkanı bulmuşlardır. Sonrasında çalışan kişilerde gözlenen farklılıklar hortikültürel terapinin ilerleyen yıllarda meslek haline dönüşmesine yardımcı olmuştur (Shoemaker, 2014). Pensilvanya' da bulunan Tıp Enstitüsünde "Amerikan Psikiyatrisinin Babası" olarak da söylenen Dr. Benjamin Rush, ruh sağlığı sorunlarına karşı Hortikültürel Terapi kavramını kullanan ve etkinliğini belgeleyen ilk psikiyatrist olarak kabul görmektedir (AHTA, 2022). Sonraki süreçte İkinci Dünya Savaşı sonrası ABD'de savaştan dönen gazilerin tedavilerine hastanede devam edilirken, hortikültürel terapi programlarının rehabilitasyon süreci içinde uygulandığı bilinmektedir (AHTA, 2022). 1955 yılına gelindiğinde yapılan hortikültürel terapi çalışması sonucu araştırmacılar şizofreni de dahil olarak bu terapi yönteminin ruhsal ve zihinsel süreçlerde olan sorunları büyük ölçüde iyileştirdiğini gözlemlemiştir (Kinross-Wright, 1955, Kabakçı, 2022). Sonraki süreçte 1973 yılında "Hortikültür Yoluyla Terapi ve Rehabilitasyon Konseyi" kurulmuş fakat sonradan adını "Amerikan Hortikültürel Terapi Derneği" olarak değiştirmiştir. Bu dernek kar amacı gütmeden halen varlığını devam ettirmektedir (Yar, 2019).

3. Hortikültürel Terapinin Psikolojik Etkileri

Hortikültürel terapinin uygulanan tüm modellerinde belirlenen gruplar üzerinde entelektüel, ruhsal, sosyal ve fiziksel gelişim düzeylerinin hepsinde olumlu gelişim düzeyine ulaşılabilmektedir (Pouya, 2023). Yetkin olarak uygulandığında benlik kavramının gelişmesinde, algılanan kontrol duygularında gelişim sağlamaktadır. Bu sayede bireylerin diğer terapötik girişimler için esneklik kazanması sağlanarak, uygulanan diğer tedavi süreçleri daha verimli işleyecebilmektedir (Pouya, 2023). Hortikültürel terapinin beklenen psikolojik etkileri içinde stresin azalması, güvenin yeniden kazanılması, yararlı benlik duygusunun geri kazanılması, zihinsel işlevlerin korunması veya geri kazanılması yer almaktadır. Bu kapsamda sıralanan zihinsel işlevler, oryantasyon işlevlerini (zamana, yere, kişiye vb. yönelim), enerji ve dürtü işlevlerini, dikkat işlevlerini (dikkati sürdürme, bölme ve kaydırma), bellek işlevlerini, duygusal işlevleri, algısal işlevleri, düşünce işlevlerini, üst düzey bilişsel işlevleri, dilin zihinsel işlevlerini, karmaşık hareketleri sıralamanın zihinsel işlevini ve benlik ve zaman işlevlerini deneyimlemeyi içermektedir (Toyoda, 2012). Bu deneyimleme farklı olan gruplarda bitkiler ile çalışma, öz saygı, farkına varma ve görev alma duygusunun yükselmesi gibi ruhsal ve zihinsel faydalar sağlamaktadır (Pouya, 2023). Bahçe bitkilerine yapılan bakım, bireylerin özgüvenlerini ve özgürlükçü duygularını artırmaktadır. Bahçe bitkilerinin görüntüleri, kokuları katılımcı kişiye huzur hissi vermektedir ve bireyin yaptıklarından haz almasını sağlamaktadır. Bu kazanımlara ek olarak hortikültürel terapi bireylere sosyalleşme fırsatı sunmaktadır (Uslu ve Shakouri, 2012). Fakat tüm

FULL TEXTS BOOK

hortikültürel terapi uygulamaları bitkilerden, gözlemden, renkten kaynaklanan hoş bir duygu ve sosyalleşme ortamı sunsa da amaçlarına göre uygulandığında sosyal, zihinsel ve fiziksel olarak kazanım sağlamaktadır (Yar, 2019).

4. Hortikültürel Terapi Kullanım Alanları

Hortükültürel terapinin ve bireyin ruhsal refah seviyesini artıran yeşil ortamların ortak noktası, bunların evrensel olarak bitki ortamlarında olmasıdır (Pouya, 2023). Bahçecilik terapisi, süreç odaklı olan, sürecin terapötik işleyişine odaklanan ve bir tedavi planı bağlamında ortaya çıkan aktif bir süreçtir. Bahçecilik terapisinde katılımcılar, bahçecilikle ilgili faaliyetlerde bulunurlar. Katılımcıların bakım gerektiren tanımlanmış bir sakatlığı, hastalığı veya yaşam durumu varsa, hortikültürel terapist aktiviteyi kolaylaştırır (Haller ve ark., 2019). Katılımcı ya da danışan, müdahalenin merkezinde yer alır (Lasaater, 2022). Hortikültürel terapi uygulaması ve mesleği dünya çapında gelişmeye devam ettikçe, bahçecilik terapisinin kullanımı çeşitli ortamlarda kullanılmaktadır. Bunlar arasında tıbbi, psikiyatrik, rehabilite edici ve konut ortamlarının yanı sıra yüksek stresli ortamlar olan bakım evleri ve hapishaneler bulunmaktadır. Bahçecilik terapisi, kırsal ve kentsel alanlar gibi coğrafi alanlarda, yüksek ve orta gelirli ülkelerde de uygulanmaktadır (Lasaater, 2022). 1214 katılımcıyı içeren 21 araştırmanın incelendiği bir sistematik incelemede hortükültürel terapi uygulamaları geniş etki yelpazesine sahip bir uygulama olarak tanımlanmış, bakım kurumları, hastaneler, evler gibi farklı alanlarda uygulanmasının teşvik edilmesi üzerinde durulmuştur (Wang ve ark., 2023).

5. Hortikültürel Terapinin Psikiyatri Hemşireliği Uygulamalarında Kullanımı

Araştırmalar, iç mekanlarda çok fazla zaman geçirmenin çeşitli fiziksel ve zihinsel problemlerle (örneğin uyku yoksunluğu) ilişkili olduğunu göstermektedir (Chaudhury ve Banerjee, 2020; Oh ve ark., 2020; Wright ve ark., 2013). Bununla birlikte, dünya çapında ruh sağlığı sorunlarındaki artışı kabul etmek de önemlidir. Bunlardan en yaygın ikisi depresyon ve anksiyetedir (Earl, 2022; WHO, 2018). Ruhsal hastalıklar, hastalığın doğası gereği çeşitli işlevsel bozukluklara neden olmaktadır. Ruhsal hastalığı olan bireylerin baş etme becerileri normal insanlara göre daha zayıf olmakla birlikte, bunun yarattığı stres nedeniyle bireylerde birçok psikososyal sorun ortaya çıkmaktadır (Park ve Park, 2017). Bu nedenle ruhsal hastalığı olan bireylerde hastaneye yatmayı gerektiren akut belirtilerin hafiflemesi ile hastaneden taburcu edilmesinden sonra dahi, hastalığın yol açtığı psikolojik ve kişilerarası sorunlar onların yaşamda zorluk yaşamasına, uzun bir süre boyunca tekrarlı hastane yatışlarının olmasına sebep olmaktadır (Kim ve ark., 2022).

Son zamanlarda ruh sağlığı hizmetleri, ruhsal hastalığı olan bireylerin hizmetlere proaktif katılımının güçlendirilmesini vurgulayan bir iyileşme modeline doğru genişlemektedir (Kwak ve ark., 2018). Ruh Sağlığı Refah Yasası'nın 2017'deki revizyonuyla ilgili önemli bir politika değişikliği, ruhsal hastalığı olan bireylerin etkili tedavisi ve rehabilitasyonu için taburcu olduktan sonra bile toplum temelli ruh sağlığı hizmet kuruluşlarıyla sürekli bir bağlantı sisteminin sürdürülmesi ve böylece psikososyal sorunlarla baş edebilmenin güçlendirilmesini içermektedir (Kim ve ark., 2020). Yani ruhsal hastalığı olan bireylerin taburcu olduktan sonra kendine yardım becerilerini kullanabilmeleri için klinik aşamadan itibaren zihinsel rehabilitasyon programlarından aktif olarak yararlanmaları oldukça önemlidir (Kim ve ark., 2022). Mental rehabilitasyon programının amacı, kronik ruhsal hastalık nedeniyle işlevleri azalan hastaların taburcu olduktan sonra normal bir yaşam sürmelerine yardımcı olmak, hastaların olumlu benlik saygısı ve başarı duygusu yoluyla sosyal beceri ve bağımsızlık geliştirmelerini sağlamaktır (Kang, 2015). Çeşitli zihinsel rehabilitasyon programları arasında hortikültürel terapi programının, ruh sağlığı sorunu olan kişiler için ilgiyi teşvik eden, bir şeyler üretebileceklerine dair güveni artıran, karmaşık olmayan etkinliklerden oluşan yapısıyla etkili bir yöntem olduğu söylenebilir (Lee ve ark., 2007). Hortikültürel terapinin anksiyete ve depresyon üzerinde olumlu etkilerinin olduğu saptanmıştır. Araştırmalar, doğa ile temas kurmanın stresi azaltmada, depresyon ve olumsuz duyguları azaltmada,

FULL TEXTS BOOK

olumlu duyguları artırmada etkili olduğunu ve bunun sonucunda ruh sağlığını iyileştirdiğini göstermiştir (Oh ve ark., 2020). Uzun vadede, doğada geçirilen zamanın dolaylı etkileri ev, iş ve genel olarak yaşamdan memnuniyet düzeylerinin artmasını sağlamaktadır (Oh ve ark., 2020). Şizofreni hastalarına yönelik uygulanan hortikültürel terapi programının etkililiğine ilişkin bir meta-analiz çalışması, şizofreni hastalarının ruhsal semptomları, rehabilitasyonu, yaşam kalitesi ve sosyal işlevleri üzerinde olumlu etkisinin olduğunu bildirmektedir (Lu ve ark., 2021). Bunun nedeni, hortikültürel terapide bitkiler aracılığıyla terapistle etkileşime girerek, akranlar arasındaki grup aktivitelerine katılarak, aktif ve bağımsız aktiviteleri mümkün kılarak, zihinsel hastalığı olan kişilerin gerilemesini önleyebilmesi ve sosyal becerileri geliştirebilmesidir (Lee, Kim, 2017). Bitki bakımı ve bitki yetiştirme deneyimi, ruh sağlığı hastalığı olan kişilerin zihinsel iyileşmesine yardımcı olmakta, onlara sadece bakılmaktan ziyade bir şeyle ilgilenebilecekleri ve sağlıklı bir yaşam sürdürmenin anlamı konusunda bir özgüven duygusu vermektedir (Matsuo, 2008). Bununla birlikte, Kore'de bu terapötik etkilerin avantajları kanıtlanmış ve uygulamada kullanılması teşvik edilmiş olmasına rağmen, çoğu psikiyatri kliniğinde bir iç çatı bahçesi, bir dış sebze bahçesi veya bir tedavi bahçesinin bulunmadığı, buna ayrılmış insan gücünün olmadığı, klinik ortamlarda kullanılmasının ve tutarlı bir şekilde uygulanmasının zor olduğu, dışarıdan bir hortikültürel terapistin işe alınmasının mali bir yük getirdiği bildirilmiştir. Uygulamada olan bu engeller birçok ülkede bulunan ruh sağlığı hastaneleri ya da psikiyatri klinikleri için geçerlidir. Bu nedenle bu uygulamanın yaygın şekilde kullanılması ve etki mekanizmasından faydalanılabilmesi için psikiyatri hemşirelerinin bu konuda eğitim almaları ve uygulamaları önerilmektedir (Kim ve ark., 2022).

Ağır ruhsal bozukluğu olan birey örnekleminde (n=24) hortikültürel terapi uygulamasının etkinliğinin incelendiği bir araştırmada 10 seans günde bir kez ve bir saat uygulanan program aşağıda verilmiştir:

1. Seans: Oryantasyon (Bahçeye Uyum, Aktiviteler vb)
2. Seans: Organik Tarıma Giriş (Uygulamalar)
3. Seans: Yetiştirme ve Büyüme
4. Seans: Büyük Başarıya Doğru Küçük Adımlar
5. Seans: Büyük Gün
6. Seans: Rahatlama İçin Otlar
7. Seans: Bir Korkuluk Kadar Dayanıklı Olun
8. Seans: Otların Tadına Bak
9. Senas: Hayata Geçirmek
10. Seans: Destekle Büyüt

Uygulanan bu program sonrasında anksiyete, depresyon, stres, iş performansı, yaşam kalitesi üzerinde olumlu sonuçlar elde edilmiştir. Bu çalışmada her oturumda bir tema bulunmaktadır ve canlı bitkilerle çalışılmıştır (Kam ve Siu, 2010).

6. Sonuç

Sonuç olarak hortikültürel terapi, insanın temelinde bulunan doğa ile etkileşimde kalma gereksiniminden yola çıkarak fiziksel ve psikososyal açıdan olumlu sonuçlar veren bir yöntemdir. Bu terapi yöntemi bahçe, çiftlik gibi açık alanlarda olduğu kadar hastane, cezaevi, bakım evi gibi kapalı alanlarda da etkin şekilde kullanılabilmektedir. Kliniklerde ve eşdeğer ortamlarda uygulanan hortikültürel terapi programları hasta veya danışanların ihtiyaçlarını belirleyen ve bu süreçte amaçlı bir müdahale programı tasarlayabilen psikiyatri hemşirelerinin uygulaması için uygundur.

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FULL TEXTS BOOK

LONDRA'DA CATO SOKAĞI KOMPLOSU (1820)
CATO STREET CONSPIRACY IN LONDON

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ÖZET
1790-1820 arası İngiltere'nin siyaseten en radikal yıllarıydı. Bu radikal yıllarda yaşananlardan çıkarılan dersler İngiliz demokrasisi ve parlamenter yapısının gelişiminde önemli rol oynadı. Radikal dönemde liberallerin ve işçilerin talepleri, demokrasi mücadelesi ve kazanımlarının dayanak noktası oldu; talepler, farklı yöntemlerle ısrarla dile getirilerek uzun bir mücadelenin sonunda hakedildi. Cato Sokağı Komplosu olarak anılan olay bu radikal dönemin en ilginç olaylarındandı. Dönemin koşulları Kral III. George'un 29 Ocak 1820'deki ölümü ile doğan hükümet bunalımıyla daha zorlu bir hal aldı. Napolyon Savaşları'nın yarattığı ekonomik sorunlar, Spa Fields ve Peterloo gibi olaylar nedeniyle öfkeli olan cumhuriyetçi bir grup radikal, hükümet krizini de fırsat bilerek bir komplo planladılar. Bu komplo, tüm kabine üyelerini ve başbakanı öldürmeyi içeren bir darbe planıydı. Ancak aralarındaki casus George Edwards nedeniyle komplo açığa çıktı. Olayla bağlantılı olan ve suçlu bulunan 11 kişiden 5'i idam edildi, 5'i Avustralya'ya sürgüne gönderildi, 1'i ise hapis cezası aldı. Cato Sokağı Komplosu'na karışan isimlerin tamamı Spencean Hayırseverleri olarak bilinen ve Thomas Spence'in fikirlerini takip eden grubun üyeleriydi. Thomas Spence, genel oy hakkını destekleyen, özel mülkiyete son verilerek ulusun topraklarının halk arasında paylaştırılmasını savunan fikirleri ile bilinir. Spencean Hayırseverleri grubu yaklaşık 27 kişi olmakla birlikte, Cato Sokağı Komplocuları 13 kişiydi ve Onüçler Komitesi olarak bilinmekteydiler. Komplocular, Lordlar Kamarası üyelerinin ve Kabinenin, ülkedeki tüm acıların mimarı olduğuna inanarak hareket etmişlerdi. Kabine üyelerinin Grasvenor Meydanı'ndaki Lord Harowby'nin evinde birlikte akşam yemeği yiyeceklerini aktaran New Times gazetesindeki haber ile yemeğin yeneceği 23 Şubat 1820 akşamı elbombası ve diğer ateşli silahlarla tüm kabine üyelerini öldürmek üzere harekete geçtiler ve Grasvenor meydanına çıkan Cato Sokağı çıkmazındaki bir ahıra saklandılar. Harekete geçmek üzereyken tedbir almış olan Coldstream Muhafız Müfrezesi'nin baskını ile yakalandılar. Mahkeme sürecinde grubun lideri Arthur Thistlewood'un savunması ile idam edilenler arasında olan William Davidson'ın savunması dönemin radikal fikirlerini vurgulaması açısından dikkat çekici savunmalar olarak öne çıkmaktadır.
Bu çalışmanın amacı İngiltere'deki toplumsal yapı değişimi ile bunun siyasete olan etkisini açıklamak ve Cato Sokağı Komplosu'nun mikro olarak bu süreçteki yerini detaylandırmaktır. Bu detaylandırma çabası, Cato Sokağı Komplosu gibi radikal girişimlerin İngiltere'de başarıya ulaşmama nedenlerini açıklayabilmek için bir başlangıç noktası oluşturacaktır. Bu çerçevede İngiltere'de radikal dönemin çatışmalı ortamından uzlaşmaya geçişin temel dinamikleri nelerdir? Sorusunun yanıtlanması mümkündür. Bu sorunun yanıtı ile İngiliz Demokrasisi'nin özgün yanları tespit edilebilir. Bu amaçlar çerçevesinde çalışma iki bölüm olarak planlandı: Giriş bölümünde Sanayi Devrimi, İngiltere'nin ekonomik değişimi ve toplumsal yapıdaki değişim açıklanmaktadır. Birinci bölümde 1799'da işçi örgütlenmeleri dahil her türlü muhalif örgütlenmeyi yasaklayan İsyancı Dernekler Yasası sonrasında gelişen ve hak talep eden eylemler ile tarihsel arka plan özetlenmektedir. İkinci Bölümde ise Cato Sokağı Komplosu'nun gelişim süreci ve etkileri ele alınmaktadır.
Anahtar Sözcükler: İngiltere'de Demokrasi, Cato Sokağı Komplosu, Arthur Thistlewood, İngiltere'de Gösteriler

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FULL TEXTS BOOK

ABSTRACT

Between 1790 and 1820, England experienced its most politically radical years. The lessons drawn from this period significantly influenced the development of English democracy and the parliamentary system. During these radical years, the demands of liberals and workers laid the foundation for the struggle for democracy and its eventual achievements. These demands were persistently expressed through various methods and were ultimately realized after prolonged efforts. One of the most intriguing events of this era is the Cato Street Conspiracy. The period's challenges were exacerbated by the government crisis following King George III's death on January 29, 1820. A group of angry republican radicals, motivated by the economic problems stemming from the Napoleonic Wars and events such as Spa Fields and Peterloo, exploited this crisis to plan a conspiracy. This conspiracy aimed to overthrow the government by assassinating all cabinet members and the prime minister. However, the plot was foiled by a spy among them, George Edwards. Of the 11 conspirators found guilty, 5 were executed, 5 were exiled to Australia, and 1 was imprisoned. All those involved in the Cato Street Conspiracy were members of the Spencean Philanthropists, a group that adhered to the ideas of Thomas Spence. Spence advocated for universal suffrage and the redistribution of the nation's land among the people, proposing the abolition of private property. The Spencean Philanthropists consisted of approximately 27 individuals, while the Cato Street Conspirators, known as the Committee of Thirteen, numbered 13. The conspirators believed that the House of Lords and the Cabinet were responsible for the country's suffering. They planned to kill all cabinet members with grenades and firearms on the evening of February 23, 1820, based on a New Times newspaper report that the cabinet members would dine together at Lord Harrowby's residence in Grosvenor Square. They hid in a barn in the cul-de-sac of Cato Street leading to Grosvenor Square, but were captured during a raid by the Coldstream Guards Detachment, who had taken precautions. The defenses of the group's leader, Arthur Thistlewood, and William Davidson, who was among those executed, highlighted the radical ideas of the time during their trial.

This study aims to explain the changes in England's social structure and their impact on politics, detailing the role of the Cato Street Conspiracy in this process on a micro level. This detailed examination serves as a starting point to explain why radical initiatives like the Cato Street Conspiracy did not succeed in England. Within this framework, the study seeks to answer the question: What are the fundamental dynamics of the transition from a conflicting environment to a consensus during England's radical period? Addressing this question can reveal the unique aspects of English democracy. The study is planned in two sections: The introduction discusses the Industrial Revolution, England's economic transformation, and changes in social structure. The first section summarizes the historical background and rights-based actions that emerged after the Seditious Societies Act of 1799, which banned all forms of dissenting organization, including worker organizations. The second section addresses the development process and effects of the Cato Street Conspiracy.

Keywords: Democracy in England, Cato Street Conspiracy, Arthur Thistlewood, Demonstrations in England most politically radical years.

GİRİŞ

Cato Sokağı Komplosu'na olan ilgi 2020'de komplonun 200.yıl dönümü nedeniyle artmış[1] ve çeşitli tartışmaları da beraberinde getirmiştir. Cato Sokağı Komplosu, İngiltere Tarihi açısından uzun bir süre

[1] Westminster Community Reminiscence and Archive Group (WCRAG) isimli bir Sivil Toplum Kuruluşu tarafından Heritage Fund'dan alınan 72.400 £'luk hibenin yardımı ile Westminster tarihini ortaya çıkarmak ve her yaştan insanı Westminster tarihine dahil etmek amacıyla Cato Sokağı Komplosu hakkında bir yerel tarih projesi başlatılmış ve Cato Sokağı Komplosu'na özel bir internet sayfası oluşturulmuştur. https://www.catostreetconspiracy.org.uk/

FULL TEXTS BOOK

görmezden gelinmiş ve ümitsiz, aptalca ve nihayetinde önemsiz bir olay olarak aktarılmıştır (McElligot, 2021, s. 481). Oysa İngiltere Tarihi'nde Cato Sokağı Komplosu kadar şiddet içeren olaylar, 1605 Barut Komplosu ya da IRA'nın 1984'te Brighton'daki Grand Hotel'de Tory kabinesine suikast planı gibi, sonuçlarından bağımsız ilgi görmüşlerdir. E. Palmer Thompson, bu ilgisizliğin oldukça tuhaf olduğu ve dönemin kaynaklarının yeterince değerlendirilmemesinden kaynaklandığı görüşündedir (Thompson, 2006, s. 588-590). 2000'lerin başından itibaren Cato Sokağı'nın ele alınış biçimi farklılaşmaya başlamış, Birleşik Krallık Ulusal Arşiv'indeki belgeler ve mahkeme kayıtları ile olayın detayları yüksek bir akademik ilgi ile incelenmiştir. Bu incelemeler Cato Sokağı Komplosu'nun basit bir hükümet darbesi girişimi yerine Fransız Devrimi'nden etkilenen Cumhuriyetçi fikirleri olan, İrlanda radikalizminden etkilenen; askeri birlikleri işin içine katarak ne kadar zor görünürse görünsün bir askeri darbe olasılığını yaratan, ciddi etkileri olan bir olay olduğunu ortaya koymuştur.

Komplonun ortaya çıktığı dönemde Lord Liverpool başbakanlığındaki hükümet, İngiltere tarihinin en hatırda kalan hükümetlerinden biridir. Bunun en önemli nedeni Napolyon Savaşları'nı yöneten ve başarıyla sonuçlandıran kabine olmasıdır. Castlereagh, Canning ve Lord Sidmouth gibi aristokrat kökenleri zayıf bakanlar[2] (McCord & Purdue, 2007, s. 11) İngiliz hükümetlerinde farklı profilli bakanlar dönemini başlattı. Bu hükümet dönemi ayrıca hükümet sisteminin güçlendiği, monarşi karşısında hükümet yetkilerinin genişlediği ve bu bağlamda parlamenter yapının güçlendiği bir dönemdir. Bu güçlenmede Naiplik döneminin etkisi vardır. Liverpool hükümeti aynı zamanda Torylerin birkaç parçaya bölündüğü bir dönemdir. Bizzat Liverpool, liberal muhafazakardır, ekonomik yapıdaki değişimin bir yansıması olarak Whigler parlamentoda daha etkin olmaya başlamışlardır. Ancak bu durum Muhafazakar Whiglerin kopmasından sonra yavaş yavaş gerçekleşebilmiştir (McCord & Purdue, 2007, s. 10). Özellikle Lordlar Kamarası'ndaki bu değişim 1830'da IV. George'un Reform Yasalarını Lordlar Kamarası'ndan geçirebilmek için yaptığı yeni Lord atamaları ile hızlanmış Muhafazakar ve Liberal partilerin oluşumu adı konabilir hale gelmiştir.

Sanayi devrimi, İngiltere'de üretim ilişkilerini 1750 sonrasında hızla değiştirmiştir. 1750 sonrasında uzun bir süreç boyunca hazırlanan sanayi devrimi İngiltere'yi bir ekonomik büyüme sürecine sokmuştur. Teknolojik ilerlemelerin başat katkısı ile sanayi devrimi başta dokuma sektörü olmak üzere üretim ve istihdam artışını gerçekleştirmiş, deniz gücü üstünlüğü ile uluslararası ticaretin büyük kısmı İngiliz tüccarlar eliyle gerçekleşmeye başlamıştır. Bu şartlar altında öncelikle toplumsal bir değişim başlamış ve eskiden tarım işçisi olarak çalışan insanlar sanayi işçisine doğru dönüşmüştür. Toplumsal sınıfların ayrıcalıkları açısından belirgin değişim, kent nüfuslarının artışı ile yeni ve eskisinden daha farklı bir yaşam tarzını, toplum düzenini beraberinde getirmiştir. Sanayi devriminin daha iyi beslenme ve tıbbi yardım sağlayan koşullarının etkisi ile de hızlı artan nüfus, İngiltere'de üretimin yoğunlaştığı sanayi kentlerinde işçi olarak çalışmaya başlamıştır. Manchester, Liverpool, Birmingham gibi sanayi kentleri giderek güçlenerek parlamentoda daha fazla temsil hakkını arayan ve sürecin değişimine toplumsal gösteriler ile etki eden merkezler olmuşlardır (Allen, 2006). Cato Sokağı Komploculları'nın Londra'da başlattıkları bir devrimin bu kentler tarafından takip edileceğine dair inançları buradan kaynaklanmaktadır. Ancak daha iyi yaşam beklentisi ile kentlere gelen insanların 19.yüzyıl başındaki ekonomik sıkıntılarla yüzleşmesi sırasında beklenti ve talepleri değişmiştir. Bu değişimde dönemin aydınlanmacı düşüncelerinin etkisi ile başta daha iyi yaşam ve çalışma koşullarına yönelik talepleri; ardından da karar verici bir etkiye sahip olmak adına siyasal talepleri gelmiştir. Bu bildiriye konu olan olayların ve süreçlerin tamamı bu değişim döneminin başlangıcını aktarmakta, bildiri; çatışmadan uzlaşmaya geçişin dinamiklerini aramaktadır.

[2] Castlereagh, İrlandalı bir aileden gelen ikinci kuşak bir soyluydu, Canning, kariyerini kendi yeteneklerine ve başarılı bir bankacı olan amcasının zamanında yardımına borçluydu. Lord Sidmouth, bir doktorun oğluydu ve siyasete W. Pitt'in bir arkadaşı olarak girmişti; asaleti sadece 1805'ten kalmaydı.

FULL TEXTS BOOK

1. 18.YÜZYIL SONUNDAN 1820'YE TARİHSEL ARKAPLAN

İngiliz tarihçi Eric Hobsbawm, 1789-1848 yılları arasını Devrim Çağı olarak tanımlar ve bu dönemde İngiltere'nin rejim değişikliği ile sonuçlanan bir devrimden kurtulmasının şans eseri olduğu görüşündedir. Hobsbawm'a göre devrim ruhuyla hareket eden bir burjuvazinin olmaması anarşiye sürüklenmeyi önlemiştir (Hobsbawm, 2003). İngiltere'de Devrim Çağı, araştırmacılar tarafından üç döneme ayrılarak incelenmektedir. Birinci dönem 1789-1815 Fransa ile mücadele dönemidir. İkinci Dönem 1815 barışı sonrası ekonomik sıkıntıların derinleştiği, sanayi devrimi etkilerinin ortaya çıktığı ve 1830'a kadar süren dönemdir. Bu dönem İngiliz siyasal yapısının en hızlı değiştiği dönem olarak kabul edilebilir. Üçüncü dönem ise 1832 Reform Yasasının kabulü ile 1848 arasında geçen dönemdir (Lee, 1994, s. 15).

Birinci dönemde başta kıta ablukasının getirdiği ekonomik sorunlarla gittikçe zorlaşan bir dönem yaşanmış, artan nüfusu besleme sorunu; tarımsal üretimde 1790 sonrası görülen bitki hastalığı kaynaklı düşüş ile en önemli sorunlardan biri haline gelmiştir. Bu dönemde yiyecek sıkıntısı *"radikal dava için önemli bir üye kazanım aracı"* haline gelmiştir (Lee, 1994, s. 17-18).

Fransa ile savaş devam ederken İskoçya ve İrlanda'nın karışması; donanmada 1797 Nore ve Spithead isyanları sürekli varolan bir ayaklanma söylentisini de beraberinde getirmiştir. Buna rağmen Lee, İngiltere'de genel bir ayaklanma olasılığını *"oldukça düşük"* olarak değerlendirmekte ve bunun nedenlerini şu şekilde analiz etmektedir: En önemli unsur Fransız Devrimi'nin İngiltere'de sınırlı bir etki yaratmasıdır. Fransızların aksine İngiliz siyasal sisteminin soyut haklar yerine Burke etkisi ile somut haklara yönelmesi, ekonomik durum iyileştikçe devrim ve ayaklanma riskini azaltmıştır. İngiltere'de Locke'un etkisi Rousseau'dan fazladır. Locke'un akılcılığının Rousseau'nun eyleminden fazla olması uzlaşmayı desteklemiştir. Ayrıca İngiltere'de 17.yüzyıl devrimlerinden itibaren bir radikalizm geleneği vardır ve en geniş kitlelere hitap eden gruplar genellikle en az açıkça devrimci olanlardır. İngiltere'de Protestanlığın çeşitli biçimlerinin varlığı, her ne kadar Anglikan kilisesine ayrıcalıklar tanınsa da, devam edebilmiş ve Protestanlığın dünyevi hayatla olan bağı radikalizmi kısıtlayıcı bir etki yaratmıştır. Metodizm özellikle siyasi uyumu vurguladığından İngiltere'de radikalizmi azaltan önemli bir unsur olmuştur (Lee, 1994, s. 17-18).

Hükümet ayrıca yasal düzenlemelerin sağladığı kısıtlamalar ile siyasal kurumları stabil tutabilmiştir. 1794-1800 arası arka arkaya hükümet kontrolünü arttıran düzenlemeler yapılmıştır. Bu düzenlemelerden en başta geleni Cato Sokağı Komploculari'nın idam cezası almalarında ve idam şekillerinde etkisi bulunan 1795 tarihli Vatana İhanet Yasası'dır. Diğer önemli düzenlemeler 1799'da başta işçi örgütlenmeleri olmak üzere toplumsal örgütlenmeleri yasaklayan Corresponding Societies[3] ve İsyancı Dernekler Yasası (Seditious Societies Act)[4]'dır (Lee, 1994, s. 19). Bu yasaklara rağmen parlamenter reform belli isimlerin liderliğinde savunulmuştur. William Cobbet, John Cartwright, Henry Hunt gibi isimler gerçek bir öncülük yapmıştır (Morris, 1948).

Çeşitli talepler kent merkezlerinde yüksek sesle dile getirilmeden önce maden, tarım ve dokuma üretimlerinin yoğun olduğu kırsal bölgelerde eylemler başlamıştır. Makine Kırıcılığın 1811 civarında başladığı (Hobsbawm, The Machine Breakers, 1952); Yorkshire'ın West Riding bölgesinde, Lancashire'da ve Midlands'da oldukça etkili olduğu söylenebilir, 1815'te Battaniyeciler Eylemi, 1816

[3] Bu terim Türkçeye Mektuplaşma ya da Yazışma Dernekleri olarak çevrilebilir. 18.yy. sonunda fikir ve bilgi paylaşımı amacıyla kurulan aynı zamanda birer yardımlaşma derneği olarakta çalışan sivil topluluklardır. İngiltere'de işçi örgütlenmelerinin gelişerek sendikalaşması konusunda önemli rol oynamışlardır. Bunlar arasında en dikkat çekeni ve Spencean Hayırseverler Derneği ile irtibatta olanı London Corresponding Society'dir. Bu çerçevede İngiltere'de Sendikal yasakların 1799'da başladığı kabul edilir.

[4] İlk etapta radikal olan mektuplaşma derneklerini diğerlerinden ayırmak için kullanılmıştır. Ancak sonrasında hükümet hemen hepsinden aynı derecede çekinmiştir. Bu tür yasaklayıcı yasaları birleştiren bir Birleştirme Yasası (Combination Act'te)1800'de çıkartılır.

FULL TEXTS BOOK

Spa Field Gösterileri, 1817 Derbyshire Ayaklanması (Pentridge Ayaklanması), 1819 Peterloo[5] ve 1820 Cato Sokağı Komplosu dönemin en radikal itirazlarıdır (Lee, 1994, s. 21-23). Bu itirazların motivasyon kaynağı henüz sınıf bilincinin tam olarak gelişmediği bu dönemde ücretlerdeki düşüşler ve istihdama yönelik tehditlerdir. Yok sayıldıklarının farkında olan insanlar değişim talep etmekten başka çıkar yol görmemişlerdir. Bu değişim döneminde geldikleri toplumsal kökenin bir yansıması olarak Cato Sokağı Komplocuları, aristokrasiye ve monarşiye karşı bir nefret geliştirmişlerdir. Yukarıda sayılan olaylarda hükümetin takındığı tavizsiz otoritenin kaynağı olarak Lord Liverpool'u ve İç İşleri Bakanı Lord Sidmouth'u görmüşlerdir. Cato Sokağı Komplocuları'nın Lideri Arthur Thistlewood ile Lord Sidmouth arasında ayrı bir nefret olduğunu da belirtmek gerekir. Thistlewood, Sidmouth'u bir tiyatro oyununda sahneye çıkarak düelloya davet etmiştir, sürekli kendisine tehdit içerikli mektuplar yazmıştır. 1816'da Habeas Corpus'un[6] kaldırılması ve 1818 Ocak ayına kadar uzatılması nedeniyle Thistlewood, Sidmouth'a ettiği tehditlerden tutuklanarak yargılanmadan 1817'de hapiste tutulmuştur (McCord & Purdue, 2007, s. 23).

Derbyshire ve Peterloo olayları hoşnutsuzluğu geniş kitlelere ileten ateşleyiciler olmuştur. Spencean Hayırseverlerinin bu süreçte oldukça fazla sempati ve aktif taraftar edindiği söylenebilir. Komplocular, İngiltere'deki bütün kötülüklerin kaynağı olarak Kralı, Naibi, Başbakan Liverpool'u ve Lord Sidmouth'u görmüşlerdir. Kral, III. George'un akıl sağlığı ile oğlu, naip IV. George'un bohem hayatı zaten sorunlarla boğuşan pek çok sıradan insan açısında önemsenmediği duygusunu hissettirmiştir (McCord & Purdue, 2007, s. 16-26).

1815 sonrası ikinci dönemin önemli bir faktörü de savaşın bitimi ile İngiliz Donanması'nın küçülmesi ve terhis olan askerlerin durumudur. Askerlerin içinde bulunduğu ekonomik durum ve daha önce donanmada gerçekleşen isyan örnekleri Thistlewood'a devrimci bir girişim esnasında ordudan destek bulabileceklerini düşündürmüştür.

1815 sonrasında savaş ekonomisinin sona ermesi ile maliyet ve giderlerde azalma beklentisine rağmen değişen koşullar ve savaş sırasında oluşan borçlanma, kamu maliyesinin sürekli açık verdiği bir döneme girdiğinin işaretlerini vermiştir. Bu durum halkta, savaş zamanı konmuş olan dolaylı vergilerin kaldırılması beklentisi ile çelişmiş; yiyecek kıtlığı, yüksek vergi ve düşük ücret ile yüksek fiyatlar arasında ekonomik huzursuzluklar artmıştır. 1815'te çiftçi ve toprak sahiplerini korumak üzere tahıl yasalarının çıkartılması, tahıl ithalatının yerli üreticiyi korumak üzere sınırlandırılması ekmek fiyatlarının artmasına neden olmuştur (McCord & Purdue, 2007, s. 33). Hükümet gerçek bir mali reforma ancak 1820 sonrasında başlayabilmiştir.

1820'de III. George'un ölümü Kraliçe Viktoria'yı tahta çıkaracak olaylar ve varisler sürecini başlatmıştı. IV. George döneminde Kral ve Lord Liverpool arasındaki denge 1827'de Liverpool'un ölümü ile bozuldu, Liverpool sonrası Canning'in başbakanlığı kısa ve kabine birlikteliği sağlayamayan bir başbakanlık oldu. Hükümet kurmada yaşanan sorunlar ve güç dengelerinin değişimi 1830-32 arasında yasama reformlarının en önemli nedeni haline geldi.

1832'deki reform yasası ile İngiltere'de oy verme için gerekli olan şartlar hafifletildi. Hala belli bir oranın üstünde vergi veriyor olma şartı mevcuttu ancak toprak sahibi olma şartı kaldırılmıştı. Bu durum oy hakkı genişlemesinin ilk büyük adımı oldu ve Whigler arasında oy kullanamayan hemen hemen

[5] Olaya Waterloo'ya atıf ile Peterloo denmektedir. 1819'da Manchester'ın hemen dışındaki Saint Peter çayırında düzenlenen barışçıl gösteri İngiliz Süvarilerin sert müdahalesi ile bir katliama dönüşmüştür. Süvarilerin komutanı olarak Waterloo kahramanı Lord Wellington'un varlığı Peterloo adının verilmesinde başlıca etkendir.

[6] İngiltere'de 17.yüzyıl devrimlerinin sonucu olarak ortaya çıkmış insan haklarının ve demokratik gelişimin önemli bir parçası olarak nitelendirilen yasadır. 1679 yılında çıkan yasa, tutuklamaların mahkeme kararına bağlanmasını ve suçun kanıtlar ile mahkemede ispatlanma zorunluluğunu sağlamıştır. Yasa, İngiltere'de 1794'te 1814, 1816 ve 1863'te belirli süreler ile askıya alınmıştır. Bazı savaş durumlarında da uygulanmamıştır.

FULL TEXTS BOOK

kalmadı. Az sayıda işçi de oy kullanma hakkına kavuşmuş oldu. İşçilerin çoğunun oy kullanmasını sağlayan değişiklik ise 1867'de gerçekleşti.

2. CATO SOKAĞI KOMPLOSUNUN GELİŞİMİ

2.1. Thomas Spence ve Spencean Hayırseverleri Derneği

Spencean Hayırseverleri Derneği, Naiplik döneminde tarım işçilerinin ve kentlerdeki çalışanların içinde bulunduğu umutsuz koşullarda gelişme fırsat bulmuş ve geniş bir sempatizan kitlesine ulaşmıştı. Buna rağmen işçi sendikalarından ya da diğer radikal gruplardan daha az incelenmiştir. Oysa Lord Sidmouth'un casus ağını yönetem John Stafford, Spence'in ölümü sonrası cemiyete özel bir ilgi göstermiş, önce John Castle isimli casusu arkasından Cato Sokağı Komplosu'nda önemli bir rol oynayan George Edwards'ı gruba yerleştirmişti. (Beeson, 2012, s. 6) Muhtemelen Cato Sokağı Komplosu olmasa cemiyetin daha fazla göz ardı edilmesi söz konusu olurdu.

Thomas Spence'in ilk fikirlerini 1773'te Newcastle olaylarına tanık olduktan sonra geliştirdiği düşünülmektedir. Newcastle'da çiftçilerin çitleme hareketine karşı direnişi sonrası toprağın hallkın ortak malı olduğuna dair ilk fikirilerini dile getirmişti. Spence, toprağın zenginliğin tek kalıcı biçimi olduğuna inanıyordu, bu nedenle toprak sahiplerinin mücevherleri ve taşınır malları onlarda kalabilirdi ama toprak olmadan servetlerinin devam etmesini mümkün görmüyordu. Ayrıca kadınlara oy hakkı dahil genel oy hakkına ve gizli oylamaya inanıyordu. Çalışamayacak durumda olanlar için gelir garantisi sağlanmasını ve dokuma fabrikalarında çalıştırılmakta dahil olmak üzere çocukların istismar ve yoksulluktan korunması gerektiğini savunuyordu. Merkezi hükümete güvenmiyor ve daimi bir orduya karşı çıkıyordu. Herkesin toplum içindeki yerini gerçekten anladığında bu fikirlerden ayrı düşünemeyeceği görüşündeydi. (Beeson, 2012, s. 19)

Spence, 1792'de Londra'ya gitti, burada London Corresponding Society (LCS) ile ilişki kurdu ve bu ilişki sonrasında hükümet tarafından takip edilmeye başlandı. LCS ile ilişki kurması cemiyetinin geleceğinde ve Cato Sokağı Komplosu'nda etkili olmuştur. Londra'da kendisi etrafında bir hayran kitlesi oluşarak cemiyetin kurulması gerçekleşmiştir. Cemiyet'in 1803'te kurulduğu kabul edilmektedir (Beeson, 2012, s. 21). Butcher, Cemiyetin toplantılarını her hafta White Lions barında yaptığını ve en az 30 kişinin sürekli toplantılara katıldığını söylemektedir (Butcher, 2007, s. 10).

Özetle; Thomas Spence (1750-1814), arazinin ortak mülkiyete devredilmesini savunmuş ve Paine'in insan hakları kavramını politik bağlamın aksine geniş bir ekonomik anlayışa dayandırarak savunmuştur. Spence'e göre insanın iyi yaşama hakkı geniş bir ekonomik özgürlükten ve her bireyin mülkiyetinden tam olarak faydalanmasından geçer (McElligot, 2021, s. 488-489). Toprak mülkiyetinin hala başlıca zenginlik kaynağı olduğu bu dönemde fikirleri geçimlik toprağı çoğunlukla olmayan ve karın tokluğuna çalışan geniş bir kitlede yer bulmuştur. Spence'in fikirleri özünde oldukça barışcıldır. Spence'in ölümünden sonra yerine Thomas Evans geçmiştir. Grubun Evans, döneminden itibaren daha radikal bir hale geldiği görülmektedir. Ancak Evans'ın 1816 sonunda Cemiyetten ayrılması ile Thistlewood'un liderliğe gelmesi sonrasında en radikal cemiyetlerden biri haline gelir. Tarihçiler Spenceanların kralın kendisine kızgın olmadıkları konusunda hemfikirdir. Cemiyet içinde 13'ler Komitesi olarakta bilinen Cato Sokağı Komplocuları da Hannover Hanedanı'nın çok uzun süredir iktidarda olduğuna inansalarda, esas olarak Parlamento üyeleri ve kralın kabinesi tarafından gerçekleştirildiğini düşündükleri yetki suiistimallerine kızgındırlar (Beeson, 2012, s. 13).

Cato Sokağı Komplocuları'nın tamamı Thomas Spence'in fikirlerini savunan Spencean Hayırseverleri Derneği'ne farklı zamanlarda giren geçmişleri birbirinden farklı radikallerdir. Grubun en radikalleri Arthur Thistlewood, James Watson, Thomas Preston'dır. Bu isimlerin ortak noktası geçmişlerinde hepsi farklı gruplarda silah zoruyla köklü anayasal değişiklikler yapma arzusunu geliştirmişlerdir. Barışcıl bir gösteri olan Peterloo'nun kanlı bir şekilde bitmesinin arsından Aralık 1819'da Thistlewood ilk olarak 200 kişi ile parlamentoyu basma planını gruba kabul ettirmeyi denemiş ancak 40 kişi ile kabinenin düzenli toplu yemeklerinden birinde kabineyi öldürmenin daha gerçekçi bulunması ile plan değişmiştir.

FULL TEXTS BOOK

Grup, 1 Şubat 1820'de gerçekleşeceği bilinen kabine yemeğini hedef almıştır (McElligot, 2021, s. 483). Koplocuların hedefi, tüm kabineyi öldürerek ortadan kaldırmak ve geçici bir hükümetin kurulmasını sağlayarak bu süre içinde eşitliği sağlayan reformları hayata geçirmektir. Bu plana Batı Yakası İşi (West End Job) adını vermişlerdir (Beeson, 2012, s. 1).

2.2. Komplonun Planlanması ve Polis Baskını

Komplocular, ilk olarak 1 Şubat'taki baskın hedefine yönelik; 25 Ocak'ta Gray's Inn Yolu 4 Fox Court'ta Komplocu John Brunt'un kaldığı evde ilk planlama toplantısını yaptılar. Toplantıya katılanlar şunlardı: John Brunt, iç işleri casusu George Edwards, Abel Hall, John Palin, Bay Potter, Arthur Thistlewood ve Richard Tidd. Toplantıda, yemeğin yapılacağı Grosvenor Meydanı'ndaki Harrowby Konutu'nun sürekli gözlenerek raporlanmasına, askerlere ve halka hitaben bildiriler hazırlanarak posta yoluyla Manchester, Glasgow, Newcastle, Lynne gibi kentlere gönderilmesine karar verildi (McElligot, 2021, s. 484). Bildirileri basma görevini, Cumhuriyetçi geçmişi olan ve London Corresponding Society üyesi Thomas Davidson gönülsüz bir şekilde kabul etti.

27 Ocak'ta aynı yerde yapılan ikinci toplantıda üretilen el bombalarının "teneke kabuk" örnekleri gösterildi ve halka hitaben yazılacak ilk bildirinin taslağı hazırlandı[7]:

"İngilizler,

Adalet zafer kazandı - ve Zalimleriniz yok edildi - vatansever çabalarınızı şanlı bir kader bekliyor - yüzyıldan fazla bir süredir sizi köleleştiren ve aşağılayan Oligarşinin yerine geçici bir Hükümet atandı - Geçici Hükümet, her bireyin Mülkiyetinden ve Korunmasından tam olarak yararlanmasını sağlayacaktır.

Ve, sizin durumunuzun ve ülkemizin iyileştirilmesinin bir garantisi olarak, hak gaspçıları tarafından bu tarihten itibaren kabul edilen her eyleme bu şekilde uyulmasına son verilmesine karar verilmiştir. Ancak Halkın duygularına ve nesillerinin çıkarlarına uygun olarak Hükümeti benimsemesi için fırsat sağlamak üzere bu tarihten itibaren bir ay içinde 21 yaşını doldurmuş tüm erkeklere oy kullanma hakkını veren bir Temsil Sözleşmesinin oluşturulmasına yönelik tedbirlerin kabul edilmesi arzu edilmektedir. Ülkelerinin Rütbelerine katılan ordular, liyakatlerine göre ilave maaş avansı alacaklardır; ailelerinin yanına dönmek isteyenler silahlarını teslim etmeye çağrılmaktadır ve bunun karşılığında kendilerine en cömert şekilde derhal ödeme yapılacaktır." (McElligot, 2021, s. 485-486)

Hazırlanan bu taslak bildiri metni White Cross hapishanesinde tutuklu bulunan ancak ziyaretçi kabul edebilen eski Corresponding Society üyesi James Watson'a düzeltmesi için ulaştırıldı. Watson'un düzeltilmiş taslağı 28 Ocak'ta Thistlewood ve Davidson'a ulaştı. Watson'un taslağı ilkinden çok farklıydı. İngilizler şeklinde olan halk hitabını İngilizler ile Birleşik Britanyalılar ve İrlandalılar olarak iki gruba ayırmıştı. Bu ayrım o dönemde İngiltere'nin durumunun Birlik yasasına rağmen birlik olamadığını göstermektedir. İki hitap birbiri ile çelişmektedir. Askerlere yönelik vaadlerin olduğu bölüm de kaldırılmış ve Watson tarafından orduya hitaben ayrı bir bildiri yazılmıştır. Ayrıca ilk taslakta olan oy kullanma ve yeni hükümetin oluşma şeklinden ise hiç bahsedilmemektedir.

"İngilizler!

Adalet sonunda galip geldi. Zalimleriniz yok edildi.

Vatansever enerjilerinizi şanlı bir kader bekliyor. Sizi bir yüzyıldan fazla bir süredir en kısmi ve baskıcı tedbirlerle köleleştiren ve aşağılayan aşağılık ve kötü Oligarşinin kötülüklerinden ve yanlışlarından sizi korumak için geçici bir Hükümet atandı. Geçici Hükümetin Kararlarına itaat, her bireyin Kişilerinin ve Mülklerinin korunmasını sağlayacaktır.

Birleşik Britanyalılar ve İrlandalılar!

[7] Bu bildiri metni ve diğerleri, McElligot'un Home Office belgeleri ve mahkeme kayıtlarına dayalı olarak aktardığı İngilizce metinlerden tarafımca çevrildi. Bu çeviriler, bildirilerin Türkçe metinlerinin ilk yayınlanmasıdır.

FULL TEXTS BOOK

Sivil ve Dini Özgürlük!

Kararname:

Bundan böyle İlçe Taciri Gasp Eylemlerinin etkisi sona erecektir. İnsanlar, kendi duygularına en uygun ve Gelecek nesillerin çıkarlarına en uygun olan Hükümet Sistemini oluşturmaya çağrılmaktadır." (McElligot, 2021, s. 486)

Watson'un askerlere yönelik yazdığı bildiri metni ise şöyledir:

Cesur Askerler, Zalimler artık yok!

İnsanlarla ortak bir amaç edinin. Babalarınız, annelerinizi ve arkadaşlarınızı düşünün! Uzun zamandır katlandıkları acıların hakkını verin! Kendinize adil olun!

Cesur ol ve özgür ol!!!

İnsanlara katılın; Dünyadaki en özgür ulus olmak için, o zaman en müreffeh ve mutlu ulus olacaksınız. Geçici Hükümet'in talimatlarını bekleyin, hizmetleriniz için sizi ödüllendirecek önlemleri projelendirmekle meşgul. Durumunuz mutlu edilecektir. Geçici hükümlere uyun.

Sen cesursun, Ülkenin yanlışlarına karşı adil ol. Kader, talep eder; Adalet, İnsan Haklarının korunmasını gerektirir. Büyük bir ödül Hakkındır." (McElligot, 2021, s. 488)

Basılmak üzere hazırlanan bu bildiriler Davidson tarafından basılamamıştır. İzlendiğini bilen Davidson, bildirileri basmak konusunda oyalanmıştır. Ancak bildiriler basılmamasına rağmen Davidson olaydaki rolü nedeniyle idam cezası alacaktır. 29 Ocak'ta bildirlerin hala basılamaması üzerine Thistlewood, basabilecek başka bir isim ya da yer arayışına girmiştir.

1 Şubat planı için hazırlıklar sıkışırken beklenmedik bir olay planı bozdu. Kral III. George 29 Ocak'ta öldü. Thistlewood kabine yemeğinin herşeye rağmen yapılmasını umdu ve Kralın cenazesine katılmak için Londra'dan ayrılan askeri birliklerin işleri kolaylaştıracağını düşünüyordu. Sonuçta 1 Şubat planının yapılması imkansız hale geldi. Thistlewood, olası bir hükümet krizi ile işlerinin kolaylaşacağını, vazgeçmemeleri gerektiğini düşünüyor ve grubu ikna etmeye açlışıyordu. Thistlewood, yapılacak ilk işin bildirilerin basılması ve kent merkezlerine postalanması olduğuna inanıyordu ancak tüm uğraşlarına rağmen 18 Şubat'ta hala bildirler basılmamış ve herhangi bir kabine yemeği duyurusu yapılmamıştı. Beklemenin gerginliği ve gizli davranma zorunluluğunun sinirlerini oldukça gerdiği düşünülebilir.

Grubun içindeki casus George Edwards, grubun her an harekete geçebileceğini iç işlerine rapor ediyordu. 20 Şubat'taki grubun toplantısına ilişkin raporunda; Brunt'un 23 Şubat Çarşamba gününe kadar bir kabine yemeği ilan edilmezse, grubun ellerindeki silahlarla karışıklık çıkararak taraftar toplayıp bir Londra ayaklanması çıkarma planının oybirliği ile kabul ettiğini belirtiyordu. Bunun üzerine İç İşleri, 22 Şubat'ta New Times gazetesinde yayınlanan sahte kabine yemeği haberini organize etti. Haberi, bizaat Edwards'ın Thistlewood'a gösterdiği ve teşvik ettiği anlaşılmaktadır (McElligot, 2021, s. 491). Sonuçta 1 Şubat için yapılan hazırlıklar 23 Şubat'ta Cato Sokağı çıkmazından Harrowby kontuna yapılacak yeni bir plana entegre edildi. Grup daha fazla ateşli silah toplamak üzere harekete geçti. Basılamayan bildirilerin yerine el yazısı ile halka ve askerlere yönelik iki kısa bildiri çoğaltıldı, Halka olan bildiri şöyle diyordu: *"Tiranlarınız yok edildi - özgürlük dostları ileri gelmeye çağrıldı - Geçici Hükümet şimdi toplandı. [İmza] James Ings, Sekreter, 23 Şubat"* (McElligot, 2021, s. 492) Askere hitaben yazılan bildiri biraz daha uzundu ve ekonomik vaadlerden ayrılmıyor, askerleri "özgürlük dostlarına" katılmaya çağırıyordu (McElligot, 2021, s. 493).

Bildiriler ancak kabine üyelerinin öldürülmesinin başarılması üzerine etkili olabilirdi ve askerlerin müdahale etmeyeceğini varsaymak o noktada dahi oldukça gerçek dışıydı. Bu şekilde yemeğin saatini beklemek üzere Cato Sokağı'ndaki ahırın çatı katında toplanan yaklaşık 20 komplocunun heyecanlı bekleyişi başladı. Bekleyiş sona ermeden Yüzbaşı Fitzclarence liderliğinde Coldstream Muhafızları çatı katına baskını saat 19:30'da gerçekleştirdi (Pollard, 2020). Baskın sırasında Thistlewood, bir polis memurunun ölümüne sebebiyet verdi. O kargaşada Thistlewood çatı katından kaçabildi. Edwards'ın ihbarı ile saklandığı yerde 24 Şubat günü yakalandı. Thistlewood, Edwards'ın hükümete çalışan bir

FULL TEXTS BOOK

casus olduğunu ancak bu noktada öğrendi (Beeson, 2012, s. 51). Baskınla, Spencean Hayırseverleri Cemiyeti'nin en radikal üyeleri tutuklanmış ve hükümet darbesi girişimi başarısızlıkla sonuçlanmış oldu.

2.3. Yargılamalar

Yargılamalar 15 Nisan 1820'de başladı. Her bir komplocunun yargılanması istinad edilen suçlara göre bireysel olarak isim isim yapıldı. Görülen ilk duruşma Thistlewood'un davası oldu ve iki gün sürdü (Beeson, 2012, s. 53). Komplo Yargılamaları Old Bailey olarak bilinen Merkezi Ceza Mahkemesi kayıtlarında detaylı olarak bulunmaktadır. Duruşma kayıtları, sanıklara yöneltilen suçlamaların yanı sıra suikast girişimini çevreleyen günlerde komplocuların faaliyetlerine ilişkin görgü tanıklarının raporlarını da içermektedir (Beeson, 2012, s. 8).

Savunma Avukatı John Adolphus, vatana ihanet suçlamasına itiraz ederek, bulunan silahların ancak *"bir yol soygunu için yeterli olduğunu"* iddia etmiştir. Adolphus, 1814'te Thistlewood'un tutuklanıp yargılanması esnasında, John Castle isimli casusun tanıklığını çürüten ve Thistlewood'u kurtaran savunmayı deneyerek Casus George Edwards'ın işin beyni olduğunu; onun manipülasyonları olmadan müvekkillerinin işleri bu raddeye getirmeyeceğini iddia etmiştir (McElligot, 2021, s. 494). Savcılık, Edwards'ı tanık kürsüsüne çıkarmadan 4 tutuklu komplocu; Robert Adams, Thomas Dwyer, Thomas Hiden ve John Monument ile anlaşarak suçlamalarının düşürülmesi karşılığında tanıklık etmelerini sağlamıştır (McElligot, 2021, s. 495).

Savunmanın itirazları yetmedi ve 5 komplocu idam cezası aldı: Arthur Thistlewood, James Ings, William Davidson, John Brunt ve Richard Tidd. Eski asma ve dörde bölme cezasının bir kalıntısı ile idam edileceklerdi. Asıldıktan sonra başları kesilerek teşhir edildi. İnfaz 1 Mayıs 1820'de Newgate Hapishanesi'nin dışındaki iskelede binlerce kişilik bir kalabalığın önünde gerçekleşti. Thistlewood'dan sonra grubun ikinci adamı James Ings'in son sözleri *"Ölüm ya da özgürlük! Kral George beni hatırlasın, Tanrı onu korusun!"* oldu. Thistlewood son sözleri ise *"Umarım dünya, çabalarımda samimi olduğuma ve özgürlüğün dostu olarak öldüğüme ikna olacak."* oldu (Bates, 2020). Beş komplocu, Richard Bradburn, Charles Cooper, John Harrison, John Shaw Strange ve James Wilson ise Avustralya'da ömür boyu sürgün cezasına çarptırıldı ki birçokları bunu idamdan daha kötü bir kader olarak görüyordu. İnfazları izlemeye zorlandıktan sonra aynı gün Guildford gemisiyle yola çıktılar (Beeson, 2012, s. 69). Onların Avustralya'daki yaşamları kolay olmadı, tehlikeli radikaller olarak orada da sıkı şekilde takip edilirler. McQueen, 1819-20 arasında Cato Sokağı Komplocusu olarak Avustralya sürgün kayıtlarına geçmiş 25 kişinin varlığından bahseder. McQueen, Avustralya'nın bir siyasal sürgün yeri olarak kullanılması ve önemli pek çok radikalin ömür boyu Avustralya'da yaşamak zorunda kalmasının Avustralya demokrasisini olumlu anlamda etkilendiği görüşündedir (McQueen, 1968, s. 3-4). McQueen'in 1794-1842 Arasında Avustralya'ya gönderilen siyasi mahkumlara ilişkin ortaya koyduğu veriler ışığında tarafımca oluşturulan aşağıdaki tablo oldukça ilgi çekicidir.

Tablo 1: 1794-1842 Arası Avustralya'ya Sürülen Siyasi Mahkumlar

1794-1842 Arası Avustralya'ya Gönderilen Siyasi Mahkumlar		
Yıl	Siyasi Grubu	Sayıları
1794	İskoç Şehitleri (Scottish Martyrs)	5
1812	Luddist	50
1817	Derbyshire İsyancıları (Derbyshire Rioters)	11
1819-1820	Cato Sokağı Komploculari (Cato Street Conspirators)	25

FULL TEXTS BOOK

1830-1831	Tarım İşçileri (Agricultural Labourers)	464
1834	Tolpuddle Şehitleri [8](Tolpuddle Martyrs)	6
1839-1842	Sendikacı ve Chartist (Unionist and Chartists)	72

Tablodan da anlaşılacağı üzere Avustralya sürgünü Cato Sokağı Komplosu'ndan sonra da radikalleri İngiltere'den uzaklaştırmak için kullanılan bir ceza oldu. Özellikle 1830-1831 Kaptan Swing (Hobsbawm, Captain Swing, 2001) olaylarında çok sayıda tarım işçisinin bu cezaya maruz kaldığı anlaşılmaktadır. Kaptan Swing olaylarının kırsalda başta toprak sahiplerinin üzerinde ve mülklerinde olmak üzere geniş bir anarşi ortamı yarattığı ve bir anlamda 1832 reformlarının çıkışını desteklediği söylenebilir. İşçi ve sendika hareketlerinin 1824'de yasallaşması ile bu sürede giderek artan sayıda sendikacının da sürgün cezasına maruz kalması olasıdır. McQueen, 1839 sonrası için yüksek bir rakam tespit etmiştir.

İdamlar binlerce kişi tarafından izlendi. Özellikle Ings'e karşı büyük bir sempati ve sevgi vardı. İdamlardan sonra başlarının kesilmesi ve 1 saat boyunca teşhir edilmesi pek hoş karşılanmadı. Başları kesen celladın kim olduğuna dair spekülasyonlar yapıldı. Çoğunluk bir doktor olabileceğini düşünüyordu, Londra'da bir cellat avı başladı. Mahkumların başlarını kesen cellat olduğu suçlaması ile Doktor Thomas Wakley'in evi yakıldı. Gerçek cellat ise Web'deki karakolda otopsi odasının baş görevlisi Tom Parker'dı. Parker'ın kimliği ancak yıllar sonra ortaya çıktı (Butcher, 2007, s. 12-14). Aynı tepki toplumdan dışlanan George Edwards'a da gösterildi. Londra'da saklanmak ve kaçmak zorunda kaldı. Mahkeme de tanıklık yapmamış olsa bile pek çok kişi Edwards'ı suçladı. Edwards, güvenliği gerekçesi ile hükümet tarafından ülke dışına çıkarıldı ve 1843'te Güney Afrika'da öldü (Bates, 2020).

Suçlamaların düşürülmesi karşılığında tanıklık yapan Robert Adams, Thomas Dwyer, Thomas Hiden ve John Monument'ın da Londra'da kalabilmesi mümkün değildi. İngiltere sınırları içinde radikalizmin en az görüldüğü yer olan Güney Galler'e gönderildiler. Cato Sokağı Komplosu'na adı karışan başka isimlerde Güney Galler'e gitti ve bazıları emniyet müdürlüğü makamı da dahil olmak üzere çeşitli hükümet kademelerinde görev alan eski radikaller oldular (McQueen, 1968, s. 20). İdamlar sonrası görüldüğü üzere hayatta kalan üyeler sisteme entegre oldular ve Spencean Hayırseverleri Cemiyeti toplumda sahip olduğu sempatiye rağmen bir süre sonra unutuldu.

SONUÇ

Cato Sokağı Komplosu planı, İngiltere'de 18.yüzyıl sonunda başlayan huzursuzluk isyanlarının şiddet içeren önemli bir parçasıdır. Peterloo gibi olaylarda yaşanan şiddet gösterinin ya da planın kendisinden değil, hükümetin müdahale şeklinden kaynaklanmıştır. 1810'lardan itibaren İngiltere'de huzursuzluk kaynaklı, çeşitli haklar talep eden eylemlerin varlığı İngiltere'nin Kıta Avrupası'ndan biraz daha erken

[8] Dorset kentindeki Tolpuddle köyündeki 6 tarım işçisi 1834'te Tarım İşçileri Dostluk Derneği (Friendly Society of Agricultural Labourers) kurarak gizli bir yemin etmekten suçlu bulundular. Yasadışı Yeminler Yasası (Unlawful Oaths Act) çıkmıştı ve Avusturalya'ya sürgün cezasına çartptırıldılar. Yoğun protestolar ve Lord John Russell'ın desteği ile 1836'da affedildiler ve 1837-39 arasında İngiltere'ye döndüler. Şehitlerin liderleri George Loveless, kararı duyduğunda bu dizeleri yazmıştı:

Tanrı rehberimizdir! Tarladan, dalgadan,
Sabandan, örsten ve tezgahtan;
Geliyoruz, ülkemizin haklarını kurtarmaya,
Ve zalim bir hizbin felaketini dile getiriyoruz:
Özgürlük şiarını yükseltiyoruz;
Yapacağız, yapacağız, özgür olacağız!

FULL TEXTS BOOK

bir dönemde 19.yüzyıl devrimleri sürecini yaşamaya başladığını düşündürmektedir. İngiltere, bu süreçte çeşitli yasal düzenlemelerle hakların tanınması sürecine erkenden başlayarak ve devrimci bir burjuvazisinin olmamasının avantajını kullanarak; isyan ve eylemlerin devrimci bir duruma dönüşmelerinin önüne geçebilmiştir.

Cato Sokağı Komplosu'nun siyasi niteliği ve hükümet casuslarının komploda oynadıkları rol, hükümetin yetki alanı tartışmalarını arttırmıştır. Tory ve Whigler arasında değişmekte olan güç dengelerinin ilk işaretleri 1832 Reformu sürecinde 1830'da başlayan parlamento tartışmaları sırasında ortaya çıkmıştır.

Cato Sokağı Komplosu İngiltere'de halka ve orduya açıkça bir ayaklanma çağrısını da içermesi nedeniyle İngiliz Demokrasisi'nin gelişim sürecinin sorunsuz ilerlemediğini ve devrimci durumların hükümet tarafından bıçak sırtı bir süreçte durdurulabildiğinin kanıtıdır. Komplocular, aktif ve geniş bir sempatizan desteğine rağmen başarısız olmuşlardır. Bu başarısızlığın temelinde aristokrasi burjuvazi uzlaşması; Tory ve Whiglerin sınırlı monarşi konusunda anlaşmaları bulunmaktadır.

Komplocuların kurmayı istedikleri düzenin nitelikleri Cumhuriyetçi fikirlerin İngiltere'de görüldüğü ve etkilerinin bilenenden fazla olduğunu göstermektedir.

Komplonun başarısız olmasındaki en önemli rol huzursuzluğunu çeşitli gösteriler ile dile getiren halkın, Komplocuların arzu ettiğinin aksine doğrudan bir rejim değişikliği istemiyor olmasıdır. İngiliz halkında monarşinin her zaman önemli bir desteği bulunmaktadır. Halkın temel isteği daha fazla dikkate alınma, daha iyi yaşam ve çalışma koşullarıdır. Kısacası halk ve siyasal aktörler sınırlı monarşi ve parlamento yetkilerinin iki meclis arasında düzenlenerek arttırılması konusunda uzlaşmışlardır.

Bildirinin araştırma sorusu olan; İngiltere'nin radikal döneminde çatışma ortamından uzlaşıya geçişin temel dinamikleri nelerdir? sorusunun cevabı siyasal aktörler arasında yukarıda bahsi geçen uzlaşının varlığı ve 17.yüzyıl İngiliz Devrimlerinden itibaren tarihsel süreç içinde parlamentonun güçlenmesidir. 19.yüzyılın sonunda parlamenter gücün Lordlar Kamarası'ndan Avam Kamarası'na doğru kayışı ise ayrı bir siyasi mücadeleyi gündeme getirecektir.

İngiltere gibi bugün "demokrasinin beşiği" olarak kabul edilen bir ülkede demokrasinin gelişim süreci içinde bu tür darbe girişimlerinin görülmesi; siyasal güç mücadelesinde bu tür çatışmaların olası olduğunun bir göstergesidir. Türkiye Cumhuriyeti'de demokrasi sürecinde bu darbe girişimleri ile karşılaşmıştır. İngiliz demokrasisinin geçtiği yol ve gelişim çizgisinin dayandığı tarihsel sürecin uzunluğu dikkate alındığında Türkiye Cumhuriyeti'nin Meşrutiyet dönemine kadar götürebildiğimiz parlamento gelişimi ve demokrasi süreci henüz gençtir. Demokratik gelişimin belli dinamik ve kurumlara sahip bir süreç olduğu düşünüldüğünde, demokrasinin yaşadığı sorun ve engelleme girişimleri siyasal-sivil kurumsallaşma ve demokratik bilincin gelişimi ile süreç içinde aşılamayacak sorunlar değildir.

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FULL TEXTS BOOK

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FULL TEXTS BOOK

TÜRKİYE'DE GÖÇMENLERİN AİDİYET VE ENTEGRASYONU: SAĞLIK POLİTİKALARI BAĞLAMINDA BİR DEĞERLENDİRME
BELONGING AND INTEGRATION OF MIGRANTS IN TURKEY: AN EVALUATION IN THE CONTEXT OF HEALTH POLICIES

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ÖZET
Göç, insanlığın ilk varoluşundan günümüze kadar süren ve günümüzde de halen devam etmekte olan önemli bir olgudur. Göçmenler, yalnızca coğrafi bir yer değiştirme yapmamakta, aynı zamanda yaşamları boyunca edindikleri çeşitli sosyo-kültürel, ekonomik, politik ve hukuki değerleri de beraberlerinde taşımakta ve yeni ortamlarında kendilerinden oldukça farklı toplumsal yapılarla karşılaşmaktadırlar. Bu durum göç alan ülkelerin göç ile ilgili önemli politikalar üzerinde yoğunlaşmasını zorunlu kılmaktadır. Bu ülkeler arasında yer alan Türkiye, geçmişten günümüze göç alan ve göç veren bir ülke olarak, göç ve entegrasyon politikalarına büyük oranda ağırlık vermektedir. Özellikle son yıllarda artan göçmen çeşitliliği, yasalların ve politikaların yeniden düzenlenmesini zorunlu kılmıştır. Türkiye'de yaşayan çeşitli göçmen grupları hukuki statülerine göre ayırt edilerek; uluslararası koruma altında olanlar, geçici koruma sağlananlar, ikamet iznine sahip olanlar, düzensiz göçmenler ve vatansızlar gibi farklı gruplar bulunmaktadır. Göç yönetimi, politik, yasal, ekonomik ve toplumsal alanlarda önemli yönetim becerilerini gerektiren, çok boyutlu ve çok aktörlü bir süreç olarak tanımlanmaktadır. Bu nedenle günümüzde yapılan entegrasyon politikaları toplumsal yaşamın sadece bir alanında değil iç içe geçmiş birden fazla alanında çok boyutlu olarak yapılmaktadır. Türkiye'de ise son yıllarda artan göç olayları neticesinde göçmen bireylerin ekonomik, sosyal, siyasal ve kültürel yaşama etkin katılımını ve hâkim toplumla karşılıklı ilişkilerini mümkün kılmayı amaçlayan, sosyal, kültürel ve ekonomik alanlarda önemli entegrasyon çalışmaları yapılmaya çalışılmaktadır. Bu entegrasyon çalışmalarının en önemlilerinden biri de sağlık politikaları alanında yapılan çalışmalardır. Bu çalışmanın amacı Türkiye'de göçmenlere yönelik sağlık alanında yapılan entegrasyon politikalarının uygulamadaki zorluklarını ve toplumdaki etkinliğini ortaya koymaya çalışmaktır. Çalışmada tarihsel ve betimsel metodoloji kullanılmıştır.
Anahtar Kelimeler: Sağlık Politikaları, Göç, Aidiyet, Entegrasyon.

ABSTRACT
Migration is an important phenomenon that has continued from the first existence of humanity to the present day and still continues today. Immigrants not only make a geographical displacement, but also carry with them various socio-cultural, economic, political and legal values that they have acquired throughout their lives, and they encounter social structures that are quite different from their own in their new environments. This situation necessitates the receiving countries to focus on important policies regarding migration. Turkey, which is among these countries, gives great importance to immigration and integration policies as a country that has received and sent immigrants from past to present. The increasing diversity of immigrants, especially in recent years, has necessitated the reorganization of laws and policies. Various immigrant groups living in Turkey are distinguished according to their legal status; There are different groups such as those under international protection, those under temporary protection, those with residence permits, irregular immigrants and stateless people. Migration

FULL TEXTS BOOK

management is defined as a multidimensional and multi-actor process that requires significant management skills in political, legal, economic and social fields. For this reason, today's integration policies are made multi-dimensionally, not only in one area of social life, but in more than one intertwined area. In Turkey, as a result of the increasing migration events in recent years, important integration studies are being carried out in social, cultural and economic fields, aiming to enable the active participation of immigrant individuals in economic, social, political and cultural life and their mutual relations with the dominant society. One of the most important of these integration studies is the studies carried out in the field of health policies. The aim of this study is to try to reveal the difficulties in implementation of integration policies in the field of health for immigrants in Turkey and their effectiveness in society. Historical and descriptive methodology was used in the study.
Keywords: Health Policies, Immigration, Belonging, Integration.

GİRİŞ

Göç kavramı küreselleşme ile beraber büyük bir ivme kazanmış olsa da göç olgusu insanların ilk anından bu güne kadar sürekli gerçekleştirdiği bir eylemdir. Göç birden çok faktöre bağlı olarak ortaya çıkar. Göç eyleminin çıkış nedeni her ne olursa olsun gerçekleştiği taktirde küresel boyutta önemli sonuçlar doğuran bir hareketliliktir. Geçmişten günümüze kadar olan süreçte insanlar, birçok doğal afet yaşamış, salgın hastalıklarla mücadele etmiş, kıtlık ve açlık gibi zorlu süreçlerden geçmiştir. Bu doğal süreçlerin dışında ülkelerarası çatışmalar, iç savaşlar, bunlardan doğan insan hakları ihlalleri gibi nedenlerle gönüllü veya gönülsüz, tamamen veya geçici bir süre bulundukları mekândan başka bir yere göç etmek zorunda kalmışlardır.(Çağlar, 2018:30). Göç eden kişi, göç ettiği yere sadece beden olarak gitmekten ziyade ayrıldığı mekânın kendisine kattığı sosyal, ekonomik ve kimliksel özellikleri de yanında götürmektedir. Bu nedenle göç, hem göç eden tarafı hem de göçe maruz kalan tarafı etkileyen çift yönlü bir olgudur.

Türkiye'de göçmenlerin entegrasyonu ve aidiyet duygusunun güçlendirilmesi, çeşitli politika ve uygulamalarla desteklenmektedir. Entegrasyon politikaları, göçmenlerin yeni toplumlarına uyum sağlamaları ve toplumsal hayata katılımlarını artırmayı hedefler. Bu politikaların başarılı olabilmesi için göçmenlerin temel ihtiyaçlarının karşılanması, özellikle de bireyin yaşamı için en temel olan sağlık hizmetlerine erişimlerinin sağlanması ve toplumsal destek mekanizmalarının oluşturulması büyük önem taşır (Kirişci, 2003). Göçmenlerin sağlık hizmetlerine erişiminde karşılaşılan engellerin aşılması, entegrasyon sürecinin başarılı olabilmesi için hayati önem taşır. Sağlık hizmetlerine erişim, göçmenlerin yeni toplumlarına daha hızlı uyum sağlamalarını ve aidiyet duygularının güçlenmesini sağlar. Türkiye'de sığınmacılara yönelik olarak geliştirilen sağlık politikaları, geçici koruma statüsü altındaki bireylerin sağlık hizmetlerinden faydalanabilmelerini sağlamayı amaçlamaktadır. Geçici koruma kimlik belgeleri ile sağlık kuruluşlarına başvurabilen göçmenler, acil durumlar haricinde sağlık hizmetlerine doğrudan erişim imkanına sahiptir (Gültaç ve Ark. 2018:193-204). Sağlık faktörü her ne kadar birinci öncelik olsa da iki tarafın da tam olarak bütünleşebilmesi açısından göçmenlerin entegrasyonu ve aidiyet duygusunun güçlendirilmesi, sadece sağlık hizmetlerine erişimle sınırlı kalmamalıdır. Eğitim, istihdam, sosyal hizmetler ve kültürel uyum gibi diğer alanlarda da göçmenlere yönelik politikaların geliştirilmesi gerekmektedir. Entegrasyon süreçlerinde karşılıklı anlayış ve işbirliği, hem göçmenlerin hem de ev sahibi toplumların daha uyumlu ve barışçıl bir şekilde bir arada yaşamasını sağlayacaktır (Akgündüz, 2017,s,1-24).

Türkiye'de göçmenlerin aidiyet ve entegrasyon süreçlerini inceleyen bu çalışma, sağlık politikalarının bu süreçteki rolünü ve önemini vurgulamayı amaçlamaktadır. Göçmenlerin sağlık hizmetlerine erişimlerinin iyileştirilmesi ve entegrasyon süreçlerinin desteklenmesi, toplumsal uyum ve barışın sağlanması açısından büyük bir öneme sahiptir. Bu bağlamda, yapılan çalışmada Türkiye'deki göçmenlere yönelik sağlık hizmetlerinin yasal düzenlemeler açısından yeterliliği ve bu yasal düzenlemelerin uygulamadaki verimliliği değerlendirilecektir. Türkiye'nin deneyimleri ve

FULL TEXTS BOOK

uygulamaları, uluslararası göç yönetimi ve entegrasyon politikaları için önemli bir model teşkil etmektedir.

KAVRAMSAL ÇERÇEVE

Göç Kavramı

Göç kavramı insanlık tarihi ile ortaya çıkmış ve hala varlığını sürdürmeye devam eden önemli bir olgudur. Geçmişten günümüze yaşanan her türlü Göç'ün temelinde bireyin şuan bulunduğu konumdaki sahip olduğu yaşam standartlarından daha iyi bir yaşam standartlarına geçmek istemesi yer alır.(Yaman ve Kaya, 2023:71). Türk Dil Kurumu Sözlüğünde göç kavramı, "ekonomik, toplumsal ve siyasi sebeplerle bireylerin veya toplulukların bir ülkenin başka bir bölgesine veya başka bir ülkeye yerleşmek amacıyla yaptığı yer değiştirme hareketi; taşınma, hicret, muhaceret" şeklinde tanımlanmaktadır. (TDK, 2005). Son yıllarda artan küreselleşme hareketi doğrultusunda göç faaliyetlerinde büyük çaplı artış yaşanmaktadır. Göç, nedenine bakılmaksızın geçmişten günümüze sürekli olarak yapılan bir eylemdir. İlk zamanlarda göç olayları genellikle coğrafi şartlar, açlık, savaş, kıtlık ve iklim koşulları gibi nedenlerden kaynaklanırken, günümüzde bu nedenler önemli ölçüde değişim göstermiştir. Tarih boyunca insanlar, hayatta kalabilmek, daha verimli topraklara ulaşmak veya doğal afetlerden kaçmak için göç etmişlerdir.(Akıncı, Nergiz ve Gedik,2015:60-61). Eski dönemlerde göç, büyük ölçüde zorunlu sebeplerden kaynaklanırken, modern dünyada göçün sebepleri çok daha çeşitlenmiş ve karmaşık bir hal almıştır. Göç kavramı birden fazla disiplin alanını ilgilendirmiş ve bu disiplinler tarafından farklı tanımlanmıştır. Lee, göç üzerine yazmış olduğu makalede göçü zorunlu ya da gönüllü olmasının dışında tamamen yaşanan yerin kalıcı veya geçici olarak değiştirmesi şeklinde ifade etmiştir.(Özcan, 2016 :186). Göç kavramı her ülkeye ya da mekâna göre değişen bir olgu olmaktan ziyade insanın bulunduğu her bölgede ve ortak nedenler eşliğinde gerçekleşmektedir. Ortaya çıkış nedenleri bakımından göç olgusu, genellenebilir bir olgudur.(Koçak ve Terzi, 2012:165).

Göç, insanların bir yerden başka bir yere, uluslararası bir sınırı geçmek suretiyle veya bir devletin içinde yer değiştirerek gerçekleştirdiği nüfus hareketleridir. Bu hareketler, süresi, yapısı ve nedenleri ne olursa olsun, insanların yaşam alanlarını değiştirme sürecini ifade eder. Son yıllarda göç türleri, hedef ülkeye ulaşma yöntemi, geri dönme olasılığı ve göç sırasında kullanılan transit ülkeler açısından farklı kategorilere ayrılmaktadır. Bu bağlamda, göç türleri transit göç, mekik göç ve sığınmacı göç olarak sınıflandırılmaktadır.(Aktel ve Kaygısız, 2018:581). Bunun dışında genel anlamda göçler, nereye, nasıl ve ne amaçla yapıldığına göre, ülke içine veya dışına yapıldığında dış ve iç göç; Göç edilme kararının alınış şekline göre gönüllü veya zorunlu göç; göç edenlerin amaçları ve özelliklerine göre iş göçü ve beyin göçü olarak kategorize edilmektedir.(Başel, 2003:17). Göç, geçmişten günümüze bakıldığında sürekli artış gösteren bir kavramdır. Bunun temelinde ise her toplumu önemli ölçüde etkilemiş olan küreselleşme faktörü yer alır. Günümüzde yaşanan küreselleşme ile birlikte ulusal ve uluslararası alanlarda yoğun bir göç yoğunluğu yaşanmaktadır. Bu nedenle göç kavramı evrensel bir sorun haline gelmiştir.(Türkel, 2018,s.30).

Günümüzde yaygınlaşan göçler neticesinde göç edenleri tanımlamak için göç eden kişinin durumuna göre farklı kavramlar ortaya çıkmıştır. Bunlardan ilki göçmen kavramıdır. Göçmen kavramı Birleşmiş Milletlere göre "sebebi olsun veya olmasın, gönüllü veya gönülsüz, düzenli veya düzensiz, göç yolları ile fark etmeksizin bir yıldan fazla yabancı bir ülkede ikamet eden birey" şeklinde tanımlanmıştır.(Fansa, 2021:296). Bir diğer önemli kavram ise mülteci kavramıdır. Mülteci kavramı 1951 Cenevre Sözleşmesinin 1.maddesine göre, meydana gelen olaylar sonucunda ırkı, dini, tabiiyeti, belli bir toplumsal gruba mensubiyeti veya siyasi düşünceleri yüzünden zulme uğrayacağından korktuğu için vatandaşı olduğu ülkenin dışında bulunan ve bu ülkelerin korumasından yararlanamayan ya da söz konusu korku nedeniyle yararlanmak istenmeyen yahut tabiiyeti yoksa bu tür olaylar sonucu önceden yaşadığı ikamet ülkesinin dışında bulunan, oraya dönemeyen veya söz konusu korku nedeniyle dönmek istemeyen şahıs olarak tanımlanmıştır.(Nurdoğan, Dur ve Öztürk, 2016:219). Göç olgusu ile hayatımıza

FULL TEXTS BOOK

giren bir diğer kavram ise sığınmacı kavramıdır. Sığınmacı kavramı mülteci kavramı ile sıkça karıştırılmaktadır. Her iki kavramında göç eden kişiyi nitelerken benzer noktaları bulunsa da anlam ve kişiye getirileri bakımından farklıdırlar. Sığınmacı kavramı "Avrupa ülkelerinde meydana gelen olaylar nedeniyle; ırkı, dini, tabiiyeti, belli bir toplumsal gruba mensubiyeti veya siyasi düşüncelerinden dolayı zulme uğrayacağından haklı sebeplerle korktuğu için vatandaşı olduğu ülkenin dışında bulunan ve bu ülkenin korumasından yararlanamayan ya da söz konusu korku nedeniyle yararlanmak istemeyen yabancıya veya bu tür olaylar sonucu önceden yaşadığı ikamet ülkesinin dışında bulunan, oraya dönemeyen veya söz konusu korku nedeniyle dönmek istemeyen vatansız kişiye statü belirleme işlemleri sonrasında verilen statüyü ifade eder."(T.C.İ.B Göç İdaresi Başkanlığı,2024).

Göç Yönetimi

Göç yönetimi, devlet sınırları içinde yabancıların girişi ve mevcudiyetini, mültecilere ve korunma ihtiyacı bulunan diğer kişilere sağlanan korumayı düzenli ve insani bir şekilde yönetmek üzere oluşturulan ulusal sistem içindeki çeşitli devlet kurumlarından oluşan yönetim sürecini tanımlayan bir terimdir. Göç yönetimi, göçe ilişkin kilit konuları ele alacak politikaların, yasal ve idari düzenlemelerin geliştirilmesine yönelik planlı bir yaklaşımı ifade eder. Bu süreç, hem ulusal güvenliği sağlamak hem de insan haklarını korumak amacıyla çeşitli devlet kurumları ve organları tarafından yürütülen kapsamlı bir çerçeve oluşturur.(Uluslararası Göç Örgütü(IOM), 2004:36). Göç yönetimi, göçmenlerin ülkeye girişinden önce başlayan ve çeşitli uygulamalar ve hukuki düzenlemelerle devam eden kapsamlı bir süreçtir. Bu süreç, göçmenlerin ülkeye kabulünden önce alınacak önlemler ve yapılacak kontrollerle başlar. Bu önlemler arasında sınır kontrolleri, vize düzenlemeleri, sağlık kontrolleri ve güvenlik taramaları yer almaktadır.(Aktel ve Kaygısız, 2018:384).

Göç gerçekleştikten sonra alınan önlemler ise, yasa dışı göçü önlemek, ulusal güvenliği sağlamak ve halk sağlığını korumak amacıyla uygulanır. Ancak göç yönetimi sadece ülkeye girişte yapılan kontrollerle sınırlı kalmaz. Göçmenlerin ülkeye geldikten sonraki süreçte de devam eder ve bu süreçte yeni gelen toplulukların temel ihtiyaçlarının karşılanması, sosyal hizmetlerin sunulması ve entegrasyonlarının sağlanması gibi önemli adımlar atılır. Göçmenlerin barınma, sağlık hizmetleri, eğitim, istihdam ve sosyal güvenlik gibi temel ihtiyaçlarının karşılanması, göç sonrası dönemde büyük önem taşır (UNHCR, 2021).

Entegrasyon

Entegrasyon kavramının dilimizdeki karşılığı 'bütünleşme' ve 'uyum' karşımıza çıkarken sosyoloji bilimi tarafından toplumsal kurumların, grupların ve toplumsal yapının diğer unsurları arasındaki uyumu şeklinde tanımlanmaktadır.(Aslan, 2019:77). Toplumun ve bireylerin birlikte bir bütün olarak yaşayabilmeleri açısından entegrasyon kavramı oldukça önemlidir. Farklı ülkelerde ve bağlamlarda çeşitli şekillerde kullanılan ve anlaşılan "entegrasyon" terimi, göçmenlerin hem birey olarak hem de grup olarak toplumun bir parçası kabul edildiği süreci ifade eder. Bu süreç, genellikle göçmenler ile ev sahibi toplumlar arasında iki yönlü bir etkileşimi kapsar. Ev sahibi toplumların göçmenleri kabul etmesi için gerekli somut koşullar, ülkeden ülkeye farklılık gösterir ve bu süreçte yerel politikalar, kültürel normlar ve sosyal yapılar belirleyici olabilir.(Uluslararası Göç Örgütü(IOM), 2004:30).

Entegrasyon, daimi yerleşim anlamına gelmek zorunda değildir. Bunun yerine, göçmenlerin ve ev sahibi toplumların haklarına ve yükümlülüklerine erişimlerini, çeşitli hizmetlerden ve işgücü piyasasından yararlanabilmelerini ve ortak değerler etrafında birleşmelerini ifade eder. Bu süreçte göçmenler, ev sahibi toplumun sosyal, kültürel ve ekonomik hayatına katılarak toplumsal bağlarını güçlendirirler. Aynı zamanda, ev sahibi toplum da göçmenlerin katkılarını ve varlıklarını kabul ederek toplumsal uyumu sağlar (Penninx ve Garces-Mascarenas, 2016).

FULL TEXTS BOOK

Sağlık Politikaları

Sağlık politikası, sağlık alanındaki birden fazla faktörün nasıl işleyeceğine karar veren ve süreci kontrol eden politikadır. Sağlık politikaları, mevcut sağlık hizmetlerinin kime yönelik yapılacağı ya da kimin bu hizmetten yararlanabileceği, hangi sağlık teknolojilerinin üretilmesi gerektiği, sağlık hizmetleri organizasyonlarının nasıl yapılacağı ve tüm bu sürecin mali kontrolünün nasıl sağlanacağı konusunda yol gösterici bir faktördür.(Toygar, 2022:12). Bu tanıma göre sağlık politikaları, toplumun sağlık düzeyini korumak ve iyileştirmek amacıyla oluşturulan, sağlık hizmetlerinin planlanması, uygulanması, finansmanı ve değerlendirilmesini içeren stratejik kararlar ve eylem planlarıdır. Bu politikalar, hükümetler, uluslararası kuruluşlar ve sağlık kurumları tarafından geliştirilir ve toplumun sağlık ihtiyaçlarına yanıt vermeyi hedefler. Sağlık politikalarının temel amacı, herkesin eşit ve adil bir şekilde sağlık hizmetlerine erişimini sağlamaktır (WHO, 2000).

Türkiye'de sağlık politikaları, Sağlık Bakanlığı tarafından belirlenmekte ve uygulanmaktadır. Türkiye'de uygulanan sağlık politikalarının temel amacı, herkesin nitelikli sağlık hizmetlerine erişimini sağlamak ve sağlık hizmetlerinin kalitesini artırmaktır. Özellikle son yıllarda, sağlıkta dönüşüm programları kapsamında önemli reformlar gerçekleştirilmiştir. Türkiye Halk Sağlığı Kurumu, sağlık politikalarının uygulanmasında önemli bir rol oynamaktadır (Sağlık Bakanlığı, 2013).

METODOLOJİ

Araştırmanın Yöntemi

Bu çalışma tarihsel ve betimsel metodoloji kullanılarak oluşturulmuştur. Tarihsel metodoloji geçmişte yaşanmış olaylar, olgular, nesneler ve kişilerin araştırılması ya da belirli bir problemin geçmiş ve bazen de günümüzle olan ilişkisi yönünden incelenmesi amacıyla kullanılan yöntem, olarak adlandırılır. Bu yöntem, geçmişin eleştirel bir şekilde tanımlanması ve analiz edilmesini içerir. Tarihsel yöntem, araştırmanın sistematik bir biçimde yapılmasını, verilerin analiz ve sentezinin gerçekleştirilmesini ve bu verilerden elde edilen bulguların değerlendirilmesini kapsar. Türkiye'de göçmenlerin aidiyet ve entegrasyonu: sağlık politikaları bağlamında bir değerlendirme adlı çalışma tarihsel yöntem ışığında ülkemizde yakın geçmişte gerçekleşen göç olaylarının nedenleri, süreçleri ve sonuçları incelenmiş bu alanda yazılan çalışmalardan veriler elde edilerek analiz yapılmıştır. Bu bağlamda Türkiye'ye yapılan göçler geçmiş belgelerde yazan somut verilerle ortaya konmuştur.

Bu çalışmada mevcut veya geçmişten gelen sorunların, belirli standartlar doğrultusunda değerlendirilerek, olaylar arasındaki ilişkilerin ortaya çıkarılması amaçlanmıştır. Bu nedenle bu çalışma yapılırken bir diğer bilimsel metodoloji olan betimsel yöntem kullanılmıştır. Bu yöntem, incelenen konunun ayrıntılı bir şekilde tanımlanmasını ve açıklanmasını hedeflemektedir. Bu doğrultuda yapılan bu çalışmada göçmenlerin aidiyet ve uyum süreçleri bunun akabinde yapılan entegrasyon politikalarının göç sürecine olan olumlu etkisi ayrıntılı bir şekilde aktarılmaya çalışılmıştır. Göçmenlere Uygulanan entegrasyon politikalarından yalnızca sağlık politikaları seçilmiş olup bu doğrultuda Sağlık Bakanlığının göçmenlere yönelik yapmış olduğu faaliyetlerin yazılı olduğu tüm kaynaklar incelenerek bu alandaki faaliyetlerin etkinliği ortaya konmuştur. Ayrıca göçmenlerin ilk göç ettiği tarihten bu yana göçmenlere yönelik yapılan politikaların ve stratejilerin günümüzde ne kadar etkili olduğu resmi kaynaklar taranarak ve uygulama aşamasındaki verimliliği belirli standartlar çerçevesinde değerlendirilerek bir çıkarım yapılmıştır.

Araştırma Sorunun Analizi

Türkiye'de göçmenlerin aidiyet ve entegrasyonu: sağlık politikaları bağlamında bir değerlendirme adlı çalışma doğrultusunda elde edilen verilerle 'göçlerin oluşturduğu olumsuz sonuçların en aza indirilmesinde en etkili yol olan uyum politikalarının verimlilik düzeyleri ortaya konmaya çalışılmıştır. Bu doğrultuda ilk olarak Türkiye'deki göçmenlere yönelik olan sağlık politikalarının yasal

FULL TEXTS BOOK

düzenlemelerine, bu yasal düzenlemelerin uygulanışındaki başarısına ve ortaya çıkan netice itibariyle de göçmenlerin hakim toplumla olan uyum seviyesine bakılmıştır.

Bu çalışmada ilk üzerinde durulan bağlam, iki unsur arasındaki uyumu engelleyen veya aksatan sorunların açığa çıkarılmasıdır. Bu bağlamda incelenecek ilk faktör, göçmenlere yönelik sağlık alanında yapılan uyum politikalarının yasal dayanaklarda ne oranda ele alındığı ve yasal olarak bu alanda ne kadar çalışma yapıldığıdır. Bu amaçla taranan kaynaklarda elde edilen verilere göre yasal anlamda göçmenlere yönelik birçok sağlık hizmeti düzenlemelerinin yapıldığı ve hala günümüzde yapılmaya devam edildiği saptanmıştır. Bu elde edilen veriye ise kaynaklık eden yasal düzenlemelerin bazıları şunlardır(Gültaç ve Balçık, 2018:195):

*AFAD Yönetmeliği (19.02.2011)
*Yabancılar ve Uluslararası Koruma Kanunu (04.04.2013)
*Geçici Koruma Yönetmeliği (22.10.2014)
*Geçici Koruma Altına Alınanlara Verilecek Sağlık Hizmetlerine Dair Esaslar (25.03.2015)
*AFAD ve Sağlık Bakanlığı Protokolü 2015 (01.07.2015)
*AFAD- Suriyeli Misafirlerin Sağlık ve Diğer Hizmetleri Hakkında Genelge (12.10.2015)
*Göçmen Sağlığı Merkezleri/Birimlerine Dair Yönerge (03.09.2015)
*Geçici Koruma Altına Alınanlara Verilecek Sağlık Hizmetine Dair Esaslarda Değişiklik Yapılmasına İlişkin Esaslar (04.11.2015)
*AFAD ve Sağlık Bakanlığı Protokolü 2016 (01.01.2016).

Bu veriler incelendiğinde yasal düzenlemelerin belirli yıllarda üst üste güncellendiği buradan yola çıkılarak ise bu konudaki çalışmalara önem verildiği ortaya konmuştur. Bunların dışında bu yasal düzenlemelerin içeriği incelendiğinde göçmenlerin niteliklerine göre ayrım yapılmadığı bu çalışmalardan hem sığınmacıların hem de mültecilerin yararlanabildiği saptanmıştır. Bu veriler ışığında göçmenlere yönelik Türkiye'de yapılan sağlık hizmetleri uyum politikalarında yasal anlamda bir eksiklik olmadığı bulgusu elde edilmiştir.

Entegrasyonu önemli ölçüde etkileyen politikalar arasında yer alan sağlık hizmetlerinin değerlendirilmesinden yola çıkılarak yapılan bu çalışmada elde edilen bir diğer önemli veri ise politikaların uygulama süreci ile ilgili elde edilen bilgilerdir. Türkiye'de göçmenlere yönelik sağlık politikalarının uygulanabilirliği incelediğinde, araştırılan kaynaklardan elde edilen verilere göre göçmenlerin dil farklılığı nedeniyle kendilerini ifade etmede zorlandıkları bu nedenle sağlık hizmetlerinden tam anlamıyla verim alamadıkları saptanmıştır. Elde edilen bir diğer veri ise göçmenlerin çok fazla yığılma yaptığı bölgelerde hem göçmenlerin hem de ülke vatandaşlarının randevu bulmada zorlandıkları bu açıdan sağlık hizmetlerinin talepleri karşılamada sayıca yetersiz olduğu bilgisidir. (Turhan, Turan ve Karakullukçu, 2021:288-289). Bu çalışma doğrultusunda elde edilen çıkarım, bu tür olumsuz aksaklıkların hem göçmenlerin hem de ülke vatandaşlarının en temel ihtiyacı olan sağlık hizmetlerinden yararlanabilmesini önemli ölçüde düşürdüğü bunun neticesinde ise her iki taraf arasındaki entegrasyon sürecinin zorlaştığı ve geciktiğidir. Bu doğrultuda Türkiye'de sağlık hizmetlerini daha verimli kılmak için bu alanlardaki eksiklerin giderilmesine yönelik çalışmalar devam etmektedir.

Araştırma Modeli

Bu çalışmada, geçmişte ya da hali hazırda var olan basılı ya da internet ortamındaki belgelerin araştırma konusu için incelenip analiz edildiği tarama modeli kullanılmıştır. Bu doğrultuda çalışma da kullanılmak üzere geçmişten günümüze Yükseköğretim Kurulu Başkanlığı (YÖK) Ulusal Tez Merkezi veri tabanında kayıtlı göçmenlerin aidiyeti, entegrasyon ve Türkiye'de yapılan sağlık politikaları kapsamında yazılan Yüksek Lisans ve Doktora tezleri ayrıca Dergipark gibi akademik yayınların yapıldığı diğer çevrimiçi kaynaklar taranmıştır

FULL TEXTS BOOK

SONUÇ

Bu çalışma, Türkiye'de göçmenlerin aidiyet ve entegrasyon süreçlerini sağlık politikaları bağlamında değerlendirerek, bu politikaların etkinliğini ve uygulanabilirliğini ele almayı amaçlamıştır. Göç, insanlık tarihi boyunca var olan ve günümüzde küreselleşmenin etkisiyle daha da artan bir olgu olarak, hem göç eden bireyleri hem de ev sahibi toplumları derinden etkileyen çift yönlü bir süreçtir. Göç süreci tamamlandıktan sonra artık farklı kültürleri birbirlerine uyumlayabilmek için entegrasyon sürecine geçilmektedir. Entegrasyon süreci birden fazla boyuta sahiptir. Bu nedenle politika yapıcılarının birden fazla alanda çalışma göstererek, sağlık hizmetlerine erişim, eğitim, istihdam, sosyal hizmetler ve kültürel uyum gibi alanlarda da politika yapmaları ve uygulamaları gerektirmektedir. Bu çalışmada entegrasyon alanında yapılan en önemli uygulamalardan biri olan sağlık hizmetleri üzerinde durulmuştur. Çalışmada elde edilen bulgular, Türkiye'de göçmenlere yönelik sağlık hizmetlerinin yasal düzenlemeler açısından yeterli olduğunu, ancak uygulama sürecinde bazı aksaklıkların bulunduğunu göstermektedir.

Göçmenlerin dil bariyeri nedeniyle sağlık hizmetlerinden tam anlamıyla faydalanamaması ve yoğun göç alan bölgelerde sağlık hizmetlerine erişimde yaşanan sıkıntılar, entegrasyon sürecini olumsuz etkilemektedir. Bu tür aksaklıkların giderilmesi, hem göçmenlerin hem de yerel halkın sağlık hizmetlerinden eşit şekilde yararlanabilmesi açısından büyük önem taşımaktadır. Bu alanda yapılabilecek faydalı çalışmalara, tercüman yardımı, göçmenlere basit sağlık terimleri ile alakalı eğitim verilmesi ve illerdeki yığılmaların önüne geçilmesi gibi alternatif politikalar da önerilmektedir. Entegrasyon süreçlerinde karşılıklı anlayış ve işbirliği, hem göçmenlerin hem de ev sahibi toplumların uyumlu ve barışçıl bir şekilde bir arada yaşamasını sağlayacaktır.

Sonuç olarak, Türkiye'de göçmenlerin entegrasyonu ve aidiyet süreçlerinde bireyin en temel ihtiyaçlarından biri olan sağlık politikalarının önemi büyüktür. Bu doğrultuda, Türkiye'nin göçmenlere yönelik sağlık ve entegrasyon politikalarının sürekli gözden geçirilmesi ve iyileştirilmesi, toplumsal uyum ve barışın sağlanması açısından kritik bir öneme sahiptir. Türkiye'nin bu alandaki deneyimleri ve uygulamaları, uluslararası göç yönetimi ve entegrasyon politikaları için önemli bir model teşkil etmektedir.

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FULL TEXTS BOOK

VASİLİ VASİLYEVİÇ RADLOV'UN ALTAY'A SEYAHATİNİN 163. YILI MÜNASEBETİYLE

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ÖZET
Bu çalışma, ünlü Alman Türkolog Friedrich Wilhelm Radloff'un (Rus Türkolojisinde genel olarak bilinen adıyla Vasili Vasilyeviç Radlov'un) 1861 yılında Altay'a yapmış olduğu seyahatinin 163. yılı münasebetiyle kaleme alınmıştır. Çalışma öncelikle Radlov'un kısa bilimsel biyografisi ile başlayıp, daha sonra Altay seyahati ile ilgili bilgiler ihtiva etmektedir. Son olarak, Radlov ve onun çalışmaları ile ilgili bilgileri bulabileceğimiz kısa bir kaynakça sunulmuştur.
Anahtar Kelimeler: Vasili Vasilyeviç Radlov, Rus Türkolojisi, 1861, Altay.

ABSTRACT
This study was written on the occasion of the 161st anniversary of the famous German Turcologist Friedrich Wilhelm Radloff (Vasili Vasilyevich Radlov, commonly known in Russian Turcology) to Altai in 1861. The study first starts with Radlov's short scientific biography and then includes information about his Altai travel. Finally, a short bibliography is presented where we can find information about Radlov and his work.
Key words: Vasili Vasilyeviç Radlov, Russian Turkology, 1861, Altay.

GİRİŞ

Türkoloji çalışmaları 19. Yüzyılın ortalarından itibaren hızlı bir şekilde artmaya başlamış ve bu alanda araştırmalar yoğunlaşmıştır. 1889'da Köl Tigin ve Bilge Kağan bengü taşlarının bulunması, 1893'te Göktürk yazısının çözümlenmesi, 1897'de Tonyukuk Anıtı'nın keşfi, yine aynı yıl Kutadgu Bilig'in Mısır nüshasının bulunması, 1898 – 1914 arasında Doğu Türkistan'a yapılan ilmi seferler sonucunda Eski Uygur Türkçesiyle yazılmış birçok eser, belge ve şiirin ortaya çıkarılması, 1906'da Atabetü'l Hakayık'ın bulunması, 1915'te Divanü Lügati't Türk'ün keşfi gerçekleşmiştir.[9] Bu birbiri ardına gelen keşif ve çalışmalar Türkoloji alanında yaşanan hızlı gelişmenin birer göstergesi olarak kabul edilebilir. Yapılan keşif ve çalışmaların perspektifinden bakıldığında bu çalışmaları gerçekleştiren ünlü Türkologların isimleri de hemen akla gelmektedir. Bu bilim adamları içerisinde Türkoloji çalışmalarında bir döneme ismini vermiş olan Vasili Vasilyeviç Radlov[10] ayrı bir öneme haizdir.

Türkoloji literatüründe V. V. Radlov'un ilmi hayatı ve onun çalışmaları üzerine yapılmış oldukça fazla eser ve makale bulunmaktadır. Biz burada sadece onun Altay'a yapmış olduğu seyahatini ve bu yol üzerinde uğramış olduğu merkezleri ele alacağız. Radlov, seyahati esnasında Altay halklarının hayatları, giyim kuşamları, günlük hayatları, örf ve adetleri gibi konularla ilgili aldığı notlarını "Sibirya'dan" adlı eserinde detaylı bir şekilde aktardığından tarafımızca burada bu detaylara girilmeyecektir.[11]

Vasili Vasilyeviç Radlov'un Hayatı (17 Ocak 1837 – 12 Mayıs 1918)

Vasili Vasilyeviç Radlov'un çalışmaları ile ilgili Türkoloji literatüründe yapılan araştırma ve bilimsel çalışma sayısı oldukça fazladır. Sadece Türkoloji çalışmaları değil, hayatında önemli yer arz eden

[9] Ahmet Bican Ercilasun, "Wilhelm Radloff ve Türk Bengü Taşları", **Avrasya Etüdleri**, S. 13, İlkbahar 1998, s. 92.
[10] Almanca adı Friedrich Wilhelm Radloff olsa da genel olarak Rus Doğu Bilimi ve Rus Türkolojisi'nde bilinen adıyla Vasili Vasilyeviç Radlov olarak daha çok anıldığından metin içerisinde bu adı kullanmayı tercih ettik.
[11] Radlov'un Altay halkları ile ilgili aktarmış olduğu detaylı bilgiler için bakınız: W. Radloff, **Sibirya'dan I**, Ahmet Temir (çev.), İstanbul 1956.

FULL TEXTS BOOK

Rusya'daki (Kazan'daki, St. Petersburg'taki ve Sibirya'daki) faaliyetleri de ayrı ayrı çalışma konusu yapılmıştır.[12] Bu çalışmalar içerisinde Türkçe yazılmış olanlar arasında karşımıza çıkan önemli nokta, Radlov'un eserlerinin veya çalışmalarının yanında biyografisinin de ele alınmasıdır. Dolayısıyla bazen hemen hemen aynı bilgileri veren yazılarla karşılaşmak pek tabii şaşırtıcı olmamaktadır. Ancak Yusupov'a göre, V.V. Radlov'un çalışmalarının araştırılması üzerine adanmış çok sayıda bilimsel makale ile hayatı ve faaliyetlerinin farklı dönemlerini, çok yönlü eserlerinin farklı açılardan sunumlarını içeren birçok biyografi denemesi bulunmasına rağmen usta Türkolog'un hayatı bu zamana kadar tam anlamıyla bilinmemektedir.[13]

V. V. Radlov'un hayatı bizce Berlin, Halle ve Jena dönemi ve Petersburg, Sibirya, Kazan dönemi olarak ikiye ayrılabilir.[14] Rusya'ya geldikten sonra burada yapmış olduğu çalışmalar incelendiğinde Radlov'un hayatında Rusya'nın ve Rusya'daki araştırmaların ne kadar büyük önem taşıdığı net bir şekilde görülebilir.

V. V. Radlov, 17 Ocak 1837 yılında Almanya'nın Berlin şehrinde dünyaya gelmiştir. Genel olarak Rus adıyla bilinse de Almanca adı Friedrich Wilhelm Radloff'tur. Babası Berlin polis komiseri Wilhelm W. Radloff'tur.[15]

İlk, orta ve lise eğitimini Berlin'de tamamlayan Radlov, daha sonra burada 1854 tarihinde üniversiteye başlamıştır. İlk olarak teolojiye merak sarmış, ancak çok geçmeden tarihi-karşılaştırmalı dilbilim ile ilgilenmiştir.[16] Radlov, dönemin en tanınmış dil bilginlerinin öğrencisi olmuştur: Franz Popp, August Pott, Steinthal, Doğu bilimci W. Schott, coğrafya uzmanı Carl Ritter.[17] Özellikle W. Schott'un etkisinde kalarak doğu dilleri sahasına ilgi duymuş; İbranî, Arap, Fars, Türk, Mançu ve Çin dilleri gibi derslere devam etmiştir.[18] Bu esnada bir yandan da Rusça öğrenmeye başladığı bilinmektedir.

Eğitim süresinin büyük bir kısmını Berlin'de tamamlayan Radlov, iki dönem Hell'de bulunmuştur. Jena Üniversitesi'nde 1858'de "*Über den Einfluss der Religion auf die Nationalitäten und Sprachen*

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[12] Bu noktada ilk dikkati çeken çalışma Ahmet Temir'in "**Türkoloji Tarihinde Wilhelm Radloff Devri Hayatı – İlmi Kişiliği – Eserleri"** adlı eserde müellif tarafından Radlov'un hayatı bölümlere ayrılarak verilmesidir. Bunun dışında Radlov'un bu bölgelerdeki çalışmalarından yola çıkılarak yazılan makalelerden bazıları şunlardır: Abdülkadir İnan, "Radloff'un Proben'leri Üzerine Bazı Düzeltmeler", **Dil ve Tarih-Coğrafya Fakültesi Dergisi**, S. 3, Ankara 1944; Ahmet Temir, "Radloff'un Proben <Deneme>leri", **Arayış**, S. 17, Ankara 1958; Osman Fikri Sertkaya, "Eski Türkçe (Göktürkçe ve Uygurca) Araştırıcısı Olarak Wilhelm Radloff", **Türk Dili**, S. 444, 1988; Hasan Eren, Wilhelm Radloff ve Türk Diyalektleri Sözlüğü", **Türk Dili**, S. 444, 1988; Zeynep Korkmaz, "Friedrich Wilhelm Radloff'un Orta Türkçe Üzerindeki Çalışmaları", **Türk Dili**, S. 444, 1988; Nuri Yüce, "Friedrich Wilhelm Radloff'un Derlemeleri", **Türk Dili**, S. 444, 1988; Naciye Yıldız, "Wilhelm Radloff; Hayatı, Eserleri, Manas Destanı", **Türk Kültürü**, S. 384, Ankara 1995; Mehmet Ölmez, "Radloff Sözlüğünün Yeni Bir Yayımı Nasıl Olmalıdır?", **VII. Uluslararası Türk Dilbilimi Kurultayı**, (yayımlayanlar: K. İmer, N. E. Uzun), Ankara 7-9 Ağustos 1996; Mustafa Toker, "W. Radloff'un "*Opıt Slovarya Tyurkskih Nareçiy*" Adlı Eserinde Geçen Tatar Türkçesine Ait Kelimeler Üzerinde Genel Bir Değerlendirme", **Selçuk Üniversitesi Türkiyat Araştırmaları Dergisi,** S. 14, 2003; G. Selcan Sağlık**, "**Wılhelm Radloff'un Hayatı ve Sibirya Türk Halklarının Kültür Dokusu Üzerine Görüşleri", **Hacettepe Üniversitesi Türkiyat Araştırmaları Dergisi**, S.9, 2008.

[13] Ferit Yusupoviç Yusupov, "Rusya Türkolojisinin Kurucusu – V. V. Radlov", Fatih Ekici (çev.), **Atatürk Üniversitesi Edebiyat Fakültesi Sosyal Bilimler Dergisi**, 52, 2014, s. 292.

[14] Bizim gibi A. N. Kokonov da Radlov'un hayatını ayırmayı uygun görmüştür. Biz Radlov'un Alman olduğunu ve doktora eğitimi bitene kadar orada olmasını göz önüne alarak böyle bir ayrım yaptık. Ancak Kokonov bizden farklı olarak hayatını Altay, Kazan ve Petersburg şekilde ayırmıştır. Detaylı bilgi için bakınız: A. N. Kokonov, "V. V. Radlov i Oteçestvennaya Türkologiya", **Türkologiçeskiy Sbornik 1971,** Moskva 1972.

[15] Naciye Yıldız, "RADLOFF, Friedrich Wilhelm (1837-1918)", **Türk Diyanet Vakfı İslam Ansiklopedisi**, C.34, İstanbul 2007, s. 388.

[16] Yusupov, **a.g.m.**, s. 292.

[17] A. N. Samoyloviç, "Akademik V. V. Radlov (1837–1937)", **Vestnik Akademii Nauk SSSR**, 1937, S. 1, 124. Bu yazı Serdar Karaca tarafından Türkiye Türkçesine kazandırılmıştır. Detaylı bilgi için bakınız: A. N. Samoyloviç, "Akademik V. V. Radlov (1837–1937)", Türk Dili, Y. 69, S. 825, Eylül 2020, s. 44 – 48.

[18] Mustafa Toker, "W. Radloff'un "*Opıt Slovarya Tyurkskih Nareçiy*" Adlı Eserinde Geçen Tatar Türkçesine Ait Kelimeler Üzerinde Genel Bir Değerlendirme", **Selçuk Üniversitesi Türkiyat Araştırmaları Dergisi,** S. 14, 2003, s.19.

FULL TEXTS BOOK

Hochasiens" adlı teziyle Felsefe doktoru ünvanını almıştır.[19] Bir süre sonra halk mektebi öğretmenlerinden birinin kızı olan Pauline Auguste Fromm'la nişanlanmıştır.

Dönem itibariyle Türkoloji çalışmaları Rusya'da Moskova, Petersburg ve Kazan'da yoğun bir şekilde gerçekleşmektedir. Radlov tezini savunmuş olduğu yılın yaz ayında hocasından almış olduğu tavsiye mektubuyla beraber Türkoloji çalışmalarının yoğun bir şekilde yapıldığı St. Petersburg'a gelmiştir. Burada Şarkiyat Fakültesi'ne girmek ve yapılan çalışmalara katılmak istemiştir. Bu dönemde F. B. Schmidt'in başkanı olduğu Rus Coğrafya Cemiyeti'nin bilimsel bir gezisine katılabilmek ve Amur bölgesine gidip Tunguz halklarını araştırabilmek için uğraşmıştır.[20] Ancak heyet planlanan tarihte hareket etmemiştir. Geçimini sağlamak için Almanca, Latince ve İtalyanca özel dersleri vermiştir. Bu esnada Rusçası da gelişen Radlov, üniversitede yapılan lise öğretmenliği sınavlarına katılarak öğretmen olma hakkı kazanmıştır. P. Meyendorff ve F. A. Schiefner gibi hamileri ona Altay bölgesindeki Barnaul şehrinde öğretmen olmasını tavsiye etmişlerdir.[21] Bu tavsiyeden sonra Radlov, Barnaul'a gitme hazırlıkları yapmıştır. Kendisi Barnaul'a gittikten kısa bir süre sonra 1858'de nişanlandığı Pauline Auguste Fromm eşi olarak Barnaul'a yanına gelmiştir.

Radlov'un Barnaul'a gelişi onun ilmi hayatında adeta bir dönüm noktasıdır. 1859 – 1871 yılları arasında Sibirya'da kalmıştır. Kononov onun hayatındaki bu dönemi (Altay Dönemini) Altay'ın Türk dillerinin incelenmesi ve daha sonra folklor, etnografya ve arkeoloji ile ilgili materyallerin toplanması ve birincil işlenmesi Altay ve Batı Sibirya Türk halkları ile ilgili çalışmalar gerçekleştirmesinden ötürü kendi kendine eğitim süreci olarak adlandırmaktadır.[22] Radlov, 1860 yılından itibaren gezilerine ve çalışmalarına başlamıştır.

1871 yılında Radlov Kazan'a taşınmak üzere Barnaul'dan ayrılmıştır.[23] Türkoloji çalışmaları açısından onun hayatındaki Kazan dönemi Sibirya'da geçirmiş olduğu dönem kadar verimli geçmemiştir diyebiliriz. Kazan'a geldikten sonra Nikolay İvanoviç İlminsky ve Pytor Dmitrieviç Şestakov ile görüşmüştür. Bu görüşme neticesinde Radlov'a Müslüman Tatarlar için okullar ile çalışmalarda lider olması teklif edilmiştir.[24] Radlov bu teklifi kabul etmiş ve hayatının Kazan dönemi başlamıştır.

10 Mart 1871 tarihinde P. D. Şestakov Milli Eğitim Bakanı Dmitry Andreeviç'e bir dilekçe göndererek "Kazan eğitim bölgesi idaresi altında Tatar, Başkurt ve Kırgız okullarında müfettişlik pozisyonunun kurulması ve Radlov'un bu pozisyona atanması hakkında" Radlov'un belirtilen pozisyona görevlendirilmesini yapmıştır.[25] Bu dilekçe içerisinde Radlov'un görevi de açık bir şekilde belirtilmiştir.

6 Kasım 1872'de Radlov, Şestakov'a, kendisini öğretim yöntemleri, programları ve öğretim yardımcıları hakkında bilgi sahibi olması için yurtdışına gönderme talebiyle dönmüştür.[26] Radlov'un bu talebi olumlu sonuçlanmış ve Millî Eğitim Bakanlığı'nın 24 Şubat 1873 tarih ve 2 numaralı emriyle altı aylığına gönderilmiştir.[27]

Öğretim yöntemleriyle ilgili çalışmalarıyla görevlendirmeden sonra Kazan'a görevine dönen Radlov, 1872 – 1881 tarihleri arasında mevcut müfettişlik görevi paralelinde raporlar hazırlamış ve bunları ilgili makamlara iletmiştir.[28]

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[19] Ahmet Temir, **Türkoloji Tarihinde Wilhelm Radloff Devri Hayatı – İlmi Kişiliği – Eserleri**, TDK Yayınları, Ankara 1991, s. 9.
[20] Yusupov, **a.g.m.**, s. 293.
[21] Ahmet Temir, **a.g.e.**, s. 15.
[22] A. N. Kononov, **a.g.m**, s. 9.
[23] "Radlov Vasiliy Vasileviç (17 Yan. 1837 – 18 Maya 1918)", **Issledovadeteli Altayskogo Kraya XVII – Naçala XX Beka**, Barnaul 2000, s. 174.
[24] L. N. Zakirova, "Nauçnaya i Prosvetitelskaya Deytelnost V. V. Radlovav Kazani", **Vestnik Yelyabinskogo Gosudarstvennogo Universiteta Filologiya İskusstvovedenie**, Vıp. 61, No. 37 (252), 2011, s. 36.
[25] **Natsionalnıy Arhiv Respubliki Tatarstan,** F. 92, Op. 1, D. 10290. **Natsionalnıy Arhiv Respubliki Tatarstan** daha sonra kısaca **NART** şeklinde belirtilecektir.
[26] **NART**, F. 92, Op. 1, D. 10908, L. 1–2; L. N. Zakirova, **a.g.m.**, s. 37.
[27] **NART**, F. 92, Op. 1, D. 10908, L. 10; L. N. Zakirova, **a.g.m.**, s. 37.
[28] **NART**, F. 92, Op. 1, D. 10972; D. 13147; L. N. Zakirova, **a.g.m.**, s. 37.

FULL TEXTS BOOK

Görüldüğü üzere Sibirya'da Türkoloji alanıyla ilgili yoğun bir şekilde araştırmalar yapan Radlov, Kazan'da idari ve pedagojik faaliyetlerde bulunmuştur.

1884 yılında Kutadgu Bilig'in Viyana nüshasının tıpkı basımı için Avusturya'ya giden Radlov, bu seyahati sırasında Petersburg İlimler Akademisi'nin teklifini kabul etmiş ve asli üye olarak bu akademiye geçmiştir.[29] Burada kaldığı süreçte toplamış olduğu materyallerin düzenlenmesine ve yayımlanması faaliyetlerine yoğunlaşmıştır. Bunun dışında 1886'da Kırım 1887'de Batı Karaylar'a gitmiş, 1888'de Macar İlimler Akademisi'nin Muhabir üyeliğine seçilmiş, 1891'de Orhon bölgesine gönderilen heyete başkanlık yapmıştır.

1899'da Roma'da toplanan XII. Şarkiyatçılar Kongresi'nde Radlov'un teklifi üzerine St. Petersburg'da, Orta Asya ve Uzakdoğu'nun arkeolojik ve linguistik yönden araştırılması için milletlerarası bir cemiyetin kurulmasına karar verilmiştir.[30] 1902 yılında tekrar toplanan kongrede konu tekrar görüşülerek cemiyetin tüzüğü kabul edilmiş ve başkanlığına Radlov getirilmiştir. 1907 yılında Batı Avrupa Etnografya müzelerini dolaşmıştır. Radlov ne yazık ki 12 Mayıs 1918 tarihinde yakalanmış olduğu grip nedeniyle vefat etmiştir.

V. V. Radlov ünlü bir Türkolog olmasının yanı sıra etnolog, arkeolog, oryantalist ve aynı zamanda seyyah[31] olarak nitelendirilmektedir. V. V. Radlov, çoğunluğu Almanca olmak üzere 150'den fazla eser yayınlamıştır.

V. V. Radlov'un Altay'a Seyahati

V. V. Radlov'un ilmi hayatındaki dönüm noktalarından biri Barnaul'a gelişidir. Genç yaşlarında Barnual'a gelmiş olması onun kendi içinde planları olmadığı anlamına gelmemektedir. Bu durumu daha sonra ortaya koymuş olduğu eserlerinde net bir şekilde görebilmekteyiz. Barnaul'a 1859 tarihinde geldikten sonra Radlov, kışın öğretmenlik yapmış, yazın ise ilmi çalışmalar yapmak üzere saha araştırmalarına çıkmıştır.

1861'de V. V. Radlov, folklor materyallerini toplamak ve yerli nüfusun yaşamı ve dili hakkında bilgi almak için Altay Dağ Bölgesi'nin doğu kısmına neredeyse üç aylık bir gezi yapmıştır.[32] Bu gezi esnasında yer yer atlarla karadan yer yer kayık veya teknelerle nehir yoluyla yolculuk yapmıştır. 10 Mayıs 1861 tarihinde Radlov eşiyle birlikte bu seyahati için Barnaul'dan ayrılmıştır.

11 Mayıs 1861'de Şmakova, Berkova, Mamanova ile Suyenga posta istasyonlarından geçtikten sonra Yegorievsk köyüne varmıştır. Burası bütün Altay'ın en eski altın ocağıdır. Bu noktada Radlov bu maden ocağı ve civarı hakkında edindiği bilgiyi kısaca bizlere aktarmıştır.[33] Buradan daha sonra Lisvinki altın istasyonuna geçmiştir.

12 Mayıs'ta Podnivaya, Kasma, Brıykanova ve Timakova köylerinden geçen Radlov Brıykanova'da Starşina (köy muhtarı) ile görüşüp bölge hakkında bilgiler almıştır.[34] 13 Mayıs'ta ilk Teleüt köyüne geldikten sonra 14'ünde Solkoy, 16'sında Ulus – Şandı ve 17'sinde Ulu – Ayıl Teleüt köylerinde kaldıktan sonra Sokolova, Tereşkina ve Nedoresova köylerinden geçerek 18 Mayıs tarihinde Kuznetsk'e varmıştır.

[29] Naciye Yıldız, **a.g.m.**, s. 389.
[30] Naciye Yıldız, **a.g.m.**, s. 389.
[31] Radlov'un 'Seyyah' olarak nitelendirildiği tek bir kaynak karşımıza çıkmaktadır. Detaylı bilgi için bakınız: "Radlov (Vasiliy Vasileviç)", **Entsiklopediçeskiy Slovar**, F. A. Brokgauz – İ. A. Efron (İz.), T. XXVI, Sankt Petersburg 1899, s. 93.
[32] A. M. Maloletko, "150 Let So Vremeni Puteşestviya V. V. Radlova Po Altayskomu Gornomu Okrugu", **Altayskii Kray 2011 g.: Kalendar Znamenatelnıh i Pamyatnıh Dat**, Barnaul 2010, s. 150.
[33] W. Radloff, **Sibirya'dan (Seçmeler)**, Ahmet Temir (çev.), İstanbul 1976, s. 94.
[34] V. V. Radlov, **İz Sibiri,** Moskva 1989**,** s. 45. Bu kıymetli eser Ahmet Temir tarafında Türkçeye aktarılmıştır. Ancak biz eserin Rusça nüshasından yararlanmayı uygun gördük. Ahmet Temir'in yapmış olduğu çeviri eserler ile ilgili bakınız: W. Radloff, **Sibirya'dan I**, Ahmet Temir (çev.), Maarif Basımevi, İstanbul 1954; **Sibirya'dan I.2.**, Maarif Basımevi, İstanbul 1956; **Sibirya'dan II- Sibirya'dan II.2.**, Maarif Basımevi, İstanbul 1956.

FULL TEXTS BOOK

Hatıralarında 20 Mayıs tarihli yazısında Radlov bizlere Kuznetsk hakkında bilgiler vermektedir.[35] 21 Mayıs tarihinde Radlov Şor Tatarları ile ilgili bilgi toplamak üzere kaldığı yerden seyahatine devam etmiştir. Önce Attamanovo köyüne, ardından tekneyle Bezrukova (Protok) köyüne ulaşmıştır. 22 Mayıs'ta çoğu Ruslaşmış olan Tatarlardan oluşan Balbı köyüne ulaşmıştır. Halkın çoğunun Ruslaşmasından ötürü burada kalmayan Radlov yoluna devam ederek Pras – Pältärindä adlı Tatar köyüne varmıştır.[36] Burada 2 gün kalmıştır.

24 Mayıs akşamı Krasnoyarsk'a gelen Radlov buradan 26 Mayıs tarihinde ayrılmış ve Sıbırgı boyundaki Ulus'a kadar gitmiştir. Burada bir gün kaldıktan sonra Çıbaş ve Ulus – Kaynçak'tan geçerek Rusların "Sosnavaya gora" dedikleri Ulus – Tos'a varmıştır. 29 Mayıs'ın sabahında buradan ayrılan Radlov uzun ve yorucu bir yolculuktan sonra Ulus – Çeley köyüne varmıştır.

3 Haziran günü Ulus – Çeley'den ayrıldıktan sonra yine Mras nehri yolunu takip ederek yolculuğuna devam etmiştir. 6 Haziran'a kadar Ulus – Karga, Ak – Kaya, Ulus – Kızıl – Kaya, Ulus – Tayaş'ı geçerek Spasski altın ocağına varmıştır. 9 Haziran'da buradan ayrılmıştır. Bu noktadan ayrıldıktan sonra 10 Haziran'da daha önce altın ocağı olan ancak daha sonra sadece istasyon olarak kullanılan Biysk altın ocağına gelmiştir. Daha sonra yoluna devam eden Radlov Ulbas'ta Lebed Tatarlarına rastlamıştır. 14 Haziran sabahı güneş doğarken Radlov ve beraberindekiler Ulbas'tan ayrılmıştır. 19 Haziran günü Karaorman Tatarlarının kulübelerine rastlamıştır. 20 Haziran tarihinde ünlü bir şarkıcıyı görmek için Radlov Teletsk gölüne giden en kısa yol üzerinde bulunan Käbisän misyonerliğine gitmeyip Talaslı kulübelerine yönelmiştir. Daha sonra 22 Haziran'da belirlemiş olduğu rotasını yeniden takip etmeye başlayarak Käbisän misyonerliğine gitmiştir. Burada çok kalmayarak yoluna devam eden Radlov, Oroşok – Zaysan'ı geçerek Teletsk gölüne gitmiştir. Bu civarda yapmış olduğu seyahatinin neticesinde Tolış mansabına vararak ilk Dvoyedan yurtlarını 25 Haziran'da görmüştür.

26 Haziran tarihinde Radlov ve ekibi yola erkenden çıkmıştır. 26 Haziran 1861 tarihi Radlov'un seyahatinde bir dönüm noktasıdır. Çünkü Abakan Nehri'ne giden yol, Çolışman Vadisinden geçmektedir. Çolışman Nehri'nin sağ kolu üzerinden Radlov'un seyahati başlamıştır. Seyahatini karanlık bastığı için Başkaus mansabı yakınlarında durdurmak zorunda kaldığını belirten[37] Radlov, güncesine bu tarihten sonraki tarih olarak 17 Temmuz 1861'i düşmüştür. 17 Temmuz günü Çolışman'dan Çülçö membaına doğru hareket etmiş ve öğleden sonra buraya vararak çadırını burada kurmuştur.[38] Radlov güncesinde 17 Temmuz'dan 24 Temmuz tarihine kadar herhangi bir bilgi aktarmamıştır. Bu noktadan bakınca Radlov'un bir müddet burada kaldığı yorumunu yapabiliriz.

24 Temmuz tarihinde Çin sınırına doğru ilerlerken Çolışman nehri o kadar yükselmiştir ki mecburen yoluna sağ sahil boyunca devam etmek zorunda kalmıştır. 25 Temmuz'da Radlov, mevsimin ilerlemesinden ötürü Teletsk gölünün batısından geçen kara yoluyla hareketine devam etmiştir.[39]

26 Temmuz'da Açıman'dan ayrılan Radlov batı yönünde yükselen dağ zirvelerine doğru yönelmiştir. Buradan Biji nehir sistemine varmıştır. Akşamleyin Biji nehrinin güneyindeki doruklar çizgisine varmış ve burada gecelemiştir.[40] 27 Temmuz günü erkenden yola çıkan Radlov ve beraberindekiler şiddetli bir yağmura tutulmuşlardır. Hava şartlarının kötü olmasından dolayı ekip oldukça yavaş hareket etmek zorunda kalmıştır.[41]

28 Temmuz'da Biji'nin küçük bir kolu boyunca dağın doruklar çizgisinden tekrar yukarıya doğru yürüyen ekip sık orman, bataklık ve taşlı – çamurlu yoldan ilerlemiştir. Zorlu yolculuğun sonunda Radlov ve ekibi Biji vadisini görmüştür. Bu vadideki ilk yurt'a varışları öğleden sonra 4 gibi olmuş ve

[35] V. V. Radlov, **a.g.e.**, s. 46.
[36] **Aynı eser**, s. 48.
[37] Radlov, **a.g.e.**, s. 65.
[38] **Aynı yer.**
[39] Radlov, **a.g.e.**, s. 66.
[40] Radlov, **a.g.e.**, s. 68.
[41] **Aynı yer.**

FULL TEXTS BOOK

burada yemek yedikten sonra yollarına devam etmişlerdir. Gece geç vakitlerde Biji nehrini geçerek büyük bir Tatar köyüne varmışlardır.[42]

29 Temmuz'da Ügön yolunu takip eden Radlov ve beraberindekiler akşam vakti Kara – Köpçü sahilindeki Kömnöş boyundaki Zaysan – Tatar'ın yurduna varmıştır.[43]

Radlov ve ekibi, 30 Temmuz'da Kara – Köpçü boyunca ilerlemiştir. Paspagıl boyunda vaftiz edilmiş Tatarların köyünden geçen Radlov buradan Katun'nun ilk kolu olan İşi'ye doğru dönmüştür. Gece geç saatlerde son Tatar köyü olan Taştu'ya varan Radlov Biysk yoluna varabilmek için at üzerinde seyahatine devam etmiştir.[44]

1 Ağustos tarihinde Barnaul'a geri dönen Radlov zorlu saha çalışmasını başarıyla tamamlamıştır. Radlov'un yapmış olduğu bu seyahat Altay halklarının hakkında merak uyandırmış ve yeni çalışmaların yapılmasını sağlamıştır.

V. V. RADLOV HAKKINDA BAKILABİLECEK KAYNAKLARDAN BAZILARI

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SONUÇ

V. V. Barthold'un değerlendirmesiyle "dünya çapında birinci sınıf bir bilgin", Akademi üyesi S. F. Oldenburg'un ifadesiyle "Türkolojinin kurucusu" olarak adlandırılan Radlov'un bu sözlerle tarif edilmesi pek tabii olarak tesadüf değildir. Ömrünün 60 yıllık bir zaman dilimini Türkoloji çalışmalarına adayan Radlov, Türk halklarının, örf, adet, yazı, folklor gibi birçok unsurunu kaydederek arkasından gelen Türkologlar için eşsiz çalışmalar bırakmıştır. Bugün Radlov'un çalışmalarındaki eksik veya yanlışlar hala Türkologların çalışma konularının temelini oluşturmaktadır.

1861 yılında Radlov'un Altay bölgesine yapmış olduğu seyahatinin 163. yılı olması münasebetiyle kaleme almış olduğumuz bu yazımız Radlov'un seyahatinin güzergahını ve bu güzergahta görmüş olduğu yerleşim yerlerinin tespiti üzerinedir. Pek tabii olarak seyahati esnasında karşılaşmış olduğu hava ve yol durumlarının muhalefetinden de bahsedilmiştir. Yolculuğu boyunca Altay'ın zorlu coğrafyası ve iklimi karşısında çeşitli zorluklarla karşılaşmış olsa da bu seyahatinden vazgeçmeden devam eden bu büyük Türkolog bizlere Altay hakkında paha biçilemez bir kıymetli günce bırakmıştır.

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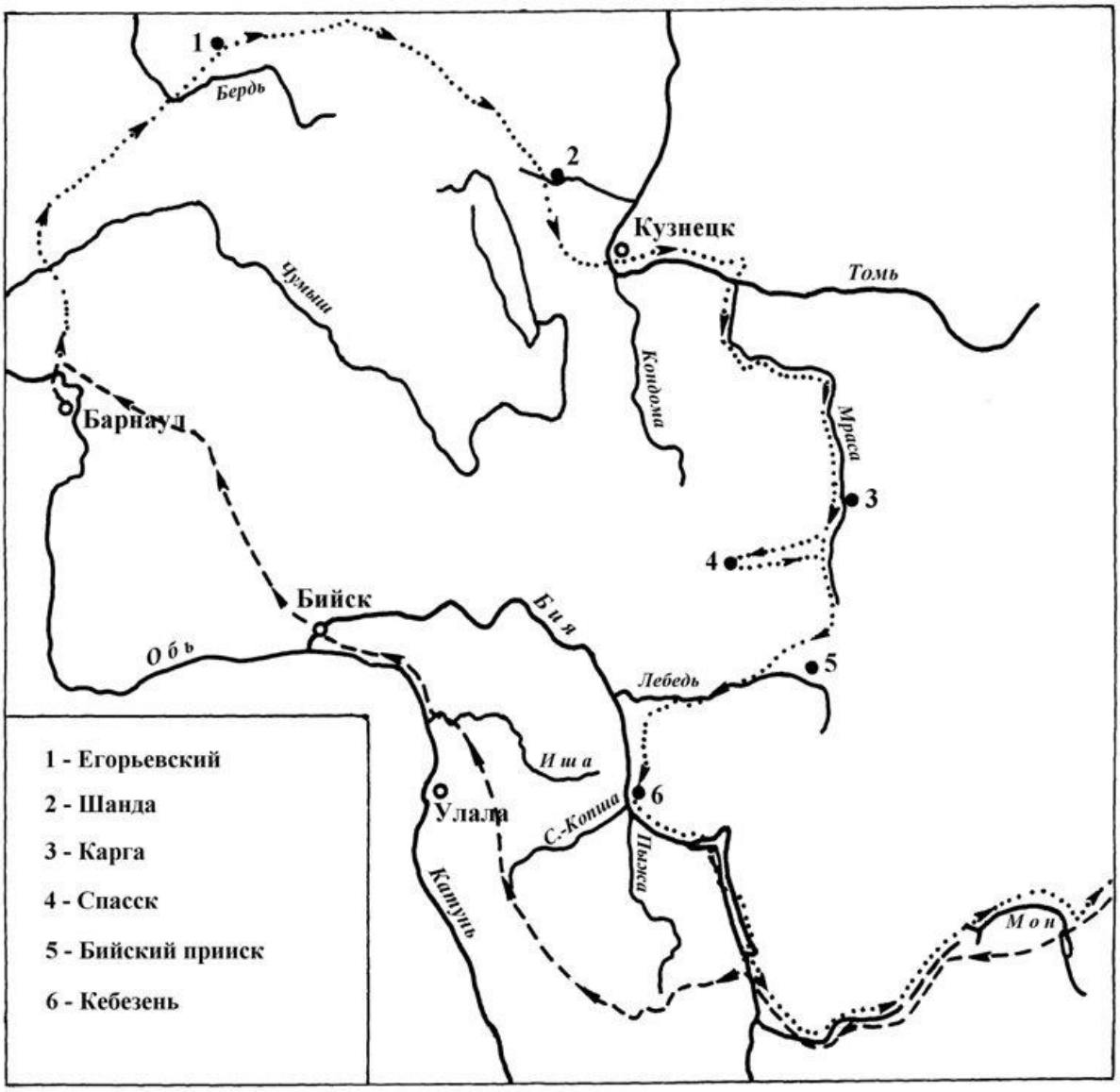
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Radlov'un 1861 Yılında Altay Seyahati Boyunca Takip Ettiği Yol

(A. M. Maloletko, "150 Let So Vremeni Puteşestviya V. V. Radlova Po Altayskomu Gornomu Okrugu", **Altayskii Kray 2011 g.: Kalendar Znamenatelnıh i Pamyatnıh Dat,** Barnaul 2010, s. 151)



FULL TEXTS BOOK

EVLİLİK VE KADIN: *BLUEBEARD* VE *THE YELLOW WALLPAPER* ADLI ESERLERDE KUŞATILMIŞ KADINLIK

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ÖZET
Kadınların aile içinde maruz kaldığı kötü davranışlar, şiddet ve kısıtlamaları konu alan pek çok edebi ve görsel metin bulunmaktadır. Söz konusu eserlerde kadın, kocası tarafından sınırlandırılan ve daima ev içi alana, bir diğer tabirle özel alana hapsedilen bir kimlikle karşımıza çıkmaktadır. Kadından istenilen ev içindeki işleyişi düzenlemesi ve uysal bir eş olmasıdır.
Çalışmada ele alınacak eserlerde de karşımıza kadından böylesine istekleri olan kocalar çıkmaktadır. Charles Perrault'nun yapma masalı olan Mavi Sakal'da, korkutucu görünümüne rağmen zenginliği sayesinde evlenen bir adam ve onun eşi arasındaki mücadele anlatılmakta, kadının kocasının isteklerine riayet etmesi beklenen bir nesne gibi sunulmasına karşı çıkılmaktadır. Masalda kocanın kadından beklediği tek şey, emirlerinin dışına çıkmaması ve meraklı olmamasıdır.
The Yellow Wallpaper adlı eserse, Charlotte Perkins Gilman tarafından yazılmış bir kısa öyküdür. Bu öyküde geçirdiği ruhsal buhranlar nedeniyle mutsuz olan bir kadınla, kendisini bilime adamış ve rasyonel kocasının ilişkisi aktarılmıştır. Yine bu eserde de kadından beklenilen kocasının istek ve yönlendirmelerine kesin bir kabulle uymasıdır.
Çalışma kapsamında feminist yaklaşım üzerinden bu iki eser irdelenecek ve kadınların evlilik içi psikolojik şiddete maruz kalışları ve bununla mücadele stratejileri değerlendirilecektir. Yayımlanma tarihleri itibariyle birbirleri arasında büyük bir fark bulunmayan bu iki eserde, kadının rolünün nasıl değiştiği de yine çalışmada açıklanmaya gayret edilecektir.
Anahtar Kelimeler: *Mavi Sakal*, *The Yellow Wallpaper*, Charles Perrault, Charlotte Perkins Gilman, Feminist eleştiri

ABSTRACT
There are many literary and visual texts that address the mistreatment, violence, and restrictions faced by women within the family. In these works, women often appear as identities confined to the domestic sphere, or in other words, the private realm, restricted and controlled by their husbands. They are expected to regulate the household chores and to be obedient wives.
The works to be discussed in this study also feature husbands who have such expectations from their wives. In Charles Perrault's fairy tale 'Bluebeard,' despite his frightening appearance, a man who marries due to his wealth is depicted in a struggle with his wife, who is presented as resisting being treated as an object expected to comply with her husband's wishes. The only thing expected of the wife in the tale is not to disobey his orders and not to be curious.
'The Yellow Wallpaper,' written by Charlotte Perkins Gilman, is a short story depicting the relationship between a woman unhappy due to her mental breakdowns and her husband dedicated to science and rationality. In this work too, the woman is expected to unquestioningly adhere to her husband's desires and directions.
Within the scope of this study, these two works will be analyzed through a feminist approach, evaluating the psychological violence experienced by women within marriage and their strategies of resistance. Despite being published around the same time, the study will also attempt to explain how the role of women changes in these works
Keywords: *The Bluebeard*, *The Yellow Wallpaper*, Charles Perrault, Charlotte Perkins Gilman, Feminist Theory.

FULL TEXTS BOOK

GİRİŞ

Bu çalışmada Fransız yazar Charles Perrault'nun 1697 yılında yayımlanan *Bluebeard* ve Amerikalı yazar Charlotte Perkins Gilman'ın 1887 yılında yazdığı *The Yellow Wallpaper* adlı eserleri feminist yaklaşım ışığında karşılaştırmalı olarak ele alınacaktır. İki eserde de evlilik içinde kadının yaşadığı problem ve kısıtlamalar irdelenecek ve eserler arasındaki zaman farkının kadının toplumdaki yerine yönelik ne gibi değerlendirmelere yol açabileceği üzerinde durulacaktır.

Çalışma kapsamında belirlenen eserler, edebi metinlerde kadın ve kadının temsili noktasında farklı bir bakış açısı sunan feminist eleştiri kuramından hareketle değerlendirilecektir. Bu nedenle feminist eleştiri yaklaşımına yönelik bilgilerin verilmesi çalışmanın tutarlılığı açısından yerinde olacaktır.

En genel ifadeyle feminist eleştiri, cinsiyet temelli yaklaşımlarla ilintilidir. Örneğin bazı feminist eleştirmenler, medya ve yazılı basında kadının nasıl karakterize edildiğiyle ilgili araştırmalarda bulunur, edebi metinlerde kadının rolünü sorgular, kadın bedeninin istismar edilmesine ve erkeğin kadına bakışına odaklanır, kadına yönelik olduğu düşünülen edebi ve görsel metinlerde kadının nasıl işlendiğini inceler. Bir başka ifadeyle feminist eleştiri; kadının edebi metinlerde ve daha geniş bir bağlamda günlük yaşamdaki rolünü, kadının bir cinsellik nesnesi olarak istismarını, erkeğin iş yerinde, cinsel ilişkide ve yaşamın diğer alanlarındaki egemenliğini ve kadının kendi varlığının bilincine varmasını çalışma alanının eksenine yerleştirmiştir. Feminist eleştirmenler pek çok toplumun ataerkil bir yapıda olduğunu ve dünyayı algılamada ve bilimde erkek egemen görüşün, üstün kabul edildiğini iddia etmektedirler (Berger, 1995, s.29-30).

Feminist edebiyat eleştirisi, kadının ve erkeğin rol modeller edinmesi ve sosyalleşmesinde önemli bir yeri olan edebiyatta, kadının nasıl ele alındığını sorgular (Barry, 2002, s.122). Feminist araştırmacılar, geleneksel yaklaşım her ne kadar edebiyat eleştirisinin cinsiyet temelli olmadığını iddia etse de, edebiyat eleştirisinin evrensellik gayesi taşıyorsa feminist bilince sahip olması gerektiğini savunmuşlardır. Erkek egemen yapıdaki edebiyat ve edebiyat eleştirisinin mevcudiyetini savunan feminist teorisyenler, edebiyat eleştirisinin feminist bilinci de kapsayacak şekilde yeniden yapılandırılması gerekliliğini dile getirmişlerdir. Onlara göre 1960 ve 1970'lerde yükselen özgürlük hareketlerinin çıkış noktası, erkek egemen söylemdir. Bu dönemin Amerikan toplumunda muteber olan çoğunluğun beyaz, orta sınıfa mensup erkekler olduğu feminist araştırmacılar tarafından ortaya koyulmuştur (Guerin vd., 1979:245-246).

Feminist eleştiri, cinsiyet eşitliğini savunan ve toplumda cinsiyet temelli egemenliği ortadan kaldırmak için ataerkil kültüre karşı çıkan bir yaklaşımdır. Feminist eleştiri her türlü ataerkil düzeni, edebiyat ve edebiyat eleştirisinden uzak tutma amacı taşımaktadır (Selden vd., 1997, s.121).

Feminist eleştiriyi sadece 20. yüzyıla özgü bir yaklaşım olarak görmek doğru değildir. Feminist söylemin geçmişi Antik Yunan'a, Sappho'nun şiirlerine ve Aristophanes'in *Lysistrata* adlı eserlerine dek götürülebilir. Antik dönemden, orta çağa ve sonrasında günümüze değin izleri sürülebilecek feminist yaklaşımın çeşitli temel taşları mevcuttur. Bu temel taşlardan ilki olan Mary Wollstonecraft, Fransız Devrimi'nden sonra devrimin ve Aydınlanma düşüncesinin ideallerinin kadınları da kapsayacak şekilde kurgulanması gerekliliği yönündeki tartışmaları ateşlemiş, kadınların da eğitim alabilmesi zorunluluğunu savunmuştur. 19. yüzyılda ise, Virginia Woolf, Bronte Kardeşler, Eliot Stein, Katherine Mansfield gibi feminist yazarlar göze çarpmaktadır. Feminist söyleme sahip kadın yazarlar, sadece eğitim ve finansal bağımsızlık hakları için mücadele etmezler, bunun yanında kendilerinin edebi üretimlerini, üretim çabalarını küçümseyen, kendilerinden sessizlik ve itaat bekleyen erkek egemen ideolojiyle de savaşmışlardır. Onlara göre erkek egemen edebiyatta; melek, ilahe, fahişe, itaatkâr kadın ve anne olarak işlenen kadın, cinsiyet temelli ideolojinin yansımasıdır. 20. yüzyılla birlikte kadınların politik haklarını kazanma yönündeki mücadeleleriyle, feminist eleştiri sistemli bir yapıyı ortaya çıkarmıştır. Bu dönemden itibaren feminist eleştiri; kadın emeklerini de kapsayan yeni bir edebiyat tarihinin oluşturulması, kadın edebiyat geleneğinin takip edilmesi, cinsellik ve cinsel farklılık temelli teorilerin oluşturulması, erkek egemen edebiyatta kadının temsili, edebi üretim ve eleştiride cinsiyet

FULL TEXTS BOOK

rolleri, edebi türlerle cinsiyet ilişkisi gibi konularla ilgilenmiştir. Yine eril değerlerle ve içerikle yüklü bir dille edebiyat yapmanın problemleri de feminist eleştirinin araştırma alanlarından biri olmuştur (Habib, 2005, s.667-668).

Feminist yaklaşıma göre dil, kaynağını Aristoteles'te bulan bir eril düşünme biçimiyle örgütlenmiştir. Aristoteles'in öğretilerine göre mantık, kimlik ve diğer kategorilendirmelerde, sınırlar kesin olarak çizilmiştir. Aristoteles'e göre bir insan ya erkek ya da kadındır, ya siyah ya da beyazdır, ya efendi ya da köledir ve bu gibi ayrımların hepsi, oldukça sınırlayıcıdır. Feminist teorisyenlere göre bu kategoriler doğal olmadığı için, kültürel ve ideoloji kaynaklıdır. Tam da bu noktada feminist söylemin, yapıbozumculuktan, Hegel, Schopenhauer ve Bergson'dan, Fransız sembolizminden yararlanmakla birlikte, eleştirdiği bir yapıya benzememek adına sınırlı, sabit kurallarla, değerler dizgesiyle kuşatılmadığını söylemek mümkündür (a.g.e., 668-669).

Günümüz feminist edebiyat eleştirisi 1960'ların 'kadın hareketi'nin bir ürünüdür. Feminist hareket, edebi metinlerde yansıtılan kadın imajının önemini kavramış, edebi metinlerdeki kadın imajıyla mücadeleyi önemli olarak addetmiş ve eril edebiyatın otoritesini ve geçerliliğini sorgulamıştır. Feminist eleştiride temel odak; cinsiyet eşitsizliğinden kaynaklanan ve kültürel temeli olan 'kadın' ve 'erkek'e yönelik sabit fikirlerin oluşturduğu ataerkil mekanizmaların ortaya çıkarılmasıdır. Erkek yazarlar tarafından yazılan, kadına yönelik tipik ya da etkili imajlara yer veren eserler, bu kapsamda incelenmiştir. 1980'lerle birlikte feminist yaklaşımının bakış açısı değişmiştir. İlk olarak feminist yaklaşım eklektik bir yapıya bürünmüş ve Marksizm, yapısalcılık ve dilbilim gibi alanların bulgu ve yaklaşımlarından yararlanmıştır. Bu dönemde feminist yaklaşım eril dünyanın uygulamalarına saldırmak yerine, kadının dünyasının ve görünüşünün doğasına, kaybolan ya da baskılanan kadın deneyimini yeniden oluşturmaya odaklanmıştır. Feminist yaklaşımdaki bir diğer odak değişimi ise; ihmal edilmiş/görmezden gelinmiş kadın yazarlara hak ettikleri değerin verildiği yeni bir edebiyat tarihinin yazılması ve bir kadın edebiyatı kanonu oluşturulmasıdır (Barry, 2002, s.121-122).

Feminist edebiyat eleştirisinin başlangıcı olarak gösterilebilen 1960'larda, feminist edebiyat eleştirisinin tam anlamıyla oluştuğu, bir kimlik ve içerik kazandığını iddia etmek güçtür. Feminist edebiyat eleştirisi o dönemde, yüzyıllara dayanan kadın yazınına, kadın yazını hakkında oluşturulan kadın yazınına, kadınların zihinleri, bedenleri, sanatları ve fikirleri ile ilgili olarak kadın ve erkek yazınına karşı farkındalık yaratma amacı taşımıştır. Feminist eleştiri yöntemi genel olarak feminist yazının kaynağını açıklamak, kadın yazın geleneğini oluşturmak ve erken dönem 'feministleri'nin, erkeği ve erkek dehasını, sorgulamadan kabul etmelerine karşı çıkma amacını taşımaktadır (Plain ve Sellers, 2007, s.2).

Feminist yaklaşım tarihsel açıdan ele alındığında üç dalga halinde gelişim göstermiştir. Bu dalgalardan ilki olan birinci dalga feminizmi Virginia Woolf ve Simone de Beauvoir'le temsil edilmiştir. Bu dönem feministlerin, kadın-erkek eşitliği, oy kullanma hakkı ve kadının; babanın ve kocanın malı kabul edilemeyeceği fikrini savunmuştur. Woolf, *Kendine Ait Bir Oda* adlı eserinde, erkek egemen toplum yapısında, 'kadın'ın, erkek egemen söylem tarafından tanımlandığını iddia etmiştir. Woolf'a göre siyasal, ekonomik, sosyal ve edebi konuları kontrol eden de erkektir. Kadına düşense, mevcut durumu kabul etmeyip, kendi kimliğini oluşturmak ve tanımlamaktır. Beauvoir'sa *İkinci Cinsiyet* adlı eserinde kadının olmanın ne demek olduğunun erkek tarafından belirlendiğini yazmıştır. Kadın, bu noktada erkeğin karşısındaki değersiz 'öteki'dir. Feminist eleştirinin ikinci dalgası, 1960'ların özgürlük söyleminin yansımasıdır. Feminist yaklaşım bu dönemde kadınların sosyal alandaki temsiliyet krizine dikkat çekmiş, kadınların farkındalık kazanması ve cinsellik gibi konular üzerinde durmuştur. Kadın, sıkıştığı erkek boyunduruğundan çıkmalı ve kendine ait bir yazın anlayışı oluşturmalıdır. Bu dönemin önde gelen temsilcisi Elaine Showalter'dir. O, kadın yazınını üç evrede anlatır. Bu evreler; 1840-1880 arasındaki dişil evre, 1880-1929 arasındaki feminist evre ve 1970 sonrasındaki kadın evresidir. Dişil evre yazarları eserlerinin basılması için erkek isimlerini takma ad olarak kullanmışlardır. Feminist evrede, erkek egemen edebiyatta kadının nasıl ele alındığını araştırılmıştır. Kadın evresinde ise, kadınların kendilerine dayatılan ikincil pozisyonu kabullenmeyişi vardır. Genel akış içinde üçüncü dalga

FULL TEXTS BOOK

feminist yaklaşımsa; bütün ötekileştirilen sınıf ya da ırkları kapsayan bir anlayışa sahiptir. Söz gelimi, siyah feminizm, Amazon feminizmi ve ekofeminizm gibi alt alanlar, bu dönemde gündeme gelmiştir (Turgut, 2019, s.41-51).

Temel hatları ve tarihsel gelişimiyle aktarılmaya çalışılan feminist yaklaşım ve feminist edebiyat eleştirisi, kadının yaşamdaki, edebi ve görsel metinlerdeki rolüne odaklanmakta, erkek egemen yapıdaki çevre ve edebiyat dünyasında kadına yönelik bir farkındalık yaratma amacındadır.

ARAŞTIRMA VE BULGULAR

Çalışmada kullanılacak olan ilk eser olan Perrault'nun eseri kısaca, mavi bir sakalı varlıklı bir adamla evlenen genç kadının evlilik sürecinin anlatılmasıdır. Varlıklı bir adam olan Mavi Sakal, iş için evden ayrılırken eşine evin tüm odalarının anahtarını bırakır ve her odayı gezebileceğini, arkadaşlarını çağırabileceğini ama bir odaya kesinlikle girmemesi gerektiğini söyler. Genç kadın kendisine yasaklanan odanın kapısını açar ve bu anlamda eşinin uyarılarını dikkate almaz. Eserde kocasının uyarılarına kulak asmayan bir kadının eşi tarafından cezalandırılması ve öldürülmeye çalışılması işlenmiştir.

Charles Perrault'nun orijinal dilindeki adıyla "La Barbe bleue" adlı eseri 1697 yılında yayımlanmış ve eser yayınlandıktan çok kısa bir süre sonra seri katil koca tipini içeren edebi eserlerin öykündüğü kanonik metin haline gelmiştir. Bir yapma masal olan Perrault'nun eseri daha sonra, söz gelimi 18. yüzyılda sözlü geleneğe geçmiştir. Grimm Kardeşlerin 1812-1815 yılları arasında derledikleri masallarda 'Blaubart' masalının yer alması bu geçişin ispatı niteliğindedir (Ruddick, 2004: 346-347). Perrault'nun eseri, kolektif hayalgücüne etki eden ve yazıldığı tarihten sonra pek çok kez yinelenen ve yeniden yazılan bir metindir (Le Juez, 2016:4). Perrault'nun eserini, 15. Yüzyılda yaşayan soylu Gilles de Rais'ten etkilenerek oluşturduğu da düşünülmektedir (Vincendeau, 2010:50). Ruddick'e göre varlıklı adamın mavi bir sakala sahip olması, erkeğin doğal olmayan maskülenliğine/erilliğine bir göndermedir. Erkeğin mavi sakalı aslında açık bir tehlike uyarısı olmakla birlikte, kadının Mavi Sakal'ın zenginliğinden etkilenmiş ve sakalın 'aslında o kadar da mavi olmadığını' düşünmesine neden olmuştur (a.g.e.,:348). Perrault'nun eserinde geçen bu ifade, aslında yine eserdeki kadının zenginlik karşısındaki tamahkârlığının göstergesidir. Mavi Sakal'ın şatosunda mobilya ve sofra takımlarının koleksiyonunun da olması, eserde kendisiyle evlenen kadın için bir cazibe unsurudur. Başlangıçta Mavi Sakal'la evlenmek istemeyen kadın, Mavi Sakal'ın evindeki bir haftalık şölen neticesinde onun sakallarının o kadar da mavi olmadığını düşünebilecektir (Randall, 2004:91).

Randall'a göre Perrault'nun eserindeki erkek karakterin mavi sakalı, düşmanlarını püskürtüp tehdit eden ve farklılığını gösteren bir unsurdur. Mavi Sakal'ın evindeki koleksiyon odalarında pek çok zenginlik unsuru meta bulunmakta ve saklı odada, daha önce evlilik yaptığı kadınların cesetleri yer almaktadır ve odadaki ölü gelinlerin varlığı Mavi Sakal'ın kadınlar üzerindeki gücünü göstermektedir. Kendisi fiziksel güzellikten yoksun olduğu için, Mavi Sakal kendisinden kaçan kadınlara karşı intikamını arzu nesnelerini ve güzel vücutları toplayıp biriktirerek alır. Ayrıca Mavi Sakal'ın eşine verdiği emirler mantık dışı, keyfi ve tuzaklıdır, mutlakçı bir dilin ve davranışın tezahürüdür. Mavi Sakal'ın eşine koyduğu yasakları ifade etme biçimi, açık bir şekilde Tanrı'nın Havva'ya yasakladığı ağacın meyvesini yememesi gerektiği yolundaki uyarısına benzemektedir (Randall, 2004:94).

Perrault'nun eserinde aslında Mavi Sakal'ın karısı kurallara uymaması için eşi tarafından ayartılmış, bir anlamda ikna edilmiştir. Eserde görüldüğü şekliyle Bluebeard kadına sadece anahtarı vermekle kalmaz aynı zamanda anahtarın açtığı odanın yerini bütün açıklığıyla tarif eder. Aynı zamanda kadın, eşiyle ilgili hiçbir bilgiye sahip değildir. Kadın, eşinin seçimlerini ve düşüncelerini bilmediği için evlilik içinde hem daha değersiz hem de tehlikeye çok daha açık durumdadır. Bu durum aslında halen güncel olan ev içi istismara da açık bir göndermedir. Esere başka bir açıdan yaklaşıldığında; Mavi Sakal'ın eşinin kendisinden önce Mavi Sakal'la evlenenlerin akıbetini gördüğü açıktır. Bu noktada Mavi Sakal'ın ilk eşinin bu odada ne gibi bir manzarayla karşı karşıya kalmış olabileceği açık şekilde eril tahakküme bir

FULL TEXTS BOOK

göndermedir. Erkeğin girmemesi, merak etmemesi üzerine yaptığı vurgu ve sınırlama aslında kendi otoritesinin sınandığı bir güç gösterisidir (Le Juez, 2016:6-7).

Çalışma kapsamında ele alınabilecek bir diğer eser olan *The Yellow Wallpaper* adlı öykü yazar Charlotte Perkins Gilman'a aittir. Gilman'ın *The Yellow Wallpaper* adlı öyküsünün otobiyografik özellikler taşıdığı iddia edilebilir. Gilman, eserini nasıl ve neden yazdığı sorusuna yanıt verdiği bir yazıda, 1887 yılında derin bir depresyon yaşadığını ve ülkenin tanınmış ruh hastalıkları uzmanlarından birine gittiğini belirtir. Gittiği uzman, ondan 'mümkün olduğunca evde kalmasını, günde sadece iki saatlik bir süreçte entelektüel faaliyetlerde bulunmasını ve asla kurşun ya da dolma kalemi eline almamasını' ister. Gilman üç ay bu şekilde yaşadığını fakat zihinsel sağlığının bu süreçte daha da bozulduğunu söyler ve uzmanın tavsiyelerine uygun yaşamı reddeder ve bu dönemde *The Yellow Wallpaper* adlı eserini yazar. Eseri yazmaktaki amacının insanları delirtmek değil, onları delirmekten kurtarmak olduğunu belirten yazar, bunda da başarılı olduğunu savunur (Gilman, 2011, s.265). *The Yellow Wallpaper* adlı öykü, yazıldıktan sonra uzun bir müddet okurların ilgisini çekmemiştir. Eserin yeniden fark edilir olması, Elaine Hedges'in öyküyü küçük bir edebi şaheser olarak nitelendirmesiyle gerçekleşmiştir. Eser, 20. yüzyıl feminizmiyle birlikte keşfedilmiş ve ilgi görmüştür (Shumaker, 1985, s.588-589).

Charlotte Perkins Gilman'ın yazdığı *The Yellow Wallpaper* adlı öykü, farklı okumalara açık bir metindir. Söz gelimi Greg Johnson eseri, gotik bir metin olarak nitelendirmektedir. Johnson'a göre Gilman kadın bir yazar olarak eril tahakkümdeki yazın kanonunu, Gotik unsurlarla aktararak bir alegori yapmıştır. Eserde bilindik gotik unsur ve temaların kullanıldığına değinen Johnson, tutsaklık ve isyan, yasaklanan arzı ve akıldışı korku, akıl sağlığını kaybeden kadın, yasaklanan ev ve otoriter erkek kahraman gibi içerikleri buna örnek olarak gösterir (Johnson, 1989, s.530). Bir başka eleştirmen Davison ise, Gilman'ın eserinin daha çok kadın gotiği (female gotic) olarak değerlendirilmesi gerektiğini savunur. Davison, kadın gotiğinin, geleneksel gotik edebi metinlerden farklı olarak genel anlamda kadının kadınlığına geçişine odaklanan ve yine kadının güncel ve ev odaklı yaşam biçimiyle, özellikle evlilik ve annelikle olan kararsız/müphem ilişkisine değinen bir tür olduğunu belirtmiştir (bkz. Davison, 2004, s.48). Kadın gotiği kavramı ilk olarak Ellen Moers tarafından 1976 yılındaki *Literary Women* adlı eserinde, kadının cinsellik ve çocuk doğurmakla ilgili korkularını referans alan tür olarak kullanmıştır (Moers, 1976, s.53). Kadın gotiği üzerine değerlendirmelerde bulunan araştırmacılar, kadınların korkularının ve arzularının farklı anlamları olduğunu belirtmişlerdir. Kadın gotiği anlatıları uyarıcı, ritüelvari, gezi-macera romanları olarak görülebilir ve bir kadının kadınlığını keşfetmeye ve evlilik öncesindeki duygusal durumuna odaklanır. Kadın gotiğinde nihai amaç, kadının evliliğe teşvik edilmesi değildir (Davison, 2004, s.50). Kadın gotiği, kadının kendi cinselliği ve kimliğiyle çatışması ve ruhsal katharsis yaşamasının anlatısıdır (Vincent, 1983, s.157). DeLamotte ise kadın gotiğinin, kadınların kendilerine ve kendi duyuşlarına tamamen yabancı olan yapılardan mustarip oluşunu anlattığına değinir. Ona göre kadına yabancı bu yapılar; ataerkil aile, ataerkil evlilik, erkek egemen sınıf, eğitim ve ekonomik sistemdir (DeLamotte, 1990, s.152). Eva Figes, kadın gotiğini 'evinden çıkmaya gönlü olmayan kadın'a odaklanan tür olarak tanımlar. Evin, gotik kurmacadaki rolüyle birlikte, kadın gotiğinde yeni anlamlar kazandığı savunulur. Kadın gotiğinde ev, erkek imtiyazının merkezi ve 'talihli' kadının erkek tarafından korunmasının, eril gücün, tehdit ve baskının mekânıdır (Figes, 1982, s.74). Kadın gotiğinde evlilik ve annelik gibi pozitif ideallerin karanlık tarafları keşfedilir ve ortaya çıkarılır. Gotik edebiyatın ana belirleyicilerinden olan dönüşüm, kadını, kendisine dayatılandan olmak istediğine doğru değiştirmeye odaklanır. Kadının ev hayatıyla ilgili deneyimleri karanlıkla ve hapishaneyle sunulur, evlilik gittikçe hapis hayatına doğru evrilir (Davison, 2004, s. 54-55).

Her iki eserde de otoriter koca figürleri işlenmiştir. Evlilik içindeki erkekler fiziksel görünüşleri ya da meslekleri nedeniyle kadınların önünde ve yine kadınların yönlendiricisi olarak çizilmişlerdir. *Bluebeart* adlı eserde erkeğin sahip olduğu ve korkutucu niteliğe sahip mavi sakal ve *The Yellow Wallpaper*'da erkeğin doktor olması, kadınlar üzerinde otorite kurmalarına zemin hazırlamıştır. *Bluebeard* adlı eserde erkeğin mavi bir sakala sahip olması metin açısından önemlidir. Mavi ve sakal kelimelerinin birlikte

FULL TEXTS BOOK

kullanımı çelişkili, karşıt anlamlı çağrışımlar da doğurmaktadır. Mavi, kutsal saflığın ve sonsuzluğun, aynı zamanda da felaketin, simyanın, gösteriş ve beyhudeliğin rengidir. Yine mavi renk soyluluk ve sebatkârlık, canavarlık ve dolandırıcılık, felaket ve kederle de açıklanmaktadır. Mavi, saflık, doğruluk, kutsallık, soyluluk, sonsuzluk anlamlarına gelirken, diğer yandan da saçmalık, anlamsızlık ve soğukluk (ölümün soğukluğu gibi) anlamlarını da çağrıştırmaktadır. Sakalsa erkeklik, güç, bilgelik ve itibar anlamlarına gelmektedir. Tanrılar, yarı-Tanrılar, azizler sakallıdır, sakalı olmayan bir büyücüye kimse itibar etmez. Fakat sakalın delilikle ilgili çağrışımları da söz konusudur. Bu yorumlar ışığında "mavi" ve "sakal" kelimelerinin birlikte kullanımı, pek çok metaforik okumaya açıktır. Bu okumalardan en yaygın olanı mavi sakalın soğukluk ve kötülük ibaresi olmasıdır. Diğer okuma biçimleriyse bilgelik ve sihirbazlık arasındaki bağıntıya vurgu yapmaktadır. Metinde bunun kanıtı Bluebeard'ın sahip olduğu ve ne kadar yıkanırsa yıkansın temizlenmeyen büyülü anahtardır. Bu anlamda Bluebeard soğuk mizaçlı, ölümü anımsatan bir büyücüdür demek yanlış olmayacaktır (Menninghaus, 1999:53-54). *The Yellow Wallpaper* adlı eserdeki koca ise doktordur, eserin yazıldığı 19. Yüzyıl özelinde düşünüldüğünde aydınlanmanın ve rasyonel aklın en önemli temsilcilerinden biridir. Tahakküm kuran aklın vücut bulmuş halidir. Lloyd'un da belirttiği gibi batı geleneğinde erkeğin rasyonel olanla, akılla ilişkilendirilmesi söz konusuyken, kadın rasyonel bilginin otoritesi altına alınan ve aşılan bir varlık olarak açıklanmıştır (Lloyd, 2015:23).

Kadının evlilik içindeki durumunu, maruz kaldığı fiziksel ve ruhsal şiddeti ele alan bu iki eser, hem konu hem de olay örgüsü açısından benzerlik taşımaktadır. Bu anlamda iki eserde de göze çarpan ilk unsur erkeklerin eşleri üzerindeki gücü ve ikna yetenekleridir. Bluebeard'da kadın eşinin zenginliği ve başlangıçtaki zarafeti nedeniyle korkutucu yüzünü bile görmezden gelecektir:

Everything went so well that the youngest daughter began to think that the beard of the master of the house was not so very blue, after all that he was, all in all, a very fine fellow (Perrault, 1984:34).

The Yellow Wallpaper adlı eserde, kocanın tahakkümü bilimsel bilgiye sahip olmasından kaynaklanmaktadır. Tanınmış ve saygın bir doktor olan eş, kadının rahatsızlık ve korkularını ciddiye almaz, kadın da başlangıçta eşinin haklı olduğunu düşünür:

If a physician of high standing, and one's own husband, assures friends and relatives that there is really nothing the matter with one but temporary nervous depression, -a slight hysterical tendency- what is one to do? (Gilman, 1997:1).

İki eserde en belirgin bir diğer unsur erkeklerin kısıtlayıcı tavır ve davranışlarıdır. Gerek *Bluebeard*'da ve gerekse *The Yellow Wallpaper* adlı eserde erkeklerin eşlerinin davranışlarını kontrol etmek adına ve kendi düşüncelerine göre eşlerinin yararına olacak şekilde tahakküm kurmak isterler. Bluebeard'da kadının girmesi yasaklanan odanın varlığı ve kocanın bu odaya girilmemesi gerektiği yönündeki vurgusu bunun açık bir tezahürüdür:

(...) But this little key, here, is the key of the room at the end of the long gallery on the ground floor; open everything, go everywhere, but I absolutely forbid you to go into that little room and, if you so much as open the door, I warn you that nothing will spare you from my wrath. (...) She promised to do as he told her (Perrault, 1984:34).

The Yellow Wallpaper adlı eserde de doktor kocanın çeşitli talimatlarla kadını kontrol altına almaya çalıştığı görülmektedir:

"I did write for a while in spite of them; but it does exhaust me a good deal – having to be so sly about it, or else meet with heavy opposition (Gilman, 1997:2).

"I have a schedule prescription for each hour in the day; he takes all care for me, and so I feel basely ungrateful not to value it more (Gilman, 1997:2)."

Yine metnin başka bir bölümünde doktor kocanın karısına yazı yazmayı yasaklamasından da bahsedilmektedir: *There comes John, I must put this away, -he hates to have me write a word* (Gilman, 1997:3).

FULL TEXTS BOOK

Eserlerdeki söz konusu yasaklar farklı okumalara ya da yorumlara açıktır. Bluebeard'ın eşine koyduğu yasaklar arkaik bir biçimde tabu formatı taşımaktadır. Öncelikli olarak Mavi Sakal'ın eşine koyduğu yasaklar bir amaç veya motivasyondan yoksundur. Freud'a göre tabudan doğan yasakların veya kısıtlamaların bir gerekçesi ve anlaşılır bir yanı yoktur. Tüm bu dayanaktan ve anlamdan yoksun olan kısıtlamalar, kısıtlanan kişi için açık ve görünürdür. Perrault'nun eserinde de Mavi Sakal'ın eşi için temelsiz yasaklama ya da kısıtlamalar apaçık ve kutsaldır. Tabular için 'bu ve şu yasaktır' ve nedeni bilinmez ve nedeni sorgulanamaz. *Bluebeard*'daki kısıtlamada da odaya girmenin ya da girmemenin sonunda bir bilgi, tatmin, maddi veya manevi bir kazanç yoktur. Mavi Sakal'ın karısı odanın içini gördüğü için değil, yasağı çiğneyip odanın kapısını açtığı için cezalandırılmıştır. Tabu mantığıyla düşünüldüğünde, kapının ardındaki sır bir anlam teşkil etmez. Masalda ilk ve son eşlerin odanın içinde gördükleri şeyler sorunu yaratmaz ama problemin ana nedeni tabu mantığı açısından aşikârdır; kapı ve anahtar, arkasında ne olduğu bakılmaksızın önemlidir (Menninghaus, 1999:61-62). Gilman'ın eserinde doktor kocanın eşine yazı yazmayı yasaklamasının altındaki dürtü ise daha farklıdır. Gilman, eserini geçirdiği bir ruhsal bunalımın tedavisi sürecinde yaşadıklarından hareketle kaleme almıştır. 1887 yılında geçirdiği bir buhranın neticesinde görüştüğü uzman ondan uzunca bir süre yazı yazmamasını istemiştir (Gilman, 2011:265). Eserdeki kocanın, Gilman'ın tedavi sürecindeki doktordan esinlenerek oluşturulduğu ve sağlık nedeniyle yazı yazmasının yasaklandığı düşünülebilir.

Eserlerdeki her iki kadın için de yaşadıkları yer bir anlamda hapishanedir. *Bluebeart* adlı eserde koca, eşine sadece kendi izin verdiği yerleri gezebileceğini söyleyerek onu sınırlandırmış, kadını tahditli bir bölgeye hapsetmiştir (Perrault, 1984:34). *The Yellow Wallpaper*'da ise, kadının yaşadığı odanın yapısı açık bir şekilde hapishaneye göndermede bulunmaktadır:

"It is a big, airy room, the whole floor nearly, with windows that look all ways, and air and sunshine gallerie. It was nursery first and then playground and gymnasium, I should judge: for the windows are barred for little children, and there are rings and things in the walls (Gilman, 1997:3).

Bu noktada her iki kadının da eve, bir diğer tabirle özel alana kapatıldığını söylemek mümkündür. *Bluebeard* adlı öyküde kadının ev dışına çıkması istenmezken, *The Yellow Wallpaper*'da kadın ancak kiraladıkları eski villanın bahçesinde gezinebilecektir.

İki eserde görülen bir diğer ortak nokta ise renklerin kullanımıdır. Yukarda da değinildiği gibi *Bluebeard* eserinde karakterin güç ve korku unsuru olarak değerlendirilebilecek mavi bir sakalı vardır. *The Yellow Wallpaper* adlı eserde de, esere adını veren sarı duvar kâğıdı belirleyicidir.

The color is repellant, almost revolting; a smouldering, unclean yellow, strangely faded by the slow-turning sunlight. (...) It is a dull yet lurid orange in some places, a sickly sulphur tint in others (Gilman, 1997:3).

God had also given him a blue beard, which made him look so ghostly that women fled at the sight of him (...) None of them had dared to call while the master was at home because his blue beard was so offensive (Perrault, 1984:33-34).

Eserlerde kadınların tutsaklığı meselesi kilitli oda ve duvar kâğıdı üzerinden aktarılmıştır. *Bluebeard* adlı eserde kadın, kendisinden önceki eşlerin cesetlerinin yer aldığı odayı görerek kendi sonuyla ve bir anlamda kuşatılmışlığıyla yüzleşmiştir. *The Yellow Wallpaper* adlı eserde ise, kadın yaşamakta olduğu odanın kopmuş ve yıpranmış sarı duvar kâğıdındaki desenleri, sınırlanmış ve duvardan çıkmak kurtulmak için mücadele eden kadınlar olarak görmektedir. Evi boşaltacakları günse kadın kendisini odaya kilitlemiş ve odanın duvar kâğıtlarını sökerek kadınları bir anlamda özgürlüklerine kavuşturmayı arzulamıştır. Eserlerin sonlarındaki bu eylemler ve bu eylemlerin neticesi de karşılaştırılabilir niteliktedir.

Why, there's John at the door! It is no use, young man, you can't open it! (...) How he does call and pound it! (...) 'John, dear' said I in the gentlest voice, 'the key is down by the front steps, under a plantain leaf! (Gilman, 1997:15).

FULL TEXTS BOOK

(...) You have opened the door of the forbidden room. Well, madame, now you have opened it, you may step straight inside it and take your place beside the ladies whow you have seen there! (Perrault, 1984: 37).

Kadınların yasakları çiğnemeleri, *Bluebeard*'da kilitli kalması gereken odanın kapısının açılması ve *The Yellow Wallpaper*'da kadının 'hayal' kurması ve yazı yazması gibi etmenler neticesinde eserlerin sonunda kocaları tarafından cezalandırılmalarına ya da kontrol altına alınmalarını gerektirmiştir. *Bluebeard*'da koca, karısını öldüreceğini ve gördüğü cesetlerin yanına koyacağını söylerken, *The Yellow Wallpaper* adlı eserde kocanın eşini daha ileri seviyede bir tedavi yöntemine maruz bırakacağı düşünülmektedir. *Bluebeard* adlı eserde kadın kocasının zulmünden kurtulabilmek için erkek kardeşlerine haber gönderir ve onların gelmesiyle kurtulmuştur. *The Yellow Wallpaper*'da ise kadın, eşini bir anlamda 'çiğneyerek' odadan çıkar. Eserlerin sonunda kadınların kurtuluşları ya da özgürlüklerini kavuşmaları aşağıdaki gibi aktarılmıştır:

They trust their swords through him and left him for dead. Bluebeard's wife was almost as overcome as her husband and did not have enough strength left to get to her feet and kiss her brothers (Perrault, 1984: 39).

I've got out at last, said I, 'in spite of you and Jane! And I've pulled off most of the paper, so you can't put me back! (...) Now why should that man have fainted? But he did, and right across my path by the Wall, so that I had to creep over him every time! (Gilman, 1997:15).

Görüldüğü üzere her iki metinde de karakterlerin evliliğin baskıcı yapısından en azından bir süreliğine de olsa kurtuldukları söylenebilir. *Bluebeard* adlı eserdeki kadın, kocasından kalan mirasın bir bölümünü kendisini kurtaran erkek kardeşlerine verir, başka bir adamla evlenir ve Mavi Sakal'dan kalan evde yaşamaya devam eder. *The Yellow Wallpaper* adlı eserde ise kadın, gördüğü manzara karşısında dehşete düşüp bayılan kocasının üzerinden tıpkı duvar kâğıdında gördüğü kadınlar gibi sürünerek geçer ve odadan çıkar.

SONUÇ

Kadının evlilik hayatındaki kuşatılmışlığı üzerine örüntülenen her iki eserde de, kadınlarına çeşitli açılardan sınırlar koyan iki otoriter erkeğin varlığı söz konusudur. *Bluebeard* eserindeki erkek, görünüşü ve tavırlarıyla korku uyandıran bir tiran olarak çizilmişken, *The Yellow Wallpaper* adlı eserdeki erkek, bir bilim insanı –doktor- olarak oluşturulmuş ve pozitif bilimlere uygun hareket eden bir yapıyla karakterize edilmiştir.

Eserlerde kadınların eşleri tarafından çeşitli gerekçelerle sınırlandırıldıkları, eşleri tarafından kontrol edildikleri görülmektedir. *Bluebeard* adlı eserde koca, adeta bir tiran edasıyla eşine herhangi bir gerekçesi olmayan ve bir anlamda uyulmamasını istediği yasaklar koymuş ve öldürdüğü kadınların cesetlerinin yer aldığı odayı açmamasını emretmiştir. Odayı açmaması yönündeki vurgu da bir anlamda ondan bu yasağı çiğnemesini ister gibi bir izlenim taşımaktadır. Söz konusu yasağı defalarca tekrarlar, kilitli odanın anahtarını verir çünkü yeni bir kurban arayışındadır.

The Yellow Wallpaper adlı eserde ise doktor olan John, eşinin hayal kurmamasını, düşünmemesini ve kesinlikle yazı yazmamasını isteyerek onu mental sağlığına kavuşturmayı amaçlar. Kadının duvar kâğıdında gördüğü ve duvardan çıkmak için bir nevi yardım ettiği kadınlar, John'a göre kadının vehimleridir ve ciddiye alınacak bir yanı yoktur. Kadının oda değiştirme isteğini de ciddiye almayan John için rasyonel aklın aydınlatmacı tavrına inanan, kadınları bu açıdan eksik ve tahakküm altında tutulması gereken varlıklar olarak gören bir dönem erkeğidir.

Eserlerde kullanılan renkler, evlerin yapıları gibi unsurlar büyük ölçüde özdeşlik göstermektedir. Çalışmada da gösterildiği gibi, hem *Bluebeard*'da hem de *The Yellow Wallpaper*'da kadın karakterler, kocaları tarafından ev içi ya da diğer bir tabirle özel alana hapsedilmişlerdir. Erkekler ise kamusal alana yönelik faaliyetlerini sürdürmektedirler. Söz gelimi *Bluebeard*'da Mavi Sakal işleri için şehir dışında

FULL TEXTS BOOK

çıkmışken, *The Yellow Wallpaper*'da doktor olan John eşini evde bırakarak başka kasaba ve köylerdeki hastaları ziyarete gitmiştir.

Yine eserlerde farklı manalar taşıyan renklerin kullanımı da göze çarpmaktadır. *Bluebeard* adlı eserde mavi renk, kötü, ölümcül olanı sembolize ederken, *The Yellow Wallpaper* adlı eserde duvar kâğıdının sarı rengi hastalığı imlemektedir. Bu noktada her iki yazarın da renkleri bilinçli bir şekilde kullandıkları düşünülmektedir.

Eserlerin sonları, yazarlar ve dönemler açısından farklı açılardan ele alınabilir. Perrault'nun eserinin sonunda kadın, erkek kardeşleri tarafından kurtarılmıştır. Bunun gerekçesini yazarın da bir erkek olması üzerinden okumak mümkündür. Ayrıca Perrault eserinin sonuna kendince ahlaki öğütler eklemiş ve bu öğütlere göre merak iyi bir dürtü değildir. Yine eserin sonundaki notlara göre *Bluebeard* adlı öykünün dönemin modern erkekleri için bir ölçüt kabul edilmemesi gerekir çünkü Perrault'ya göre modern kocalar 'Bluebeard'ın yarısı kadar bile zalim değillerdir. Perrault'nun eserinin sonuna eklediği notlar bile, eserin feminist bir inceleme açısından eleştirel bir yaklaşımla okunmasına sebebiyet vermek için yeterlidir.

Charlotte Perkins Gilman'ın *The Yellow Wallpaper* adlı eserinin sonu ise kadının kısa süreliğine de olsa kurtulmasını ve özgürleşmesini anlatır. Eserin sonunda kadın, bayılan kocasının üzerinden geçerek odadan çıkıp bahçeye doğru yol alır. Bu hareket aslında bir süre sonra başlayacak yeni kısıtlama ve tahakkümleri de anıştırmaktadır. John ölmemiş kısa süreli bir baygınlık geçirmiştir ve eser boyunca çizilen rasyonel yapısı nedeniyle eşini tekrar ve belki de daha yoğun bir tedavi programına tabi tutacaktır.

Eserlerin yazılışları arasındaki tarihsel fark, yazarlarının cinsiyeti ve dünya görüşü gibi unsurlar iki eserin ortak bir tipten hareketle farklı bir yaklaşım sergilemelerine neden olmuştur. Elbette Gilman'ın eserinin Perrault'nun yapma masalının bir yeniden yazımı olarak düşünülebilmesi mümkündür. Söz konusu yeniden yazımda Gilman kendi kimliğini, cinsiyetini ve düşüncesini eserine yansıtmıştır demek yerine olacaktır.

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FULL TEXTS BOOK

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FULL TEXTS BOOK

WEIGHT REDUCTION USING ULTRA HIGH STRENGTH STEEL (UHSS) IN SEMI-TRAILER CHASSIS

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ABSTRACT
In recent years, the main goal of commercial vehicle manufacturers is to reduce the fuel consumption and emissions of the vehicle while maximizing the carrying capacity as much as possible. Due to its high carrying load, manufacturers generally aim to achieve high strength by using high-thickness steel S355. However, it can also achieve high strength by using ultra-high strength steel. In this study, the semi-trailer chassis was designed with the help of the Computer Aided Three-Dimensional Interactive (CATIA) program, and ultra-high strength steel and S355 steel materials were defined in ANSYS. Dual-phase steels, which have high strength and are known for their machinability and ease of forming, were used in the lightweighting process. The mechanical properties, stresses, and deformations of the materials were compared by applying a 30-ton load on the semi-trailer chassis. Since the geometry and loading have a symmetrical structure, the analysis model was modelled as symmetrical, that is, half, and nonlinear analysis was performed. In the results obtained, while stresses in the range of 235-470 MPa were detected on the I type section spacer of the semi-trailer chassis defined as S355 material, a stress value of 550 MPa was observed on the kingpin table region. In the ultra-high strength material chassis, stresses in the range of 240-400 MPa were observed in the I-type section spacer, and a stress of 455 MPa was found on the kingpin table region. Stress and deformation values under load in ultra-high strength steel are better than S355 material. In the analysis results obtained when the thickness of the I-type section in the longitudinal carriers was reduced, a 182 kg lightening was discovered in the chassis longitudinal carriers. The result of the weight analysis was defined in the VECTO program and carbon emissions and fuel savings were calculated. The 182 kg reduction in chassis weight corresponds to a 9% reduction in the entire chassis. It has been found that from the VECTO program, UHSS chassis provides fuel savings of 2.9% per 100 km and a reduction in carbon emissions of 3% per km.
Keywords: Semi Trailer Chassis, Ultra-High Strength Steel, Weight Reduction, Fuel Consumption, Emission.

INTRODUCTION
A semi-trailer chassis is known as the part that supports the body and load of the trailer. It is also called the chassis or undercarriage of a semi-trailer. In addition to being composed of many parts, chassis are made to carry the weight of the load and to withstand the conditions during transportation. Semi-trailers are elements designed to be pulled by a tractor or semi-truck, allowing goods to be transported to long distances.

The load capacity, stability, and overall performance of the trailer on the road are directly related to the design and general structure of the chassis. Manufacturability and cost efficiency, structural integrity, weight distribution, durability and fatigue resistance, load capacity, suspension and axle configuration, material selection, safety features, and regulatory compliance are critical factors taken into consideration in semi-trailer chassis design. When designing a semi-trailer chassis, it is critical to create a structure that can meet transport demands while adhering to industry standards and regulations. In all these

FULL TEXTS BOOK

parameters, the most important components when it comes to the chassis are the longitudinal beams (Talas, 2024).

According to research, the fact that 25% of the emissions in the world are made up of the logistics sector, 70% of the emission rate of the logistics sector is from road transportation, and 25% of the emissions from road transportation are from heavy vehicle trailer vehicles, has led manufacturers to seek different designs in terms of design (Continental, 2024). In this direction, manufacturers have focused on reducing empty vehicle weights and improving aerodynamic designs. The largest percentage of vehicle weight is made up of the chassis, therefore, by choosing materials, vehicle weight is reduced and therefore carbon emissions are reduced. At this point, S355J2 steel is generally preferred in various applications due to its strength and mechanical properties. Application areas include machinery, construction, shipbuilding, and automotive components. With its flexibility of use and durability, it is preferred in areas where flexible and strong materials are needed (Piping mart, 2024). Dual Phase 1180 steel is also automotive steel and is known for its high strength and excellent crash performance. It stands out in critical components in vehicles in safety applications in the automotive industry. These steels not only reduce vehicle weight with their high strength and deformation characteristics but also make the structure perfect in terms of safety. This type of steel is used in parts that require high energy absorption during collisions, such as columns, reinforcement panels, side impact beams, and areas in the vehicle where safety is important (Lin et al., 2012).

In previous studies on vehicle chassis, conclusions were generally reached by analysing the entire chassis. Semi-trailer chassis type analysis study is not common in the literature. In his study, Doğru (Doğru, 2019) performed topology optimization to reduce the weight of truck chassis exposed to various loads. It was determined that the non-optimized chassis showed a von Mises stress value of approximately 194 MPa when the weight was 2685 kg. After topology optimization, the weight decreased to approximately 2316 kg, while the von Mises stress value reached approximately 220 MPa. This indicates that the weight reduction in the truck chassis created with optimization is approximately 14%. Vijaykumar and Patel (Vijaykumar & Patel, 2012) examined the stress and deformation values in finite element analysis by analytical calculation on the chassis frame based on bending theory. They revealed the stress and deflection values of their existing chassis through finite element analysis in case of overload. For weight reduction, sensitivity analysis was carried out and design changes were made. In the sensitivity analysis, three cases were analyzed in which the thickness and height of the flange were optimized for weight reduction while keeping the section modulus and flange width constant. As a result, in three analyses, the weight in the third case decreased by approximately 7%, while the deformation and stress values decreased by approximately 11% and 12%, respectively. Galos and Sutcliffe (Galos & Sutcliffe, 2020) made a combination of structural optimization and material substitution on a light truck trailer. With the finite element model and material optimization they developed, a weight reduction of 1326 kW, or 67%, was observed in the chassis. It was statistically examined how the weight reduction was affected in two trailers with movable floors belonging to different companies. It has been stated that a 30% decrease in the curb weight of trailers causes an 11% decrease in the mass energy performance of trailers (Galos et al., 2015).

According to the prediction that fuel consumption and emissions will decrease if the vehicle weight decreases, it is stated that if the weight of the trucks decreases by approximately 300 kg, it will save 3000 litres of fuel per 200000 km. If it is assumed that trucks travel approximately 300000 km per year, it is stated in the report that 4500 litres of fuel can be saved annually for each truck (Bandivadekar, 2008). In this study, it is aimed to reduce the weight of the trailer by using light but high strength materials in trailer production, thus reducing fuel economy and emissions. Due to the symmetry of the geometry and loads, time was saved by choosing the semi-trailer model. The effects of S355J2 and DP1180 steel materials on weight reduction, stress, and deformation values in the semi-trailer chassis were examined.

FULL TEXTS BOOK

MATERIAL

S355J2 and DP1180 materials were preferred in this study for semi-trailer chassis. S355 steel is the steel type generally chosen in engineering and various industrial fields due to its excellent strength, weldability and durability. The other used dual-phase 1180 steel is referred to as advanced high-strength steel, which is specially designed for its good formability and exceptional strength. Ultra-high strength DP 1180 steel meets the need for high performance and safety in various branches of the industry, especially in areas where high strength and light materials with good formability are required, such as the automotive industry. S355J2 and DP1180 are steel types that offer different combinations of strength, formability, and mechanical properties and are preferred for different applications. DP 1180 stands out as a type that provides exceptionally high strength while maintaining its formability while providing ease of production, especially in the automotive industry. (Talas, 2024). Table 1 indicates the characteristics of materials used in this paper.

Table 1. Characteristics of materials (Murata et al., 2017; Talas, 2024)

Materials	Density (kg/m^3)	Yield strength (MPa)	Elongation (%)	Tensile ultimate strength (MPa)	Young modulus (GPa)	Poisson ratio
S355J2	7850	355	22	520	200	0.3
DP1180	7850	980	10	1380	200	0.3

METHODOLOGY

In this work, the chassis model was analysed as a non-linear analysis with the help of the ANSYS static structural module. In the analysis model, the simplified chassis model was analysed with finite elements to be solved by numerical solution through the finite element method. These elements are components modelled as shells formed by hexagonal structural solution elements placed on them. Figure 1 shows the design image of the entire chassis.

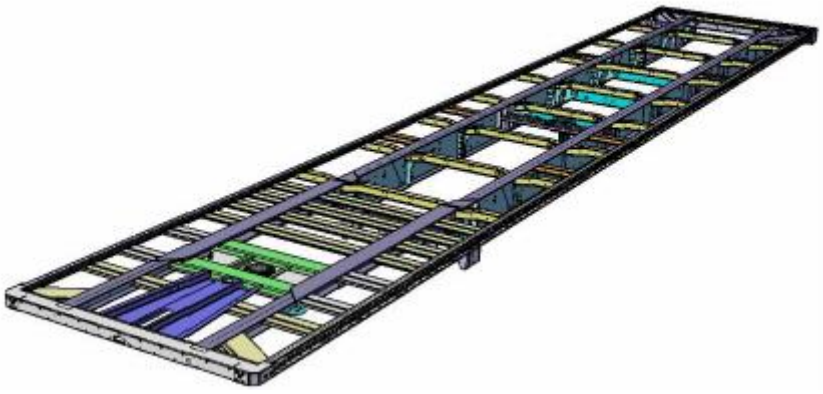


Figure 1. Chassis view

3D solid models were simplified with Space Claim Direct Modeler in ANSYS software and an analysis model was created. Since the geometry is symmetrical in all analyses, the same geometry divided in half was used. Figure 2 indicates the semitrailer chassis model analysed. The aim of the simplification process is to provide quick solutions by ignoring sharp corner chamfers, relatively small rounding, and fasteners such as bolts and nuts, which have no effect on the analysis, or parts that have a negligible effect. Thus, easier and fewer numerical solution elements will appear in the analysis (Talas, 2024).

FULL TEXTS BOOK

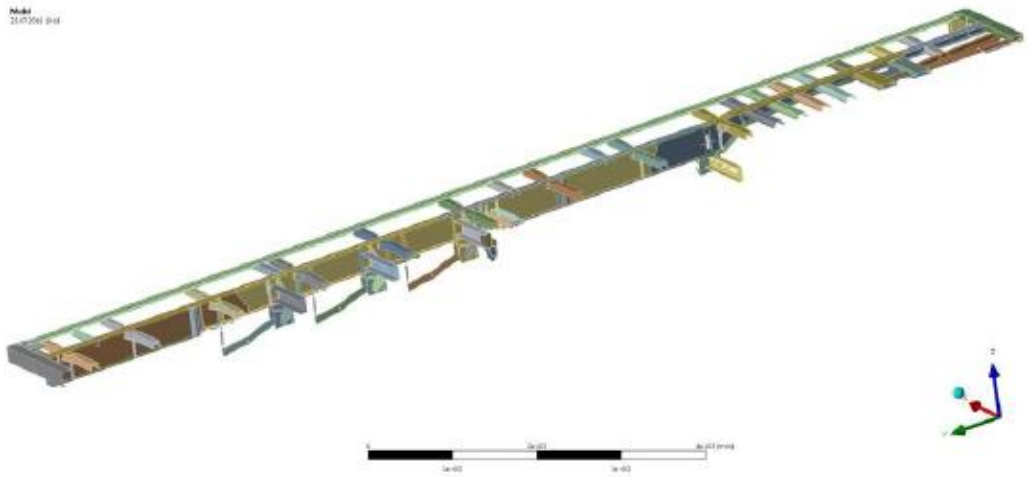


Figure 2. Analysed model

The meshed model of the semi-trailer chassis is given in Figure 3. After the mesh, a total of 1199753 node points and 1175570 elements were calculated. While the average element quality value was 0.94, the minimum skewness value was 0.13. These values are at an acceptable level in terms of the accuracy of the mesh results.

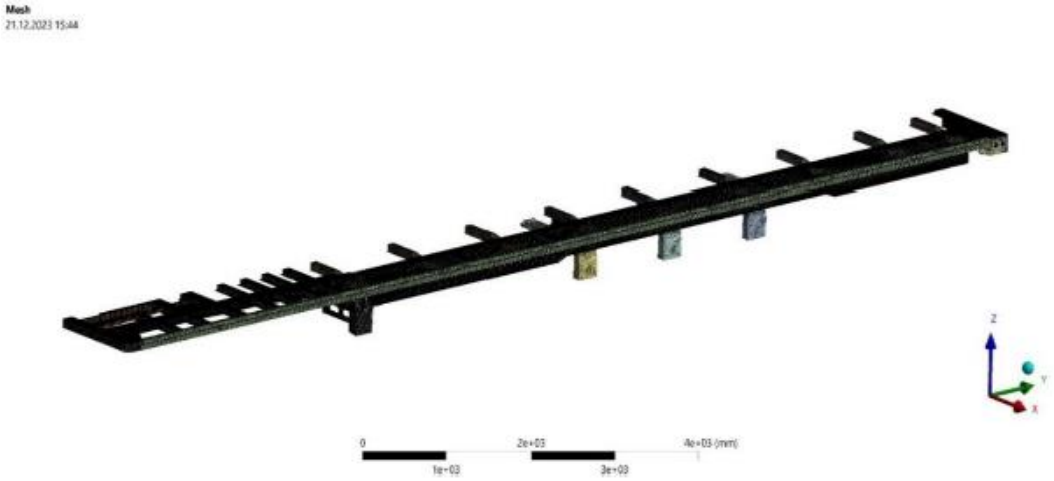


Figure 3. Mesh model of the chassis

Although the useful load that the trailer can carry is 30 tons, the chassis has a symmetrical structure, so half of the chassis was modelled and half of the useful load was analysed based on 15 tons of distributed force. Figure 4 displays the areas where force is applied on the model and their sizes. As shown in Figures 5, 6, and 7, the chassis was fixed at 4 different points. As seen in the figures, the 1st, 2nd, and 3rd axle bellows and the kingpin plate were preferred as fixed support areas.

FULL TEXTS BOOK

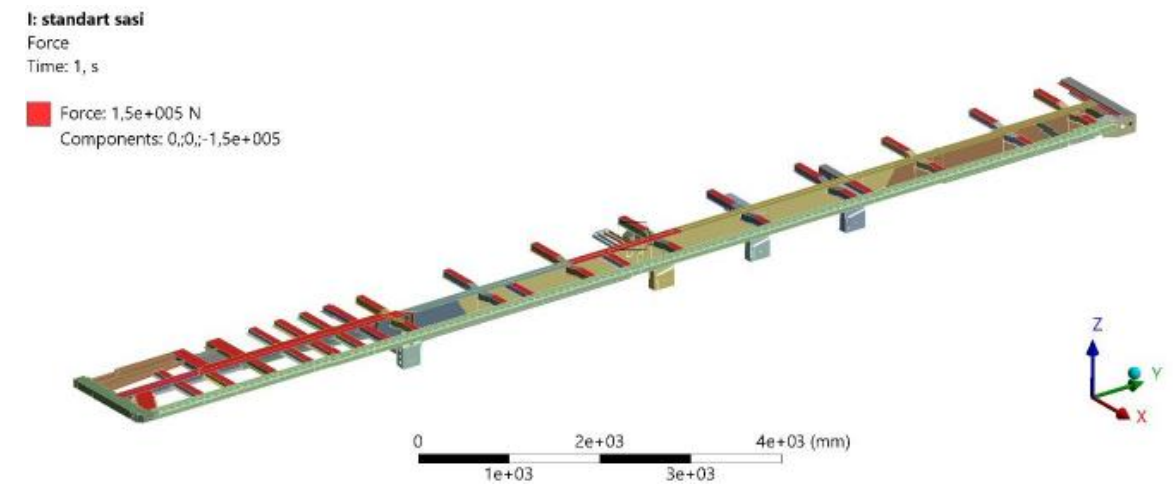


Figure 4. Force region on the chassis

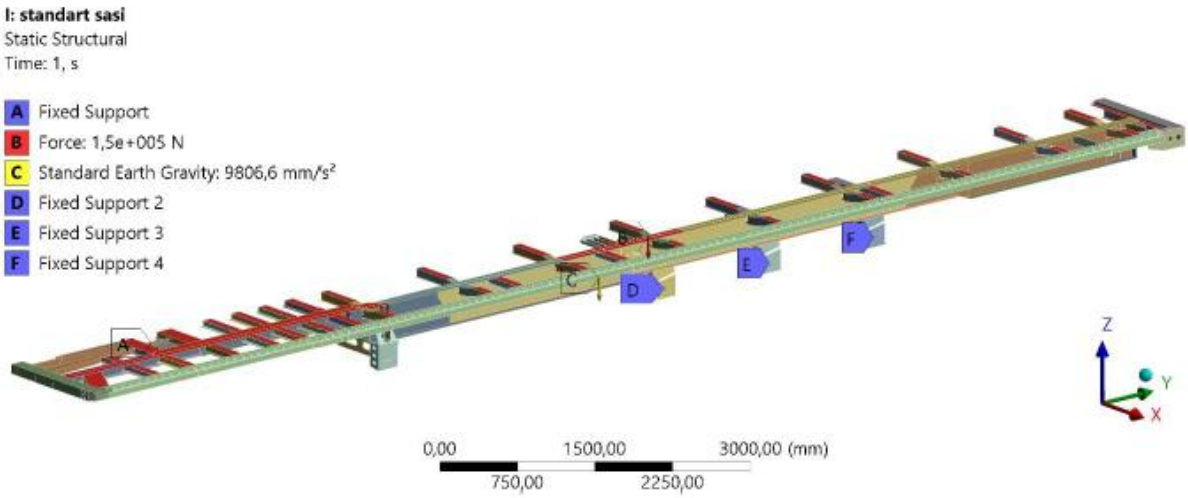


Figure 5. Fixed support region-1

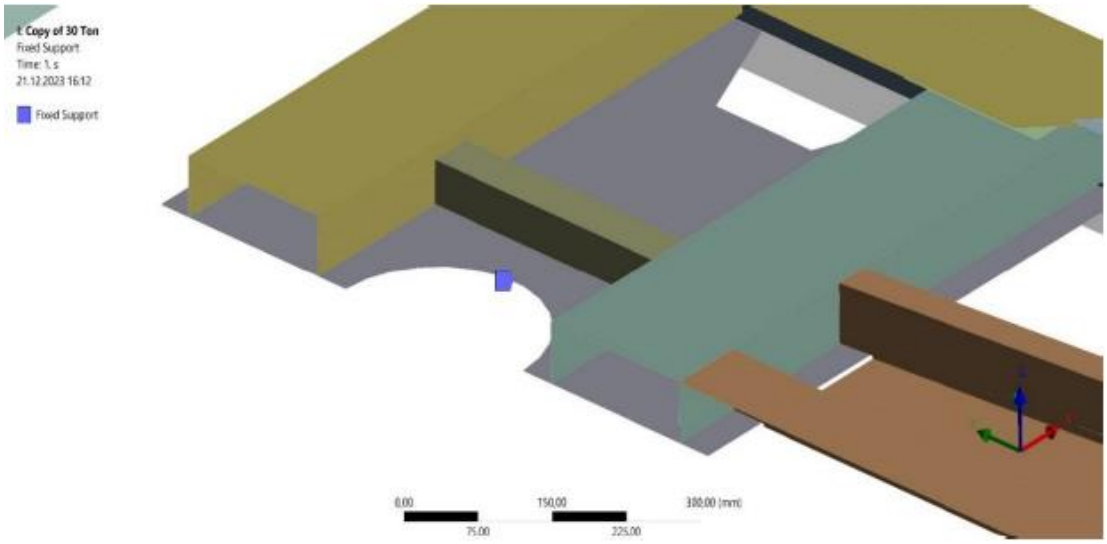


Figure 6. Fixed support region-2

FULL TEXTS BOOK

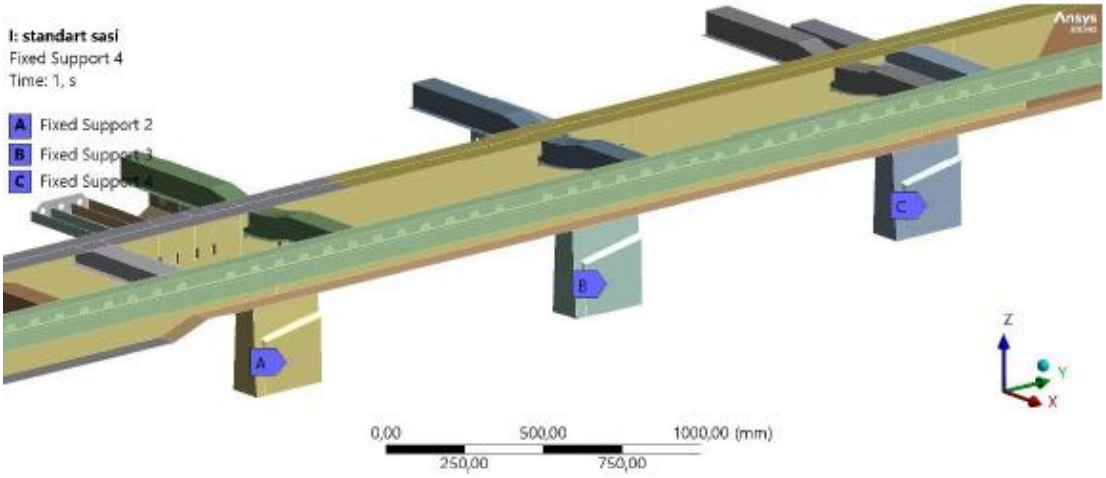


Figure 7. Fixed support region-3

The chassis longitudinal carrier consists of 3 welded parts as seen in Figure 8. The section thicknesses of the longitudinal carriers, called "I section", are for section 1, section 2, and section 3, respectively; 8 mm for the upper lath, 6 mm for the intermediate lath, 8 mm for the lower lath; 18 mm for the upper lath, 6 mm for the intermediate lath, 18 mm for the lower lath and 12 mm for the upper lath, 4 mm for the intermediate lath,13 mm for lower lath.

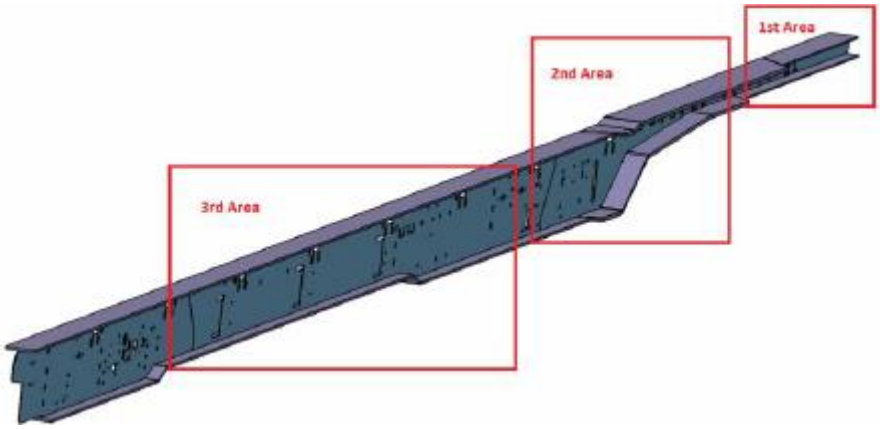


Figure 8. Longitudinal carrier

With the help of the ANSYS static structural module, 3 different analyses were carried out, where the chassis material was defined as S355J2 and DP1180, and the chassis material was defined as DP1180, optimizing the reduced section thickness in the longitudinal carrier. Design optimization was carried out on the chassis by reducing the longitudinal beam thickness of the chassis, in which DP1180 steel is defined, by 1 mm. The thicknesses reduced to in the 1st zone are 7 mm on the upper lath, 5 mm on the intermediate lath, and 7 mm on the lower lath, the thicknesses reduced to in the 2nd zone are 17 mm on the upper lath, 5 mm on the intermediate lath, and 17 mm on the lower lath, and the thickness in the 3rd region was reduced to 11 mm on the upper lath, 3 mm on the intermediate lath, and 12 mm on the lower lath.

CONCLUSION AND DISCUSSION

Figures 9 and 10 indicate the S355J2 material semi-trailer design analysis results. Figures 11 and 12 display the S355J2 material longitudinal carrier design analysis results. The 15-ton load applied to the analysed model caused a maximum stress of 1459 MPa at the kingpin plate point. The maximum stresses occurred at values below the yield point of the S355J2 material in the King-pin plate. As a result of the

FULL TEXTS BOOK

analysis, the deformation in the chassis was found to be 28.22 mm, and the maximum deformation in the longitudinal carrier was found to be 14.98 mm.

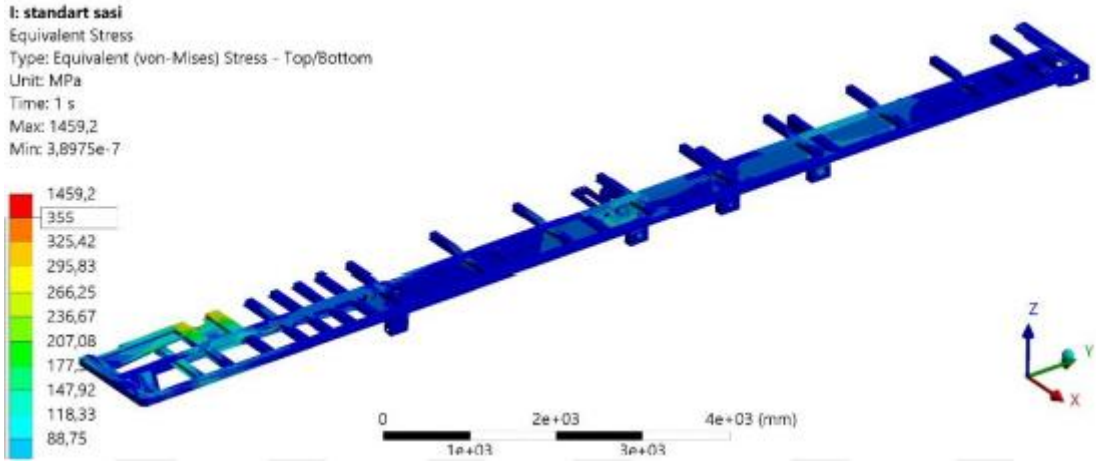


Figure 9. Equivalent stress value of S355J2 material

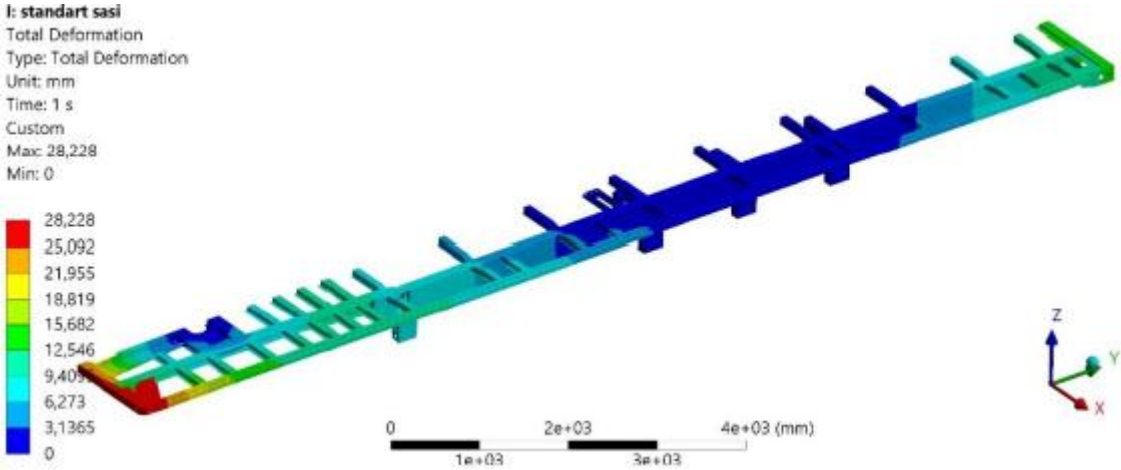


Figure 10. Total deformation value of S355J2 material

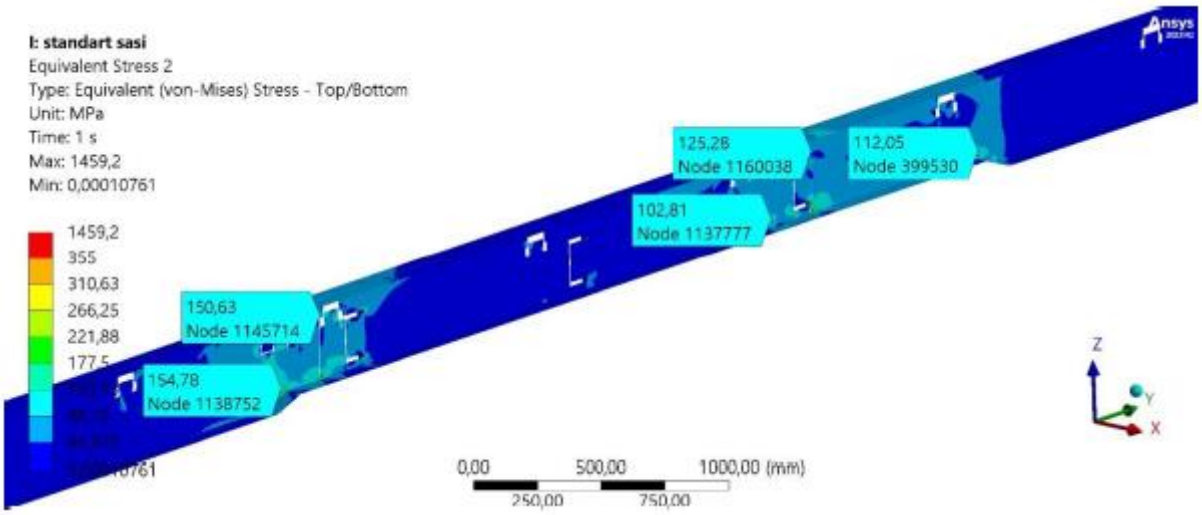


Figure 11. Equivalent stress value of longitudinal carrier with S355J2 material

FULL TEXTS BOOK

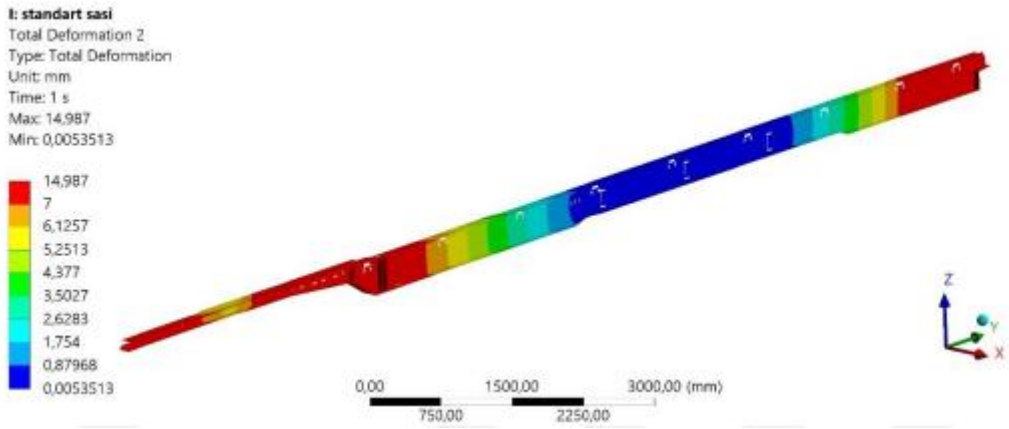


Figure 12. Total deformation value of longitudinal carrier with S355J2 material

Figures 13,14,15 and 16 show the DP1180 material semi-trailer design analysis results. Figures 17 and 18 represent the DP1180 material longitudinal carrier design analysis results. After applying 15 tons of load to the chassis defined as DP1180 steel, the maximum stress at the kingpin plate point was found to be 1275 MPa. It was concluded that no stress was observed in the internal structure of the material in the high stress region and that the stress was superficial. As seen in Figures 14,15,16, it was observed that the stresses in the transverse supports in the king pin section reached a point maximum value of 572 MPa in the sheet metal bending section. There is no difference in the form of the material according to the mechanical properties of the DP 1180 material in stress distribution.

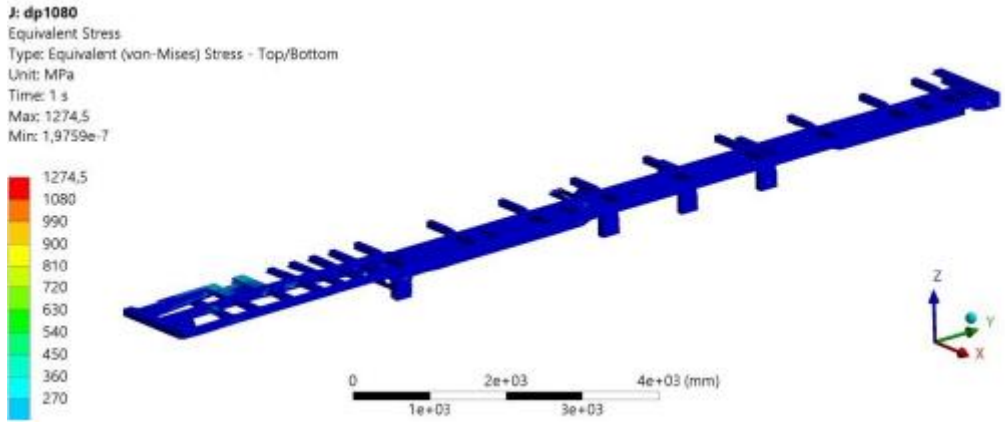


Figure 13. Equivalent stress value of DP1180 material

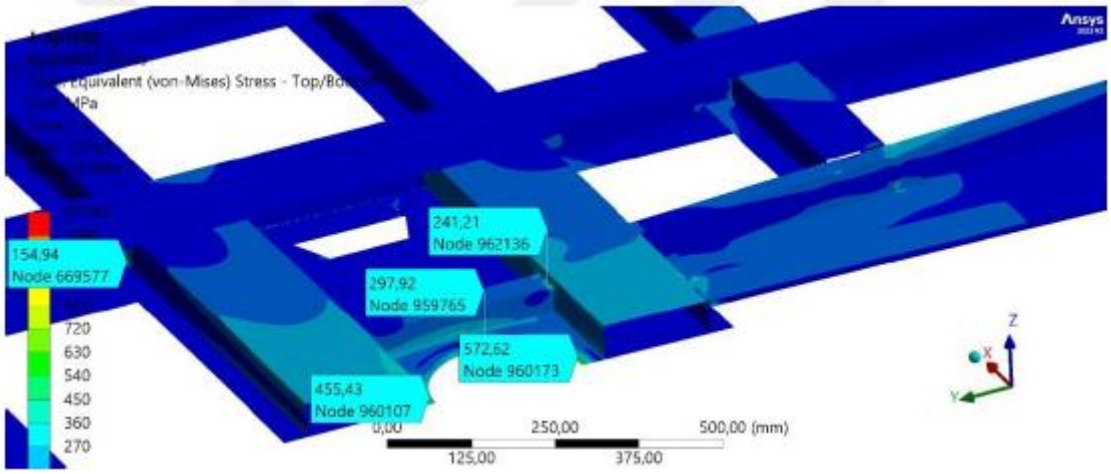


Figure 14. Detailed representation of equivalent stress value in design with DP1180 material-1

FULL TEXTS BOOK

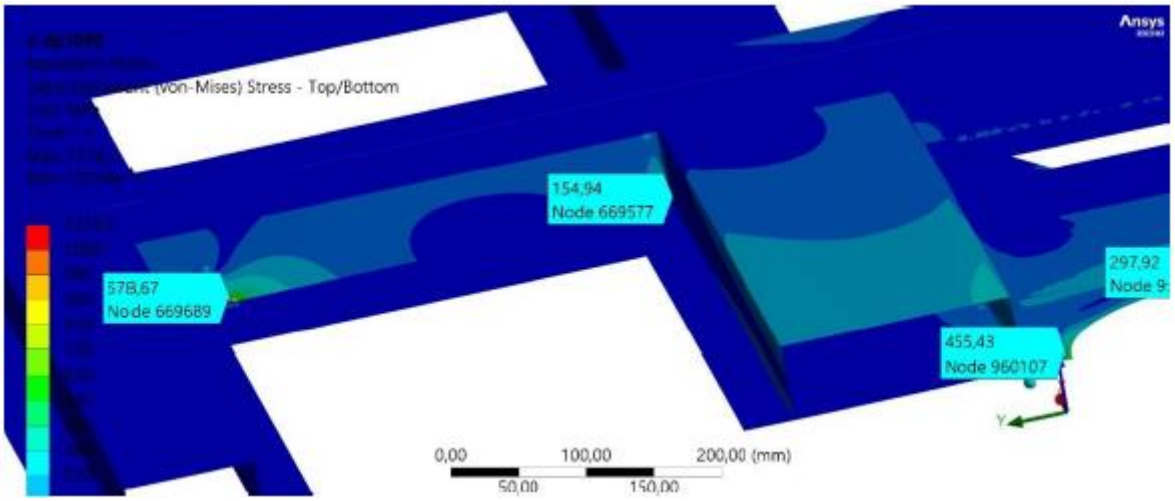


Figure 15. Detailed representation of equivalent stress value in design with DP1180 material-2

As can be seen from Figure 16, the stresses are in the range of 85-123 Mpa and are at a negligible level. These voltage values are lower than the S355J2 chassis design.

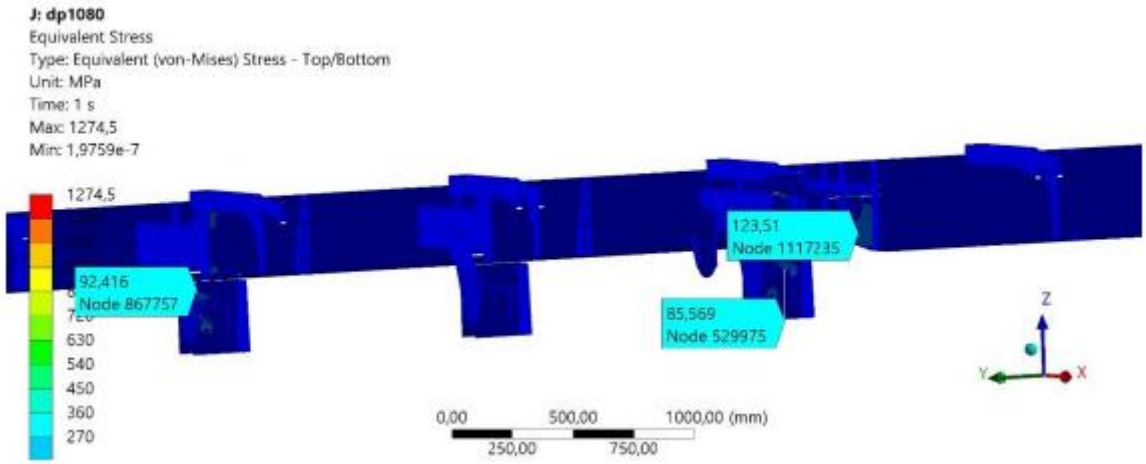


Figure 16. Detailed representation of equivalent stress value in design with DP1180 material-3

The stresses occurring in the longitudinal carrier are calculated in the range of approximately 100-173 MPa and can be said to be low stress values. The maximum deformation of the longitudinal carrier on the front cover was calculated as 24 mm.

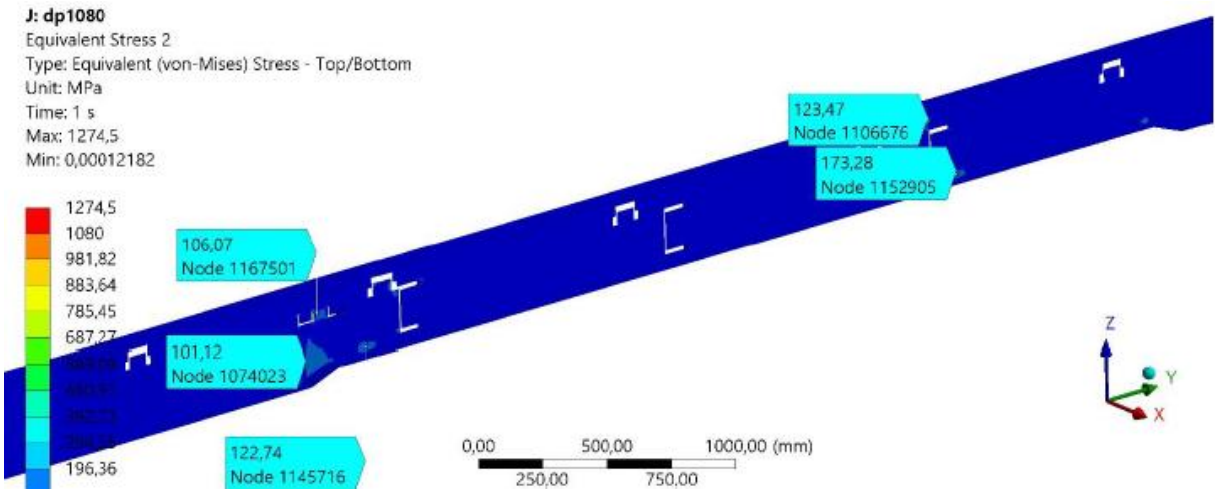


Figure 17. Equivalent stress value of longitudinal carrier with DP1180 material

FULL TEXTS BOOK

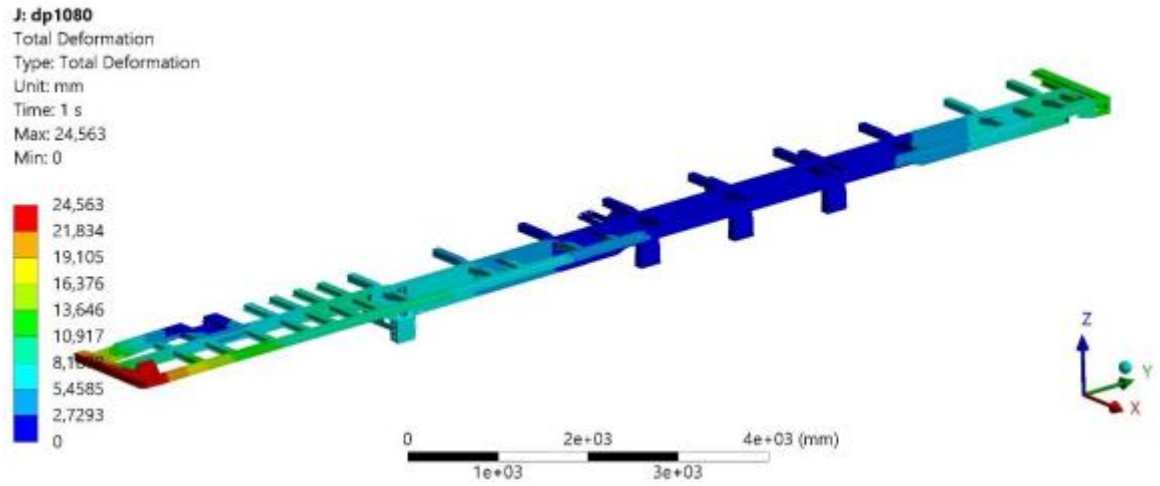


Figure 18. Total deformation value of longitudinal carrier with DP1180 material

Figure 19 and Figure 20 present the design results of optimized thicknesses in the chassis where DP1180 material is defined in semi-trailers. Figure 21 and Figure 22 reflect the design results of the optimized thickness of the longitudinal carrier in which the DP1180 material is defined. When the analysis results of the S355J2 material defined and DP1180 material defined chassis model analysis results are compared under the same conditions, similar values emerged in reducing the thickness of the I section in the chassis. With a load of 15 tons applied to the chassis model, the maximum stress at the kingpin plate point is 1720 MPa. While the stress values at the king pin points were found to be in the range of 248-575 MPa, the stresses at the axle beam connection points were found to be in the range of 100-136 MPa. These values are thought to be negligibly small compared to the mechanical properties of DP1180 steel. While the maximum deformation is 24 mm in the chassis, it is 13 mm in the longitudinal carrier on the front cover. The result of the analysis is similar to the one before optimization.

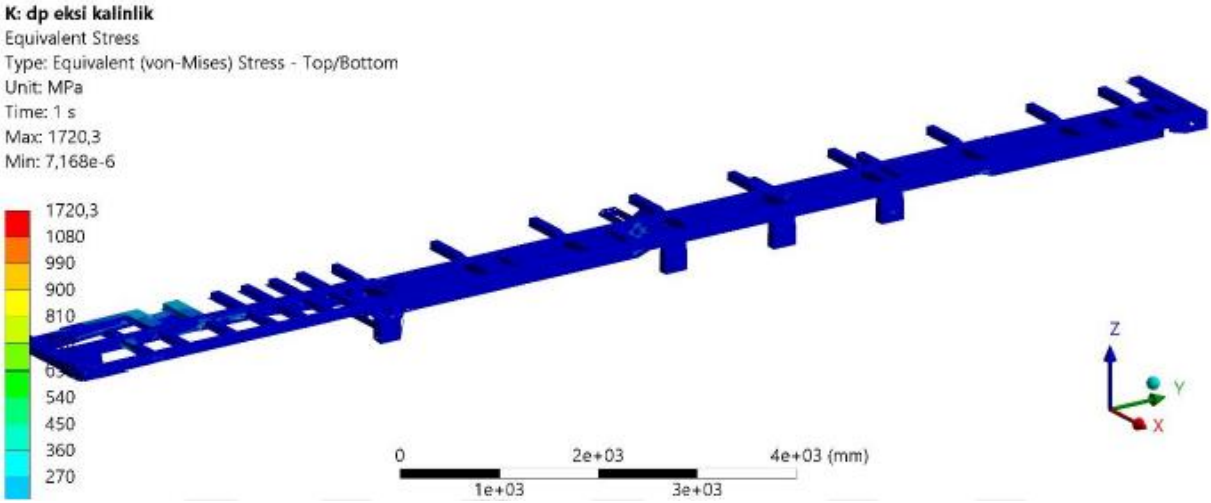


Figure 19. Equivalent stress value of DP1180 material with optimized thickness

FULL TEXTS BOOK

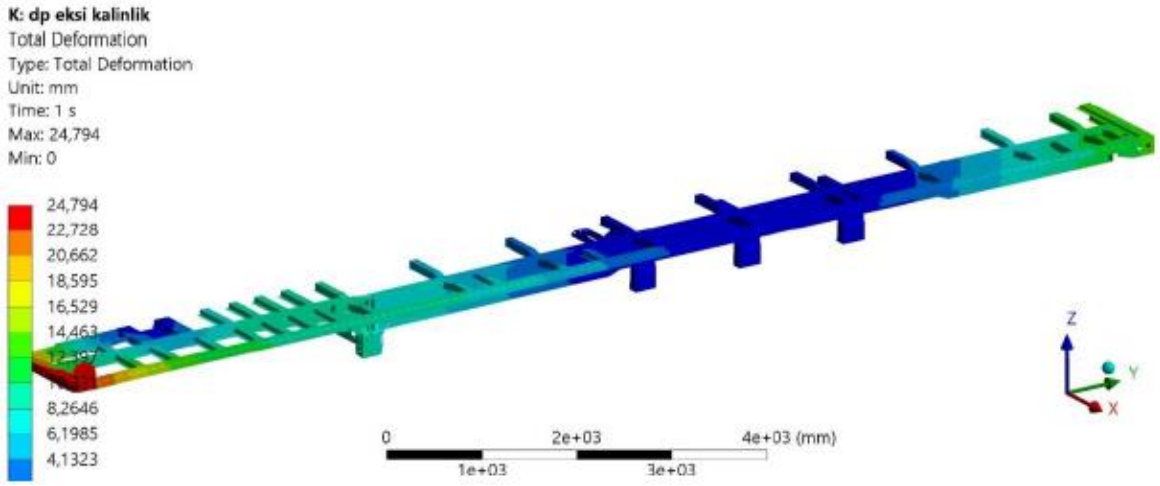


Figure 20. Total deformation value of DP1180 material with optimized thickness

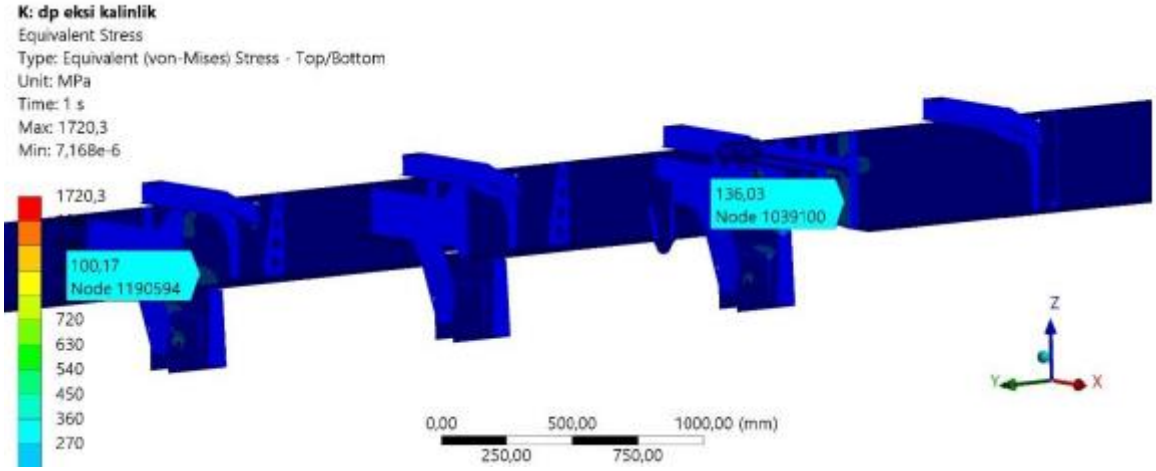


Figure 21. Equivalent stress value of longitudinal carrier with DP1180 material with optimized thickness

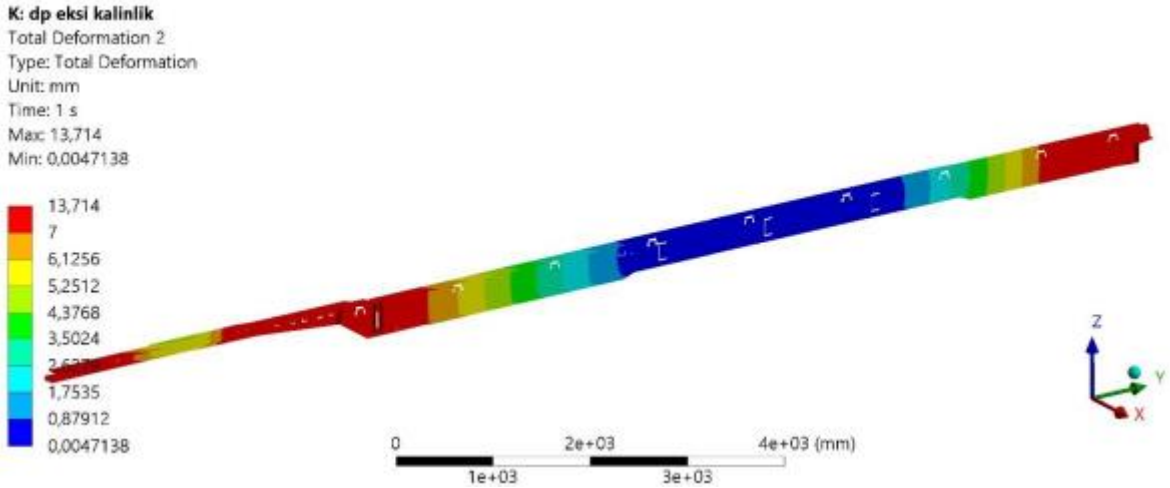


Figure 22. Total deformation value of longitudinal carrier with DP1180 material with optimized thickness

Table 2 gives a comparison of the results for semi-trailer chassis and longitudinal carriers. Table 3 reflects the chassis weights and unit prices of the materials when used.

FULL TEXTS BOOK

Table 2. Comparison of outcomes

Semi-trailer chassis	Equivalent stress (MPa)	Total deformation (mm)	Optimized thickness with Semi-trailer chassis	Equivalent stress (MPa)	Total deformation (mm)
S355J2	1459.2	28.228	DP1180	1720.3	24.794
DP1180	1274.5	24.5			
Longitudinal carrier	Equivalent stress (MPa)	Total deformation (mm)	Optimized thickness with Longitudinal carrier	Equivalent stress (MPa)	Total deformation (mm)
S355J2	100-150	14.987	DP1180	100-140	13.714
DP1180	85-120	24.563			

Table 3. Cost calculations of outcomes

Total weight reduction (kg)	S355J2 material with chassis (kg)	DP1180 material with chassis (kg)	Cost per Ton for S355J material ($)	Cost per Ton for DP1180 material ($)	Cost difference between two materials used ($)
182	1981	1789	680	840	157

The results of the analyses made with the data obtained throughout the study in the VECTO Trailer Program, fuel consumption, and emission rates are presented in the visuals taken from the program in Figures 23 to 26.

FULL TEXTS BOOK

Long Haul

Simulation Parameters

Payload:	2600	kg
Total vehicle mass:	17347	kg
CdxAyawAngle0:	5.641	m²
CdxAyawAngle3:	5.832	m²
CdxAyawAngle6:	6.505	m²
CdxAyawAngle9:	7.350	m²
Average speed:	79.7	km/h
Fuel consumption:	22.3	l/100km
Fuel consumption:	0.0857	l/t-km
Fuel consumption:	0.00236	l/m³-km
Fuel consumption:	186	g/km
Fuel consumption:	71.6	g/t-km
Fuel consumption:	1.97	g/m³-km
CO2 emissions:	583	g/km
CO2 emissions:	224.2	g/t-km
CO2 emissions:	6.18	g/m³-km
Efficiency ratio:	0.983	km-based
Efficiency ratio:	0.983	t-km-based
Efficiency ratio:	0.948	m³-km-based

Long Haul

Simulation Parameters

Payload:	19300	kg
Total vehicle mass:	34047	kg
CdxAyawAngle0:	5.641	m²
CdxAyawAngle3:	5.832	m²
CdxAyawAngle6:	6.505	m²
CdxAyawAngle9:	7.350	m²
Average speed:	78.5	km/h
Fuel consumption:	29.8	l/100km
Fuel consumption:	0.0154	l/t-km
Fuel consumption:	0.00316	l/m³-km
Fuel consumption:	249	g/km
Fuel consumption:	12.9	g/t-km
Fuel consumption:	2.64	g/m³-km
CO2 emissions:	780	g/km
CO2 emissions:	40.4	g/t-km
CO2 emissions:	8.27	g/m³-km
Efficiency ratio:	0.980	km-based
Efficiency ratio:	0.980	t-km-based
Efficiency ratio:	0.946	m³-km-based

Regional Delivery

Simulation Parameters

Payload:	2600	kg
Total vehicle mass:	17347	kg
CdxAyawAngle0:	5.641	m²
CdxAyawAngle3:	5.832	m²
CdxAyawAngle6:	6.505	m²
CdxAyawAngle9:	7.350	m²
Average speed:	60.7	km/h
Fuel consumption:	23.4	l/100km
Fuel consumption:	0.0900	l/t-km
Fuel consumption:	0.00248	l/m³-km
Fuel consumption:	196	g/km
Fuel consumption:	75.3	g/t-km
Fuel consumption:	2.07	g/m³-km
CO2 emissions:	612	g/km
CO2 emissions:	235.6	g/t-km
CO2 emissions:	6.49	g/m³-km
Efficiency ratio:	0.957	km-based
Efficiency ratio:	0.957	t-km-based
Efficiency ratio:	0.923	m³-km-based

Regional Delivery

Simulation Parameters

Payload:	12900	kg
Total vehicle mass:	27647	kg
CdxAyawAngle0:	5.641	m²
CdxAyawAngle3:	5.832	m²
CdxAyawAngle6:	6.505	m²
CdxAyawAngle9:	7.350	m²
Average speed:	60.1	km/h
Fuel consumption:	30.0	l/100km
Fuel consumption:	0.0232	l/t-km
Fuel consumption:	0.00318	l/m³-km
Fuel consumption:	250	g/km
Fuel consumption:	19.4	g/t-km
Fuel consumption:	2.66	g/m³-km
CO2 emissions:	784	g/km
CO2 emissions:	60.8	g/t-km
CO2 emissions:	8.31	g/m³-km
Efficiency ratio:	0.966	km-based
Efficiency ratio:	0.966	t-km-based
Efficiency ratio:	0.932	m³-km-based

Figure 23. VECTO trailer results in long distance and regional delivery with a weight of 7200 kg

FULL TEXTS BOOK

Urban Delivery

Simulation Parameters

Payload:	2600	kg
Total vehicle mass:	17347	kg
CdxAyawAngle0:	5.641	m²
CdxAyawAngle3:	5.832	m²
CdxAyawAngle6:	6.505	m²
CdxAyawAngle9:	7.350	m²
Average speed:	26.2	km/h
Fuel consumption:	36.8	l/100km
Fuel consumption:	0.142	l/t-km
Fuel consumption:	0.00390	l/m³-km
Fuel consumption:	308	g/km
Fuel consumption:	118.3	g/t-km
Fuel consumption:	3.26	g/m³-km
CO2 emissions:	963	g/km
CO2 emissions:	370.3	g/t-km
CO2 emissions:	10.21	g/m³-km
Efficiency ratio:	0.948	km-based
Efficiency ratio:	0.948	t-km-based
Efficiency ratio:	0.914	m³-km-based

Urban Delivery

Simulation Parameters

Payload:	12900	kg
Total vehicle mass:	27647	kg
CdxAyawAngle0:	5.641	m²
CdxAyawAngle3:	5.832	m²
CdxAyawAngle6:	6.505	m²
CdxAyawAngle9:	7.350	m²
Average speed:	25.7	km/h
Fuel consumption:	52.0	l/100km
Fuel consumption:	0.0403	l/t-km
Fuel consumption:	0.00551	l/m³-km
Fuel consumption:	434	g/km
Fuel consumption:	33.7	g/t-km
Fuel consumption:	4.61	g/m³-km
CO2 emissions:	1360	g/km
CO2 emissions:	105.4	g/t-km
CO2 emissions:	14.41	g/m³-km
Efficiency ratio:	0.962	km-based
Efficiency ratio:	0.962	t-km-based
Efficiency ratio:	0.928	m³-km-based

Weighted Results

Payload:	13842	kg
Fuel consumption:	27.6	l/100km
Fuel consumption:	0.0199	l/t-km
Fuel consumption:	0.00292	l/m³-km
Fuel consumption:	230.6	g/km
Fuel consumption:	16.7	g/t-km
Fuel consumption:	2.45	g/m³-km
CO2 emissions:	722	g/km
CO2 emissions:	52.1	g/t-km
CO2 emissions:	7.65	g/m³-km
Efficiency ratio:	0.979	km-based
Efficiency ratio:	0.979	t-km-based
Efficiency ratio:	0.945	m³-km-based

Figure 24. Results of VECTOR trailer program overall fuel consumption and CO_2 Emissions with a weight of 7200 kg

FULL TEXTS BOOK

Long Haul

Simulation Parameters		
Payload:	2600	kg
Total vehicle mass:	17347	kg
Average speed:	79.7	km/h
Fuel consumption:	21.8	l/100km
Fuel consumption:	0.0837	l/t-km
Fuel consumption:	0.00231	l/m³-km
Fuel consumption:	182	g/km
Fuel consumption:	70.0	g/t-km
Fuel consumption:	1.93	g/m³-km
CO2 emissions:	569	g/km
CO2 emissions:	219.0	g/t-km
CO2 emissions:	6.04	g/m³-km
Efficiency ratio:	0.960	km-based
Efficiency ratio:	0.960	t-km-based
Efficiency ratio:	0.926	m³-km-based
Reference ratio:	0.977	km-based

Long Haul

Simulation Parameters		
Payload:	19300	kg
Total vehicle mass:	34047	kg
Average speed:	78.6	km/h
Fuel consumption:	28.9	l/100km
Fuel consumption:	0.0150	l/t-km
Fuel consumption:	0.00307	l/m³-km
Fuel consumption:	242	g/km
Fuel consumption:	12.5	g/t-km
Fuel consumption:	2.56	g/m³-km
CO2 emissions:	757	g/km
CO2 emissions:	39.2	g/t-km
CO2 emissions:	8.03	g/m³-km
Efficiency ratio:	0.952	km-based
Efficiency ratio:	0.952	t-km-based
Efficiency ratio:	0.918	m³-km-based
Reference ratio:	1.002	km-based

Regional Delivery

Simulation Parameters		
Payload:	2600	kg
Total vehicle mass:	17347	kg
Average speed:	60.7	km/h
Fuel consumption:	23.0	l/100km
Fuel consumption:	0.0884	l/t-km
Fuel consumption:	0.00244	l/m³-km
Fuel consumption:	192	g/km
Fuel consumption:	73.9	g/t-km
Fuel consumption:	2.04	g/m³-km
CO2 emissions:	601	g/km
CO2 emissions:	231.2	g/t-km
CO2 emissions:	6.37	g/m³-km
Efficiency ratio:	0.939	km-based
Efficiency ratio:	0.939	t-km-based
Efficiency ratio:	0.906	m³-km-based
Reference ratio:	0.980	km-based

Regional Delivery

Simulation Parameters		
Payload:	12900	kg
Total vehicle mass:	27647	kg
Average speed:	60.1	km/h
Fuel consumption:	29.3	l/100km
Fuel consumption:	0.0227	l/t-km
Fuel consumption:	0.00311	l/m³-km
Fuel consumption:	245	g/km
Fuel consumption:	19.0	g/t-km
Fuel consumption:	2.60	g/m³-km
CO2 emissions:	767	g/km
CO2 emissions:	59.4	g/t-km
CO2 emissions:	8.13	g/m³-km
Efficiency ratio:	0.944	km-based
Efficiency ratio:	0.944	t-km-based
Efficiency ratio:	0.911	m³-km-based
Reference ratio:	0.994	km-based

Figure 25. VECTO trailer results in long distance and regional delivery with a weight of 7018 kg

FULL TEXTS BOOK

Urban Delivery

Simulation Parameters

Payload:	2600	kg
Total vehicle mass:	17347	kg
Average speed:	26.2	km/h
Fuel consumption:	36.4	l/100km
Fuel consumption:	0.140	l/t-km
Fuel consumption:	0.00386	l/m³-km
Fuel consumption:	304	g/km
Fuel consumption:	117.0	g/t-km
Fuel consumption:	3.23	g/m³-km
CO2 emissions:	953	g/km
CO2 emissions:	366.3	g/t-km
CO2 emissions:	10.10	g/m³-km
Efficiency ratio:	0.938	km-based
Efficiency ratio:	0.938	t-km-based
Efficiency ratio:	0.905	m³-km-based
Reference ratio:	0.966	km-based

Urban Delivery

Simulation Parameters

Payload:	12900	kg
Total vehicle mass:	27647	kg
Average speed:	25.8	km/h
Fuel consumption:	51.5	l/100km
Fuel consumption:	0.0399	l/t-km
Fuel consumption:	0.00546	l/m³-km
Fuel consumption:	430	g/km
Fuel consumption:	33.3	g/t-km
Fuel consumption:	4.56	g/m³-km
CO2 emissions:	1347	g/km
CO2 emissions:	104.4	g/t-km
CO2 emissions:	14.28	g/m³-km
Efficiency ratio:	0.953	km-based
Efficiency ratio:	0.953	t-km-based
Efficiency ratio:	0.919	m³-km-based
Reference ratio:	0.977	km-based

Weighted Results

Payload:	13842	kg
Fuel consumption:	26.8	l/100km
Fuel consumption:	0.0194	l/t-km
Fuel consumption:	0.00285	l/m³-km
Fuel consumption:	224.4	g/km
Fuel consumption:	16.2	g/t-km
Fuel consumption:	2.38	g/m³-km
CO2 emissions:	702	g/km
CO2 emissions:	50.7	g/t-km
CO2 emissions:	7.45	g/m³-km
Efficiency ratio:	0.953	km-based
Efficiency ratio:	0.953	t-km-based
Efficiency ratio:	0.919	m³-km-based

Figure 26. Results of VECTOR trailer program overall fuel consumption and CO_2 Emissions with a weight of 7018 kg

Reducing the thickness of the I section in the chassis by 1 mm led to the chassis weight falling from 1981 kg to 1799 kg, thus saving 9 percent in chassis weight. When the walking weight in a curtainsider vehicle decreases from 7200 kg to 7018 kg, it corresponds to 2.7 percent (2.7%) of the total mass. Considering that one trailer travels 200,000 km per year, a weight reduction of 182 kg provides 1600 litres of fuel savings in the trailer. This weight gain and fuel savings are in line with previous studies. Consumption and energy gain analyses made in the VECTO Trailer program show that fuel consumption in a trailer with a walking weight of 7200 kg is 27.6 lt/100 km, while fuel consumption in a 7018 kg trailer is calculated as 26.8 lt/100 km. It was also determined that carbon emissions decreased from 722 g/km to 702 g/km.

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FULL TEXTS BOOK

WHAT A PAEDIATRIC NURSE SHOULD KNOW ABOUT CONGENITAL HEART DISEASE

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ABSTRACT
Congenital heart disease is an abnormal formation of the heart or large blood vessels that occurs during development in the womb. Among all congenital malformations, congenital heart disease stands out as the most prevalent and occurs in approximately 8-12 per 1000 live births. Approximately 1/4 of young individuals who are born with a heart condition (CHD) have critical CHD. In healthy newborns, less than 50% of critical congenital heart disease can be detected by routine examinations. Children with critical congenital heart disease are children who have to continue to live with poor prognosis and neurological disease after high costs, significant morbidity and mortality, multiple invasive interventions and prolonged intensive care treatment. Children with heart disease live with it for a long time, affecting both them and their parents. The follow-up and treatment process should be overseen by health professionals, notably pediatric nurses. Their role includes preparing the child and family for surgery, providing care, facilitating discharge, educating the family about the disease, and offering support. This study delves into what pediatric nurses need to know about congenital heart disease
Keywords: Congenital Heart Disease, paediatrics, nurse

1.INTRODUCTION

During fetal development, the heart or great vessels can undergo a malformation, resulting in a condition known as congenital heart disease (CHD) (1). This is the most prevalent congenital anomaly among newborns and holds significant implications for childhood health and well-being on a global scale., with morbidity and mortality ranging from 19% to 75% (2). People born with coronary artery disease are approximately 12 times more likely to die in the first year if they survive the neonatal period (3). Severe CHD are heart lesions that require intervention and/or surgery early in life. It is estimated that approximately 20-25% of CHD cases (i.e., 1 in 500 births) are critical CHD (4,5). (4.5). At least half of all heart abnormalities require surgery after delivery. According to the World Health Organization, it is the leading cause of early neonatal and prenatal death (6).Diagnosis is made in the first week in 40-50% of babies with heart disease, and 50-60% within the first month (7). In recent years, with the development of diagnostic and therapeutic methods, the mortality rate has gradually decreased and the life expectancy of children has increased (8,9). In addition to the clinical symptoms and complications that occur in children during this procedure, the quality of life related to the problems that arise should also be assessed. When assessing quality of life in patients with congenital heart disease, it is important to consider the physical, psychological, and social problems that may contribute to a decreased quality of life (10). In this text, it was aimed to investigate the prevalence, diagnosis and treatment of common congenital heart defects and the care of children with congenital heart disorder

1.1.Classification of CHD

CHD can be divided into cyanotic and cyanotic forms on examination according to clinical conditions. In recent years, coronary artery disease has been divided into severe and non-severe coronary artery disease according to echocardiographic findings (11). Acyanotic congenital heart disease includes aortic stenosis (AD), atrial septal defect (ASD), patent ductus arteriosus (PDA), pulmonary artery stenosis

FULL TEXTS BOOK

(PD), ventricular septal defect (VSD) and aortic infarction (AC). Cyanotic congenital heart disease includes transposition of the aorta (BAT), tetralogy of Fallot (TOF), tricuspid valve obstruction, total pulmonary venous return anomalies (TPVDA), single ventricle, Şimşek and Baysal (2019) examined the distribution of CHD in our country and found that the most common cyanotic heart diseases were VSD with 31.3%, ASD with 30.1% and TOF with 30.1%. The incidence of cyanotic heart disease is 3.8% (12).

1.2.Diagnosis and Treatment in Congenital Heart Diseases:

Congenital heart disease is diagnosed by ECG, Doppler echocardiography (ECHO) and cardiac catheterisation; without ECHO it is impossible to diagnose CHD such as ASD and provide guidance on necessary treatment, follow-up, angiography and emergency surgical intervention, It is particularly important for paediatric cardiologists to assess patients within the first 30 days of life. Paediatric cardiac catheterisation and angiography is a diagnostic procedure in which a flexible, long, thin catheter is passed through the femoral artery into the large vessels around the heart to look inside the heart. Pressure measurements and blood samples are taken from various heart chambers and the vessels around the heart to obtain detailed information about heart function. Contrast agents can be administered through a catheter into the heart and surrounding imaging structures. Cardiac catheterisation provides different treatments for different heart problems (14) and treatment plans for congenital heart disease are fully individualised. Different patients have different degrees and types of symptoms. It is therefore important that treatment is assessed by a specialist. The process starts with a physical examination, which determines the necessary treatment for the patient based on the tests performed by the doctor.

Table 1. Incidence of Congenital Heart Diseases (13).

Lesion	Frequency **(%)**
Ventricular Septal Defect	25-30
Atrial Septal Defect (Secundum type)	6-8
Patent Ductus Arteriosus	6-8
Aortic Coarctation	5-7
Tetralogy of Fallot	5-7
Pulmonary Stenosis	5-7
Aortic Stenosis	4-7
Corrected Transposition of the Great Artery	3-5
Hypoplastic Left Heart Syndrome	1-3
Total Pulmonary Venous Return Anomaly	1-2
Truncus Arteriosus	1-2
Tricuspid Atresia	1-2
Single Ventricle	1-2
Double Outlet Right Ventricle	1-2
Others	5-10

2.METHOD

The purpose of the study was to examine research on congenital heart defects and breastfeeding. In order to access the studies on this subject, Google Scholar (Academic), National Thesis Centre and pubmed were searched by typing the words 'congenital heart disease, paediatrics and nursing' between 2014 and December 2021. After the titles and abstracts were evaluated, the studies that were thought to be suitable for the purpose of this study were evaluated.

FULL TEXTS BOOK

3.RESULTS

In addition to providing care, nurses also perform a variety of roles in enhancing the quality of life for families and children with congenital heart disease. The primary responsibilities include getting the child and family ready for surgery, tending to them, getting them ready for discharge, teaching them about the illness and assisting them in coping, recognizing potential issues the family may face, and coming up with solutions (15). Follow-up after cardiac catheterisation or cardiac surgery should include not only medical aspects but also a multidisciplinary approach to the process to achieve good outcomes for the baby and parents. Paediatric nurses should monitor the infant's fluid intake and output, weight monitoring, skin colour and extremity temperature, as well as monitor the infant and frequently assess the heart rate and rhythm (16). Regarding infection, attention should be paid to dressing babies regularly according to aseptic technique, not leaving the dressings dirty after breastfeeding or breast physiotherapy, and using hypoallergenic plasters for application. The surgical site should be monitored in terms of swelling, redness, tenderness, temperature increase, malodour and discharge and care should be performed regularly (17). Nurses should ensure that the baby's nutrition is maintained. In doing so, care should be taken to give breast milk in small amounts, frequently and according to the age of the baby. Oxygen saturation should be monitored during feeding to support breastfeeding. The daily amount of food taken by the baby should be recorded and the daily weight should be monitored (18). Supporting mothers with skin-to-skin contact, hugging and breastfeeding practices by nurses has a positive effect on growth and development (19). Paediatric nurses should have a high level of ethical sensitivity in order to be able to recognise

Behavioral problems encountered when treating children in their care and to make ethical decisions to solve the problems. Care activities that parents should undertake at home after surgery include monitoring cardiopulmonary system functions, hygiene and wound care, maintaining nutrition and activity, maintaining interaction with the baby, correct administration of medications, careful monitoring of signs and symptoms requiring hospitalisation, and pain management. Nurses should educate families in this direction (20). Paediatric nurses should plan what will be applied in care, treatment, follow-up and emergency situations and should educate parents in this regard.

4.CONCLUSION

Effective management of these patients requires a rigorous approach to the physiology of heart disease and acquired., as well as the effects of mechanical ventilation, mechanical circulatory support and vasoactive drugs and a powerful body. Requires laboratory skills, accurate interpretation of hemodynamic and laboratory data, and knowledge of active testing. Participation in bedside examinations, communication skills, and careful care of invasive monitoring catheters and tubes.

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FULL TEXTS BOOK

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FULL TEXTS BOOK

ENHANCING SOCIAL INCLUSION FOR INDIVIDUALS WITH AUTISM THROUGH ASSISTIVE TECHNOLOGY

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ABSTRACT

Social inclusion is crucial for the well-being of people with autism. Research has identified access to education and employment as key drivers of social inclusion. However, participation rates in these domains remain low for people with autism. Assistive technology offers significant potential to improve inclusion, but its adoption has been limited due to various barriers. In 2020 the COST Action, a STEP with 134 members from around 23 countries started working on this ambitious project.

The COST Action, a-STEP, aims to address these challenges by building an interdisciplinary, intersectoral network spanning Europe and beyond. This network focuses on enhancing social inclusion and empowerment of individuals with autism and/or intellectual disability and their families by promoting the development and use of accessible and sustainable AT.

Over the past four years, a-STEP has made significant progress toward this goal through several initiatives by conducting comprehensive reviews of existing AT to identify effective tools and practices, engaging stakeholders to understand diverse perspectives and preferences related to AT, creating guidelines to promote best practices in AT applications within education and employment contexts, establishing an open-access platform containing information on AT best practices and emerging technologies, and nurturing the next generation of researchers and practitioners through training schools, workshops, and Short-Term Scientific Missions (STSMs).

This white paper seeks to examine the critical role of policy frameworks in the European Union in narrowing these gaps and proposes solutions and recommendations for the effective distribution of assistive technologies for the benefit of neuro-diverse people as part of COST Action, a-STEP activities. Key achievements include the identification and evaluation of existing AT, a better understanding of factors affecting AT use across different contexts, and the creation of a joint roadmap for the inclusion of stakeholders in AT design and deployment. Despite challenges posed by the COVID-19 pandemic, the network has successfully expanded, fostering interdisciplinary and intersectoral collaboration, and has actively disseminated knowledge through various channels, including conferences and publications. The ongoing work of a-STEP is set to continue addressing the unmet needs in AT adoption, promoting evidence-based practices, and ensuring the inclusion of individuals with autism in the research process. By leveraging interdisciplinary and intersectoral collaboration, a-STEP is dedicated to creating a sustainable impact on social inclusion and empowerment for this community.

For more information, visit the [a-STEP website] (https://www.a-step-action.eu).

Keywords: Social Inclusion, Assistive Technology, Intellectual Disability, Autism, Empowerment

Statement about language

The term "autistic people" has been criticized for influencing social attitudes and self-perceptions of autistic persons (Keating et al., 2023). Advocates feel that discussing their experiences and preferences is critical to inclusive conversation. The White Paper tries to incorporate the autistic community's

FULL TEXTS BOOK

preferred vocabulary into conversations about autism, using the term "autistic people" rather than "people with autism spectrum disorders." (Keating et al., 2023; Gillespie-Lynch et al., 2017; Bury et al., 2023). Despite evidence of these preferences, autistic individuals' language choices are frequently neglected in autism studies. The Statement on Language Use underlines the importance of inclusive language practices in autism research and beyond.

Introduction

Autism represents complex challenges for individuals, families, and communities across Europe and over the globe. This multifaced approach needs an integrated intervention to ensure the social inclusion and general well-being of autistic people. Specific autistic experiences and characteristics constitute a complex neurological condition characterized by diverse needs, rendering the development of universally adaptable product and service solutions challenging (Cañete & Peralta, 2022; Kapp, 2023). The prompt progress of digital technology over the past decades accentuated by the COVID-19 pandemic, the economic crises, and the insecurity afflicted by the war in Ukraine and Gaza has reshaped various aspects of life.

While digital innovations have intensified accessibility and communication (Varriale, et al., 2023), neuro-divers-people, especially those with autism, may face exclusion due to limited digital skills or inadequate access to technology, emphasizing the need for inclusive technological solutions and further research in this domain (Kapp, 2023; Akhunova & Okhunova, 2023). Autism has two basic manifestations: a) limiting and repetitive patterns of interests, behavior, or activities, and b) persistent challenges with communication and social engagement (Lord et al., 2020). Autistic people face particularly severe issues in social interaction, imagination, and communication, which have a profound impact on their everyday lives and general well-being. Their proclivity for social isolation and lack of interpersonal engagement exacerbate these problems (Varriale, et al., 2023). Furthermore, their lack of social awareness and reluctance to participate in social activities limit their ability to interact effectively with others, which is limited by rigidity and difficulty predicting reactions and reading emotional cues from others (Varriale, et al., 2023; Akhunova & Okhunova, 2023).

Autistic people according to the Strategy for the Rights of Persons with Disabilities 2021-2030 have the right to good working conditions, live independently, have equal opportunities, and fully participate in their communities (European Commission, 2021). The Commission President Ursula von der Leyen highlighted this commitment, stating, “Persons with disabilities have the right to have good conditions in the workplace, to live independently, to equal opportunities, to participate fully in the life of their community. All have a right to a life without barriers. And it is our obligation, as a community, to ensure their full participation in society, on an equal basis with others” (von der Leyen, 2020)

People with autism require equal access to education, as guaranteed by the fundamental human right, as well as artificial intelligence-powered assistive technologies that promote inclusive education and support diverse needs such as visual, hearing, communication, intellectual, cognitive, and motor impairments, while also addressing potential ethical issues (Zdravkova, 2022). Access to assistive technology is required for people with autism to live independently and participate fully in society (Varriale, et al., 2023; El-Salahi, Khaki, & Vohora, 2023). Many countries, particularly developing ones, experience access challenges due to a lack of available, low-cost, or adequate assistive technologies.

Access to information and communication technology (ICT) empowers autistic people, considerably improving their lives and contributing to fulfilling sustainable development goals; nonetheless, accessibility remains a challenge for many nations in Europe and beyond (National Council for Special Education, 2024). Prioritizing accessibility in ICTs through universal design principles that ensure equitable access for everybody, regardless of nation of origin is essential for empowerment and social inclusion of autistic people. International trade policies and agreements can also help ensure that assistive devices are affordable in developing countries (National Council for Special Education, 2024).

FULL TEXTS BOOK

This white paper seeks to examine the critical role of policy frameworks in the European Union in narrowing these gaps and proposes solutions and recommendations for the effective distribution of assistive technologies for the benefit of neuro-diverse people. Exploring the current challenges and opportunities that autistic people face in everyday life, as well as demonstrating how strategic policy interventions can promote broader adoption, affordability, and accessibility of assistive technologies tailored to autistic people's specific needs. Furthermore, it emphasizes the transformative impact of these technologies in empowering autistic individuals in numerous aspects of life, such as education, health care, employment, accessibility, independent living, and justice and law.

Through a comprehensive analysis of existing EU policies, reports, successful case studies, and recommendations for future policy development, this white paper aims to inform stakeholders—policymakers, educators, healthcare providers, technology developers, and advocacy groups—on effective strategies to enhance social inclusion and empower neuro-diverse individuals through assistive technology. By advocating for inclusive and supportive policy frameworks, we endeavor to create a more equitable and inclusive society where all individuals, regardless of their cognitive abilities, can thrive and contribute meaningfully.

Method

To investigate the role of policy frameworks in supporting the proper deployment of assistive technologies for the benefit of autistic people, the technique includes a thorough analysis that focuses on acquiring and analyzing a wide range of documents. Policy documents from the EU and other countries, such as regulations, guidelines, and reports, address current issues that autistic people experience, as well as proposals for using assistive technology to overcome them. Academic publications, reports, and studies investigating the influence of policy interventions on the deployment and use of assistive technology. Examples of good policy implementations or efforts to promote the integration of assistive technologies into educational, vocational, and community contexts for autistic persons. Documents created by advocacy organizations that outline challenges, solutions, and progress toward improved policy frameworks. The search terms included "autism," "assistive technology," "policy frameworks," "social inclusion," and "empowerment."

Existing challenges and barriers for autistic people's

The Disability and Development Report 2024, published six years before the 2030 Agenda deadline, indicates that individuals with disabilities are “left behind” (United Nations, Department of Economic and Social Affairs, 2024; United Nations. 2023, December 19; United Nations. 2023, August 24). Governments around the world have prioritized the rights of people with disabilities since the late twentieth century. Innovative social inclusion techniques are being developed to preserve their rights. This emphasis on disability as a human rights problem underscores the challenges that people with autism confront in education, employment, accessibility, healthcare, and independent living (United Nations, Department of Economic and Social Affairs, 2024). The European Parliament (European Parliament, 2023) voted on a resolution to address the issues that autistic people and their families experience. The resolution advocates for development in a variety of areas, including access to diagnosis, healthcare, education, employment, legal capability, lifetime support, culture, sports, training, research, and combatting violence and forced sterilization. It also emphasizes the importance of person-centered therapies and the proper implementation of the European Disability Card scheme. The resolution also advocates for establishing a European legal status for people with disabilities, allowing for mutual recognition and accreditation across all Member States.

To address these barriers, various facilities have been initiated in the last few years (IVRAP -project, 2023; European Parliament, 2023; National Council for Special Education, 2024; European Commission, 2021). However, several challenges still need to be considered to provide a complete facility to people with ASD.

FULL TEXTS BOOK

The addressed challenges are almost in all the areas, but with a greater impact are considered some of the areas, which will be the focus of the white paper. To start with the challenges for autistic learners in the EU, in the area of **education**. Studies and reports state limited and inadequate support as the main challenges for autistic people or others with neuro-diverse needs (Ahlers et al., 2023; European Commission, 2021; European Commission, Directorate-General for Employment, Social Affairs and Inclusion, 2021). The level of support for autistic learners in inclusive education across all levels is often limited and, when present this is frequently inadequate and doesn't match with the needs of the learners (Keville, Mills, & Ludlow, 2023). A lack of understanding of autistic learners' needs and what constitutes appropriate adapted support and reasonable accommodations in the education settings affect deeply the interaction of autistic people with mediators in the school context (Dignitem Foundation, 2021). Often the inflexible curriculum and the inadequate infrastructure cause difficulty in addressing the topics and lack the necessary flexibility to leverage the strengths of autistic learners. Another challenge in the school context is related to the insufficient vocational and lifelong learning opportunities that often affect the advancement in the development of professional competencies for autistic individuals (United Nations, 2023, August 24; European Commission, 2021; European Commission, Directorate-General for Employment, Social Affairs and Inclusion, 2021).

Another area of concern is **employment** disparities and decent work for autistic people (Women and Equalities Committee, 2024, May 21; Economy and Fair Work Committee, 2023, February 8)). Based on the data from the EU report (United Nations, Department of Economic and Social Affairs, 2024), only 27% of persons with disabilities are employed, compared to 56% of persons without disabilities (United Nations, Department of Economic and Social Affairs, 2024). The unemployment rate for people with disabilities is 10% higher than the 8% rate for persons without disabilities. The finding states that youth with disabilities are twice as likely as their non-disabled peers to be neither in employment, education, or training (United Nations, Department of Economic and Social Affairs, 2024; United Nations. 2023, December 19). Economic inequality is often related to lower wages and overrepresentation in the informal economy or self-employment of autistic people. The objective of the EU to close the employment gap by 2030 for persons with disabilities is to increase by at least 2 percentage points per year. Those objective needs workplace accessibility for the neuro-diverse needs of employers, including autistic people. Many workplaces are not accessible and lack reasonable accommodation measures and assistive technologies as mediators for the smooth integration of autistic people in the workplace. Based on the data the accessibility of employment agencies for wheelchair users improved to 62% in 2022, up from 56% in 2018 (United Nations, Department of Economic and Social Affairs, 2024).

Accessibility for autistic people to friendly use of many public spaces and community settings lacks the predictability and routine that autistic individuals require, like sudden changes, loud noises, or unpredictable events that can be overwhelming for them (United Nations, 2023, August 24; Women and Equalities Committee, 2024, May 21; United Nations, Department of Economic and Social Affairs, 2024). Activities and events often do not have clear structures or predictable routines, which can create anxiety and stress for autistic individuals. Co-occurring mental health conditions that autistic individuals can experience such as anxiety, depression, and sensory processing disorders, can exacerbate challenges related to accessibility. Also, mental health services are often not tailored to the unique needs of autistic individuals, leading to inadequate support. Many online systems, including websites and apps, are not designed with autistic users in mind, making them difficult to navigate. Information presented online is overwhelming for autistic people, especially if it is not organized clearly and concisely. Public spaces often have bright lights, loud noises, and strong smells that can cause sensory overload for autistic individuals. Buildings and facilities are frequently designed without consideration for the sensory and physical needs of autistic people. Autistic individuals struggle with interpreting social cues and engaging in typical social interactions. There is often a lack of understanding and acceptance from the broader

FULL TEXTS BOOK

community, leading to social isolation and stigmatization. Existing laws and policies are not sufficient to protect the rights and accessibility needs of autistic individuals. Even when protective laws exist, they are often not adequately enforced, leaving autistic individuals without necessary accommodations (United Nations, 2023, August 24).

The European Union confronts major obstacles in identifying, treating, and providing general **healthcare** to people with autism (United Nations, 2023, August 24; Women and Equalities Committee, 2024, May 21; United Nations, Department of Economic and Social Affairs, 2024). People with autism are 15 times more likely to have a bad perception of their health and 7 times less likely to have access to medical care. More than half of people in poor countries cannot afford healthcare due to high costs and transportation concerns. More than 10% of autistic people in wealthy countries do not have access to healthcare owing to expense, location, or long waiting lists. Public health programs, such as nutrition education campaigns and routine health screenings, frequently fail to reach autistic people (United Nations, Department of Economic and Social Affairs, 2024). These disparities are evident across different income levels of countries, with both poor and wealthy nations exhibiting barriers to healthcare for disabled individuals (Babalola *et al.*, 2024). Key challenges include insufficient screening programs, long wait times, inconsistent diagnostic guidelines, a shortage of qualified professionals, a lack of cross-border recognition of autism diagnoses, insufficient evidence-based interventions, inappropriate medication use, and unmet healthcare needs (United Nations, Department of Economic and Social Affairs, 2024; United Nations, 2023, August 24; European Commission, 2021; European Commission, Directorate-General for Employment, Social Affairs and Inclusion, 2021). The absence of specialized healthcare settings and unmet general health needs highlights the larger issue of accessibility and inclusivity in healthcare for autistic people.

Autistic individuals face various challenges related to **independent living** which impact their quality of life and ability to live autonomously (United Nations, Department of Economic and Social Affairs, 2024; United Nations, 2023, August 24; European Commission, 2021; European Commission, Directorate-General for Employment, Social Affairs and Inclusion, 2021). For autistic people individualized support is often limited or unavailable, which leads to autistic people not receiving the tailored assistance they need to thrive. For many autistic people, the available support may not be focused on achieving positive outcomes or personal goals, leading to a lack of progress and reduced independence. Community-based services that are so important for independent living, such as housing, employment support, and healthcare, are often either not available or not affordable (Department of Children, Equality, Disability, Integration and Youth, 2023. This shortage of services leads to increased dependence on institutional care, which may not provide the best quality of life or promote autonomy. Services that do exist are not flexible enough to accommodate the varying needs of autistic individuals, further hindering their ability to live independently. Autistic individuals often face societal and systemic barriers that limit their inclusion and ability to make decisions about their own lives. The transition from one life stage to another, such as from education to employment, is particularly challenging for autistic individuals because the support systems often do not adequately address these transitions, leaving individuals without the necessary resources and guidance, causing difficulties in finding and maintaining employment or engaging in meaningful adult activities, which are crucial for independent living.

There is a significant lack of services and support for autistic adults, particularly as they **age** across Europe and over. In the majority of the EU countries, older autistic people face unique challenges that are not well understood or addressed by existing support systems, leading to decreased quality of life and increased dependence on others (European Commission, Health & Consumer Protection Directorate-General; 2005, February; European Commission, Directorate-General for Employment, Social Affairs and Inclusion, 2021; United Nations, 2023, August 24; Council of Europe, Parliamentary Assembly, 2020, October 21).

FULL TEXTS BOOK

According to the United Nations (United Nations, Department of Economic and Social Affairs, 2024), in developing countries, **internet use** for persons with disabilities is 11 percentage points lower than for those without disabilities. To close this gap, internet access needs to increase by 1.2 percentage points annually until 2030. In Europe, people with disabilities are twice as likely to not afford a computer telephone, or television, with stagnant percentages since 2015. In least-developed countries, only 20% of persons with disabilities use the Internet, compared to the universal access target of 20% by 2020. The gap between women and men with disabilities exceeds 20 percentage points for internet use and mobile phone ownership. The majority of the top 1 million websites do not comply with international web content accessibility guidelines, particularly in Africa.

Addressing these challenges requires a comprehensive approach that includes policy changes, increased funding for support services, and the development of innovative tools and resources, and also an active engagement of the member states to build protocol and evaluation measures and monitoring strategies that are unified and obligatory for all. It is essential to prioritize the inclusion, autonomy, and well-being of autistic individuals to ensure they can lead independent and fulfilling lives.

Assistive Technology as a Proposed Solution for Social Inclusion of Autistic People

Assistive technology (AT) is a range of tools designed to assist autistic individuals in learning, communicating, and performing daily tasks. The resolution 76/195 of December 17, 2021, highlights the importance of financial inclusion in achieving sustainable development. It recognizes the transformative power of digital technologies in society, emphasizing their ability to advance the 2030 Agenda, promote social development, and assure access to excellent education, healthcare, decent work, affordable housing, social protection, and gender equality (United Nations, 2023, August 24).

These tools can range from simple picture boards and worry beads to sophisticated software, apps, and robots. AT can help with basic communication, reading, writing, math, time management, social skills, sensory challenges, safety, and daily living activities (Hookway, 2024). AT is divided into low-tech, mid-tech, and high-tech options (Rudy, 2023). Low-tech tools include weighted vests, sensory balls, and picture boards, while mid-tech include battery-operated sensory toys, visual timers, and social skills videos. High-tech AT includes digital technology, augmentative communication technology for non-verbal people, and robots designed to increase social skills in autistic people. Communication is an important part of AT because many autistic people are nonverbal or have limited language abilities. Low-tech solutions include picture boards and cards, but mid-tech apps provide augmentative communication and speech therapy. Speech therapy applications help to improve speech and language skills. AT also emphasizes learning and executive functioning, as 30% of autistic children have intellectual difficulties, 40% have ADHD, and 40% have anxiety issues. Low-tech alternatives include stress balls, anxiety beads, weighted vests, and visual reminders. Mid-range options include alarm clocks, visual timers, noise-canceling headphones, calculators, audiobooks, and videos. High-tech tools include mind-mapping software, speech-to-text software, and programs designed expressly for students with learning impairments.

Social skills and communication are crucial for autistic individuals, with various assistive technologies available to help them navigate complex social situations. Low-tech methods include social stories, social skills cards and games, mid-tech video modeling and apps, and high-tech tools like artificial intelligence and robots. These technologies help autistic individuals prepare for and manage new or complex situations, such as getting a haircut or starting a new school. High-tech tools, such as interactive artificial intelligence and robots, aim to create interactive experiences for autistic individuals, addressing their social-emotional needs and enhancing their overall social skills (Al-Hendawi *et al.*, 2023; European Parliamentary Research Service, 2018; United Nations, Department of Economic and Social Affairs, 2024; United Nations, 2023, August 24).

FULL TEXTS BOOK

Numerous types of AT can be used to enhance the social inclusion of autistic people like speech-generating devices that produce speech for individuals who are non-verbal or have limited speech abilities (DYNSEO, 2024). Wearables, like smartwatches and fitness trackers, can help with communication, routine management, and safety. Smartphones and tablets offer numerous apps designed to aid communication, social skills, and learning. Social robots can help autistic individuals practice social interactions in a controlled environment. Virtual reality and augmented reality provide immersive environments for practicing social scenarios ((IVRAP- project, 2023). Eye tracking is devices that track eye movements, can help in understanding social cues, and can improve communication. Smart glasses equipped with AR to assist with social interaction by providing real-time social cues. Artificial intelligence can personalize learning and social interaction experiences. Global positioning systems (GPS) ensure the safety and independence of autistic individuals by tracking their location.

Assistive technology in education can help autistic people enhance their quality of life. (National Council for Special Education, 2024). Tools such as speech-generating devices can help nonverbal students communicate more effectively. Tablets and apps facilitate learning through interactive and individualized educational programs, while virtual reality offers immersive learning experiences and social skills training (Żammit, 2023; DYNSEO, 2024).

Employment companies can benefit from the usage of assistive technology in a variety of ways. Wearables and smartwatches can help autistic employers with time management and task reminders. AI-powered solutions can be used to provide individualized training and support in the workplace. Robots that provide job training for autistic persons in simulated situations can aid with their integration into the workplace (Iannone & Giansanti, 2023).

In healthcare, the usage of assistive technology can increase the quality of care and improve the overall experience for patients, caregivers, and healthcare professionals (United Nations, 2023, August 24; European Parliament, 2023). For patients for instance some of the tools developed as voice-controlled services (like Amazon Alexa or Google Assistant) help patients with limited mobility control their environment, such as adjusting the room temperature, turning on lights, or calling for help (Masina *et al.*, 2020). Smart beds equipped with sensors and automated controls can help monitor a patient's movement, adjust positions for comfort, and even alert caregivers if there's a problem. Wearable health monitors like fitness trackers and smartwatches (Masoumian Hosseini *et al.*, 2023) that monitor vital signs (heart rate, blood pressure) can provide real-time data to healthcare providers (Wirecutter, 2024). Telehealth platforms such as video conferencing tools enable remote consultations, reducing the need for travel and making healthcare more accessible. Electronic pill dispensers help autistic patients remember to take their medications on time and even dispense the correct dosage. Hearing aids and amplification devices which are with advanced features like noise cancellation and Bluetooth connectivity. Adaptive communication devices, like speech-generating devices or communication apps, can facilitate easier communication for autistic patients with speech impairments. Assistive technology in healthcare improves the quality of healthcare services and experiences for patients, caregivers, and professionals. Voice-controlled gadgets, smart beds, wearable health monitors, telehealth platforms, e-pill dispensers, hearing aids, adaptive communication devices, and smart home technologies are some examples (Warshawsky, 2024). Healthcare personnel rely on electronic health records, decision support systems, robotic surgery systems, patient monitoring systems, mobile health applications, virtual and augmented reality, assistive robotics, and clinical workflow automation tools (Greiwe & Nyenhuis, 2020). These technologies seek to make healthcare more inclusive, efficient, and helpful, thereby lowering errors and improving the overall experience for patients, caregivers, and health professionals.

Independent living is an important aspect of autonomy and empowerment which can be improved by assistive technology. Devices like Amazon Alexa, Google Assistant, or Apple Siri can help autistic people control various aspects of their home environment (lighting, temperature, appliances) through

FULL TEXTS BOOK

voice commands (Pfohl, & Tucker, 2023). Smart lighting systems can be programmed or controlled remotely, while smart thermostats adjust the temperature based on user preferences and habits of autistic people. Advanced home security systems include cameras, motion sensors, and alarms that can be monitored and controlled via smartphone apps, providing peace of mind and safety for autistic people and their families (Warshawsky, 2024).

Devices such as smartwatches or medical alert pendants with GPS tracking can monitor location and provide emergency alerts, especially for autistic people with cognitive impairments or those who are prone to wandering. Also, video calling apps and messaging services enable autistic users to stay connected with family and friends, reducing feelings of isolation.

Accessibility for autistic people using assistive technologies can improve their ability to interact with the world around them (Iannone & Giansanti, 2023). These technologies include smart glasses, which can analyze facial expressions and body language, provide real-time social cues, offer navigation assistance, and read text directly on the lens. Augmented reality helps understand environments, provides contextual information about social interactions, and enhances interactive learning and navigation in educational settings. Speech-to-text software can improve communication and accessibility in various settings, including educational, professional, and personal environments. It can provide real-time transcription, enable document creation, and integrate with other assistive technologies, enhancing overall accessibility and usability. With the use of these technologies, autistic people can gain greater independence, better navigate their environments, and improve communication and social interactions.

The integration of these technologies in various contexts when autistic individuals (European Parliamentary Research Service, 2018) need to interact with the environment can help to overcome various challenges and achieve greater independence and inclusion in society (Iannone & Giansanti, 2023).

A unified EU approach for social inclusion of autistic people

Assistive technology may serve as a "mediator" for the social inclusion and empowerment of people with autism (European Parliamentary Research Service, 2018). The European Parliament has advocated for the protection and inclusion of all autistic persons, encouraging Member States to make autism diagnosis more accessible, make reasonable concessions in healthcare, and promote autism-friendly policies in all areas (European Parliament, 2023; United Nations, Department of Economic and Social Affairs, 2024; United Nations, 2023, August 24). They also urged for mandatory autism training in education, health, social, transportation, and justice sectors, as well as reforming guardianship structures and encouraging autistic workers to enter the workforce (United Nations, 2023, August 24; Buchanan & Hammersley, 2023). The resolution also called for funding and implementation of autism prevalence studies, awareness campaigns, and cross-sectoral national policy.

Autistic individuals may benefit greatly from digital tools that help them navigate social interactions and understand nonverbal cues such as body language and tone of voice (United Nations, Department of Economic and Social Affairs, 2024; United Nations, 2023, August 24). In 2020, 69% of countries had a regulatory framework on ICT accessibility (United Nations, Department of Economic and Social Affairs, 2024).

Based on the Convention on the Rights of Persons with Disabilities and focusing on future directions for social inclusion of people with autism using assistive technology, some of the actions stated from the EU framework start to recognize and highlight the role of AT for social inclusion and empowerment of people with disabilities (European Parliamentary Research Service, 2018), some more late report and monitoring documents put an effort to the role of AT and how this can be a tool that needs to be more in focus (Dignitem Foundation, 2021; United Nations, 2023, December 19; United Nations; 2023, August 24; Department of Economic and Social Affairs, 2024; Güell Paule, 2024, April 11).

FULL TEXTS BOOK

To better address all of the issues that autistic persons confront in the EU and across borders, a uniform protocol of implementation, assessment, and evaluation should be considered obligatory for all EU countries.

According to the Convention on the Rights of Persons with Disabilities, to support education and lifelong learning (Article 24) EU countries need to invest in educational technologies that offer adaptive learning experiences tailored to the needs of autistic students, which include interactive learning platforms, virtual reality environments, and specialized educational software that support diverse learning styles. Obligatory training for educators on the use of assistive technologies and inclusive teaching practices, ensuring they are equipped to support autistic students effectively.

Promoting employment opportunities (Article 27) through the use of assistive technology to facilitate workplace inclusion, such as job coaching apps, sensory-friendly workspaces, and adaptive communication tools to support autistic employees. The EU should impose mandatory measures on state parties to establish platforms that provide resources and guidance for autistic people interested in self-employment or entrepreneurship, including access to assistive technology that helps business operations and management.

Enhancing Health Services Accessibility (Article 25) by developing and implementing assistive technologies that integrate health management systems, allowing autistic people to access personalized health information and services, using telehealth platforms with adaptive interfaces and health tracking devices that communicate real-time data to healthcare providers, ensuring equitable access to health services for all autistic people, especially important for those with speech impairments. Adaptive communication tools such as speech-to-text and text-to-speech applications can help facilitate consultations and medical interactions and make healthcare services more accessible and inclusive for autistic people. In line with (Article 26), expanding habilitation and rehabilitation services, EU countries need to increase financial support in the research and development of customizable assistive devices tailored to the specific needs of autistic people, such as wearable sensory regulation tools or augmented reality environments designed to improve social and vocational skills. The creation of digital platforms that offer peer support and mentoring through virtual communities or app-based systems, allows autistic people to connect with peers, share experiences, and access habilitation resources, which is an important aspect of mental health well-being.

Accessibility (Article 9) is another important topic addressed by the Convention on the Rights of Persons with Disabilities, which focuses on the development of smart home technologies and urban infrastructure designed to be accessible to people with autism, such as sensory-friendly public spaces and transportation systems equipped with assistive technologies for navigation and communication. Furthermore, some directives should encourage the creation of new technologies that are designed with accessibility in mind from the start. This includes developing digital material and services that are simple to navigate and use for people with autism, such as intuitive interfaces and customizable settings for sensory sensitivities.

Independent living and community inclusion (Article 19) necessitate the use of smart home devices that provide automated assistance with daily living activities, such as voice-controlled systems for home management or robotic assistants for personal care. Autistic people's autonomy can be enhanced by the construction of digital platforms that connect them to local community services such as in-home support, social activities, and recreational opportunities.

Recommendations

To improve the social inclusion and empowerment of autistic people across the EU behind is critical to effectively use assistive technology (Department of Economic and Social Affairs, 2024; United Nations, 2023, August 24; Güell Paule, 2024; European Commission, Digital Skills and Jobs Platform, 2024). The proposals below are guided by the Convention on the Rights of Persons with Disabilities, and

FULL TEXTS BOOK

provide a comprehensive framework for policymakers, EU member states, stakeholders, enterprises, and professionals.

Recommendations are directed to different stakeholders, according to their roles and opportunities to intervene, starting with the:

1- EU policies level

- Create and implement an EU-wide **directive mandating** the integration of AT into all sectors, particularly healthcare, education, work, and communal life.
- Increase EU **funding for research** and development of autism-specific assistive technology solutions.
- Encourage **cross-border collaboration** to innovate and exchange best practices.
- Implement **autism-friendly policies** in all public services, including health care, education, and transportation, to ensure accessibility and inclusion.

2- National Policies

- Educators, healthcare providers, law enforcement, and other public sector professions should be required to receive **autism awareness** and **AT training**.
- **Adopt legislation** requiring the public and private sectors to implement AT solutions and make fair adjustments for autistic people.

3- EU Member States

- **Develop standardized protocols** for implementing, assessing, and reviewing AT throughout all sectors to ensure consistency and effectiveness.
- **Increase funding** for **adaptable assistive equipment** and develop digital channels for peer help and mentoring.

4- Stakeholders

- Conduct **EU-wide initiatives** to **raise awareness** about autism and the benefits of AT, focusing on both the general public and specific sectors such as education and healthcare.
- **Encourage collaborations** between government agencies, non-governmental organizations (NGOs), technology businesses, and academic institutions to create and promote AT solutions.

5- Businesses

- **Incorporate accessibility** features into **product design** from the start, making digital documents and services easy to use for autistic people.
- **Provide incentives** for businesses to create and produce innovative AT solutions that address the requirements of autistic people.

Acknowledgments

Advancing Social Inclusion through Technology and EmPowerment (a-STEP), CA19104 is a COST action that starts in October 2020 and will end in October 2024, that aims to enhance social inclusion and empowerment for individuals with Autism and/or Intellectual Disabilities through interdisciplinary networks. Strategic actions include evaluating and developing novel assistive technology, creating a database of contemporary technologies, and promoting evidence-based guidelines.

This cost action, chaired by Dr. Geraldine Leader, includes a varied group of specialists from many countries and disciplines. With over 134 members across numerous working groups, from over 23 countries, a-STEP is a collaborative effort to promote autistic people's social inclusion through technical advancements. Working Group 5, directed by Prof. Cecilia Sik Lanyi from the Hungarian Research Network, is supporting the initiative to write this white paper. The COST Action is made up of professionals from Ireland, the United Kingdom, Latvia, Israel, Estonia, North Macedonia, Albania, the United States, Bosnia and Herzegovina, Austria, the Netherlands, Brazil, Bulgaria, Türkiye, Spain, Cyprus, Germany, Switzerland, Denmark, Romania, Slovenia, Belgium, Norway, Italy, Poland, Serbia, Greece, Croatia, Malta, France, Australia, and Portugal.

FULL TEXTS BOOK

This wide-ranging participation highlights the collaborative effort to enhance social inclusion and empower individuals with ASD/ID across Europe and beyond. Through these coordinated efforts, a-STEP seeks to address the challenges faced by autistic people and improve their quality of life by leveraging the potential of assistive technologies.

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FULL TEXTS BOOK

GERİATRİK BİREYLERDE NÖROKOGNİTİF DEĞİŞİKLİKLER
NEUROCOGNITIVE CHANGES IN GERIATRIC INDIVIDUALS

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ÖZET
Bireylerde yaş almayla birlikte anatomik ve fizyolojik mekanizmalarda birtakım kayıplar görülmektedir. Bu kayıplar; her bireyde farklı hız ve sıklıkta değişiklik göstermektedir. Bu derlemenin amacı; geriatrik bireylerde ortaya çıkan nörokognitif değişiklikleri incelemektir. Yaşlanmayla birlikte görülen karakteristik özellikler arasında; vücudun homeostatik mekanizmalarının regülasyonunda azalma (termoregülasyon sisteminde bozukluk, baroreseptör duyarlılığında azalma), stres yanıtının bozulması, visseral sistemlerdeki rezerv kapasitelerinde azalma, adaptasyon yeteneğinde meydana gelen azalma (vestibüler etkilenimlerle kombine olarak görülebilen ortostatik hipotansiyon, ortam sıcaklığına uyum sağlayamama) gibi özellikler yer almaktadır. Yaşlılarda meydana gelen fizyolojik değişiklikler; bireylerin günlük yaşam aktivitelerini, çalışma hayatını, bağımlılık derecelerini, çevreye adaptasyonunu ve sosyal aktivitelerdeki iletişimini etkilemektedir. Bununla birlikte, yaş almaya bağlı olarak değişimlerin birçoğuna sadece yaşlılık sebep olmamaktadır. Sedanter yaşam tarzı, çevre koşulları ve stresli yaşam yaşlanmaya bağlı çevresel değişiklikler bu sebeplerden bazılarıdır. Yaşlılardaki patolojik değişimleri anlayabilmemiz için yaş alma ile birlikte görülen sürece hakim olmak gerekmektedir. Yaşlanma sürecinde vücut sistemlerinde, kas-iskelet yapısında, duyu sistemlerinde değişikliklerin ortaya çıkmasının yanı sıra geriatrik bireyler nörokognitif bilişsel süreçlerde de yavaşlamalar görülmektedir. Yaş almayla birlikte dikkat, algılama ve problem çözme yeteneğinde azalma, öğrenme, bilgi işleme, belleğe kayıt, hatırlama ve düşünme süreçlerinin hızında düşme, görsel-uzamsal beceri ve yürütücü işlevlerde bozulmalar görülür. Geriatrik bireylerle çalışan araştırmacıların diğer vücut sistemlerinin yanı sıra nörokognitif değişiklikleri de göz önünde bulundurması yaşlanma sürecini tam olarak yansıtabilmek açısından önemlidir.
Anahtar kelimeler: Geriatri, Fizyolojik Yaşlanma, Nörokognitif Süreç.

ABSTRACT
Several losses are observed in anatomical and physiological mechanisms in individuals with aging. These losses vary at different speeds and frequencies in each individual. The aim of this review is to examine the neurocognitive changes that occur in geriatric individuals. Among the characteristic features observed with aging are; decrease in the regulation of the body's homeostatic mechanisms (disorder in the thermoregulation system, decrease in baroreceptor sensitivity), deterioration of the stress response, decrease in reserve capacities in the visceral systems, decrease in adaptation ability (orthostatic hypotension that can be seen in combination with vestibular effects, inability to adapt to

FULL TEXTS BOOK

ambient temperature). Physiological changes that occur in the elderly; affect individuals' daily life activities, working life, dependency levels, adaptation to the environment and communication in social activities. However, many of the changes due to aging are not caused only by old age. Sedentary lifestyle, environmental conditions and stressful life, environmental changes due to aging are some of these reasons. In order to understand the pathological changes in the elderly, it is necessary to master the process that occurs with aging. In addition to the changes that occur in body systems, musculoskeletal structure, and sensory systems during the aging process, geriatric individuals also experience slowdowns in neurocognitive cognitive processes. With aging, there is a decrease in attention, perception, and problem-solving abilities, a decrease in the speed of learning, information processing, memory recording, recall, and thinking processes, and deterioration in visual-spatial skills and executive functions. It is important for researchers working with geriatric individuals to consider neurocognitive changes in addition to other body systems in order to fully reflect the aging process.
Keywords: Geriatrics, Physiological Aging, Neurocognitive Process.

GİRİŞ

Yaşlı sağlığı kapsamında çalışılan bir alan olan geriatri, yaşlanmanın fizyolojisi, yaşlı sağlığının korunması, ve yaşlılarda meydana gelen çeşitli problemlerle ilgilenen tıbbın özel bir dalıdır. Yaşlanma hali, yaşlı popülasyon ve yaşlılık geriatrinin tanımlamaları içerisinde yer almaktadır. Geriatri genel olarak yaşlı sağlığı ile ilgilenir (Çağaloğlu, H. 2022).

Günümüzde doğum oranlarındaki azalış ve ölüm oranlarındaki artış dünya nüfusunun negatif anlamda değişimler göstermesine sebep olmaktadır. İlerleyen yıllarda bu oranın 24 milyona ulaşabileceği tahmin edilmektedir (Çağaloğlu, H. 2022).

Yaşlanma Nedir ?

Uterus döngüsünden yaşamın son anına kadar devam eden süreçte ortaya çıkan herhangi bir rahatsızlık tanısıyla ilişkilendirilemeyen anatomik ve fizyolojik değişiklikler yaşlanma olarak tanımlanmaktadır (World Health Organization. 2015) .

Yaşlılık, yaşam süresinin; çocukluk, gençlik, yetişkinlik gibi olağan doğal ve zorunlu bir çağıdır. Kronolojik yaş: insanın içinde bulunduğu süreyi tanımlar, sosyal, biyolojik ve psikolojik faktörlerden, etkilerden farklıdır. Biyolojik yaş: biyolojik ve fizyolojik süreçlerde yaşlanmayla birlikte oluşabilen değişimleri tanımlar. Bu süreçler sosyo- kültürel faktörlerden, kişinin eğitim düzeyinden yaşam standartlarından etkilenir.

Dünya sağlık örgütü (DSÖ) söylemlerinde; dünya nüfusundaki yaşlılık oranının artmasıyla birlikte öncelikle demans, alzheimer gibi nörokognitif hastalıklarda artış görüldüğünü belirtmişlerdir.

Yaşlılık semptomlarındaki artışı etkileyen bazı faktörler bulunmaktadır. Bu faktörlerden bazıları; sigara kullanımı, sedanter hayat tarzı, bilinçsiz beslenme sonucunda meydana gelebilen obezite ve diyabet gibi gidişatı etkileyen olumsuz durumlardır (World Health Organization. 2015).

Yaşlanma süreci

Bireylerde yaş almayla birlikte anatomik ve fizyolojik mekanizmalarda birtakım kayıplar görülmektedir. Bu kayıplar; her bireyde farklı hız ve sıklıkta değişiklik göstermektedir. Yaşlanmayla birlikte görülen karakteristik özellikler arasında;

Vücudun homeostatik mekanizmalarının regülasyonunda azalma (Termoregülasyon sisteminde bozukluk, Baroreseptör duyarlılığında azalma), Stress yanıtının bozulması (Ateş, Anemi), Visseral sistemlerdeki rezerv kapasitelerinde azalma (Stress periyotlarında belirgin sıklık görülme durumu) ve Adaptasyon yeteneğinde meydana gelen azalma (Vestibüler etkilenimlerle kombine olarak görülebilen Ortostatik hipotansiyon, Ortam sıcaklığına uyum sağlayamama) gibi özellikler yer almaktadır.

İnsan zaman içinde yaş almaya bağlı olarak giderek artan kalıcı fonksiyon bozuklukları sebebiyle hastalıklara ve yaralanmalara açık hale gelmektedir (Kalyoncuo, S., & Tekinsoy Kartın, P. (2021).

FULL TEXTS BOOK

2010 yılında yayınlanan Birleşmiş Milletler (BM) raporuna göre; 65 yaş ve üzerindeki bireyler dünya nüfusunun yaklaşık %11'ini oluşturur. Ülkemizde ise; 2023 yılında %10.2 seviyelerinde seyretmektedir. Toplumun yaşlı oranın artması ve yaşam süresinin uzamasıyla, fonksiyonel kayıplarla birlikte sağlık hizmetlerine gereksinim de giderek artmaktadır. Fonksiyonel kayıpların en fazla görüldüğü yaşlı popülasyonu ise 85 yaş ve üzeri yaşlı bireylerdir (Ünlü, D., & Olgun, N. (2024). Bu derlemenin amacı; geriatrik bireylerde ortaya çıkan nörokognitif değişiklikleri incelemektir.

YAŞLANMANIN VÜCUT SİSTEMLERİNE ETKİSİ

Türkiye'de yürütülen çalışmaların sonucunda yaşlıların hipertansiyon, osteoartrit, kardiyak problemler, diyabet, osteoporoz gibi kronik hastalıklara sahip olduğu bildirilmiştir. Gerontologlar yaşlanma sürecini farklı kategorilere ayırmaktadırlar. Bu kategoriler arasında; kronolojik yaşlanma, biyolojik yaşlanma, psikolojik yaşlanma ve sosyal yaşlanma yer almaktadır. Kronolojik yaşlanma: Yaşlanma tanımını kişinin doğum tarihini temel alarak yapar. Biyolojik yaşlanma: Kalp, akciğer, dolaşım sistemi vb. organların fonksiyonel ve fiziksel açıdan farklılaşmalarından bahsedilir. Hücre sayısı yenilenmesi azalmakta bazı hücreler hiç yenilenmemektedir. Psikolojik yaşlanma: Duyu organlarının, öğrenme, hafıza, zekâ vb. beyinin algılama işlevlerinde kronolojik açıdan yaşın ilerlemesi ile görülmekte olan farklılaşmaya bakılır. Sosyal yaşlanma: Kişinin ailesi ve arkadaşlarıyla çalışma alanlarında, dini ve politik gruplardaki örgütlenmeler içerisinde üzerine düşen görevlerin değişmesi olarak açıklanır. (TOĞAÇAR, Ş., SEZER, S. Y., & DEMİR, M. B. (2022).

Yaşlanmayla birlikte insan vücudunun organlarında farklı derecelerde patolojik değişiklikler ortaya çıkacak ve bu da çeşitli hastalıklara neden olacaktır. (TOĞAÇAR, Ş., SEZER, S. Y., & DEMİR, M. B. (2022).

YAŞLILIKTA MEYDANA GELEN FİZYOLOJİK DEĞİŞİKLİKLER

Yaşlılık ile birlikte organların çalışmasındaki normal fizyolojik değişikliklerin bilinmesi hastalıklara bağlı ortaya çıkabilecek patolojilerin ayırt edilmesiyle tanı ve tedavi sürecinin planlanmasında kritik öneme sahip olmaktadır.

Yaşlılarda meydana gelen fizyolojik değişiklikler; bireylerin günlük yaşam aktivitelerini, çalışma hayatını, bağımlılık derecelerini, çevreye adaptasyonunu ve sosyal aktivitelerdeki iletişimini etkilemektedir. Bununla birlikte, yaş almaya bağlı olarak değişimlerin birçoğuna sadece yaşlılık sebep olmamaktadır. Sedanter yaşam tarzı, çevre koşulları ve stresli yaşam yaşlanmaya bağlı çevresel değişiklikler bu sebeplerden bazılarıdır. Yaşlılardaki patolojik değişimleri anlayabilmemiz için yaş alma ile birlikte görülen sürece hakim olmak gerekmektedir. Yaşlılık süreci, fonksiyonel kapasiteyle birlikte iyilik halini düzenleyen önemli ölçüde morfolojik-fizyolojik değişiklikleri etkileyen bir aşamadır. Bu süreçte yaş almayla birlikte maksimal efor sırasında ortaya çıkabilecek olan organ ve sistemlerin rezerv kapasitelerinde düşmeler görülebilir. Isı regülasyonu ve basınç sistemlerinin duyarlılığı ile ortaya çıkan internal homeostatik kontrol yeteneğinde azalma görülür. Çevresel değişikliklere uyma yeteneğinde azalmalar saptanır. Strese yanıt verme yeteneğinde azalma ortaya çıkar. Bu maddeler fizyolojik değişimlerin bazılarıdır. (World Health Organization. (2015). Tüm bu değişikliklerin ortak sonucu hastalık veya yaralanmaya duyarlılığının artmasıdır.

GENEL VÜCUT DEĞİŞİKLİKLERİ

Yaşın artmasıyla birlikte bazı vücut değişiklikleri görülebilir. Bu değişiklikler normal bir süreçtir. Boyun kısalması, omurgadaki dorsal kifoz, torakal kifoz ve göğüs çevre ölçümü değerleri azalmaktadır. Akciğer hacmi ve kapasitesi, impuls yanıtlarının hızı ve bazal metabolizma hızında da düşüşler görülmektedir. Yaşla birlikte cilt dokusu daha ince, daha elastik, kuru ve kırışık hale gelebilmektedir. Melanosit sayısındaki düşüşle beraber cilt ultraviyole (UV) ışığa karşı daha savunmasız hale gelir.

FULL TEXTS BOOK

Otonomik refleksler yavaşlar. Bundan dolayı; postüral hipotansiyon gelişimi meydana gelir, termoregülatör ısı değişikliklerine adaptasyon zorlaşır, hipotermi veya hipertermi risk oranı artar.

Yaşlı bireylerde servikal anterior tiltin artması, servikal omurgada ekstansiyon görülmesi, torasik kifoz belirginleşmeler ve lumbal lordoz açısında azalmalar görülebilmektedir. Üst ekstremitelerde ise; nötral dirsek açısının fleksiyon yönünde artış göstermesi, el bileklerinde ulnar deviasyona yönelim ve metakarpafalangeal, proksimal interfalangeal ve distal interfalangeal eklemlerde fleksiyon açısında artış ile birlikte skapular kanatlaşma, omuzların ekstansiyonu ve skapular protraksiyon pozisyonu görülebilmektedir.

Alt ekstremitede ise; kalça, dizlerin fleksiyonunda artış ve ayak bileği dorsifleksiyonunda azalma görülür. Dizlerde varus deformitesi gelişebilir. Femural anteversiyon açısındaki artış kalçaların valgus deformitesi ile sonuçlanır. Dizlerdeki fleksiyon sebebiyle vücudun ağırlık merkezi kalçaların önüne geçmektedir. Bunun sonucunda baston gibi yardımcı cihaz gereksinimi artmaktadır. Böylece yaşlı bireylerin; ayakta durma dengesi bozulmaktadır. (TOKGÖZ, G. (2022).

MUSKULOSKELETAL DEĞİŞİKLİKLER

Doku ve organ fonksiyonlarındaki ilerleyici düşmeler yaşlılığın başlıca özellikleridir ve kas-iskelet sistemi hastalığının önemli bir etkisini temsil eder. Yaşlı bireylerde; kronik kas-iskelet sistemi bozuklukları, fiziksel kırılganlık hareketliliğinin bozulmasına yol açan en yaygın durumlardır. Kas-iskelet sisteminin fizyolojik yaşlanması, sarkopeni, kemik kaybı veya osteoporoz olarak bildiğimiz kasın kuvvetinde azalma ve kas kütlesi kaybı ve kıkırdak veya osteoartritin (OA) etkilenmesiyle karakterize edilir. (Aydın, R., Genç, A., & Demirhan, B. (2023).

Yaşlanma ilerledikçe kas-iskelet sisteminde sıklıkla önemli fonksiyonel bozulmalar ortaya çıkar. Osteoartrit, osteoporoz ve sarkopeni yaşlanmayla ilişkilidir. Histiyositlerin yaşlanması bu hastalıkların gelişimini teşvik eder. (Aydın, R., Genç, A., & Demirhan, B. (2023). Kas kuvveti azalır. Kemiklerdeki kalsiyum azalır ve bunun sonucuda Kemik kütlesinde azalma görülür. Kırık riski artar. Düşme riski artar. Ve esneklik azalır.

Yetişkinlerde kas kütlesi vücut ağırlığının % 30'u kadardır, 75 yaşında ise vücut ağırlığının % 15'ine kadar azalmaktadır. Kas kuvvet kaybı 30 yaş sonrasında %10 ile %15 azalmaya başlar. Bu kayıp 55 yaşa kadar dikkat çekici değildir. 80 yaşından sonra kas kuvvetinde daha dramatik kayıplar görülür. Egzersiz yapmayanlarda 65 yaşından sonra % 20-40 maksimal kuvvet kaybı görülür. Yaş alma ile kasların tonus ve kontraksiyon yeteneği azalır. (Aydın, R., Genç, A., & Demirhan, B. (2023).

MERKEZİ VE PERİFERAL NÖROLOJİK DEĞİŞİKLİKLER

Yaşlanan beyin kütlesinde giderek azalmalar görülür. Serebral hemisferler, serebellum ve limbik sistem içerisinde yer alan birtakım anatomik yapılarda nörolojik kayıplar belirgindir. Bu kayıplar arasında hipokampüste meydana gelen değişimler ön planda yer almaktadır. Akson, dendrit ve sinaptik bağlantılarla sinir iletimini sağlayan yapıların hızında ve işleyişinde genel bir azalma görülebilir. İleri yaşlılıkta omurilik aksonlarının sayısında %37, sinir iletim hızında %10'luk azalmalar saptanmıştır. Bu değişiklikler sonucu reaksiyon hızı, harekete başlama ve bitirme süreleri gibi faktörler nöromusküler performansı etkilemektedir. Dolayısıyla periferal sinirlerde yaşlılık ile ortaya çıkan bu dejeneratif değişiklikleri; myelin kılıfta incelme, bu sebeple iletim hızının yavaşlaması ve reflekslerin kaybı takip eder. (Master's thesis, Fen Bilimleri Enstitüsü)

KARDİYORESPİRATUAR SİSTEM DEĞİŞİKLİKLERİ

Yaş almayla birlikte kalp atım sayısı, kalp atım hızı ve kardiyak output azalabilmektedir. Kalp duvar kalınlığı artmakta, damarlar elastikiyetini kaybetmektedir. Kalp çevresindeki yağ dokusu artmakta ve kalp kapakçıkları elastikiyetini kaybederek kalınlaşabilmektedir. Kardiyak sistemde meydana gelen bu değişimler; kalbin çalışma mekanizmasını etkileyerek, zamanla birlikte kronik kalp rahatsızlıklarına

FULL TEXTS BOOK

sebep olabilmektedir. Yaşlılarda koroner arter hastalığı, konjestif kalp yetmezliği, hipertansiyon, iskemik kalp hastalığı sık görülen kalp ve damar hastalıklarındandır. Yaşanan bu problemler sebebiyle dolaşım hızı yavaşlayarak farklılık gösterebilmekte, doku oksijenizasyonunda azalma, halsizlik, yorgunluk ve ödeme oluşumunu önlemeye karşı adaptasyon yeteneği zorlaşmaktadır. (Kalyoncuo, S. (2023). Yaş almayla birlikte, solunum kaslarında atrofi, diyaframda düzleşme, kostal kıkırdaklarda kalsifikasyon, göğüs kafesi boyutlarında değişim, toraksın elastikiyetini kaybetmesi gibi değişikliklerin ortaya çıkabilmesine sebep olmaktadır. Akciğer kapasitesindeki azalışa bağlı olarak metabolik gereksinime yanıt azalmakta, enfeksiyonel durum riskleri artmaktadır. Yaşın ilerlemesiyle birlikte oksijen alımı azalırken, buna bağlı egzersiz kapasitesinde azalma görülmektedir. Ayrıca solunum sistemini ilgilendiren kronik hastalıklara yol açabilmektedir. (Kaptan, G. & Dedeli, Ö. (2012).

DUYU DEĞİŞİMLERİ

Epidermis yaşlılık ile birlikte incelmekte ve epidermel hücrelerin regülasyon hızı azalmaktadır. Dokunma, ağrı ve basınç gibi duyularda değişimler görülmektedir.

Vestibüler sistemin işitme ve denge olmak üzere iki işlevi vardır. Yaşın ilerlemesiyle vestibülokohlear sistem değişim göstermekte ve bu yapıların fonksiyonlarında azalmalar görülebilmektedir. Yaşlanmayla birlikte korneanın saydamlığı ve elastikiyetinde değişiklikler olmakta ve lacrimalisin yapısında değişiklikler gözlenmektedir. Aynı zamanda lacrimal sıvı azalmaktadır. Pupillanın uyumu gecikebilmekte ve kornea refleksinde azalmalar meydana gelebilmektedir. Bu değişikliklerden dolayı görme problemleri oluşabilmekte ve göz enfeksiyonu riski artmaktadır.

Özellikle yaşlılarda koku ve tat reseptörlerinin azalmasıyla bireyler nörokognitif olarak etkilenmektedirler. Örneğin; koku duyusundaki azalmalar çevrelerinde oluşabilecek yangın, gaz kaçağı vb. problemleri de algılamalarında sınırlamalara yol açabilmektedir. (McIntyre, S., Nagi, S. S., McGlone, F., & Olausson, H. (2021).

ENDOKRİN SİSTEM VE İMMÜN SİSTEM DEĞİŞİKLİKLERİ

Yaşlılık sonucunda endokrin sistem birçok yönden değişime uğrayabilmektedir. Yaşlı kadın popülasyonda yaş almayla birlikte ilk olarak menapoz akla gelmektedir. Menapoz dönemi ortalama olarak 52 yaşında ortaya çıkmaktadır. Menopoz yaşını genetik ve çevresel faktörler etkileyebilmektedir. .Menopozun yaşam süresi ile doğru orantılı olduğu söylenmektedir. Yani yaşam süresi uzadıkça menapoza girme süresi uzar. Menapoz süreci boyunca östrojen düzeyleri azalmaktadır ve buna bağlı olarak vazomotor belirtiler, psikosomatik bozukluklar ve fiziksel değişimler görülebilmektedir. Erkeklerde endokrin sistem değişimleri 3. Dekat civarlarında daha sık görülebilmektedir. Literatürce; yaş aldıkça testosteron oranının azaldığı görülmüştür. Testosteronun azalması, hipogonadizm düzeylerine inmesi 60-70 yaşları bulmaktadır. Yaş aldıkça testosteron oranının azalmasının birden fazla nedeni vardır.Testislerde bulunan Leydig hücrelerinin testosteron üretiminde bozulmalar görülür. Bu bozulmalar; testesteron düzeyinin azalmasına sebebiyet verir. Ayrıca; hipotalamushipofiz eksenindeki görülen yetersizlikler yaşlı erkeklerin çoğunda sekonder hipogonadizm varlığını etkilemektedir . (Ağar, A. (2020).

NÖROKOGNİTİF DEĞİŞİMLER

Bilişsel süreçler kişilerin dil, düşünce ve zekâlarındaki değişiklikleri kapsamaktadır. Çarpım tablosunu ezberleme, takip edebilme, mimari bir projeyi tasarlama, bir tartışmada sağlam argümanlar oluşturabilme, kimlik numaramızı ezberleme, çılgınca alkışlanan bir sahne sanatçısı olmanın nasıl bir şey olacağını hayal etmek gibi işlevlerin hepsi bilişsel süreçleri içermektedir. Genetik faktörlerin de önemli bir etkisinin olduğu kognitif yeteneklerimiz, beyin dokusu ve sinaps yoğunluğunu arttıran öğrenme, çözme, eğitim gibi uyaranlarla artmaktadır. Böylece zamanla bilişsel yani kognitif bir birikim oluşur. Bu birikimin oluşumunda yüksek zihinsel yetenekler, akademik başarı, gelişmiş baş etme

FULL TEXTS BOOK

mekanizmaları ve sağlıklı yaşam gibi çok fazla faktör yer almaktadır. Yaşlılıkla birlikte ortaya çıkan bilişsel değişimler genel olarak gerileme ve kayıplar yönünde olup her kişide faklı düzeydedir. Ve her bireyde farklı bilişsel ve kognitif işlevlerde farklı oranlarda değişimler görülür. (Mohr, W. K. (2009). Yaşlanmayla birlikte etkilenen bilişsel süreçleri aşağıdaki gibi sıralayabiliriz:

Dikkat- Bellek – Algılama- Problem Çözme- Bilgi İşleme- Yürütücü İşlevler- Görsel-Uzamsal Beceri- Öğrenme- Düşünme- İşleme Hızı

Yaş almayla birlikte dikkat, algılama ve problem çözme yeteneğinde azalma, öğrenme, bilgi işleme, belleğe kayıt, hatırlama ve düşünme süreçlerinin hızında düşme, görsel-uzamsal beceri ve yürütücü işlevlerde bozulmalar görülür. Bununla birlikte yüksek kapasitedeki bilişsel birikimin, bilişsel işlevlerdeki bu yavaşlık ve kayıplara karşı koruyucu rol aldığı düşünülmektedir. Neyse ki ilerleyen süreye bağlı olarak bütün bu olumsuz yaşlanma değişimlerine karşın bireyin yaşam tecrübesinde ve entelektüel birikiminde artma gözlenmektedir. Yaşlılıkla birlikte kişinin zekâsında da değişimler görülmektedir (Mohr, W. K. (2009). Kısacası genel bilişsel kapasite olarak tanımlayabileceğimiz zekâ; yeni tecrübelere uyum sağlayarak bunlardan öğrenmeye yönelik çıkarımlar yapma becerisidir.

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MİKRO ŞEBEKELERDE SÜRDÜRÜLEBİLİR ENERJİ ENTEGRASYONU VE HOMER GRID OPTIMIZASYONU: ELEKTRIKLI ARAÇ ŞARJ ÇÖZÜMLERIYLE VERIMLILIĞIN ARTIRILMASI

SUSTAINABLE ENERGY INTEGRATION IN MICROGRIDS AND HOMER GRID OPTIMIZATION: ENHANCING EFFICIENCY WITH ELECTRIC VEHICLE CHARGING SOLUTIONS

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ÖZET

Fosil yakıtların hızla tükenmesi ve çevreye verdiği zararlar, yenilenebilir enerji kaynaklarına ve elektrikli araçların yaygınlaşmasına geçişi zorunlu kılmaktadır. Bu çalışma, Yalova Üniversitesi Merkez Kampüsü'ndeki binaların ve elektrikli araç şarj istasyonlarının enerji ihtiyaçlarını karşılamak için bir hibrit yenilenebilir enerji sistemi (HRES) tasarlamaktadır. HOMER Grid yazılımı kullanılarak, 8760 saatlik yük verisi, mevsimsel iklim değişkenleri ve şarj istasyonu kapasitelerini içeren simülasyonlar gerçekleştirilmiştir. Senaryo-1, optimal senaryo olarak öne çıkmış olup, 7.74 milyon $lık net bugünkü maliyeti, enerji başına 0.288 $ seviyelendirilmiş maliyeti ve 304,683 $ işletme ve bakım maliyetleri ile karakterize edilmiştir. Bu senaryo, enerjisinin %73'ünü yenilenebilir kaynaklardan elde etmekte ve 5.7 yıllık geri ödeme süresi öngörmektedir. Hibrit sistem, emisyonları önemli ölçüde azaltmış ve karbon dioksit için yıllık 387,653 kg, kükürt dioksit için 1,681 kg ve azot oksitler için 822 kg azalma sağlamıştır. Bu sonuçlar, üniversite kampüsleri gibi yüksek talep görülen ortamlarda yenilenebilir enerji sistemlerinin uygulanabilirliğini ve çevresel sürdürülebilirliğini göstermektedir.

Keywords: HOMER grid, Hibrit enerji sistemleri, Elektrikli araç şarj istasyonu, Tekno-ekonomik analiz, Enerji optimizasyonu.

ABSTRACT

The rapid depletion of fossil fuels and their environmental impacts necessitate a transition to renewable energy sources and the widespread adoption of electric vehicles. This study designs a hybrid renewable energy system (HRES) to meet the energy needs of buildings and electric vehicle charging stations at Yalova University Central Campus. Using HOMER Grid software, simulations incorporating 8760 hours of load data, seasonal climate variables, and charging station capacities were conducted. Scenario-1 emerged as the optimal scenario, characterized by a net present cost of $7.74 million, a levelized cost of energy of $0.288 per kWh, and operation and maintenance costs of $304,683. This scenario obtains 73% of its energy from renewable sources and has a projected payback period of 5.7 years. The hybrid system significantly reduces emissions, achieving annual reductions of 387,653 kg for carbon dioxide, 1,681 kg for sulfur dioxide, and 822 kg for nitrogen oxides. These results demonstrate the feasibility and environmental sustainability of implementing renewable energy systems in high-demand environments such as university campuses.

Keywords: HOMER Grid, Hybrid Energy Systems, Electric Vehicle Charging Station, Techno-Economic Analysis, Energy Optimization.

GİRİŞ

20. yüzyılda, içten yanmalı motor teknolojilerinin hızlı gelişimi ve karbon bazlı yakıtların yaygın kullanımı, otomobilleri ulaşım sektöründe en popüler araçlar haline getirdi (Leach ve ark. 2020). Ancak bu gelişme, atmosfere zararlı etkilerin artmasına yol açarak çevresel sorunlara neden oldu (Towoju ve Ishola, 2020). Fosil yakıtların doğaya verdiği zararları azaltma çabaları, yenilenebilir enerji teknolojilerine ve elektrikli araçlara yönelik geçişi hızlandırdı (Williams ve Blyth , 2022). Özellikle, elektrik ve elektronik alanlarındaki ilerlemeler, elektrikli araçların zararlı gazlar yaymadan ulaşım sektörüne hızla entegre olmalarını sağladı, çevre dostu ve ekonomik alternatifler sundu. Bu araçlar arasında elektrikli bisikletler, kaykaylar ve scooterlar bulunmaktadır. Küresel nüfusun artmasıyla bu

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teknolojilerin yaygınlaşması, küresel enerji tüketiminde de önemli artışlara yol açmaktadır (Hung ve Lim, 2019). Yine de, küresel elektrik üretiminin büyük bir kısmı fosil yakıtlardan sağlanmaktadır. Bu durum, yenilenebilir enerji kaynaklarını, örneğin rüzgar ve güneşi, elektrik enerjisine dönüştüren yeni uygulamaların gelişimini hızlandırmıştır. 2024 Şubat itibarıyla Türkiye'deki kurulu elektrik gücünün kaynaklara göre dağılımı şöyledir: %29.7 hidroelektrik, %23.3 doğal gaz, %20.3 kömür, %11.1 rüzgar, %11.5 güneş, %1.6 jeotermal ve %2.5 diğer kaynaklardan sağlanmaktadır (Güven ve Yücel, 2023). Yenilenebilir enerji kaynaklarının geliştirilmesi bu bağımlılığı azaltabilir ve ulusal ekonomiye önemli katkılarda bulunabilir.

Elektrikli araçların yaygınlaşması, aynı zamanda enerji depolama kapasitesiyle doğrudan ilgili başka bir meydan okumayı da beraberinde getirmiştir. Batarya teknolojilerindeki yavaş ilerleme, araçların menzil kapasitelerini sınırlamakta ve daha fazla şarj istasyonu kurulmasını gerektirmektedir. Bu konuda literatürde birçok çalışma bulunmaktadır. Örneğin, (Shafiq ve ark. 2023), Pakistan'da yenilenebilir enerji tabanlı bir ağa bağlı şarj istasyonları için teknik ve ekonomik değerlendirmeler yapmış, elektrikli araçların artan kullanımı ve yetersiz şarj olanaklarını ele almışlardır. Önerdikleri sistem, günlük şarj taleplerini karşılarken ağ yükünü ve enerji maliyetlerini azaltacak şekilde optimize edilmiştir. Başka bir çalışmada, Visakhapatnam'daki iş yerleri ve evler için uygun PV sistem kapasiteleri belirlenirken elektrikli araçların fotovoltaik panellerle şarj edilmesinin uygulanabilirliği araştırılmıştır (Sood ve ark. 2022).

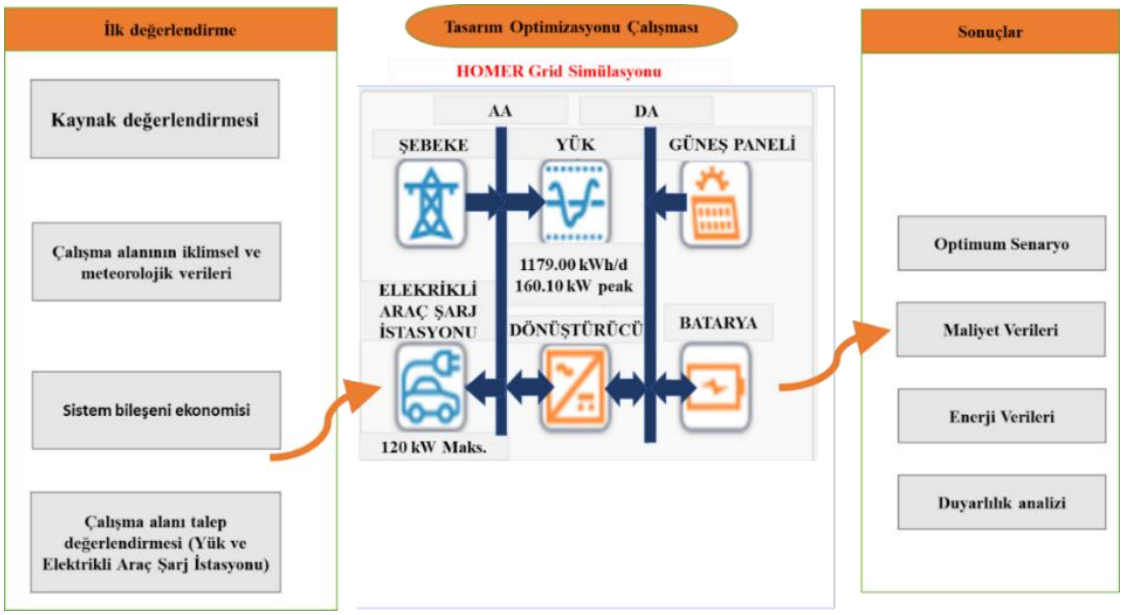
Bu çalışmaların yanı sıra, (Solanki ve ark. 2023) elektrikli araç bataryalarını sürekli şarj etmek için güneş fotovoltaik dizileri ve batarya enerji depolama sistemlerini kullanmışlardır. Bu sistemler, bataryalar tamamen şarj olduğunda fazla enerjiyi şebekeye geri verebilir veya güneş PV dizisi yeterli güç üretmediğinde enerjiyi şebekeden çekebilir. Bu tasarım, elektrikli araçların güneş enerjisi kullanılarak daha sürdürülebilir bir şekilde şarj edilmesini sağlamaktadır. (Oladigbolu ve ark. 2023) yaptıkları çalışma, yenilenebilir enerji kaynaklarının entegrasyonu yoluyla elektrikli araç (EV) şarj istasyonları için temiz enerji sağlamayı amaçlayan bağımsız bir sistem üzerinde teknik ve ekonomik analizler içermektedir. Araştırma sonuçları, mevcut şebekeye ek yatırımlar yapmak yerine, optimize edilmiş bağımsız bir EV şarj istasyonu sisteminin daha maliyet etkin, sürdürülebilir ve çevreye duyarlı bir seçenek sunabileceğini ortaya koymaktadır. Bu bulgular, elektrikli araçların enerji altyapılarına entegrasyonu konusundaki karmaşık zorlukları ve bu konuda yapılan çalışmaların geniş kapsamlılığını vurgulamaktadır. Ayrıca, her çalışma yenilenebilir enerji kaynakları ile elektrikli araç şarj altyapısının bütünleştirilmesine yönelik değerli bilgiler sunarak bu alandaki bilgi birikimine katkıda bulunmaktadır. Bu çalışmada, farklı Hibrit Yenilenebilir Enerji Sistemleri (HRES) senaryolarının performansı HOMER Grid programı kullanılarak değerlendirilmiştir. Dört senaryo, yük talebini karşılamak üzere simüle edilmiş ve her senaryo ekonomik ve çevresel parametreler açısından karşılaştırılmıştır. Simülasyonlar, güneş panelleri, şebeke ve bataryaların entegrasyonunu içeren ve enerji ihtiyaçlarını karşılarken maliyet etkinliği ve çevresel sürdürülebilirlik sağlayan Senaryo 1'i en uygun çözüm olarak belirlemiştir. Diğer senaryolar, dizel jeneratörler, rüzgar türbinleri ve batarya depolama sistemleri gibi çeşitlendirilmiş enerji üretim bileşenlerini içermekte olup, enerji sistemlerinin karmaşıklığını ve gerçek dünya uygulamalarının çeşitliliğini ortaya koymaktadır. Özellikle birinci senaryo, en verimli ve çevre dostu çözüm olarak belirlenmiş, güneş panellerinin şebeke bağlantıları ve batarya depolama sistemleri ile optimize edilmiş kullanımını sağlamaktadır. İkinci senaryo, güneş panellerini ve rüzgar türbinlerini dizel jeneratörler ve bataryalarla birleştirirken, üçüncü senaryo, yenilenebilir enerji kaynaklarının genişletilmiş kullanımını temsil eden şebekeye dizel jeneratörlerin entegrasyonunu içermektedir. Bu kapsamlı analiz, sürdürülebilir enerji sistemlerinin geliştirilmesi için sağlam bir temel oluşturmakta ve yenilenebilir enerji teknolojilerinin elektrikli araç şarj altyapısıyla daha ileri entegrasyonu için stratejik bilgiler sağlamaktadır.

MATERYAL ve METOD

Bu çalışma, Yalova Üniversitesi Merkez Kampüsü'ndeki binaların ve elektrikli araç şarj istasyonlarının 2022 yılına ait enerji taleplerinin HOMER Grid programı aracılığıyla teknik ve ekonomik analizlerini içermektedir. Sistem, günlük ortalama 5966.0 kWh yük talebi ile kayıt altına alınmış ve pik yük talebi 1005.91 kW olarak tespit edilmiştir. Elektrikli araç şarj istasyonunun günlük yük talebi ise 258 kW olarak hesaplanmıştır. Çalışma, iklimsel parametrelerin dikkate alınmasını sağlamak amacıyla, Yalova bölgesine özgü 2022 yılı verilerini kapsamlı bir şekilde kullanmıştır; bunlar arasında sıcaklık, güneş ışınımı ve rüzgar hızı bilgileri Türkiye Meteoroloji Genel Müdürlüğünden elde edilmiştir. Analizin odak

FULL TEXTS BOOK

noktası, kampüs binalarının enerji gereksinimlerini karşılamak ve mevcut fazla enerjiyi şarj istasyonlarındaki kullanım için etkin bir biçimde yönlendirmek olmuştur. Sürecin metodolojik yaklaşımını ve aşamalarını betimleyen Şekil 1, bu bütünleşik enerji yönetimi stratejisinin görsel bir özetini sunmaktadır.



Şekil 1. Optimizasyon akış süreci

Fotovoltaik panel

Bir güneş paneli, genellikle silikon gibi yarı iletken malzemelerden yapılmış olan fotovoltaik hücrelerden oluşan bir cihazdır. Bu paneller, güneş ışığını emer ve fotovoltaik hücreler aracılığıyla doğru akım (DA) enerjisine dönüştürür. Tek başına birimler olarak çalışabilirler veya güneş enerjisi sistemlerinin bileşenleri olarak bir araya getirilebilirler (Güven ve ark. 2023). Konut, ticari ve büyük ölçekli güneş enerjisi istasyonlarında elektrik üretimi için kullanılan güneş panelleri, düşük karbon ayak izleri nedeniyle sürdürülebilir ve çevre dostu bir enerji kaynağıdır. 1 kW güneş paneli sistemi için kurulum ve yenileme maliyetleri yaklaşık olarak 550 $ olarak tahmin edilmekte, yıllık bakım gideri ise 10 $ ve tahmini ömrü 25 yıl olarak öngörülmektedir.

PV panelinin güç çıkışı, Denklem (1) ile matematiksel olarak açıklanabilir:

$$P_{PV} = Y_{PV}\, f_{PV} \left(\frac{G_T}{G_{T,STC}}\right)\left[1 + \propto_f (T_C - T_{C,STC})\right]$$

Belirtilen Denklem (1)'de, P_{PV} (W) terimi fotovoltaik sistemin mevcut çıkış gücünü ifade eder. Y_{PV} (W), PV sisteminin standart test koşulları (STC) altında standart çıkış gücü olarak tanımlanırken, f_{PV} (%), PV sistemine gerçek dünya koşullarını hesaba katmak için uygulanan ayarlama faktörüdür. G_T (W/m²), herhangi bir anda PV modülünü etkileyen güneş ışınımını temsil eder ve $G_{T,STC}$ (1000 W/m²), PV sistemi üzerindeki güneş ışınımını STC altında, 25°C sıcaklıkta varsayılan ışınımı ifade eder. PV modülünün sıcaklık katsayısı, $\propto_f$ (%/°C) olarak not edilir ve genellikle %0.3 ile %0.5 arasında değişir, bu da PV çıkışının sıcaklık değişimlerine olan hassasiyetini gösterir. T_C (°C), PV modülünün mevcut sıcaklığını, $T_{C,STC}$ (°C) ise PV modülünün STC altındaki sıcaklığını belirtir ve bu da 25°C olarak ayarlanmıştır (Güven ve Poyraz, 2021).

HOMER yazılımı, PV sisteminin performansı üzerindeki sıcaklık katsayısının [$\propto_f$ (%/°C)] etkisini göz ardı ettiğinde, alternatif bir hesaplama yöntemi kullanır. Bu yöntem, denklem (2) olarak adlandırılır ve sıcaklığın etkileri az olduğunda veya sıcaklık değişimlerinin kesin etkisi önemli olmadığında süreci basitleştirir (Mussard ve ark. 2023).

$$P_{PV} = Y_{PV}\, f_{PV} \left(\frac{G_T}{G_{T,STC}}\right)$$

(2)

FULL TEXTS BOOK

Dizel jenerator

Bir dizel jeneratör (DG), dizel yakıt kullanarak elektrik enerjisi üreten bir cihazdır. Dizel jeneratörler genellikle elektrik kesintileri sırasında, yerel şebeke erişimi olmayan alanlarda veya geçici enerji ihtiyaçları için kullanılır. Taşınabilir küçük jeneratörlerden büyük endüstriyel ölçekli ünitelere kadar çeşitlilik gösterirler ve genellikle elektrik arzının sürekli olmadığı yerlerde yedek güç kaynağı olarak kullanılırlar (Güven ve Yörükeren, 2022). Ancak, dizel jeneratörlerin yanma süreci nedeniyle zararlı emisyonlar üretebileceği ve dizel yakıt maliyetlerinin dalgalanabileceği göz önünde bulundurulmalıdır. Sistemde kullanılan dizel jeneratörün emisyon değerleri şu şekildedir: CO 16.5, yanmamış HC 0.72, partikül madde 0.1 g/L, NOx yakıt başına 15.5. Yakıtın kükürt içeriği %2.2'dir. Dizel yedek jeneratörden çıkan güç, yakıt tüketimine bağlıdır. Jeneratörün yakıt tüketimini modellemek için lineer bir denklem kullanılır.

$$F_{DG} = a_1 P_{DG} + a_0 P_{DGR} \quad (3)$$

Burada, F_{DG} jeneratörün yakıt tüketimidir (l/saat), a_0 yakıt kesme katsayısıdır (l/saat/kW), P_{DGR} jeneratörün kapasitesidir (kW), a_1 yakıt eğrisi eğimidir (l/saat/kW) ve P_{DG} güç çıkışıdır (kW) (Li ve ark. 2022).

Rüzgar Türbini

Bir rüzgar türbini, rüzgar enerjisini mekanik enerjiye ve sonrasında elektrik enerjisine dönüştüren bir cihazdır. Rüzgar tarafından üretilen kinetik enerjiyi kullanarak elektrik üretmek için yaygın olarak kullanılan yenilenebilir bir enerji kaynağıdır. Rüzgar türbinleri genellikle, rüzgar çiftlikleri olarak bilinen gruplar halinde kurulur. Bir rüzgar çiftliği, genellikle geniş bir alana enerji sağlamak üzere bir elektrik şebekesine bağlı olarak aynı bölgede yer alan birden fazla türbinden oluşur. Rüzgar enerjisi, temiz, yenilenebilir ve sürdürülebilir bir enerji kaynağıdır (Ion ve Marinescu, 2019). Rüzgar türbinleri, karbon emisyonlarını azaltmada ve enerji bağımsızlığını artırmada önemli bir rol oynar. Sistemde kullanılan 1 kW rüzgar türbini için kurulum ve yenileme maliyetleri 750 $, yıllık bakım maliyeti 10 $, ömrü 25 yıl ve türbin yüksekliği 17 metredir.

$$P = \frac{1}{2} p C_p A v_\omega^3 \quad (4)$$

Denklem 4, genellikle rüzgar hızı ile bir rüzgar türbininin elektrik çıkışı arasındaki ilişkiyi tanımlar. İlgili parametreler genellikle türbinin süpürme alanını (A), hava yoğunluğunu (p) ve rüzgar hızını (v) içerir. Bu faktörler birlikte, belirli bir tasarım ve çevresel koşullara bağlı olarak, bir rüzgar türbininin rüzgar enerjisini ne kadar verimli bir şekilde elektrik enerjisine dönüştürebileceğini belirler.

Batarya (BT)

Bir BT, kimyasal enerjiyi elektrik enerjisine dönüştüren ve depolayan bir cihazdır. Çeşitli boyutlar ve kapasitelerde, farklı uygulamalar için mevcuttur. Taşınabilir elektronikler, araçlar ve enerji depolama sistemlerini güçlendirmede, şarj ve deşarj döngüleri sırasında kimyasal reaksiyonlardan yararlanarak kritik bir rol oynarlar. Şarj sırasında, elektrik enerjisi BT içindeki kimyasal reaksiyonları başlatarak enerjiyi kimyasal bir formda depolar. Deşarj olurken, depolanan kimyasal enerji tekrar elektrik enerjisine dönüştürülerek çıkış sağlanır. Bataryalar, taşınabilir cihazların işlevselliğini artırır, elektrikli araçlara güç sağlar ve evlerde ve işletmelerde yenilenebilir enerji sistemlerinin verimliliğini artırarak elektrik enerjisinin erişilebilirliğini iyileştirir (Allouhi ve Rehman, 2023).

Bir BT bankasından çıkan güç, Denklem (5) kullanılarak tahmin edilir.

$$P_{out} = I\, V_{output} = V_0 I - R_0 I^2 \quad (5)$$

Bu formül, BT bankasının iç direncini (R_0) ve nominal voltajını (V_0) dikkate alarak çıkış gücü P_{out} hesaplar ve enerji depolama sistemlerinin performansını değerlendirmek için önemlidir.

BT'nin şarj durumu (SOC), Denklem (6) kullanılarak tahmin edilebilir.

$$SOC\ (t+\Delta t) = min\{SOC(t)(1-\delta) + \eta_{ch}(P_{gen} - P_L)\Delta t, SOC_{max}\} \quad (6)$$

Burada t mevcut zamanı, Δt zaman aralığını, δ kendiliğinden deşarj oranını, η_{ch} BT verimliliğini, P_L güç talebini ve SOC_{max} maksimum izin verilen SOC'yi temsil eder.

FULL TEXTS BOOK

Üretilen güç P_{gen} belirlemek için hem PV dizileri hem de DG sistemleri kullanılır:

$$P_{gen} = \begin{cases} \eta_{Inv} P_{PV} & yalnızca\ pv\ dizisi \\ \eta_{Inv} P_{PV} + P_{DG} & PV\ ve\ DG\ sistemleri. \end{cases} \quad (7)$$

Burada η_{Inv} inverter verimliliğini ifade eder. Bu hesaplama, enerji üretim sistemlerini entegre etmek ve optimize etmek için hayati öneme sahiptir.

Şarj süreci sırasında, BT tarafından kabul edilebilecek güç, şarj akımı sınırlaması $I_{bat,c}^{lim}$ tarafından kısıtlanmıştır. Bu matematiksel olarak denklem (8)'de yer almaktadır.

$$P_{gen} - P_L < P_{bat,c}^{lim} = I_{bat,c}^{lim} \times V_{bat} \quad (8)$$

Burada V_{bat} BT'nin terminal voltajını temsil eder. Bu sınırlamanın uygulanması, BT'nin bütünlüğünü korumak ve kapasitesi ve operasyonel sınırları doğrultusunda giriş enerjisini kısıtlayarak aşırı şarjı önlemek için hayati önem taşır (Rawa ve ark. 2024).

Sistemde kullanılan bataryanın teknik ve ekonomik özellikleri şu şekildedir: Nominal voltajı 48V, maksimum kapasitesi 417 ve nominal kapasitesi 1.2 Amper-saattir. Maksimum şarj ve deşarj akımı 105 A'dır ve çift yönlü verimlilik %75'tir. Bataryanın sermaye maliyeti 10,700 $, yenileme maliyeti 9,300 $ ve ömrü 25 yıldır.

Çift yönlü dönüştürücü

İnverter, doğru akımı (DA) alternatif akıma (AA) çeviren bir cihazdır. Birçok elektronik alet ve sistem doğru akım ile çalışmakta iken, evler, iş yerleri ve genel güç altyapıları genellikle alternatif akım kullanır. Bu bağlamda, inverterler DA'den AA'ye enerji dönüşümünde hayati bir role sahiptirler. Küçük ölçekli taşınabilir aletlerden başlayıp, geniş ölçekli güneş veya rüzgar enerjisi sistemlerine kadar geniş bir uygulama yelpazesinde inverter teknolojisinden yararlanılmaktadır. İnverterlerin fonksiyonları ve kullanım alanlarına bağlı olarak çeşitli türleri ve özellikleri mevcuttur. İnverterlerin temel işlevi, DA girişini verimli bir şekilde AA çıkışa dönüştürmektir; bu da enerji verimliliği konusunda kritik bir öneme sahiptir. Bazı inverter modelleri ise voltaj ve frekans ayarları gibi ek fonksiyonlara imkan tanımaktadır. Sistemde kullanılan inverterin kurulum ve yenileme maliyeti 300 $ olarak belirlenmiş, yıllık bakım maliyeti sıfır $ olarak hesaplanmış ve kullanım ömrü 15 yıl olarak öngörülmüştür. İnverter kapasitesi, Denklem (9) aracılığıyla belirlenmiştir.

$$P_{inv} = \frac{E_{L,max}}{\eta_{DC/AC}} \quad (9)$$

Denklem (9)'da, P_{inv} (W), güç inverterinin kapasitesini belirtir, $E_{L,max}$ (Wh) yükün zirve enerji talebini ifade eder ve $\eta_{DC/AC}$ ise DC'den AC'ye dönüşümün verimlilik oranını simgeler (Singh ve Kumar, 2023).

Elektrikli araç şarj istasyonu

Elektrikli araç şarj istasyonları, sürdürülebilir ulaşımın önemli bir bileşeni olarak elektrikli araçların bataryalarını şarj etmeyi sağlayan altyapılardır. Bu istasyonlar, enerjiyi elektrikli araçlara aktararak bataryalarını doldurur ve böylece araçların kullanıma hazır hale getirilmesine imkan tanır. Genellikle evdeki standart prizler aracılığıyla gerçekleştirilen şarj işlemleri dışında, halka açık şarj istasyonları daha hızlı ve güvenli bir şarj süreci sunar. Bunlar tipik olarak şehir merkezlerinde, otopark alanlarında, alışveriş merkezlerinin yakınlarında, otoyol kenarlarında ve diğer kolay erişilebilir konumlarda yer almaktadır (Kumar ve ark. 2023).

Şarj istasyonlarının tasarımı, AA ve DA olmak üzere iki ana kategorideki farklı şarj teknolojilerine göre ayrılabilir. AA şarj noktaları daha düşük güç seviyelerinde çalışarak, genellikle ev ve iş yerlerindeki standart prizler aracılığıyla araçları tam olarak şarj etmek için uzun süreler gerektiren temel seviyedeki şarj hizmetini sağlar. DA şarj istasyonlarıysa, yüksek güç çıkışlarıyla araçları çok daha kısa sürede şarj etme kapasitesine sahip olup, bu durum özellikle yolda hızlı şarj ihtiyacı duyulduğunda büyük avantaj sunar (Singh ve Sharma, 2022). Her iki şarj istasyonu tipi de, çeşitli araç modelleriyle uyumluluk sağlamak için farklı konektör tipleri ve şarj standartlarına göre dizayn edilmiştir.

Tablo 1, Merkez Kampüsünde konumlandırılan şarj istasyonlarının teknik özelliklerini, güç çıkışını ve günlük kullanım sıklığını içermekte, Tablo 2 ise farklı elektrikli araç modellerinin—SUV'lar ve küçük elektrikli araçlar gibi—şarj istasyonlarındaki dağılımını ve şarj süreçlerini ayrıntılı olarak sunmaktadır.

FULL TEXTS BOOK

Bu bilgiler, elektrikli araçların yaygınlaşması sürecinde altyapı ihtiyaçlarının karşılanmasına ve kullanıcı deneyiminin iyileştirilmesine yönelik değerli veriler sağlamaktadır.

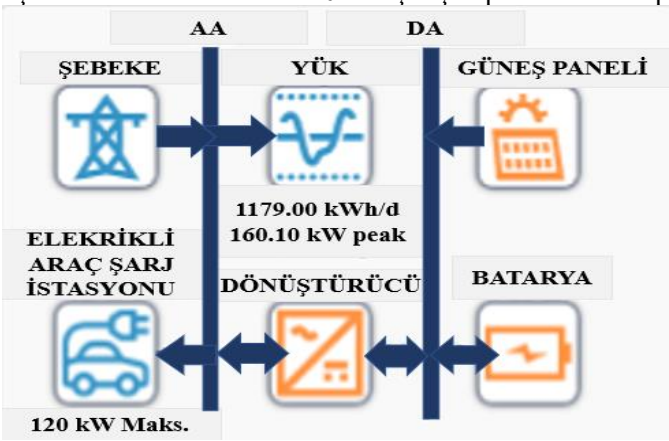
Tablo 1. Elektrikli araç şarj istasyonu teknik bilgileri

Şarj cihazı çıkış gücü (kW)	Şarj cihazı sayısı	Ölçekli Ort. Oturum/gün	Şarj cihazı yıllık yük profili (kWh/günlük ortalama.)
12	10	5	258

Tablo 2. Elektrikli araç tipleri

Araç tipi	Elektrikli araç nüfusu oranı(%)	Elektrikli araç başına maksimum şarj gücü(kW)	Ortalama şarj süresi (dk)
7SUV elektrikli araç	30	150	260
Küçük elektrikli araç	70	50	260

Şekil 2, dört farklı senaryo simülasyonundan en optimal sonuç olarak belirlenen Senaryo 1'in şematik temsilini göstermektedir. Elektrikli araç şarj istasyonu sistemine ait enerji akışını gösterirken, AA ve DA gücün entegrasyonu, zirve tüketimin etkisi ve güneş panelleri ile depolama bataryalarının dahil edilmesi detaylandırılmıştır. Sistem maksimum 120 kW çıkış kapasitesine sahiptir.



Şekil 2. Senaryo-1 mikroşebeke modeli

Enerji maliyet modellemesi

Enerji maliyeti, bir sistemin toplam yıllık enerji harcamasının AA ve DA yüklerinin toplamına bölünmesiyle hesaplanır ve bu ilişki matematiksel olarak denklem (10) ile ifade edilir. Bu denklem, enerji maliyetlerinin sistem içindeki AA ve DA yüklerine göre nasıl dağıtıldığını analiz ederek, enerji tüketimi üzerinden sistemin maliyet etkinliğini belirleme konusunda önemli bir metriktir (Seyed Alavi ve ark. 2023; Güven, 2017).

$$COST_{energy} = \frac{(COST_{yr,total})}{(DA_{load} + AA_{load})} \quad (10)$$

Bir sistemin enerji maliyeti, $COST_{energy}$, toplam yıllık maliyet olan $COST_{yr,total}$'in, sistemdeki AA ve DA yüklerinin toplamına, yani AA_{load} ve DA_{load}'a bölünmesiyle tanımlanır. Bu ilişki Denklem (10)'da açıkça ifade edilmiş olup, sistemin yıllık işletme maliyetine hem AA hem de DA güç tüketiminin farklı katkılarını dikkate alarak enerji birim maliyetini hesaplamak için net bir formül sağlar.

$$C_{year} = C_{re,fac}\,(i, R_{project_life}) \times C_{NPC,Total} \quad (11)$$

Bir sistemin proje ömrü boyunca net bugünkü maliyeti (NPC), denklem (11) ile ifade edilir. Burada C_{year}, yıllık maliyeti, sermaye geri kazanım faktörünü ($C_{re,fac}$) ve toplam NPC'yi ($C_{NPC,Total}$) içerir. Sermaye geri kazanım faktörü, indirim oranı (i) ve proje ömrü ($R_{project_life}$) işlevi olup, proje süresince eşdeğer yıllık maliyeti yansıtır (Yan ve ark. 2024; Güven ve Samy, 2022).

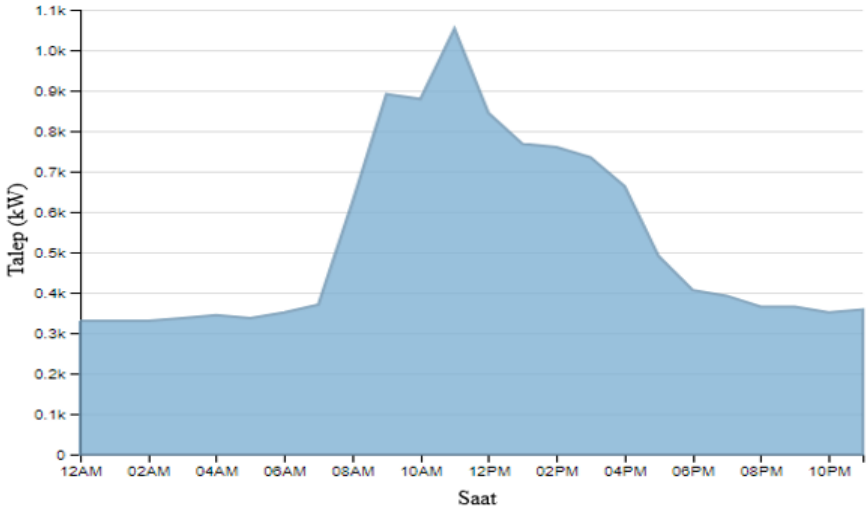
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Sermaye geri kazanım faktörü $C_{re,fac}$, bir yatırımın 'n' yıl boyunca 'i' faiz oranında geri kazanılması gereken yıllık ödemenin hesaplanmasında kullanılan finansal bir metriktir. Bu faktör, denklem (12) ile belirlenir ve sermaye maliyetini zaman içinde yansıtarak, gelecekteki ödemeler serisini tek bir mevcut değere dönüştürme sürecinde finansal analizlerin temel bir parçasıdır (Nasser ve Hassan, 2023).

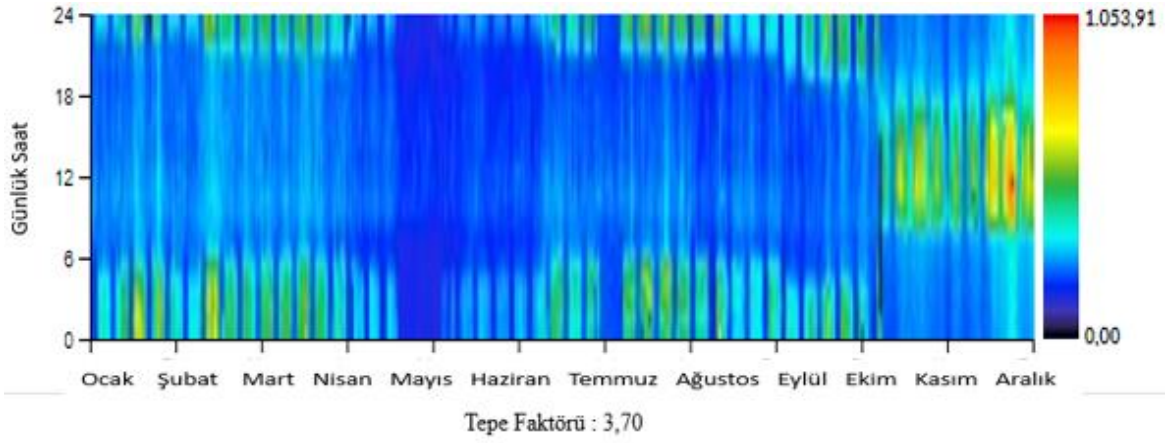
$$C_{re,fac}(i,n) = \frac{i(1+i)^n}{(1+i)^n - 1} \quad (12)$$

SONUÇLAR

Yalova Üniversitesi Merkez Kampüsü, hibrit enerji sisteminin kurulacağı yer olarak belirlenmiştir. Kampüsün ortalama elektrik tüketimi günlük olarak 6.127,3 kWh, aylık olarak 189,1 MWh ve yıllık olarak ise 2.269,3 MWh'dir. Yıl içindeki elektrik tüketimi zirvesi, 23 Aralık'ta 1.053,91 kW ile kaydedilmiştir. Ayrıca, Şekil 3'de gösterildiği üzere, en yüksek yük talebi 23 Aralık sabah saat 11:00 sıralarında 1.1 kW olarak ölçülmüştür. Sabah 7:30 ile öğlen 12:00 arasında yük talebinde bir artış gözlenmiş, öğlen 12:00'den akşam 6:00'ya kadar olan süreçte ise talep kademeli olarak azalmıştır. Bu veriler, kampüsün enerji kullanım dinamiklerini ve hibrit sistem için enerji ihtiyaçlarını belirlemede kritik öneme sahiptir.



Şekil 3. En yüksek talebin olduğu güne ait yük profili (23 aralık)



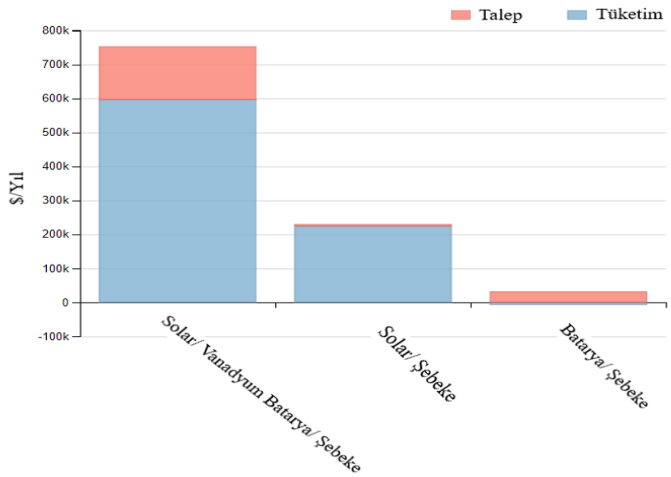
Şekil 4. Enerji tüketim modellerini gösteren ısı haritası

Şekil 4'ten de anlaşıldığı üzere, Ekim ayının ilk çeyreğinden başlayarak Aralık ayının sonuna kadar öğlen saatlerinde enerji tüketimi artmaktadır. Ayrıca, Mart ayının sonundan Haziran ayının başlarına kadar yük değerlerinin stabil olduğu gözlemlenmiştir. Bu dönemdeki yüksek ve düşük tüketim kalıpları, enerji yönetimi stratejilerinin planlanmasında önemli bir rol oynar. Ek olarak, tepe faktörü 3.70 olarak

FULL TEXTS BOOK

ölçülmüştür, bu da belirli zamanlarda maksimum talebin, ortalama talebe göre ne kadar yüksek olduğunu gösterir.

Şekil 5 incelendiğinde, Solar/Batarya/Şebeke kombinasyonunun yıllık talebinin 750 bin $ ve tüketiminin 600 bin $ olduğu görülmekte; bu da enerji fazlasının satıldığını gösteriyor. Solar/Şebeke durumunda yıllık talep 230 bin $ iken tüketim 225 bin $ olduğundan, yıllık yaklaşık 5 bin $lık bir enerji satışı yapıldığı anlaşılıyor. Batarya/Şebeke kombinasyonu için ise yıllık 25 bin $lık bir talep bulunmakta fakat tüketim gözlenmemekte. Bu durum, Solar/Batarya/Şebeke kombinasyonunun ekonomik açıdan en avantajlı seçenek olduğunu ortaya koymaktadır.



Şekil 5. Elektrik faturasında öngörülen yıllık tasarruflar

Tablo 3. Senaryo 1' e ait sistem önerilerinin karşılaştırması

Araç tipi	Temel durum	Solar/Vanadyum Batarya/ Şebeke (Senaryo 1)	Solar/Şebeke (Senaryo 1a)	Batarya/Şebeke (Senaryo 1b)
Maliyetler ve Karlar				
Sermaye gideri ($)	$0	4.134.180	675.806	251.091
İşletme gideri ($)	1.023.480	304.683	808.689	999.662
Yıllık toplam kar ($)	0	718.797	214.790	23.818
Yıllık fatura kar ($)	0	751.849	228.999	24.503
Yıllık talep masrafları ($/yıl)	221.428	66.04	216.372	190.412
Yıllık enerji ücretleri ($/yıl)	802.052	205.607	578.110	808.565
Ekonomik Parametreler				
İndirimli geri ödeme süresi(yıl)		7,5	3,6	19,7
Basit geri ödeme süresi(yıl)		5,7	3,1	10,2
Seviyelendirilmiş enerji maliyeti ($/kWh)	0,451	0,288	0,381	0,450
Maliyet/Kar oranı (%)		17.10	32.12	8.16
Bugünkü net maliyet ($)	12.103.740	7.737.383	10.239.420	12.073.160
Çevresel Etki				
Emisyon (ton/yıl)	1.433,4	387,7	1.079,8	1.146,5

FULL TEXTS BOOK

Tablo 3, Senaryo 1'e ait sistem önerilerini üç ana başlık altında karşılaştırmaktadır: Maliyetler ve karlar, ekonomik parametreler ve çevresel etkiler. Temel durumda yıllık toplam kar sıfırken, Senaryo 1 için 718.797 $, Senaryo 1a için 214.790 $ ve Senaryo 1b için 23.818 $ olarak hesaplanmıştır. Yıllık enerji ücretleri Temel durumda 802.052 $ iken, Senaryo 1'de 205.607 $'a, Senaryo 1a'da 578.110 $'a ve Senaryo 1b'de 808.565 $'a düşmektedir. kWh başına seviyelendirilmiş enerji maliyeti Temel durum için 0,451 $, Senaryo 1 için 0,288 $, Senaryo 1a için 0,381 $ ve Senaryo 1b için 0,450 $dır. Maliyet/kar oranı Temel durum için belirtilmemişken, Senaryo 1'de %17.10, Senaryo 1a'da %32.12 ve Senaryo 1b'de %8.16 olarak belirlenmiştir. Bugünkü net maliyet, Temel durum için 12.103.740 $, Senaryo 1 için 7.737.383 $, Senaryo 1a için 10.239.420 $ ve Senaryo 1b için 12.073.160 $dır. Karbondioksit emisyonlarına bakıldığında, Temel durum yıllık 1.433,4 ton iken, Senaryo 1'de 387,7 ton/yıl, Senaryo 1a'da 1.079,8 ton/yıl ve Senaryo 1b'de 1.146,5 ton/yıl olarak kaydedilmiştir. Bu sonuçlara göre, maliyet ve çevre dostu yaklaşım açısından en optimum simülasyonun Senaryo 1 olduğu belirlenmiştir.

Tablo 4. Temel durum elektrik faturası

	Ocak	Şubat	Mart	Nisan	Mayıs	Haziran	Temmuz	Ağustos	Eylül	Ekim	Kasım	Aralık
Enerji masrafları ($)	68.9	65.3	76.1	56.3	43.9	52.5	63.7	69.0	60.0	66.7	80.2	98.5
Tüketim kWh	196.8	187.1	219.0	159.9	123.2	149.4	182.4	199.8	171.9	191.0	219.3	267.7
Satış (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Talep ücretleri ($)	19.4	19.8	18.1	14.2	8.8	15.4	17.1	18.3	19.8	18.6	19.7	31.6
En yüksek talep (kW)	648	661	605	475	296	517	572	613	661	622	657	1.054
Sabit ücretler ($)	60	60	60	60	60	60	60	60	60	60	60	60
Aylık toplam ($)	88.3	85.2	94.3	70.6	52.8	68.1	80.9	87.4	79.9	85.4	100.1	130.1
Yıllık Toplam												$1.023.48

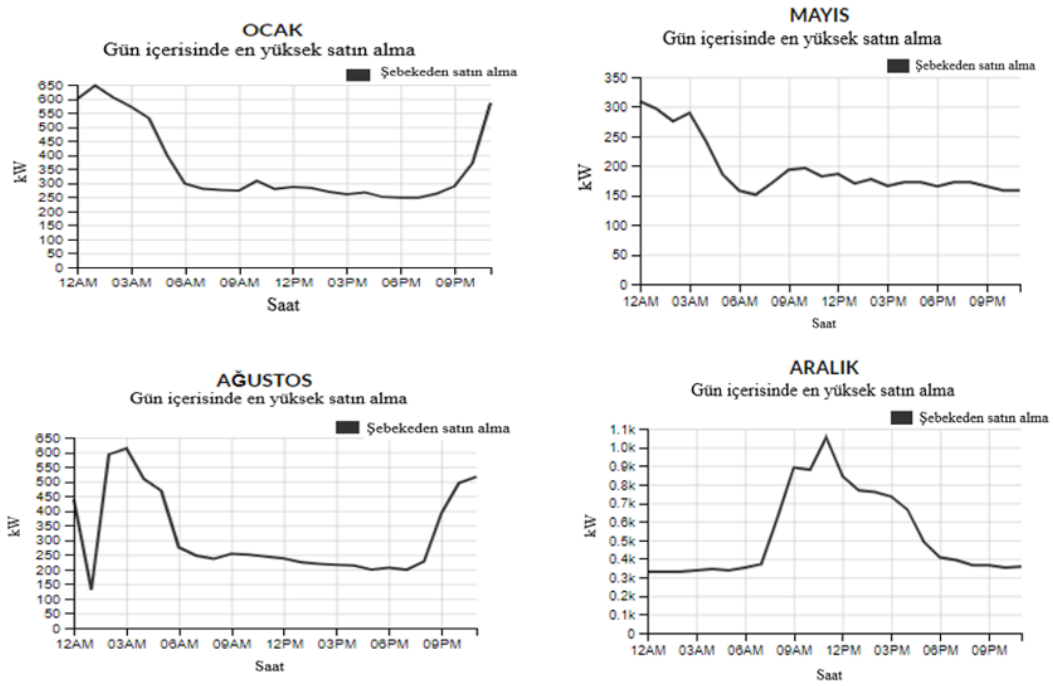
Tablo 4, bir yıllık dönem boyunca enerji masraflarını, tüketim miktarlarını, talep ücretlerini, en yüksek talep zamanlarını ve sabit ücretleri aylık bazda sunmaktadır. Ocak ayından Aralık ayına kadar enerji masrafları 68.9 $dan 98.5 $a değişirken, tüketim miktarları aynı dönemde 196.8 kWh'tan 267.7 kWh'a yükselmektedir. Satış sütunu boyunca herhangi bir kWh satışı yapılmamıştır. Talep ücretleri, aydan aya değişiklik göstererek 19.4 $dan 31.6 $a kadar çıkarken, en yüksek talep kW cinsinden 648'den Aralık ayında 1.054'e kadar yükselmiştir. Sabit ücretler ise her ay düzenli olarak 60 $ olarak sabitlenmiştir. Aylık toplam masraflar 88.3 $ ile başlayıp, yılın sonunda 130.1 $ 'a çıkmıştır. Yıllık toplamda ise masraflar 1.023,48 $ olarak hesaplanmıştır. Bu veriler, enerji tüketiminin yıl boyunca nasıl değiştiğini ve en yüksek talebin genellikle yıl sonuna doğru gerçekleştiğini göstermektedir.

FULL TEXTS BOOK

Tablo 5. Aylık emisyon değerleri

Ay	Ocak	Şubat	Mart	Nisan	Mayıs	Haziran	Temmuz	Ağustos	Eylül	Ekim	Kasım	Aralık
Emisyon(ton/yıl)	124	118	138	101	78	94	115	126	109	121	139	169

Tablo 5, Ocak ayından Aralık ayına kadar olan dönemi kapsayarak aylık karbon emisyon miktarlarını ton/yıl cinsinden göstermektedir. Yılın ilk ayı olan Ocak'ta emisyon miktarı 124 ton ile başlarken, Şubat ayında bir miktar düşerek 118 tona inmiştir. Mart ayında 138 ton ile yılın ilk çeyreğindeki en yüksek emisyon değerine ulaşılmış, Nisan ve Mayıs aylarında bu miktar sırasıyla 101 ve 78 ton 'a gerilemiştir. Haziran ayında tekrar bir artış görülerek 94 ton olarak kaydedilmiş, Temmuz ve Ağustos aylarında emisyonlar 115 ve 126 ton olarak devam etmiştir. Eylül ayında 109 ton, Ekim'de 121 ton ve Kasım'da 139 ton ile yükseliş göstermiş, Aralık ayında ise yılın en yüksek karbon emisyonu 169 ton olarak tespit edilmiştir. Bu değerler, yıl boyunca emisyon miktarlarının mevsimsel etkiler ve diğer faktörler doğrultusunda nasıl değişiklik gösterdiğini ortaya koymaktadır.



Şekil 6. Gün içerisinde şebekeden satın alma

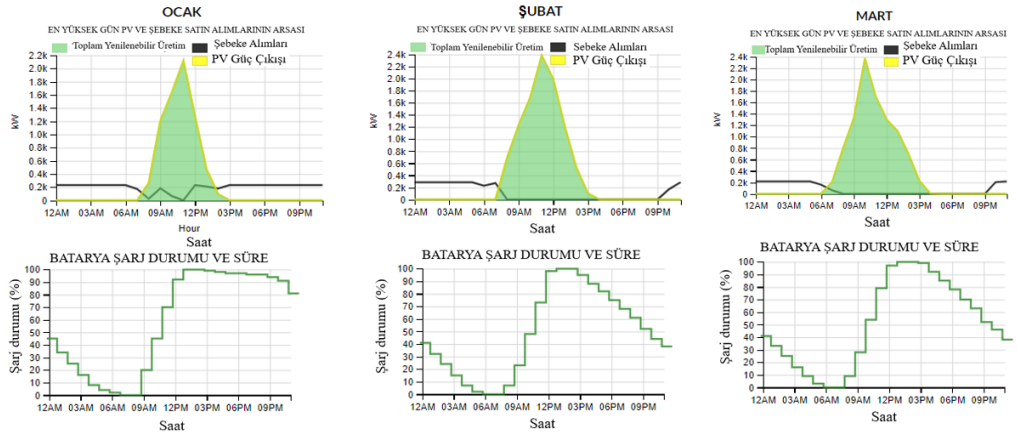
Şekil 6'da, gün içerisinde şebekeden satın alma grafiklerine göz attığımızda, Ocak ayında akşam 9 ile gece yarısı arasında bir artışın belirginleştiği görülmektedir. Gece yarısından sabah 6'ya kadar satın alma miktarları azalmakta, sabah 6'dan akşam 9'a kadar ise nispeten sabit kalmaktadır. Mayıs ayında, gece yarısından sabah 6'ya kadar olan düşüşün ardından sabah saatlerinden akşam 9'a kadar satın alma değerleri sabitlenmektedir. Ağustos ayında gece yarısından gece 2'ye kadar bir düşüş yaşandıktan sonra, gece 2'den 3'e kadar bir saat süren bir artış gözlemlenmekte ve bu artışın ardından sabah 6'ya kadar tekrar bir düşüş gerçekleşmekte, akşam 9'a dek sabit bir seyir izlenmektedir. Aralık ayında ise gece yarısı ile sabah 7 arası satın alma değerleri sabit durumdayken, sabah 7'den 11'e kadar artış belirginleşmekte ve sabah 11'den akşam 9'a kadar ise azalma eğilimi gözlemlenmektedir.

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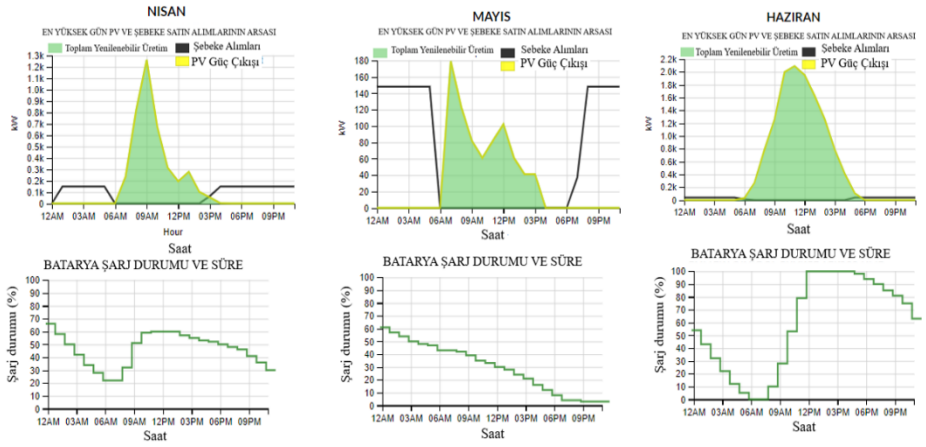
Tablo 6. Senaryo-1 elektrik faturası

	Ocak	Şubat	Mart	Nisan	Mayıs	Haziran	Temmuz	Ağustos	Eylül	Ekim	Kasım	Aralık
Enerji masrafları ($)	32.315	20.612	17.536	6.007	355	642	6.581	8.900	7.258	13.019	29.798	61.864
Tüketim (kWh)	95.173	61.924	54.215	18.513	1.116	2.108	20.492	28.145	21.577	39.625	87.542	182.945
Satış	26	67	105	128	172	174	187	188	134	109	24	10
Talep ücretleri ($)	6.942	8.578	6.533	4.464	710	1.228	3.341	4.870	4.911	5.056	6.010	13.382
En yüksek talep (kWh)	231	286	218	149	24	41	111	162	164	169	200	446
Sabit ücretler ($)	60	60	60	60	60	60	60	60	60	60	60	60
Aylık toplam ($)	39.317	29.250	24.129	10.530	1.124	1.930	9.982	13.830	12.229	18.135	35.868	75.306
Yıllık toplam ($)	271.631											

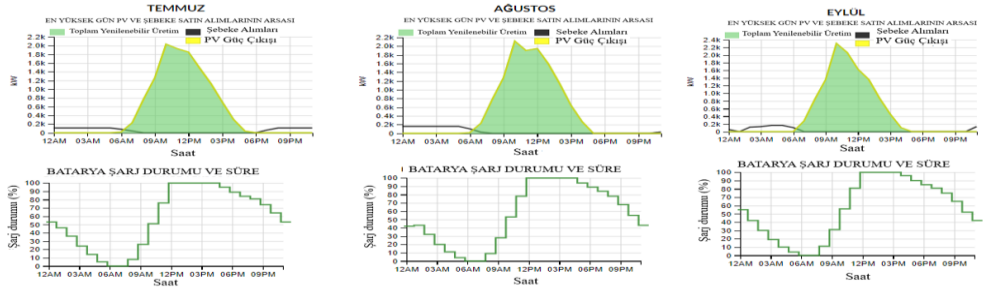
Tablo 6 , bir yıl boyunca her ay için enerji masraflarını, tüketimi, satışı, talep ücretlerini, en yüksek talep değerlerini ve sabit ücretleri göstermektedir. Ocak ayında enerji masrafları 32.315 $ ile başlayıp Aralık ayında 61.864 $a çıkmıştır. Tüketim kWh cinsinden Ocak'ta 95.173 ile başlayıp Aralık'ta 182.945 kWh'a yükselmiştir. Satışlar aydan aya değişiklik göstermiş, en düşük 10 kWh Aralık'ta ve en yüksek 188 kWh Ağustos'ta kaydedilmiştir. Talep ücretleri Ocak'ta 6.942 $ iken, Aralık'ta 13.382 $a çıkmıştır. En yüksek talep Ocak'ta 231 kW iken Aralık'ta 446 kW'a yükselmiştir. Sabit ücretler her ay düzenli olarak 60 $ olarak belirlenmiştir. Aylık toplam masraflar Ocak'ta 39.317 $ ile başlayıp, yıl sonunda 75.306 $a yükselmiştir, bu da yıllık toplamın 271.631 $ olduğunu gösterir. Bu veriler, enerji tüketimi ve maliyetlerinin yıl boyunca nasıl dalgalanabileceğini gösteren önemli bir kaynaktır.



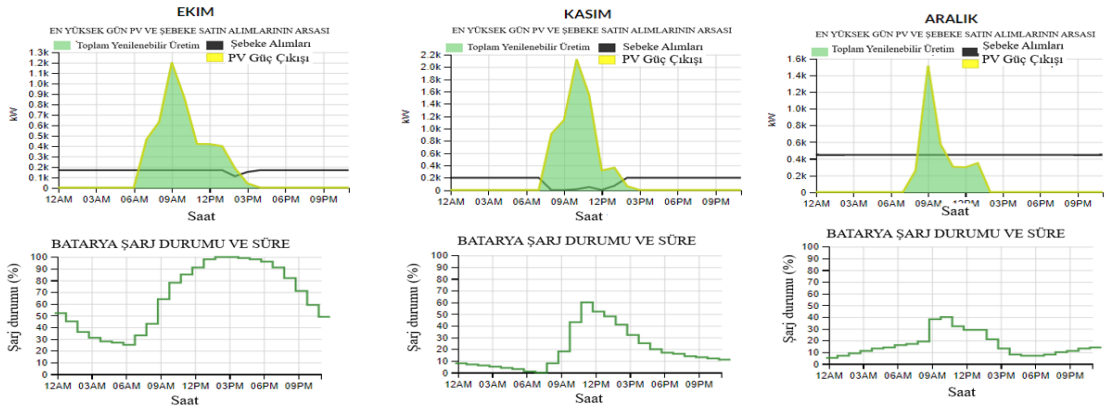
Şekil 7. Kış ayları üretim , tüketim ve batarya şarj durumu



Şekil 8. İlkbahar ayları üretim , tüketim ve batarya şarj durumu



Şekil 9. Yaz ayları üretim , tüketim ve batarya şarj durumu



Şekil 10. Sonbahar ayları üretim , tüketim ve batarya şarj durumu

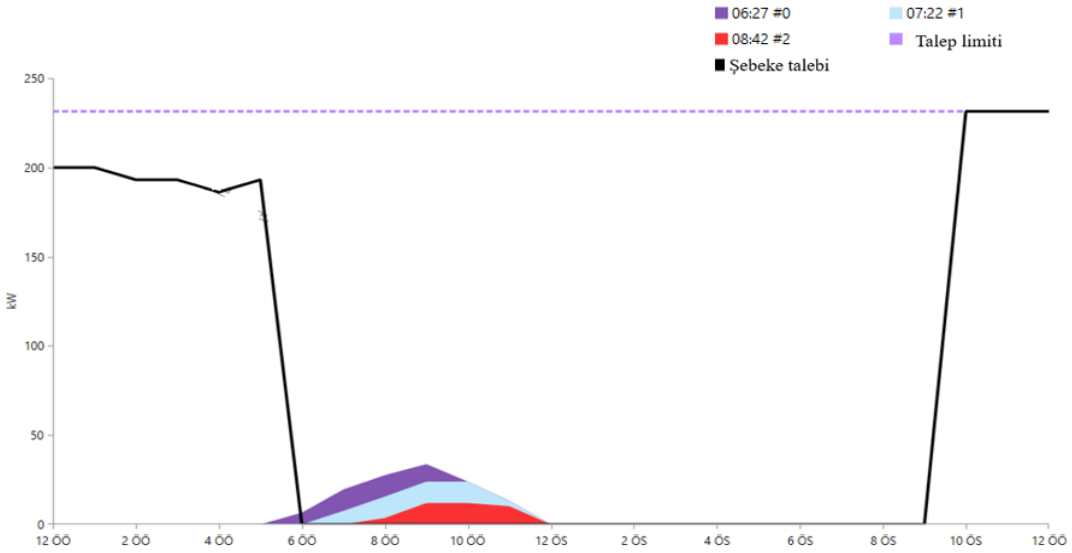
Şekil 7, Ocak, Şubat ve Mart aylarındaki güneş enerjisi üretimi ve batarya şarj durumları arasındaki farklılıkları aydınlatmaktadır. Ocak ayı verileri, güneş enerjisinin öğlen saatlerinde üretiminin pik yaptığını gösterirken, bu zirve Şubat ve Mart aylarında bir miktar azalma göstermiştir. Batarya şarj seviyeleri, güneşin varlığında önemli ölçüde artış gösterirken, şebeke enerjisi alımı da buna ters orantılı bir azalış sergilemiştir. Şubat ayında, öğleden sonraki saatlerde batarya şarjının maksimuma ulaştığı ve akabinde azaldığı gözlemlenirken, Mart ayında batarya şarj seviyelerinin daha erken saatlerde doruğa ulaşıp, gün içinde azaldığı belirginleşmiştir.

Şekil 8, Nisan, Mayıs ve Haziran aylarını kapsayan ilkbahar dönemine ait güneş enerjisi üretimi, şebeke alım-satımı ve batarya şarj durumunu saatlik verilerle karşılaştırmalı olarak sunmaktadır. Nisan ayında, güneş enerjisi üretimi öğlen saatlerinde 1.3 kW'a kadar yükselmiş ve bu üretimin batarya şarj düzeylerine pozitif bir etkisi olmuştur. Şebeke alım miktarları da, güneş enerjisi üretiminin düşük olduğu sabah ve akşam saatlerinde artış göstermiştir. Mayıs ayına gelindiğinde, güneş enerjisi üretiminin pik

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değerleri Nisan ayına göre bir artış göstererek yaklaşık 160 kW'a ulaşmıştır. Bu artışla birlikte batarya şarj düzeylerinin de daha yüksek olduğu ve öğlen saatlerinde %90'ın üzerine çıktığı gözlemlenmektedir. Bu, Mayıs ayında güneş ışığının artan süresi ve yoğunluğunun doğrudan etkisi olarak yorumlanabilir. Haziran ayında ise, güneş enerjisi üretimi daha da artarak öğlen saatlerinde yaklaşık 1.8 kW'a kadar yükselmiştir, bu durum batarya şarj seviyelerinin neredeyse tam kapasitede olduğunu gösterir. Bu, ilkbahar ayları boyunca artan güneş ışığının ve daha uzun gün ışığı saatlerinin etkilerini yansıtmaktadır. Batarya şarj durumunun gün içerisindeki yüksek oranları, enerjinin etkin bir şekilde depolandığını ve şebeke ihtiyacının azaldığını işaret etmektedir. Genel olarak, Şekil 8'in sağladığı veriler, ilkbahar ayları boyunca güneş enerjisi üretimindeki mevsimsel artışın, batarya depolama kapasitesi ve şebeke alım-satım stratejileri üzerindeki etkilerini gözler önüne sermektedir. Enerji üretimindeki bu mevsimsel artışlar, yenilenebilir enerji sistemlerinin tasarımı ve yönetimi için önemli çıkarımlar sunar ve daha uzun gün ışığı saatlerinin avantajlarından maksimum derecede yararlanılmasını sağlar.
Şekil 9'da Temmuz, Ağustos ve Eylül ayları için güneş enerjisi üretimi, tüketim ve batarya şarj durumları grafiklerle sunulmaktadır. Temmuz ayında, özellikle öğlen saatlerinde güneş enerjisi üretiminin doruğa ulaştığı ve bu üretimin batarya şarj seviyelerini yükselttiği gözlemlenmektedir. Ağustos ayında güneş enerjisi üretiminin daha da arttığı ve şebeke alımlarının azaldığı; Eylül ayında ise güneş enerjisi üretiminin azalmaya başladığı, fakat hala yüksek şarj seviyeleri sağladığı görülmektedir. Yaz aylarında güneşin pozisyonunun enerji üretimi üzerindeki etkisi net bir şekilde belirginleşirken, batarya şarj durumlarının gün boyu yüksek seviyelerde kaldığı ve şebeke ihtiyacının minimuma indiği dikkat çekiyor. Bu durum, enerji depolama sistemlerinin ve fotovoltaik panellerin yüksek verimliliğinin bir göstergesi olarak yorumlanabilir. Eylül ayına gelindiğinde ise güneş ışığının azalmasına rağmen, batarya şarj durumunun güçlü bir performans sergilediği gözlenmiştir. Bu üç ay arasında, güneş enerjisi üretiminin en yüksek seviyeye Ağustos ayında ulaştığı ve bu ayın aynı zamanda en düşük şebeke enerjisi tüketimine sahip olduğu anlaşılmakta. Temmuz ve Eylül aylarında da benzer bir eğilim olmakla birlikte, Eylül ayında üretimin azalmasına rağmen batarya şarjının yüksek kapasitede kalması enerji depolamanın önemini vurgulamaktadır.

Şekil 10, Ekim, Kasım ve Aralık aylarına ait güneş enerjisi üretimi, şebeke alım-satımı ve batarya şarj durumlarını saatlik bazda sergilemektedir. Ekim ayında, öğlen saatlerinde güneş enerjisi üretimi yaklaşık 1.3 kW'a ulaşarak zirve yaparken, Kasım ayında bu üretim yaklaşık 2.0 kW'a yükselmiştir. Aralık ayı itibarıyla, üretim 1.6 kW seviyelerine düşüş göstermiştir. Güneşin varlığında batarya şarj durumlarının Ekim ayında %80'lere kadar yükseldiği gözlemlenirken, Kasım ayında bu oran %90'a ulaşmış, Aralık ayında ise azalan gün ışığına rağmen %60'ın üzerinde kalmayı sürdürmüştür. Şebeke alımlarının günün erken ve geç saatlerinde arttığı göz önünde bulundurulduğunda, enerji depolama sistemlerinin gün içinde güneş enerjisinin yetersiz olduğu zamanlarda şebeke yükünü dengelemekteki rolü vurgulanmaktadır.

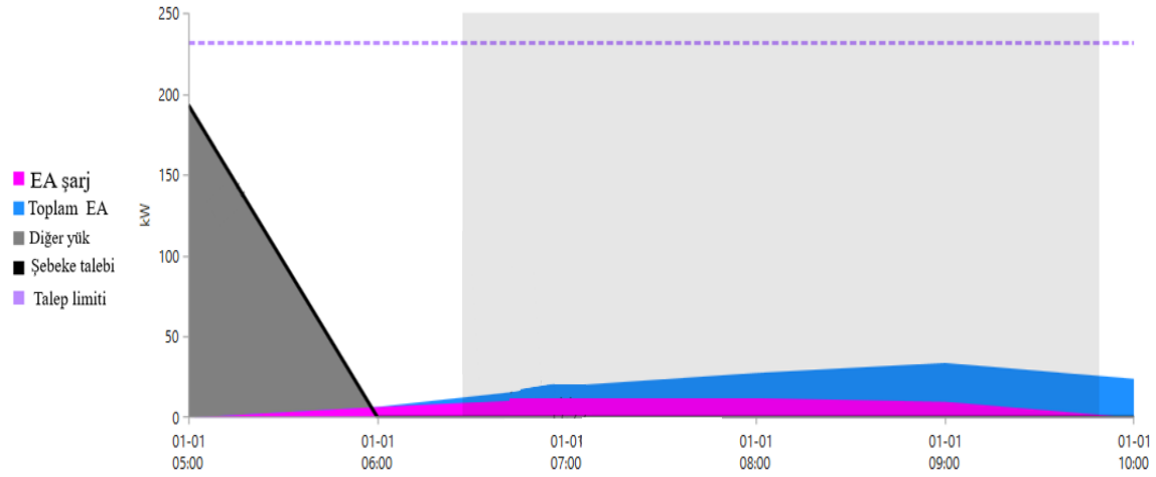


Şekil 11. 1 Ocak 2022 de şarj istasyonu günlük yük profili

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Şekil 11, 1 Ocak 2022 tarihine ait bir şarj istasyonunun günlük yük profilini göstermektedir. Grafikte saat dilimleri boyunca şarj edilen araç sayısını ve enerji kullanımını görebiliyoruz. Sabah 5:20'de başlayan şarj hizmeti, öğlen 11:45'e kadar devam etmiş ve sonrasında herhangi bir şarj aktivitesi kaydedilmemiştir. Enerji servisi, bu süre zarfında 125 kWh olarak ölçülmüş, bu da ortalama olarak her bir aracın yaklaşık 41.6 kWh enerji tükettiğini gösteriyor. Bu veri, şarj istasyonunun kapasitesi ve kullanım zamanlarının yanı sıra, elektrikli araç kullanıcılarının şarj alışkanlıkları hakkında önemli bilgiler sağlamaktadır. Şarj istasyonunun talep limitinin sabit bir şekilde 250 kW olarak ayarlandığı ve bu süre zarfında talebin asla bu limiti aşmadığı görülüyor. Ayrıca, renkli alanlar şarj edilen araçların enerji kullanım profilini, özellikle de en yoğun şarjın sabah erken saatlerde gerçekleştiğini vurgulamaktadır. Bu, genellikle araç sahiplerinin günlük işlerine başlamadan önce araçlarını şarj etmeyi tercih ettikleri anlamına gelebilir. Böyle bir grafik, bir şarj istasyonunun kapasitesinin ve hizmet saatlerinin ne şekilde planlanması gerektiği, zirve saatlerdeki talebin nasıl karşılanacağı ve olası gelecekteki genişletme ihtiyaçlarının öngörülmesi açısından önemli bilgiler sunmaktadır.

Şekil 12, 1 Ocak 2022 tarihinde şarj edilen küçük araçların şarj profili verilerini sunmaktadır. Sabah 5'te başlayan şarj işlemi, saat 6'ya kadar şebekeden sağlanan enerji ile gerçekleşmiştir, bu durum grafiğin koyu renkli alanıyla gösterilmiştir. Saat 6'dan itibaren ise enerji talebi, batarya depolama ve fotovoltaik panellerden gelen enerji ile karşılanmaya başlanmıştır, bu da grafiğin mor ve mavi renkli bölümleriyle temsil edilmiştir. Grafiğin genelinde, talep limitinin 240 kWh olarak belirlendiği ve bu limitin aşılmadığı görülüyor. Bu veriler, söz konusu tarihte küçük araçlar için tasarlanmış şarj istasyonunun enerji kullanım desenlerini ve şarj altyapısının saatlik dinamiklerini gösterir. Enerji kaynaklarının zaman içindeki kullanım dağılımı, şarj istasyonu operasyonlarının ve enerji yönetim stratejilerinin planlanması için önemli bilgiler sağlamaktadır. Bu bilgiler, enerji talebinin ve tedarik yöntemlerinin optimize edilmesine yardımcı olabilir ve özellikle enerji yoğun saatlerde şebeke yükünü hafifletmek için alternatif enerji kaynaklarının etkin kullanımını teşvik eder.

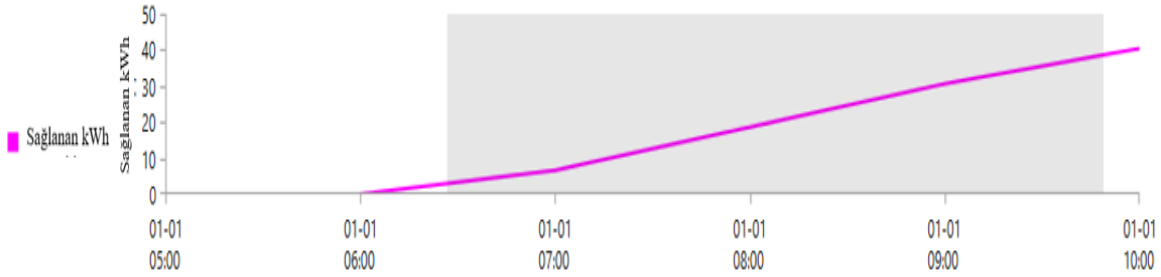


Şekil 12. 1 Ocak 2022'de şarj edilen küçük araç şarj profili

Şekil 13, 1 Ocak 2022 tarihinde küçük bir aracın şarj edilmesi sırasında sağlanan güç profilini lineer bir eğilim ile göstermektedir. Sabah 5'te sıfır kWh'tan başlayarak, saat 10'a kadar sürekli ve düzgün bir şekilde artan bir enerji sağlanışını gözlemlenmiştir. Saatlik enerji sağlanış miktarı, bu süreç boyunca lineer olarak artarak yaklaşık 50 kWh'e ulaşmaktadır. Bu grafik, şarj istasyonunun enerji sağlama kapasitesinin sabahın erken saatlerinden itibaren istikrarlı bir şekilde arttığını gösterir. Bu, potansiyel olarak aracın şarj durumunun düşük olduğu bir başlangıç noktasından, sabah saatlerinde artan bir şarj ihtiyacına cevap verme kapasitesini yansıtmaktadır. Grafikteki lineer artış, şarj altyapısının sabit bir enerji tedariki sağlama yeteneğini ve şarj süresince enerji çıktısının tutarlılığını belirtir. Bu tip bir grafik, şarj altyapılarının planlaması ve enerji tedarik stratejileri için önemlidir. Özellikle, elektrikli araç kullanıcılarının şarj alışkanlıklarını ve şarj talebinin gün içinde nasıl değiştiğini anlamak adına değerli

FULL TEXTS BOOK

bilgiler sunar. Ayrıca, şarj hizmetlerinin etkinliği ve güvenilirliği hakkında da içgörüler sağlar. Bu veriler, şarj istasyonları için enerji yönetimi ve talep tahminlerinde kullanılabilir ve daha geniş enerji ağının parçası olarak şarj altyapısının nasıl entegre edileceğine dair planlamalar yapılmasına yardımcı olur.



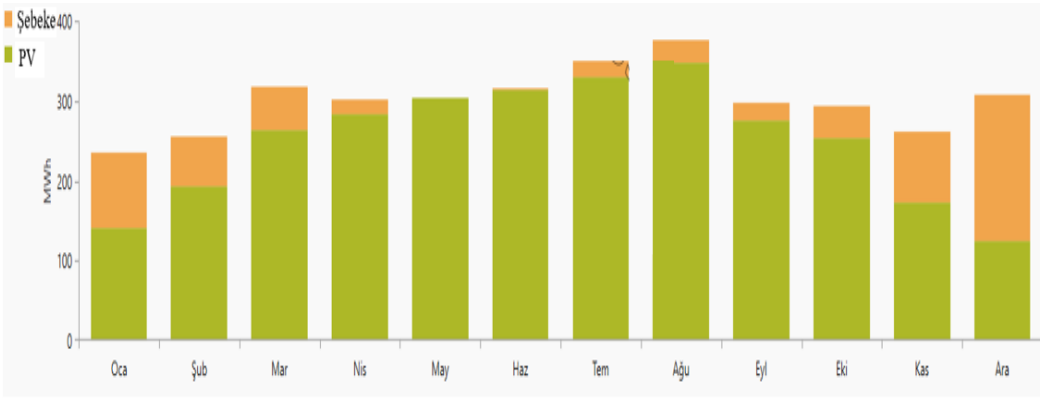
Şekil 13. 1 Ocak 2022'de küçük araç şarj için sağlanan güç profili

Tablo 7, elektrikli araç şarj istasyonu sistemine ait maliyet bileşenlerini detaylı bir şekilde sunmaktadır. Güneş panelleri (PV) için yapılan ilk yatırım 1.415.914,64 $ olup, ömür boyu süresince herhangi bir değiştirme maliyeti öngörülmemiş, bakım için ise toplam 334.894,07 $ harcanmıştır. Vanadyum batarya sistemi, 2.535.900,00 $'lık bir yatırım maliyeti ile bu tabloda en yüksek başlangıç yatırımına sahiptir ve yine herhangi bir değiştirme veya bakım maliyeti bulunmamaktadır. Konvertör bileşeni için 182.364,95 $ yatırım yapılmış, 67.620,61 $'lık bir değiştirme maliyeti ve -11.633,66 $'lık bir hurda değeri hesaplanmıştır. Şebeke maliyetleri ise, sadece bakım kalemi altında toplam 3.212.322,59 $ olarak rapor edilmiştir. Bütün bu maliyetler göz önünde bulundurulduğunda, sistem için toplamda 7.737.383,21 $'lık bir yatırım yapıldığı görülmektedir. Bu maliyetlerin toplamı, sistem bileşenlerinin uzun vadeli finansal planlaması için önemli bir göstergedir ve enerji altyapısının kurulumu ve sürdürülebilirliği açısından kritik öneme sahiptir. Bu veriler, sistem komponentlerinin başlangıç yatırımlarının yanı sıra, ömür boyu maliyetlerini ve potansiyel getirilerini de hesaba katarak, elektrikli araç şarj istasyonlarına yapılan yatırımların ekonomik analizinde kullanılabilir. Özellikle şebeke ile ilişkili yüksek bakım maliyetleri, enerji altyapı planlamasında stratejik kararlar alırken dikkatlice değerlendirilmesi gereken bir unsur olarak öne çıkmaktadır.

Tablo 7. Elektrikli araç şarj istasyonu

Komponentler	Yatırım maliyeti ($)	Değiştirme ($)	Bakım ($)	Yakıt ($)	Hurda ($)	Toplam ($)
PV	1.415.914,64	0,00	334.894,07	0,00	0,00	1.750.808,71
Vanadyum Batarya	2.535.900,00	0,00	0,00	0,00	0,00	2.535.900,00
Konvertör	182.364,95	67.620,61	0,00	0,00	-11.633,66	238.351,90
Şebeke	0,00	0,00	3.212.322,59	0,00	$0,00	3.212.322,59
Sistem	4.134.179,59	67.620,61	3.547.216,66	0,00	-11.633,66	7.737.383,21

FULL TEXTS BOOK



Şekil 14. Senaryo-1 aylara göre elektrik üretimi

Şekil 14, aylık enerji üretimini şebeke ve fotovoltaik paneller üzerinden sergileyerek, bu iki kaynağın zaman içerisindeki üretim profillerini açıkça ortaya koymaktadır. Şebeke kaynaklı elektrik tedariki, yılın tüm aylarında oldukça sabit bir seyir izlerken, PV panellerinden sağlanan enerji üretimi yaz aylarında belirgin bir artış göstermiştir. Bu durum, artan güneş ışığı süresinin ve yoğunluğunun fotovoltaik üretim kapasitesine etkisini yansıtır. Buna karşın, kış mevsimi yaklaştıkça PV panel verimliliğinin azaldığı, dolayısıyla şebeke elektriğine olan bağımlılığın arttığı gözlenir. Bu veriler, enerji üretim sistemlerinin planlanması ve ölçeklendirilmesi sırasında güneşin mevsimsel varyasyonlarının dikkate alınmasını zorunlu kılar. PV panellerden elde edilen enerjinin yılın farklı zamanlarında nasıl değişkenlik gösterdiğini anlamak, güneş ışığına bağlı enerji sistemlerinin etkin bir şekilde yönetilmesi için hayati önem taşır. Şebeke ve PV panelleri arasındaki enerji paylaşımı, sürdürülebilir ve dengeli bir enerji ağı oluşturulmasında stratejik bir rol oynar. Bu bilgiler, altyapı yatırımlarının planlanması ve yenilenebilir enerji kaynaklarının entegrasyon stratejilerinin geliştirilmesinde kullanılabilir.

Tablo 8. Elektrikli araç şarj istasyonu

Üretim	**kWh/yıl**	**%**
PV	3.000.846	83,0
Şebeke Alımları	613.376	17,0
Toplam	3.614.222	100
Tüketim	**kWh/yıl**	**%**
AA Birincil Yük	2.173.866	95,8
Şebeke Satışı	1.325	0,0584
Elektrikli Araç Şarj Cihazı	94.128	4,15
Total	2.269.319	100
Nicelik	**kWh/yıl**	**%**
Fazla Elektrik	882.842	24,4
Yenilenebilir Fraksiyon	73,0	%

Tablo 8, bir elektrikli araç şarj istasyonunun yıllık enerji üretim ve tüketimini, üretim kaynaklarına ve tüketim noktalarına göre ayrıntılı bir şekilde sunmaktadır. Üretilen toplam enerjinin %83'ü fotovoltaik panellerden gelirken, geri kalan %17'lik kısmı şebeke alımları ile karşılanmıştır. Üretilen toplam enerji miktarı 3.614.222 kWh olarak kaydedilmiştir. Tüketim tarafında, toplam enerji kullanımının büyük bir kısmı (%95,8) AA birincil yüke, yani şarj istasyonu dışındaki temel enerji tüketimine ayrılmıştır. Şebeke satışları, toplam tüketimin sadece %0,0584'ünü oluşturmuş ve elektrikli araç şarj cihazlarının kullanımı %4,15 ile tüketimin küçük bir bölümünü temsil etmiştir. Toplam tüketim 2.269.319 kWh olarak hesaplanmıştır. Bununla birlikte, toplam üretilen elektriğin 882.842 kWh'lik bir kısmı fazla elektrik olarak belirlenmiştir. Bu miktar, yıllık toplam üretimin %24,4'ünü oluşturmakta ve enerji yönetimi açısından önemli bir fazlalığı işaret etmektedir. Yenilenebilir fraksiyon yani enerji üretiminin

FULL TEXTS BOOK

yenilenebilir kaynaklardan sağlanan kısmı %73 olarak ifade edilmiş, bu da şarj istasyonunun enerji ihtiyacının büyük bir kısmının sürdürülebilir kaynaklardan karşılandığını göstermektedir.

SONUÇ

Bu çalışma, HOMER Grid yazılımı kullanarak, Yalova Üniversitesi Merkez Kampüsü'ndeki binaların enerji ihtiyaçlarını karşılamak üzere bir hibrit enerji sistemi tasarlamış ve bu sistemin ürettiği enerji fazlalığının elektrikli araç şarj istasyonlarında kullanımını da içerecek şekilde geniş bir uygulama alanına sahip olduğunu ortaya koymuştur. Analiz, Yalova'nın iklim özelliklerine ve 2022 yılı saatlik yük verilerine dayanarak yapılmıştır. İki temel unsur; enerji üretiminde yenilenebilir kaynakların etkin kullanımı ve enerji depolama çözümleri üzerine odaklanılmıştır.

Simüle edilen dört farklı senaryo arasından, teknik ve ekonomik veriler ışığında Senaryo-1 en optimum sonuçları sunmuştur. Bu senaryonun net bugünkü maliyeti 7,74 milyon $, seviyelendirilmiş enerji maliyeti ise kilovat saat başına 0,288 $ olarak hesaplanmıştır. İşletme ve bakım maliyetleri yıllık 304.683 $ olup, yenilenebilir enerji fraksiyonu %73 seviyesinde tespit edilmiştir. Sistem, 5,7 yıl içinde amorti edilebilecek bir yapıya sahiptir. Hibrit sistem, şebekeye bağlı olmasına rağmen yüksek oranda yenilenebilir enerji kullanımıyla öne çıkmaktadır. Emisyon değerleri açısından da sistemin çevresel sürdürülebilirliği dikkate değerdir; yıllık karbon dioksit emisyonu 387.653 kilogram, kükürt dioksit emisyonu 1.681 kilogram ve azot oksit emisyonu 822 kilogram olarak ölçülmüştür.

Hibrit sistemlerin tasarım ve entegrasyon süreçlerinde, bölgenin iklim şartları ve beklenen yük talebi gibi faktörlerin dikkatlice analiz edilmesi gerekmektedir. Elektrikli araç şarj istasyonlarının sisteme entegrasyonu sırasında, hedeflenen araç popülasyonunun doğru bir şekilde hesaplanması kritik önem taşımaktadır, çünkü araçların türüne bağlı olarak gereken şarj kapasitesinde değişkenlik gözlemlenebilir. Ayrıca, enerji fazlalığının depolanmasına olan ihtiyaç, hibrit sistemlerde önemli bir konudur ve sistem tasarımının bir başka kilit noktasını oluşturur. Teknik ve maliyet analizlerinin ardından hangi depolama teknolojisinin kullanılacağına dair stratejik kararlar alınmalıdır. Bu çalışma, yenilenebilir enerji kaynaklarının ve elektrikli araç şarj altyapısının entegrasyonu açısından stratejik planlama ve politika geliştirme konusunda kapsamlı bir rehber sunmaktadır.

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YENİ NESİL KERPİÇ MALZEMELERİN ÇEVRESEL SÜRDÜRÜLEBİLİRLİK BAĞLAMINDA İNCELENMESİ

INVESTIGATION OF NEW GENERATION ADOBE MATERIALS IN THE CONTEXT OF ENVIRONMENTAL SUSTAINABILITY

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ÖZET

Dünyada gerçekleşen nüfus artışı, endüstriyel ve teknolojik gelişmeler sonucunda yapı sektöründe meydana gelen dönüşüm hızlanmaktadır. Buna bağlı olarak doğal kaynaklar hızla tükenmekte; enerji tüketimi ve karbon gazı salımı gibi çevresel etkiler açığa çıkmaktadır. Yapılı çevrenin açığa çıkardığı bu etkilerin azaltılmasında sürdürülebilir yapı malzemelerinin kullanımı önem kazanmaktadır. Bu bağlamda çalışmada, ekolojik ve sürdürülebilir olma özelliklerine bağlı olarak kerpiç ve kerpiç konusunda yapılmış çalışmalar ele alınmıştır. Yerellik, kolay üretilebilme, enerji etkinliği, atık yönetiminde etkili olma ve ekonomik olma özellikleriyle ön plana çıkan kerpicin, yangına ve sese karşı dayanıklı olma gibi özellikleri de bulunmaktadır. Ancak bu özelliklere rağmen modern inşaat uygulamalarında kullanımının sınırlı olduğu görülmektedir. Düşük basınç dayanımı ve yüksek su geçirimliliği buna neden olarak gösterilebilmektedir. Kerpicin modern gereksinimlere uygun hale getirilerek yapı sektöründe yeniden kullanılmasının çevresel sürdürülebilirlik açısından önemli olduğu düşünülmektedir. Çalışmada, literatürde bulunan kerpiç ve iyileştirme yöntemleri ile ilgili çalışmalar incelenerek yeni nesil kerpiç malzemenin çevresel sürdürülebilirlik kriterleri bağlamında irdelenmesi amaçlanmıştır. Çalışma kapsamında incelenen çağdaş yapı örneklerinde katkı maddelerinin kullanımı ve sıkıştırma yöntemleriyle iyileştirme yapıldığı görülmüştür. Buna bağlı olarak yapılan literatür taramasında farklı katkıların kerpiç ile kimyasal stabilizasyonunu içeren çok sayıda deneysel çalışma olduğu tespit edilmiştir. Mevcut çalışmalar incelenerek kerpicin su geçirimliliği ve basınç dayanımına etkisine ek olarak, çevresel sürdürülebilirlik kriterlerine uygunluğu değerlendirilmiştir. Bu bağlamda çalışmada, yeni nesil kerpiç malzemelerin geri dönüştürülebilme potansiyeli, atık yönetimine katkısı, enerji verimliliği, ekosisteme ve insan sağlığına etkisi irdelenmiştir. İncelenen deneysel çalışmalar sonucunda kerpicin iyileştirilmesinde kullanılabilecek en uygun katkı maddelerinin mermer tozu, ayçiçeği sapı, alçı ve kireç olduğu tespit edilmiştir. Çimento, asfalt, uçucu kül, fosfoalçı, yüksek fırın cürufu, silis dumanı ve ferrokrom katkılarının ise belirli oranlarda su ve basınç dayanımını iyileştirmesine rağmen insan sağlığı ve ekosisteme olumsuz etkilerinin önemsenmesi gerektiği belirlenmiştir. Bu çalışmanın yeni nesil kerpiç malzemelerin çevresel sürdürülebilirlik kriterlerine uygunluğunun incelenmesi yönüyle önemli olduğu ve gelecekte yapılacak çalışmalara referans olabileceği düşünülmektedir.

Anahtar Kelimeler: Yeni Nesil Kerpiç, Katkı Maddesi, Çevresel Sürdürülebilirlik, Kerpiç Duvar, Kerpicin İyileştirilmesi.

ABSTRACT

As a result of population growth and industrial and technological developments in the world, the transformation in the construction sector is accelerating. Accordingly, natural resources are rapidly depleting; environmental impacts such as energy consumption and carbon gas emissions occur. The use of sustainable building materials is gaining importance in reducing these impacts caused by the built

FULL TEXTS BOOK

environment. In this context, in the study, studies on adobe and adobe, depending on their ecological and sustainable features, were discussed. Adobe, which stands out with its locality, easy production, energy efficiency, being effective in waste management and being economical, also has features such as being resistant to fire and sound. However, despite these features, its use in modern construction applications appears to be limited. Low compressive strength and high water permeability can be shown as the reason for this. It is thought that reusing adobe in the construction industry by adapting it to modern requirements is important for environmental sustainability. In the study, it was aimed to examine the adobe improvement methods found in the literature and to offer suggestions for new generation adobe walls and to determine the compliance of these methods with environmental sustainability criteria. It was observed that improvements were made through the use of additives and compression methods in the contemporary building examples examined within the scope of the study. Accordingly, in the literature review, it was determined that there are many experimental studies involving the chemical stabilization of different additives with adobe. Existing studies were examined and in addition to the effect of adobe on water permeability and compressive strength, its compliance with environmental sustainability criteria was evaluated. In this context, the recyclability potential of new generation adobe materials, their contribution to waste management, energy efficiency, and their effects on the ecosystem and human health were examined. As a result of the experimental studies examined, it was determined that the most suitable additives that can be used in the improvement of adobe are marble dust, sunflower stalk, plaster and lime. It has been determined that although cement, asphalt, fly ash, phosphogypsum, blast furnace slag, silica fume and ferrochrome additives improve water and pressure resistance to certain extent, their negative effects on human health and ecosystem should be taken into consideration. It is thought that this study is important in terms of examining the compliance of new generation adobe materials with environmental sustainability criteria and can be a reference for future studies.

Keywords: New Generation Adobe, Additive, Environmental Sustainability, Adobe Wall, Improvement of Adobe.

GİRİŞ

Tarih boyunca insanın en temel gereksinimlerinden birinin barınma ihtiyacı olduğu bilinmektedir. Göçebe bir yaşam süren insanlar ilk olarak ağaç kovukları ve mağaraları barınma ihtiyacını gidermek amacıyla kullanmıştır. Neolitik dönemde tarımsal faaliyetlere bağlı olarak yerleşik yaşama geçişle birlikte insanlar evlerini inşa etmeye başlamıştır [1]. Evler inşa edilirken kolay erişilebilir ve doğal yapı malzemelerine ihtiyaç duyulmuştur. Doğada var olan toprak, taş ve ağaç bu ihtiyacı karşılamak için kullanılmıştır. Toprak, evlerin inşasında kullanılan malzemelerin başında gelmekte olup; geçmişten günümüze izler taşıyan bir kültür oluşturmuştur [2]. Toprağın kullanımı ekonomik, sağlıklı ve doğayı koruma açısından faydalı olduğu için binlerce yıldır tercih edilmektedir. Toprak, su ve bağlayıcı katkı malzemeleri ile harmanlanarak kerpiç malzemeyi oluşturmaktadır. Kerpiç, toprağın farklı biçimlerde kullanılmasına olanak sağlamaktadır.

Doğada kendiliğinden var olan toprağın sürdürülebilirlik ve ekoloji bağlamında çok sayıda faydası bulunmasına rağmen modern inşaat uygulamalarında kerpiç kullanımının az olması çalışmanın çıkış noktası olarak ele alınmıştır. Bu bağlamda kerpicin iyileştirilmesi konusunda yapılan çalışmalar ele alınarak, yeni nesil kerpiç malzemelerin çevresel sürdürülebilirlik kriterleri bağlamında irdelenmesi amaçlanmıştır. Çalışma kapsamında kerpiç üretimi, özellikleri, yeni nesil kerpiç yapı örnekleri ve yapılan iyileştirme yöntemleri incelenmiştir.

Tarihsel süreçte kerpiç karışımları incelendiğinde, farklı medeniyetlerde kerpicin kullanıldığı, yerin iklimsel özellikleri ve malzeme erişilebilirliğine göre iyileştirme çalışmaları yapıldığı görülmüştür. Deneysel çalışmalar sonucunda elde edilen katkılı kerpice geçmişin izlerinde rastlanmaktadır. Bu çalışmada geçmişten günümüze ön plana çıkan iyileştirme çalışmaları kronolojik olarak belirtilmekte

FULL TEXTS BOOK

olup; Türkiye'de 1960 sonrası gerçekleştirilen ve farklı katkı maddesi kullanılan çalışmalar irdelenmiştir. Literatür taramasından elde edilen veriler doğrultusunda katkı maddesi ilavesiyle iyileştirilen yeni yapı malzemesinin çevresel etkisi irdelenmiştir. Yeni nesil kerpiç kullanımında söz konusu etkilere göre öneriler sunulmuştur. Geçmişten günümüze ulaşan bu malzemenin iyileştirilmesi ve yapı sektörüne yeniden kazandırılması gerekli görülmektedir.

KERPİÇ ÜRETİMİ, İYİLEŞTİRİLMESİ VE ÇEVRESEL SÜRDÜRÜLEBİLİRLİK

Kerpicin eski çağlardan beri varlığı arkeolojik çalışmalar sonucunda belirlenmiştir. Kerpiç kullanımının Mezopotamya, Anadolu, İran ve Akdeniz havzasında yoğunlaştığı yapılan çalışmalar sonucunda açığa çıkmıştır [3]. Geçmişe ait yapı örnekleri incelendiğinde yığma, hımış veya karma tipte kerpiç kullanımı görülmektedir. Hitit, Asur, Sümer, Mısır ve Antik Yunan mimarisinde kerpiç kullanımına sıklıkla rastlanmaktadır [4]. Erişilebilir, kolay üretilebilen ve ekonomik olma özelliklerinden dolayı geçmişten günümüze dünyanın birçok bölgesinde kerpiç yapılar görmek mümkün olabilmektedir. Anadolu'da ise Çatalhöyük, Aşıklıhöyük, Hacılar, Acemhöyük, Kültepe ve Yassıhöyük gibi birçok bölgede yapılan kazı çalışmaları sonucunda kerpiç malzemenin yapıda kullanımı tespit edilmiştir [5] (Resim 1).



Resim 1. Çatalhöyük kazı çalışmalarında çıkarılan duvarlar [6]

Kerpiç Tanımı ve Üretim Yöntemleri

Kerpiç; killi ve elverişli toprağa saman veya bitkisel liflerin karıştırılarak suyla yoğurulması sonucunda elde edilen harcın kalıplara dökülmesi ve güneşte kurutulmasıyla elde edilen yapı malzemesidir [7]. Geçmişten günümüze kerpiç, efektif kullanımını sağlamak ve dayanımını arttırmak amacıyla birçok katkı maddesiyle harmanlanarak üretilmiştir. Kerpiç üretiminin yapıldığı coğrafyaya göre saman, bitki sapları, kum, alçı, kireç, odun külü ve tuz gibi malzemeler ilk aşamada katkı maddesi olarak kullanılmıştır [8]. Kerpicin zaman içerisinde belirli ölçülerde üretilmesiyle "modüler yapı malzemesi" kavramı ilk kez kullanılmaya başlamıştır [9].

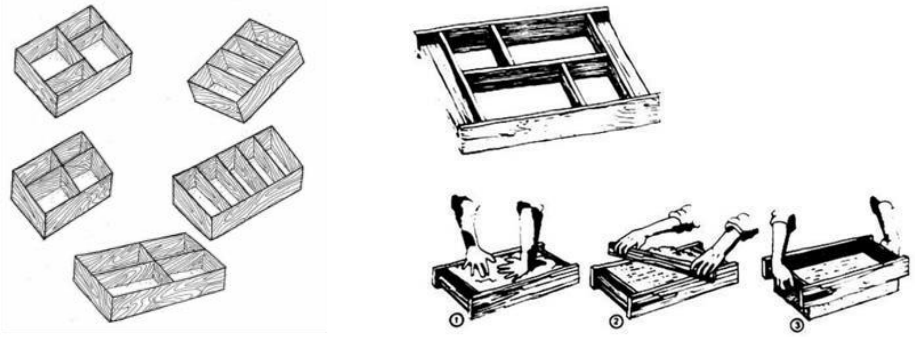
Türkiye'de kerpiç blokların üretimi, sınıflandırılması, özellikleri ve deneylerini içeren TS 2515 standardı bulunmaktadır. Kerpicin yapılarda yığma sistem, kerpiç dolgulu ahşap karkas sistem (hımış) ve karma yapım sistemi şeklinde kullanımları mevcuttur. Kerpicin duvar yapı malzemesi olarak kullanılması ise zaman içerisinde gelişen farklı tekniklerle mümkün olabilmektedir. Kerpiç duvarlar; geleneksel tuğla örgüsü yöntemi, dövme (tokmaklama) yöntemi, ahşap taşıyıcılı ve kerpiç dolgulu yöntem, omurgalı kerpiç yöntemi ve püskürtme yöntemi ile üretilebilmektedir. Geleneksel tuğla örgüsü üretim yöntemi Anadolu'da en sık rastlanan yöntem olarak karşımıza çıkmaktadır.

Geleneksel Tuğla Örgüsü Tekniği

Geleneksel tuğla örgüsü yönteminde kerpiç blok üretim süreci harcın hazırlanması, fermantasyon süreci, kalıplama işleminin yapılması, kurutma ve depolama işlemlerini içermektedir. Kerpiç harcında 2/3 oranında kil ve kum; 1/3 oranında saman ve su bulunmaktadır. Kumun kile oranı da kendi içerisinde 1/3 (2 kil ve 1 kum) olarak ayrılmaktadır [4]. Harç suyunun kontrollü ölçülerde eklenmesi gerekmekte

FULL TEXTS BOOK

olup az veya çok su ekleme durumunda kerpiç blokta rötre ve çatlaklar meydana gelebilmektedir. Fermantasyon sürecinden sonra harç Resim 2'de örneği verilen ahşap kalıplara dökülerek blok haline getirilmektedir.



Resim 2. Anadolu'da kullanılan kerpiç kalıpları ve kerpiç blok üretim aşamaları [10]

Harcın ahşap kalıplara doldurulduğunda boşluk kalmayacak şekilde sıkıştırılması ve kalıba vurulması geçirimsiz bir blok oluşturmak için önemlidir. Kerpiç harcı blok haline getirme işlemine "kerpiç kesme işlemi" adı verilmektedir [2]. Kerpiç kalıplarının ölçüleri bölgesel olarak farklılık göstermesinin yanı sıra; Türkiye'de en sık kullanılan kalıp ölçüleri Tablo 1'de verilmektedir. Kalıp ölçülerinde büyük olanlar ana ve küçük olanlar kuzu olarak adlandırılmaktadır [8].

Tablo 1. Kerpiç blok kalıp ölçüleri [7 numaralı kaynaktan düzenlenmiştir].

Sınıf	Boyut (cm)	Hacim (m^3)	Yaklaşık ağırlık (kg)
I	12×19×40	0.0091	10-12 (kuzu)
II	12×30×40	0.0144	15-25 (ana)
III	12×18×30	0.0065	7-11 (kuzu)
IV	12×25×30	0.009	10-15 (ana)

Kalıptan çıkarılan kerpiç bloklar Resim 3'te görüldüğü gibi güneşte kurumaya bırakılmaktadır. Kurutma sürecinde bloklarda çatlak oluşumunun önlenmesi için ot ve saman gibi malzemelerle üstleri örtülmeli veya hafif bir kum tabakası serpilerek koruyucu tabaka oluşturulmalıdır [11]. Üretim işlemi tamamlanan kerpiç bloklar duvar örgüsünde kullanıma hazır hale gelmektedir.

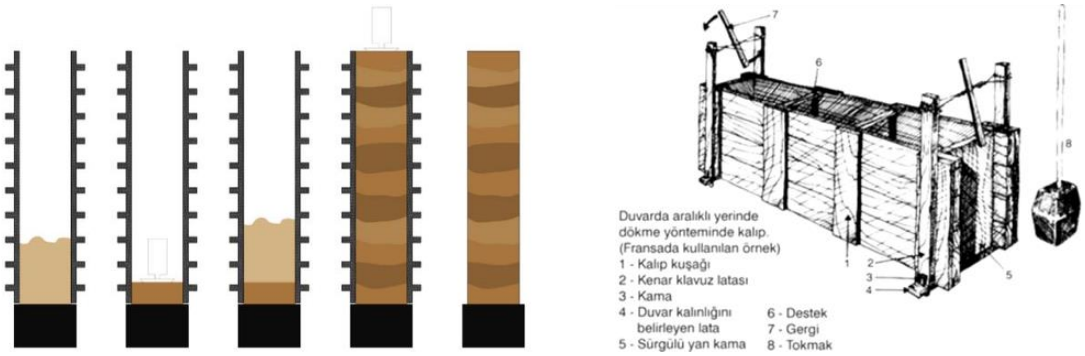


Resim 3. Kerpiç blok üretiminde kurutma ve depolama işlemi [11, 12]

FULL TEXTS BOOK

Dövme (Tokmaklama) Tekniği

Dökme tekniği olarak da bilinen bu kerpiç duvar üretim tekniğinde duvar kalınlığına bağlı olarak özel ahşap kalıplar hazırlanmaktadır. Ahşap kalıpların taşıma ve montaj kolaylığı açısından 75 cm'den fazla olmaması, kalıp kalınlığının 3-4 cm olması ve emprenye edilmiş olması gerekmektedir [2]. Kerpiç harcının ahşap kalıpların içine dökülmesi ve tokmakla dövülerek sıkıştırılmasıyla üretilmektedir. Dövme kerpiç duvarların geleneksel üretiminde tokmaklama işlemi elle yapılırken; günümüzde elektronik ve pnömatik sıkıştırma ile insan gücünü azaltan uygulamalar bulunmaktadır [13] (Resim 4).



Resim 4. Dövme (tokmaklama) işlemi [14] ve ahşap kalıp elemanları [10]

Ahşap Taşıyıcılı ve Kerpiç Dolgulu Üretim Tekniği

Ahşap taşıyıcılı ve kerpiç dolgulu duvar üretim tekniğinde ise duvarı sağlamlaştırmak amacıyla ahşap dikmeler kullanılmaktadır. Hımış olarak da bilinen yapım sistemi, ahşap karkas sistemin kerpiç bloklar ve dökme kerpiç ile doldurulmasından oluşmaktadır. Düşey eksende ahşap dikmeler, yatayda ise taban ve kirişlemelerle yapı yükü zemine aktarılmaktadır. Duvar uygulaması tamamlandıktan sonra yüzeye sıva uygulaması iklim ve tercihe bağlı olarak değişebilmektedir [2]. Uygulama esnasında yapının su vb. etkenlerden korunmasını sağlamak amacıyla Resim 5'te görüldüğü gibi beton veya taş döşek yapılabilmektedir. Geleneksel yapılarda sıklıkla rastlanan taş döşekler derin temelli yapılarda iki veya üç sıra taşla oluşturulmakta olup duvarda oluşabilecek rötre ve çatlakları önlemektedir [5].



Resim 5. Ahşap taşıyıcı kerpiç duvarlı konut örneği ve taş döşek uygulaması [15, 16]

Omurgalı Kerpiç Üretim Tekniği

Omurgalı kerpiç üretimi dövme tekniğiyle benzerlik göstermektedir. Dövme sistemden farklı olarak kalıbın içerisine tokmaklamayı önlemeyecek şekilde yatay ve düşey ahşap çubuklar yerleştirilmektedir [2]. Ayrı bir omurgaya sahip olan bu sistemde ahşap kalıplara kerpiç harç dökme işlemi aynı şekilde gerçekleştirilmesine karşın bu teknikte daha yoğun kıvamda harç kullanılması gerekmektedir [5]. Dövme tekniğinde olduğu gibi kalıplardaki harç dövülerek sıkıştırılmalıdır. Kerpiç içerisine gömülen

FULL TEXTS BOOK

ahşap omurga ile yapının dayanımı sağlanmaktadır [17]. Geleneksel Anadolu evlerinde sıklıkla kullanılan bu yapım sistemi çatlak oluşumunu önleyebilmektedir.

Püskürtme Tekniği

Püskürtme kerpiç duvar üretim tekniğinde dövme sistemdeki gibi kalıp sistemi gerekmektedir. Beton teknolojisindeki püskürtme cihazları kullanıldığı için kerpiç harcın kıvamı cihaz basıncına göre ayarlanmaktadır [18]. İç duvarlarda kullanımı daha uygun olarak görülen üretim tekniğinde sıkıştırma işlemine gerek duyulmamaktadır. Püskürtme tekniği genellikle taşıyıcı olmayan kerpiç duvarlarda uygulanmaktadır [11].

Kerpiç Malzemenin Özellikleri ve İyileştirme Yöntemleri

İnsanların yaşamını sürdürdüğü yapılar; fiziksel çevresi, tasarımı, kullanılan yapı malzemeleri ve doğaya yaklaşım bağlamında olumlu ve olumsuz etkiler sunmaktadır. Yapı malzemesi olarak kerpicin kullanımı da insanı, doğal çevreyi ve ekonomiyi etkilemektedir. Kerpicin olumlu özellikleri şu şekilde sıralanabilmektedir [10,19]:

- Ekolojik bir malzeme olması
- Sürdürülebilir olması
- Yerel malzeme, erişilebilir ve az maliyetli olması
- Pasif iklimlendirmeye elverişli olması
- Atık bırakmama özelliğinin olması
- Üretiminin kolay olması
- Enerji gereksiniminin az olması
- Yangına karşı dayanıklı olması
- Ses yalıtımı sağlaması

Kerpiç malzemenin birçok olumlu özelliği olsa da olumsuz özellikleri de bulunmaktadır. Topraktan yapılan bu malzeme belirli durumlarda yetersiz kalmakta ve performansı azalmaktadır. Olumsuz özellikleri şu şekilde belirtilebilir [10,19]:

- Su ve neme karşı dayanıksız olması
- Yanlış üretim ve bakım ile depreme dayanıksız hale gelmesi
- Basınç ve çekme dayanımının düşük olması
- Bitkisel katkıların çürümesi, mantar ve bakteri oluşumuna zemin hazırlaması

Kerpicin olumsuz etkilerini gidermek ve malzemenin kullanımını yaygınlaştırmak amacıyla pek çok çalışma yürütülmüştür. Eski çağlardan beri kerpice farklı katkı maddeleri eklenerek veya farklı yöntemlerle iyileştirme işlemi yapılmıştır. Günümüzde de olumsuz özellikleri iyileştirilmeye çalışılmakta olup olumlu özelliklerinden yararlanma yaklaşımı devam etmektedir. Kerpicin iyileştirilmesi mekanik, fiziksel ve kimyasal olarak gerçekleşebilmektedir. Mekanik iyileştirme, toprağın sıkıştırılması sonucu yoğunluk değişimiyle sağlanmaktadır. Fiziksel iyileştirme, karışımdaki malzeme oranına bağlı olarak toprağın granülometrisinin değişimiyle gerçekleşmektedir [20]. Organik bitki liflerinin kerpice ilavesi de fiziksel iyileştirme uygulamalarından biridir. Kimyasal iyileştirme ise toprağa çeşitli kimyasal katkı maddelerinin ilave edilmesiyle gerçekleşmektedir.

Yeni Nesil Kerpiç Yapı Örnekleri

Günümüzde gelişen teknoloji ve ortaya çıkan ihtiyaçlarla birlikte kerpiç duvar üretiminde geleneksel ve yeni nesil yöntemler birlikte uygulanmaktadır. Doğal bir malzeme olan kerpicin yapı malzemesi olarak kullanımında yer, işlev, iklim ve çevre parametreleri ele alınmaktadır. Geleneksel yöntemlerin bu parametrelere uygun geliştirilmesi sonucunda yeni nesil kerpiç malzeme ve üretim tekniği belirlenmektedir. Kerpiç malzemenin iyileştirilmesinde genellikle kimyasal katkılar; geliştirilmiş üretim

FULL TEXTS BOOK

tekniğinde ise dövme tekniğinden faydalanarak sıkıştırma yöntemi uygulanmaktadır. Bu bağlamda sıkıştırılmış toprak (Rammed earth) ve katkı malzemeleriyle iyileştirilmiş yeni nesil yapı örnekleri incelenmiştir.

Ricola Bitki Merkezi

Herzog & de Meuron Architects iş birliğiyle 2014 yılında İsviçre'de inşa edilen Ricola Bitki Merkezi'nin dış duvarlarında kerpiç kullanılmıştır [21]. Betonarme taşıyıcı sistem ve prefabrike sıkıştırılmış toprak bloklardan oluşan duvarlar işleve uygun ve doğal malzeme kullanımı açısından çevreye duyarlıdır. Ricola Bitki Merkezi'nin dış duvarlarında kullanılan sıkıştırılmış toprak blokların üretimi basınca karşı dayanıklılığı artırmak amacıyla uygulanmıştır. Söz konusu mekanik iyileştirmeye ek olarak toprağa kimyasal katkı maddeleri de eklenmiştir. Volkanik tüf ve kireç katkısıyla kerpiç iyileştirilmiştir [22]. Resim 6'da blokların üretim ve uygulama aşamaları görülmektedir. Kerpiç blokların arasına mukavemeti artırmak amacıyla ince bir kum, puzolan veya kireç tabakası serilmektedir [21].



Resim 6. Ricola Bitki Merkezi cephe görünüşü ve inşa aşaması [22]

Caldera Evi

Caldera Evi, yerel malzemeler ve usta-zanaat ilişkisini önemseyen DUST ekibi tarafından tasarlanmıştır [23]. 2015 yılında ABD'de inşa edilen evde biyoçeşitlilik ve doğal çevreye referans verecek şekilde toprak malzeme kullanılmıştır. Toz haline getirilmiş hafif kırmızı cüruf, çimento ve su karışımının yerel toprağa karıştırılmasıyla duvar harcı elde edilmiştir [23]. Harç kalıplara dökülerek sıkıştırılmış ve sonrasında kurutma işlemi uygulanmıştır. Sıkıştırılmış katkılı bloklardan oluşan yapıda ısı yalıtımı ve konfor sağlanmıştır [24]. Hem kimyasal ilaveler hem de sıkıştırma işlemiyle iyileştirilen kerpiç yapıda kullanıma uygun hale gelmiştir.



Resim 7. Caldera Evi cephe görünüşü ve iç mekân görünüşü [23]

FULL TEXTS BOOK

Nk'Mip Çölü Kültür Merkezi

Dialog Design tarafından 2007 yılında Kanada'da inşa edilen yapı, yaban hayatı koruma ve sosyal hizmet desteği amacıyla kurulmuştur [25]. Sürdürülebilir, yerel ve erişilebilir toprak malzemenin etkili kullanıldığı örneklerden biri olarak bilinmektedir.

Yapının duvarlarında çimento ve mineral katkılı toprak kullanılmıştır [25]. Üretilen harç kalıplara dökülerek sıkıştırılmış ve duvar katmanlarını oluşturmuştur. Proje ekibi tarafından katmanların 100 tona kadar ağırlık taşıdığı ve -30 ile 40 derece aralığında kullanılabildiği belirtilmektedir [26]. Yapı duvarlarında toprak kullanımı ısıl konfor ve enerji verimliliği açısından faydalıdır.



Resim 8. Nk'Mip Çölü Kültür Merkezi cephe görünüşü ve sıkıştırılmış toprak duvar [26]

Yapı Malzemelerinde Çevresel Sürdürülebilirlik

Endüstri Devrimi doğal kaynaklarının tüketiminin artması, hızlı sanayileşme, aşırı tüketim, artan kirlilik ve nüfus artışını beraberinde getirmiştir [27]. Yaşamın her alanında kolay erişilebilen ve ekonomik fosil enerji kaynaklarına yönelimle doğaya karşı bilinçsiz bir tüketim gerçekleşmektedir. Biyolojik çeşitliliğin azalması, sera gazı salımının artması ve atık yönetiminin sağlanamaması süreç içerisinde doğal çevreye zarar vermiştir [28]. Sürdürülebilirlik kavramı, ilk olarak 1980'lerde söz konusu zararların önlenmesi ve gelecek nesillere sağlıklı bir çevre bırakılması amacıyla ortaya çıkmıştır. Çok sayıda tanımı bulunmakta olup en kapsamlı ve en sık kullanılan tanımı 1987 Bruntland Komisyonu tarafından yapılan tanım olarak bilinmektedir [29]. Bu tanıma göre sürdürülebilirlik, insan ihtiyaçlarının gelecekteki nesillerin yaşamsal ihtiyaçlarını riske atmadan karşılanabilmesi olarak belirtilmektedir [30]. Sürdürülebilirlik yaklaşımı temelde ekolojinin korunması ve döngünün sağlanması esaslarına dayanmaktadır. Hızla tükenen kaynaklar yerine; yenilenebilen, doğa dostu, ekonomik ve sağlıklı ürünlerin kullanımının faydalı olduğu önerilmektedir. Sürdürülebilirlik kavramı çevresel, sosyal ve ekonomik olarak sınıflandırılmaktadır. Çevresel sürdürülebilirlik, doğal kaynak kullanımıyla çevreye verilen zararın en aza indirilmesini amaçlamaktadır. Sosyal sürdürülebilirlik, toplumun her kesimine eşit olanaklar ve yarar sağlamakla ilişkilendirilmektedir. Ekonomik boyutta sürdürülebilirlik ise, ülkelerin kalkınması ve ürün üretiminin sürekli olarak sağlanmasıyla gerçekleşebilmektedir. Artan enerji ihtiyacı günümüz ve gelecek için alternatif enerji kaynaklarının kullanımını kaçınılmaz hale getirirken; kullanılan kaynakların sürdürülebilir olması gerektiği düşünülmektedir.

Yapıların inşa öncesi, inşa ve kullanım sürecinde enerji kaynaklarının korunumu ve artan çevre kirliliğinin azaltılması noktasında sürdürülebilir yapı malzemeleri ön plana çıkmaktadır. Söz konusu yapı malzemelerinin kullanımı yapının yaşam döngüsü boyunca doğal dengeyi korumaktadır. Sürdürülebilir yapı malzemesi; olabilecek en az miktarda enerji tüketen, ortaya çıkardığı atıklarla ekolojik dengeyi bozmayan, hammaddenin temin edilmesi, işlenmesi ve bakımında doğal çevreye zarar vermeyen malzemeler olarak tanımlanabilmektedir [31]. Çevreye duyarlı ve doğal yapı malzemelerinin özellikleri şu şekilde sıralanabilmektedir [32]:

- Geri dönüştürülebilme özelliğiyle işlevini tamamladıktan sonra doğada kaybolması

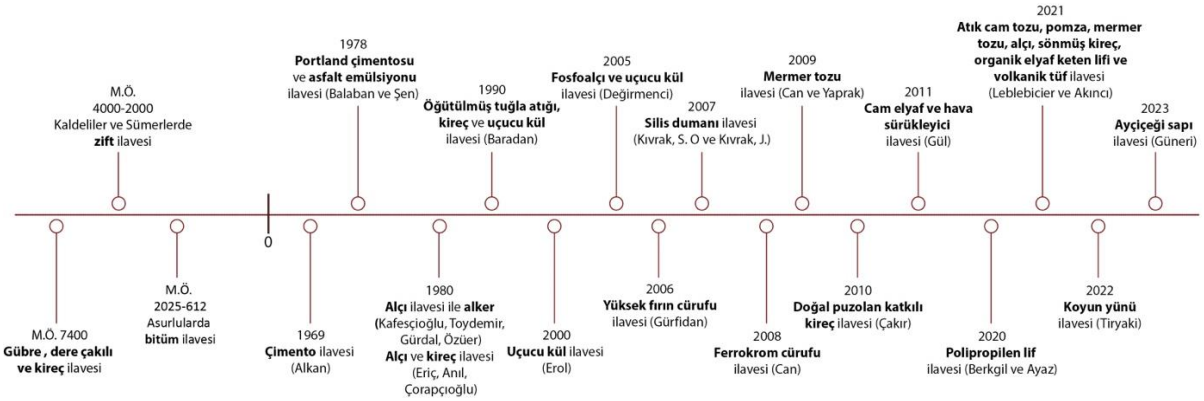
FULL TEXTS BOOK

- Enerji verimliliği sağlaması
- Atıkların ve kirleticilerin minimum düzeyde olması
- Ekosistem dengesini bozmaması
- İnsan sağlığını olumsuz etkilememesi

Kerpiç; ekolojik yönü, atık bırakmaması, kolay erişilebilir yerel bir malzeme olması, üretim kolaylığı, enerji gereksiniminin az olması, yangına karşı dayanıklılığı, ses yalıtımı sağlaması ve pasif iklimlendirmeye elverişli olmasıyla çevresel sürdürülebilirlik parametrelerini sağlamaktadır. Bu özellikleriyle günümüzde sık kullanılmama sebebi ise öncelikli olarak su ve basınca karşı dayanıklı olmamasıyla açıklanabilmektedir. Kerpicin su direnci ve basınç dayanımı iyileştirildiğinde inşaat uygulamalarında kullanımının artacağı öngörülmektedir. Çevreye ve insan sağlığına duyarlı yapı malzemeleri ön plana çıkarken kerpicin doğaya uyumu ve olumlu yönlerinin göz ardı edilmemesi gerektiği düşünülmektedir.

MATERYAL VE METOT

Tarihsel süreçte kerpicin kimyasal yöntemlerle iyileştirilmesi farklı katkı maddeleriyle gerçekleşmiştir. Bu bağlamda, kerpicin katkı maddeleri ilave edilerek iyileştirilmesini inceleyen çalışmalar literatür taramasıyla belirlenmiştir. M.Ö. 7400 yıllarında kerpice gübre, dere çakılı ve kireç ilavesi yapılmış olduğu tespit edilmiştir. [33]. M.Ö. 4000-2000 yıllarında Kaldeliler ve Sümerler zift ilavesi ile kerpicin su dayanımını iyileştirmiştir [34]. Dış sıva malzemesi olarak kullanılan ziftli kerpiç ile mukavemeti arttırmak amaçlanmıştır. Kafesçioğlu'na göre M.Ö. 2025-612 yıllarında Asurluların bitüm ilavesiyle malzemenin olumsuz özelliklerini iklimsel koşullara uygun hale getirdiği belirlenmiştir [1]. Toprağın eski çağlardan beri deneysel çalışmalarla günümüze ulaştığı görülmektedir. 1960 yılı sonrasında kerpiç iyileştirme çalışmaları hız kazanmış olup literatürde çok sayıda çalışmaya ulaşılmaktadır. Bu çalışmada, 1960 yılı sonrası Türkiye'de yapılan kerpiç iyileştirme çalışmaları incelenmiş ve Şekil 1'de kronolojik olarak gösterilmiştir.



Şekil 1. Kerpiç iyileştirme çalışmalarının kronolojik gösterimi

YENİ NESİL KERPİÇ MALZEMELERİN ÇEVRESEL SÜRDÜRÜLEBİLİRLİK BAĞLAMINDA İNCELENMESİ

Günümüzde kerpiç harcına farklı katkı maddeleri eklenmesiyle yeni nesil kerpiç malzeme elde etmek amacıyla deneysel çalışmalar yapılmaktadır. Literatür taramasında ele alınan iyileştirme çalışmaları araştırmanın bu bölümünde detaylı olarak irdelenmiştir. Çalışmalarda atık maddeler veya inşaat sektöründe katkı olarak kullanılan malzemelerin yoğun kullanımı tespit edilmiştir. İlave edilen katkıların kerpicin olumsuz yönlerinin iyileştirilmesinin yanı sıra, çevresel sürdürülebilirlik özelliklerine etkisi araştırılmıştır. 1969-2023 yılları arasında yapılan toplam 17 deneysel çalışmanın yöntem ve sonuçları incelenmiştir. Yapılarda kerpiç kullanımının azalmasına neden olan ölçütler

FULL TEXTS BOOK

çalışmaların yöntemini oluşturmaktadır. Bu doğrultuda su ve basınç dayanım ölçütleri ön plana çıkmaktadır. Katkılı yeni nesil kerpiç üretiminde su ve basınç dayanımının katkısız kerpice oranla yüksek olduğu ve çevresel sürdürülebilirlik kriterlerini koruyan malzemeler araştırılmıştır. İncelenen çalışmalar geri dönüştürülebilme, atık yönetimi, enerji verimliliği, insan sağlığına olumsuz etki ve ekosisteme olumsuz etki başlıklarıyla değerlendirilmiştir.

Alkan (1969), kerpicin suya karşı direncini ve basınç dayanımını artırmak amacıyla çimento, kireç, çimento ve kireç, bitüm emülsiyonu ve saman katkılı numuneler hazırlamıştır. Deneyler sonucunda kerpiç toprağına 1/10 ve 1/18 oranlarında çimento ilavesinin su direnci ve basınç dayanımını artırdığı tespit edilmiştir [35].

Balaban ve Şen (1978), kerpicin olumsuz özelliklerinden su ve basınç dayanımının düşük olmasını problem olarak ele almıştır. Portland çimentosu ve emülsiye asfalt ilavesiyle deneyler yapmışlardır. Çimento ve asfalt katkılı kerpicin katkısız kerpice oranla su ve basınca dayanıklı hale geldiği tespit edilmiştir. Katkılı kerpiç sıkıştırılırsa da dayanıklılık oranında artış olacağı vurgulanmıştır [36]. Çimento ve asfalt, çevresel sürdürülebilirlik bağlamında ele alındığında geri dönüştürülebilme ve enerji verimliliğine katkı sağlamaktadır. Bunun yanı sıra çimentonun yoğun CO2 emisyonu oluşturan insan sağlığı ve çevreye zararlı bir malzeme olduğu belirtilmektedir [37].

Kafesçioğlu, Toydemir, Gürdal ve Özüer (1980) ise katkısız toprak, alçı katkılı toprak, kireç katkılı toprak ve alçı ve kireç katkılı toprak olmak üzere 4 karışımdan toplamda 530 numune üretmiştir. Numunelerin toprak türleri ve kalıp boyutları farklılık göstermektedir. Elde edilen numunelere fiziksel ve mekanik dayanıklılık testleri uygulanmıştır. Fiziksel deneylerde birim ağırlık, ultrases, boyut ve rötre, ısıl genleşme değerleri hesaplanmıştır. Mekanik deneylerde ise basınç, çekme ve su (yağmurlama) dayanımı ölçülmüştür. Deneyler sonucunda alçı katkılı kerpicin katkısız kerpice oranla daha az rötre yaptığı ve birim ağırlıkta azalma olduğu tespit edilmiştir. Bu bağlamda alçılı kerpiçte (alker) porozite artmış ve malzeme suya dayanıklı hale gelmiştir. Basınç ve çekme dayanımları artmıştır. Kerpiç daha rijit ve mukavemetli hale gelmiştir. Kireç katkılı kerpiçte ise basınç dayanımı azaltmakta olup su ve neme karşı duyarlılık azalmaktadır [38].

Eriç, Anıl ve Çorapçıoğlu (1980), geleneksel yöntemlerle hazırlanan kerpicin suda dağılma ve basınç dayanım performanslarını iyileştirmek amacıyla alçı ve kireç katkılarını kullanmıştır. Kerpiç blokların hazırlanmasında alçı katkısı ve sıva olarak kireç katkısını kullanmıştır. %15 alçı katkılı kerpiç blok ve %15 kireç katkılı kerpiç sıvası uygulamasının su ve basınç dayanımını artırdığı sonucuna varılmıştır. Ek olarak kullanılan bitkisel katkıların iyileştirme sağlamadığı belirtilmektedir. Kerpiç blokların sıkıştırılarak rijitlik ve basınç dayanımının artırılması önerilmektedir [39]. Alçı geri dönüştürülebilme özelliğine sahip, insan ve ekosisteme olumsuz etkisi bulunmayan bir malzemedir [40]. Herhangi bir üretim atığı olmadığı için çevresel sürdürülebilirlik parametrelerinde atık yönetimine olumlu bir etkileri bulunmamaktadır. Kireç de alçıyla bu ölçütlerde eşleşmektedir. Yapılan deneylerde kerpiç katkısı olarak kullanılan alçı ve kerpiç yapının kullanım sürecinde enerji etkinliği sağlayacağı düşünülmektedir.

Baradan (1990), Anadolu'da sıklıkla kullanılan Horasan harcından (pişmiş toprak, kireç ve sudan oluşan harç) esinlenmiştir. Tuğla ve kiremit atıkları, kireç ve uçucu kül kerpice karıştırılarak numuneler hazırlanmıştır. Çalışmada katkılı malzemenin basınç dayanımı araştırılmış olup su dayanıklılık testi yapılmamıştır. Tuğla ve kiremit atığı, kireç ve termik santral atığı olan uçucu kül ilavesiyle kerpicin mukavemeti artmaktadır. Katkılı malzemenin basınca daha dayanıklı olduğu sonucuna varılmıştır [41].

Erol (2000) ise katkısız, uçucu kül, çimento ve saman katkılı kerpiçler hazırlanarak suda dağılma ve basınç dayanıklılık deneyleri yapmıştır. Uçucu kül katkılı kerpiç malzemenin katkısız, çimento ve saman katkılı kerpice oranla suya daha dayanıklı olduğu belirlenmiştir. Basınç dayanıklılık testinde de uçucu kül daha iyi sonuçlar vermektedir [42].

Değirmenci (2005), gübre fabrikası atığı olan fosfoalçı ve termik santral atığı olan uçucu kül kullanmıştır. Karışımlar hazırlanırken kireç ilavesi de yapılmıştır. Kuru karışım ağırlığının %10'u oranında sönmüş kireç, %20 oranında uçucu kül ve fosfoalçı/toprak oranları 0.25 ile 2.50 aralığında

FULL TEXTS BOOK

ilave edilmiştir. Numunelerden 3'er adet hazırlanmış olup kuru ve ıslak olarak basınç dayanımı testi yapılmıştır. Su dayanımını ölçmek amacıyla da laboratuvarda ve devamında kendiliğinden kurumaya bırakılan numunelere kılcal geçirimlilik testi uygulanmıştır. Deneyler sonucunda kurutulan ve suda bekletilen katkılı numuneler fosfoalçı/toprak oranı 1.25 olduğunda en iyi sonucu vermiştir. 24 saat suda bekletilen katkılı kerpicin katkısız kerpice göre basınca daha dayanıklı olduğu belirtilmiştir. Kılcal geçirimlilik testinde ise su dayanımının azaldığı gözlemlenmiştir. İklim koşullarına göre fosfoalçı oranı azaltılarak olumsuz sonuçların önlenebileceği belirtilmektedir. Uçucu kül ve fosfoalçı, üretim aşamasını tamamlayan fabrikalar tarafından atık madde olarak doğaya bırakılmakta veya depolanmaktadır. Doğal çevreye bırakılan uçucu kül ve fosfoalçının, yağmur sularıyla toprağa sızması durumunda ekosistem olumsuz etkilenmektedir. Bu maddelerin kerpice ilave edilmesi atık yönetimi bakımından fayda sağlamaktadır [43]. Solunum yoluyla insan sağlığını olumsuz etkileyen bu maddelerin kerpiç katkısı olarak kullanımı yapının enerji verimliliğini artırmaktadır.

Gürfidan (2006), 9 farklı karışımın basınç ve su emme dayanımını hesaplamıştır. Alker şahit numune olarak alınmıştır. Alker ve toprak karışımlarına %10, %20, %30 ve %50 oranlarında yüksek fırın cürufu ilavesi ile 8 karışım oluşturulmuştur. Alker ve %30 YFC ilavesi basınç dayanımında en iyi sonucu; su dayanımında ise 2. en iyi sonucu vermiştir. Su dayanımında toprak ve %50 YFC en verimli karışımdır [44].

Kıvrak S.O. ve Kıvrak J. (2007), katkısız kerpiç harcını şahit numune alarak %5, %10,%15,%20 ve %25 silis dumanı katkılı numuneler hazırlamışlardır. Numunelerin basınç dayanımları incelenmiştir. Çalışmada su dayanıklılık testi yapılmamıştır. Karışımların her birinde şahit numuneye oranla basınç dayanımı artmıştır. %10 silis dumanı katkılı karışımda basınç dayanımının en yüksek seviyeye ulaştığı belirtilmiştir [45].

Can (2008), katkısız kerpiç harcını şahit numune alarak %5, %10 ve %15 oranında ferrokrom cürufu katkılı numuneler hazırlamıştır. Hazırlanan karışımların basınç dayanımları ve suda dağılma oranları test edilmiştir. Hazırlanan numunelerin tamamında su ve basınç dayanımı artmış olup %10 ferrokrom katkılı kerpiç en iyi davranışı göstermiştir [46].

Yüksek fırın cürufu, demir üretimi esnasında fırınlarda demir filizi, kok ve kireç gibi ürünlerin eritilmesi sonucunda cevherden ayrılan atık maddelerdir [47]. Ferrokrom cürufunun da tıpkı YFC gibi demir-çelik üretiminde açığa çıkan atık ürün olduğu bilinmektedir. Silis dumanı veya mikrosilika, silisyum metali ve ferrosilisyum alaşımlarının üretiminde açığa çıkan ince taneli bir tozdur [48]. Deneylerde kullanılan bu katkı maddeleri çevresel sürdürülebilirlik bağlamında incelendiğinde; atık yönetimi ve enerji bakımından faydalı, zor olsa da geri dönüştürülebilir olduğu belirlenmiştir. Ağır metal içeren bu atık ürünlerin kerpiç katkısı olarak kullanımının insan sağlığı ve ekosisteme olumsuz etkileri olacağı düşünülmektedir.

Can ve Yaprak (2009), mermer tozu katkısız toprak şahit numune alınarak %5, %10, %15, %20 ve %25 oranlarında mermer tozu katkılı toprak karışımlarını hazırlamıştır. Çalışmada birim ağırlık, şişme, ultrases, büzülme, basınç dayanımı, çekme dayanımı, çamurlaşma ve kılcallık testleri yapılmıştır. Yapılan testler sonucunda mermer tozu arttıkça karışımın su dayanımı artmıştır. En iyi değer %25 mermer tozu katkılı kerpiçte ölçülmüştür. Basınç dayanımı ise %20 oranına kadar artış göstermekte olup %25 mermer tozu ilavesiyle azalmaya başlamıştır. Birim ağırlık %20 oranında en yüksek değere; rötre %25 oranında en düşük değere; çamurlaşma %20 oranında en dayanıklı değere; şişme %15 oranında en düşük değere; ultrases geçiş hızı %20 oranında en yüksek değere ulaşmıştır [49]. Mermer üretim fabrikalarında açığa çıkan atık mermer tozunun kerpiç katkısı olarak kullanımı çevresel sürdürülebilirlik kriterlerinde olumlu sonuçlar vermektedir. Geri dönüştürülebilme, atık kullanımı, enerji etkinliği sağlaması, insan ve çevreye zarar vermemesi mermer tozunun kerpiç katkısında kullanılabileceğini göstermektedir.

Çakır (2010), kerpiç iyileştirilmesinde doğal puzolan katkılı kireç kullanmıştır. Kerpicin yapı malzemesi veya sıva olarak kullanımı incelenmiş olup; sıva olarak kullanımına uygun harçlar hazırlanmıştır. Kireç

FULL TEXTS BOOK

ve puzolan oranları sabit; kum ve toprak oranları değişecek şekilde 5 adet karışım hazırlanmıştır. S1, S2, S3, S4 ve S5 olarak adlandırılan numunelerden S1 şahit numune olarak belirlenmiştir. S1'de toprak bulunmamakta olup S5'e doğru toprak oranı artmakta ve kum oranı azalmaktadır. Numunelerle fiziksel (birim hacim kütlesi, özgül kütle, doluluk-boşluk oranları, kılcal su emme deneyi, buhar geçirgenliği, atmosfer basıncında su emme deneyi) ve mekanik (eğilmede çekme dayanımı, basınç dayanımı ve ultra ses hızı testi) deneyler yapılmıştır. Fiziksel ve mekanik deneyler sonucunda çoğu ölçütte iyileşme mevcuttur. Doğal puzolan katkılı kerpicin hazırlanan 5 karışımda basınç dayanımını artırdığı gözlemlenmiştir. Kum ve toprak oranına göre dayanım sonuçları değişkenlik göstermektedir. Basınç dayanımı kum oranı arttıkça iyileşmektedir. Kılcal su emme deneyinde ise S1 numunesi en iyi sonucu vermiştir. Sonuç olarak, doğal puzolan katkının su dayanıklılığını azalttığı söylenebilir. Doğal puzolan, çoğunluklu volkanik tüf kökenli olan ve kendi başına bağlayıcı olmayan silis veya alüminli ürünler olarak tanımlanmaktadır [50]. Yapılan deneysel çalışmada doğal puzolanlar kireçle bağlanmış olup kerpice ilave edilmiştir. Doğal puzolan kerpici iyileştirse de insan ve ekosisteme olumsuz etkileri olduğu belirlenmiştir.

Gül (2011), cam lifi katkısı içermeyen karışım ele alınarak toprak ağırlığının %0,2 ve %0,5 oranında cam elyaf ilavesi yapılan 2 karışımı incelemiştir. Hava sürükleyici katkı ise ilk şahit numunede bulunmamakta olup su miktarının 2. karışımda %50 ve 3. karışımda %100 oranında eklenmiştir. Böylelikle 3 karışım için 9 farklı numune oluşmuştur. Numuneler 28 ve 56. günde incelenerek basınç ve suya dayanımları ölçülmüştür. Cam elyaf ve hava sürükleyici madde ayrı ayrı kullanıldığında da birlikte kullanıldığında da basınç ve su dayanımında artış gözlemlenmiştir. Hava sürükleyici katkılı kerpiç 72 saat suda bekletilmesine rağmen dağılma gerçekleşmediği tespit edilmiştir. Katkısız karışımın gevrek, katkılı karışımların ise sünek davranış gösterdiği tespit edilmiştir [51].

Berkgil ve Ayaz (2020), katkısız toprağı şahit numune alarak, % 0,5, %1 ve %1,5 oranlarında polipropilen lif ilavesi yapmıştır. Polipropilen lifler 6 mm, 12 mm ve 19 mm olacak şekilde 3 farklı boyda kullanılmıştır. Katkısız kerpiçle birlikte toplam 10 numune kullanılmıştır. Numunelerde hacim kaybı, birim hacim ağırlığı, basınç dayanımı ve eğilme hasar yükleri incelenmiştir. Çalışmada su dayanıklılık testi yapılmamıştır. Deneyler sonucunda katkı oranı ve lif boyu arttıkça hacim kaybı ve birim hacim ağırlığının azaldığı tespit edilmiştir. Basınç dayanımı ve eğilme hasar yükleri ise artmıştır. Basınç dayanımının artmasının sebebi, PP liflerinin yanal deformasyonu azaltması ile tahribatı geciktirmesi olarak belirtilmiştir [52].

Cam elyaf ve polipropilen lifler, organik olmayan ve herhangi bir ürünün üretimi esnasında açığa çıkmayan maddelerdir. Kerpice katkıları incelendiğinde benzer özellik göstermekte olan bu lifler, özellikle ısı yalıtımıyla enerji verimliliği sağlamaktadır [51]. İnsan ve çevreye olumsuz bir etkisi bulunmamaktadır.

Leblebicier ve Akıncı (2021) ise atık cam tozu, pomza, mermer tozu, alçı, sönmüş kireç, organik elyaf keten lifi ve volkanik tüf olmak üzere çok sayıda atık malzemeyle deneyler yapmıştır. Her katkı malzemesi için farklı yüzdelik oranlarda 3'er numune hazırlanmıştır. Toplamda 18 numune basınç dayanımı, ultrasonik ses dalgaları hızı ve termal iletkenlik değeri deneyleri yapılmıştır. Çalışmada su dayanım ölçümü yapılmamıştır. Basınç dayanımı ve ultrasonik ses dalgaları hızı deneyinde en iyi sonucu organik elyaf keten lifi katkılı kerpiç vermiştir. Isı iletkenlik katsayısı en düşük katkı malzemesinin ise volkanik tüf olduğu belirlenmiştir [53]. Atık malzemelerin kullanıldığı deneysel çalışma sonucunda çıkan ürünlerin çevresel sürdürülebilirlik parametrelerine uygunluğu belirlenmiştir. Katkı olarak kullanılan maddelerin çoğunun geri dönüştürülebilme, atık yönetimi ve enerji verimliliği bakımından faydalı olduğu; insan ve ekosisteme herhangi bir olumsuz etkisi bulunmadığı tespit edilmiştir.

Tiryaki (2022), kerpiç karışımına toprağın %10'u oranında alçı ilavesi yapmıştır. Şahit numune olarak alçılı karışım alınmıştır. Numuneler saman oranının %3, %6, %9 ve %12 oranında koyun yünü katkısıyla hazırlanmıştır. Katkı maddesinin kendi içerisinde performansı değerlendirilirken aynı

FULL TEXTS BOOK

zamanda saman ilave edilmeyen (toprak, toprağın %10'u oranında alçı, su ve cam elyaftan oluşan numuneyle karşılaştırma yapılmıştır. Basınç dayanımı, ses ve radyasyon geçirimlilik deneyleri numunelere uygulanmıştır. Bu çalışmada su dayanım ölçümü yapılmamıştır. Koyun yünü katkılı kerpicin hem katkısız hem de cam elyaf katkılı kerpice oranla eğilme, basınç, ultra ses hızı ve radyasyon geçirimliliğinde daha iyi sonuç verdiği sonucuna varılmıştır [54]. Koyun yünü, cam elyaf ve polipropilen lif katkılarıyla benzer özellikler göstermektedir. İnsan ve çevreye herhangi olumsuz etkisi bulunmayan koyun yünü, geri dönüştürülebilme özelliğiyle liflerden farklı davranış göstermektedir. Bağlayıcı alçıyla birlikte kerpiç katkısında kullanılması enerji verimliliğini artırmaktadır.

Güneri (2023) ise [55] katkısız toprağı şahit numune alarak kerpiç karışımına kütlece %0,25, %0,5, %0,75, %1 ve %1,25 oranlarında ayçiçeği sapı ilavesiyle deneyler gerçekleştirmiştir. Numuneler 28 ve 56. günde incelenerek birim hacim kütle, basınç dayanımı, su etkisiyle dağılma, eğilme dayanımı, ultrases geçiş hızı deneyleri ve SEM analizi yapılmıştır. Ayçiçeği sapı ilavesinin artmasıyla numunelerin kuru birim hacim kütlesinde azalma gerçekleşmiştir. En yüksek basınç dayanımı %0,5 ayçiçeği sapı içeren numunede elde edilmiştir. En yüksek eğilme dayanımı ve ultrases geçiş hızı %0,5 oranında olduğu 56 günlük numuneden elde edilmiştir. Su dayanıklılığı açısından %1,25 ayçiçeği sapı ilavesi en iyi sonuçları vermiştir. SEM analizinde tespit edilen liflerin pürüzlü yapısının toprakla oluşturduğu kohezyon sayesinde kerpiç numunelerin basınç ve gerilme dayanımı artmıştır.

Kerpiç katkı çalışmaları su direnci, basınç dayanımı ve çevresel sürdürülebilirlik kriterleriyle Tablo 2'de değerlendirilmiştir. Değerlendirme sonuçlarının geri dönüştürülebilme (+), atık yönetimine etki (+), enerji verimliliğine etki (+), ekosisteme olumsuz etki (-) ve insan sağlığına olumsuz etki (-) şeklinde olması ideal sonucu göstermektedir.

Tablo 2. Kerpiç iyileştirme çalışmalarının çevresel sürdürülebilirlik kriterlerine göre değerlendirilmesi

Kerpiç iyileştirme çalışmasının								
				Çevresel Sürdürülebilirlik Kriterleri				
Kaynak Kodu	Katkı Maddesi	Su dayanımına etki	Basınç dayanımına etki	Geri dönüştürülebilme	Atık yönetimine etki	Enerji verimliliğine etki	Ekosisteme olumsuz etki	İnsan sağlığına olumsuz etki
[35]	Çimento	+	+	+	-	+	+	+
[36]	Portland çimentosu ve asfalt emülsiyonu	+	+	+	-	+	+	+
[38]	Alçı	+	+	+	-	+	-	-
[39]	Alçı ve kireç	+	+	+	-	+	-	-
[41]	Tuğla atığı, kireç ve uçucu kül	ölçülmemiş	+	+	+	+	+	+
[42]	Uçucu kül	+	+	+	+	+	+	+
[43]	Fosfoalçı ve uçucu kül	-	+	+	+	+	+	+
[44]	Yüksek fırın cürufu	+	+	+	+	+	+	+
[45]	Silis dumanı	ölçülmemiş	+	+	+	+	+	+
[46]	Ferrokom cürufu	+	+	+	+	+	+	+
[49]	Mermer tozu	+	+	+	+	+	-	-
[50]	Doğal puzolan katkılı kireç	-	+	-	+	+	-	-

FULL TEXTS BOOK

[51]	Cam elyaf ve hava sürükleyici	+	+	-	-	+	-	-
[52]	Polipropilen lif	ölçülmemiş	+	-	-	+	-	-
[53]	Atık cam tozu, pomza, mermer tozu, alçı , sönmüş kireç, organik elyaf keten lifi ve volkanik tüf	ölçülmemiş	+	+	+	+	-	-
[54]	Koyun yünü ve alçı	ölçülmemiş	+	+	-	+	-	-
[55]	Ayçiçeği sapı	+	+	+	+	+	-	-

SONUÇ VE ÖNERİLER

Geçmişten günümüze evlerini inşa eden insanlar yerel, ekonomik ve erişilebilir bir malzeme olan toprağı kullanmışlardır. Toprak kullanımı mimaride kerpiç yapı kimliğiyle yüzyıllardır var olmuştur. Bu çalışmada kerpiç, kerpiç duvar üretim yöntemleri, yeni nesil kerpiç yapı örnekleri ve iyileştirme yöntemleri incelenmiştir. Literatür taramasından elde edilen iyileştirme yöntemleri çevresel sürdürülebilirlik bağlamında değerlendirilmiştir. Doğada kendiliğinden var olan, ekolojik ve sürdürülebilir bir malzeme olan kerpicin günümüzde kullanılmama nedenleri, iyileştirme çalışmaları ve iyileştirmeden sonra sürdürülebilirliğe uygunluğu araştırılmıştır.

Kerpicin insana, çevreye ve yapı sektörüne potansiyel birçok faydası olmasına rağmen yeterli düzeyde kullanılmaması iyileştirme çalışmalarını değerli kılmaktadır. Çalışmada belirtildiği gibi, kerpiç üç farklı yolla iyileştirilebilmektedir. Kimyasal, fiziksel ve mekanik iyileştirmeyle kerpicin günümüz modern inşaat uygulamalarına entegre olacağı düşünülmektedir. Geleneksel kerpiç malzemenin iyileştirilmesiyle yeni nesil kerpiç üretimleri ele alınmıştır. İncelenen yeni nesil kerpiç yapı örnekleri, katkılı ve sıkıştırılmış (Rammed earth) kerpiç bloklarla duvar üretiminin mümkün olduğunu göstermektedir. Bu bağlamda çalışmada, 1960 yılı sonrasını ele alan katkıların günümüzde ve gelecekte kullanımı sorgulanmıştır. Türkiye'de yapılan 17 adet deneysel kerpiç iyileştirme çalışması ele alınarak değerlendirme yapılmıştır. Deneysel çalışmalar kerpicin olumsuz olarak nitelendirilen özelliklerinden su ve basınç dayanıksızlığını iyileştirmeye odaklanmaktadır. Kerpiç harcının su geçirimliliğini azaltma ve basınç dayanımını artırmak amacıyla yapılan katkı çalışmaları çoğunlukla farklı oranlarda katkı ilavesiyle olumlu sonuçlar vermiştir. Bununla birlikte ilave edilen katkıların, kerpiç malzemenin çevresel sürdürülebilirliğine etkisi sorgulanmıştır.

Sürdürülebilirlik ekonomik, çevresel ve sosyal olmak üzere üç boyuttan oluşmakta olup bu çalışmada çevresel boyutu ele alınmıştır. Kerpiç katkı çalışmaları çevresel sürdürülebilirlik kapsamında geri dönüştürülebilme, atık yönetimi, enerji verimliliği, insan sağlığına ve ekosisteme olumsuz etki başlıklarıyla değerlendirilmiştir. Literatür taraması sonucunda elde edilen veriler şu şekilde özetlenebilir:

- Mermer tozu ve ayçiçeği sapı hem su ve basınç dayanıklılığı artırması hem de çevresel sürdürülebilirlik kriterlerine uygun olması yönüyle kullanımı önerilmektedir.
- Atık cam tozu, pomza, organik keten lifi ve koyun yünü katkıları da kriterlere uygun olmasına karşın; su geçirimlilik testi yapılmadığı için net bir öneri sunulamamaktadır.
- Alçı ve kireç ilaveleri talep edilen sürdürülebilirlik ölçütlerinin tamamını sağlamakta olup yalnızca atık yönetiminde etkisi bulunmamaktadır. Bu bağlamda alçı ve kireç de yeni kerpiç harçlarında kullanılabileceği düşünülmektedir.

FULL TEXTS BOOK

- Doğal puzolan katkılı kireç ilavesinde basınç dayanımı iyileşirken; su dayanımında azalma tespit edilmiştir. Geri dönüştürülemeyen doğal puzolan katkısı önerilmemekte olup; az yağış alan iklim bölgelerinde kullanılabileceği düşünülmektedir.
- Cam elyaf su ve basınç dayanımını artırırken; polipropilen basınç dayanımını artırmış ve su direnç testleri yapılmamıştır. Bu iki ürün ekosisteme doğrudan zarar vermemektedir. Uzun vadede geri dönüştürülebilme özelliğinin olmaması ve atık yönetimine katkı sağlamaması nedeniyle kerpice katkıları önerilmemektedir.
- Çimento ve asfalt ilavesi CO_2 emisyonunu artırmakta olup atık yönetimine olumlu etkisi bulunmamaktadır. İnsan sağlığı ve ekosistemi olumsuz etkileyen bu maddelerin kullanımı uygun görülmemektedir.
- Uçucu kül, fosfoalçı, yüksek fırın cürufu, silis dumanı ve ferrokrom cürufu ise, kerpiç malzemenin su ve basınç dayanıklılığının iyileştirmesine katkı sağlamasına karşın; insan sağlığı ve ekosisteme olumsuz etkileri bulunmaktadır. Solunum yoluyla insan sağlığını ve yer altı sularına sızıntı yoluyla ekosistemi olumsuz etkileyen bu atıkların yeni nesil kerpiç duvarlarda kullanımı önerilmemektedir.

Kerpiç malzemenin kullanımı ve iyileştirilmesi konusunda sunulan öneriler dikkate alınarak kerpiç duvarlar/yapılar üretilebilir. Bu çalışmanın yeni nesil kerpiç malzemelerin çevresel sürdürülebilirlik kriterlerine uygunluğunun incelenmesi yönüyle önemli olduğu ve gelecekte yapılacak çalışmalara referans olabileceği düşünülmektedir.

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FULL TEXTS BOOK

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FULL TEXTS BOOK

FEASIBILITY AND OPTIMIZATION OF HYBRID ENERGY SYSTEMS IN THE SAKARYA–KARASU REGION: A CASE STUDY

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ABSTRACT

Energy resources have been a critical research area throughout human history. Since the industrial revolution, the economic advantages and advanced production technologies of fossil fuels have increased their utilization. However, the limited lifespan and environmental impact of fossil fuels have significantly heightened interest in renewable energy sources. This study examines the potential for meeting the electrical and thermal needs of 462 households and 1848 residents in the Sakarya Karasu district with an off-grid hybrid energy system. Using the energy demands of the residences and the region's meteorological data, a hybrid energy system model integrated with solar and wind energy was developed using HOMER Pro software. The model is complemented by a diesel generator to ensure energy continuity. The cost analysis determined that the system's installation cost was $2,303,319.44, with an operational cost of $415,969.60 and a total net present cost of $10,358,090.00. The unit energy cost was calculated as $0.327/kWh. Sensitivity analyses highlight the economic and environmental benefits of hybrid energy systems in terms of effective battery utilization, waste heat recovery from generators, and optimized system costs. This study presents significant findings on the feasibility of implementing hybrid energy systems in off-grid areas and their potential to reduce dependence on fossil fuels.

Keywords: Techno-Economic Analysis, Hybrid Energy Systems, Renewable Energy, HOMER Pro Software, Energy Optimization.

INTRODUCTION

Energy resources have been a fundamental subject of research since ancient times. With the Industrial Revolution, the demand for energy increased rapidly, pushing the use of fossil fuels to its peak. Today, the majority of energy needs are met by fossil fuels such as coal, oil, and natural gas. However, the oil crisis of the late 20th century shook confidence in fossil fuels and spurred interest in renewable energy sources (Güven & Poyraz, 2017).

Renewable energy sources play a critical role in sustainable energy production. Sources such as solar, wind, hydroelectric, biomass, and geothermal energy have low environmental impacts and are not at risk of depletion. However, the intermittent and variable nature of these sources poses challenges in terms of ensuring the continuity of energy production (Kaldellis, Kondili & Filios, 2006). Hybrid energy systems have been developed to overcome these challenges. Hybrid energy systems combine multiple renewable energy sources. For example, the limited availability of solar energy during daylight hours and the inconsistency of wind can complicate their independent use. However, high-capacity storage systems can be used to store energy when production is not possible (Khalil et al., 2022).

Turkey has significant potential for renewable energy sources, particularly solar and wind energy. The average annual sunshine hour is 2,640 hours, equivalent to a daily average of 7.2 hours. Turkey's wind energy potential is estimated to be approximately 48 GW. This potential can meet a substantial portion of Turkey's energy needs and reduce its dependence on fossil fuels (İller Bankası, 2024).

The HOMER (Hybrid Optimization Model for Electric Renewables) software is widely used for designing and optimizing hybrid energy systems. HOMER Pro simulates various configurations of renewable energy systems, considering factors such as cost, efficiency, and environmental impact. This

FULL TEXTS BOOK

software not only performs technical and economic analyses but also conducts sensitivity analyses to identify critical factors affecting system performance. These capabilities make HOMER Pro a valuable tool for researchers and engineers (Güven & Mete, 2021).

Recent HOMER Pro studies have highlighted the effectiveness and economic advantages of hybrid energy systems. For instance, Chowdhury et al. (2023) designed a hybrid energy system that integrates solar and wind energy in a rural area of South Korea, emphasizing the system's cost-effectiveness and reliability. In their 2022 study, Güven and Mete designed and compared various hybrid energy systems. The scenarios included grid connections, solar panels, wind turbines, diesel and biogas generators, fuel cells, electrolyzer, hydrogen tanks, batteries, and converters. The most cost-effective and environmentally friendly system was the grid-connected Solar Panel/Wind Turbine/Biogas Generator/Battery hybrid, with a net present cost of $176 million, a unit energy cost of $0.0301, and 100% renewable energy production.

In another study, Prasad and Natarajan (2006) explored the cost-effectiveness of a hybrid solar and biomass energy system in a rural area of India. Rehman (2021) identified wind/solar-PV, wind/solar-PV/diesel, and solar-PV/diesel combinations as the most effective combinations for supplementing Saudi Arabia’s energy portfolio, with average energy costs of $0.458, $0.355, and $0.349 per kWh, respectively. Diaf et al. (2008) conducted a cost analysis of a hybrid energy system supported by solar and wind energy in Algeria and evaluated the system performance using HOMER Pro.

This study examines the potential of meeting the electrical and thermal needs of a community of 462 households and 1,848 people in the Karasu district of Sakarya using an off-grid hybrid energy system. Based on the energy demands of households and the meteorological data of the region, a hybrid energy system model integrating solar and wind energy was created using HOMER Pro software. The model was supplemented with a diesel generator to ensure energy continuity. After conducting cost analyses of the created system, sensitivity analyses were performed by considering parameters such as the activation of the generator at different operational loads, utilization of waste heat from the generator in a cogeneration system, increasing the height of the wind turbine tower, and changes in diesel prices. The effects of thermal load control and battery usage on the system were investigated both economically and technically. After reviewing all optimizations and sensitivity analyses, potential cost reductions were evaluated.

MATERIALS AND METHODS

The initial implementation of this study was performed in the Karasu district of Sakarya province, Turkey (41°6.8' N 30°40.6' E). The research was conducted in a community consisting of 462 households and a total of 1848 people. According to studies by TEİAŞ, the average daily electricity consumption of a four-person household is approximately 8 kWh. Therefore, the total daily electricity needs of 462 households are calculated to be 3696 kWh. The electricity consumption profile tended to be higher in the evening hours, and the predefined community load profile (Figure 1(a)) in HOMER Pro software was used in this study. The total daily electricity consumption was 3696 kWh, with a peak power consumption of 473.83 kW observed during the day (Figure 1(b)). The system is designed not only to meet the electrical load requirements but also to address the thermal load needs of households. The average heat loss per square meter is determined to be 13.761 kWh, and assuming an average house size of 100 square meters, the annual heat loss per house is calculated to be 1376.1 kWh. For a community of 462 households, the annual total thermal energy requirement was found to be 635761.58 kWh. The thermal load requirement varies seasonally, with the majority occurring in winter. The thermal load profile shown in Figure 1(c) and Figure 1 (d) was accordingly integrated into the system. The thermal load requirements are 27.18% in January, 17.85% in December, 24.70% in February, 11.75% in March, 7.43% in November, 8.70% in April, and 2.39% in October, with no thermal load requirements for the remaining months. HOMER Pro software was used for the analysis and optimization of both the electrical and thermal load profiles, with the load data detailed on an hourly

FULL TEXTS BOOK

basis throughout the year. These profiles play a critical role in system design and performance evaluation (Güven & Yörükeren, 2022).

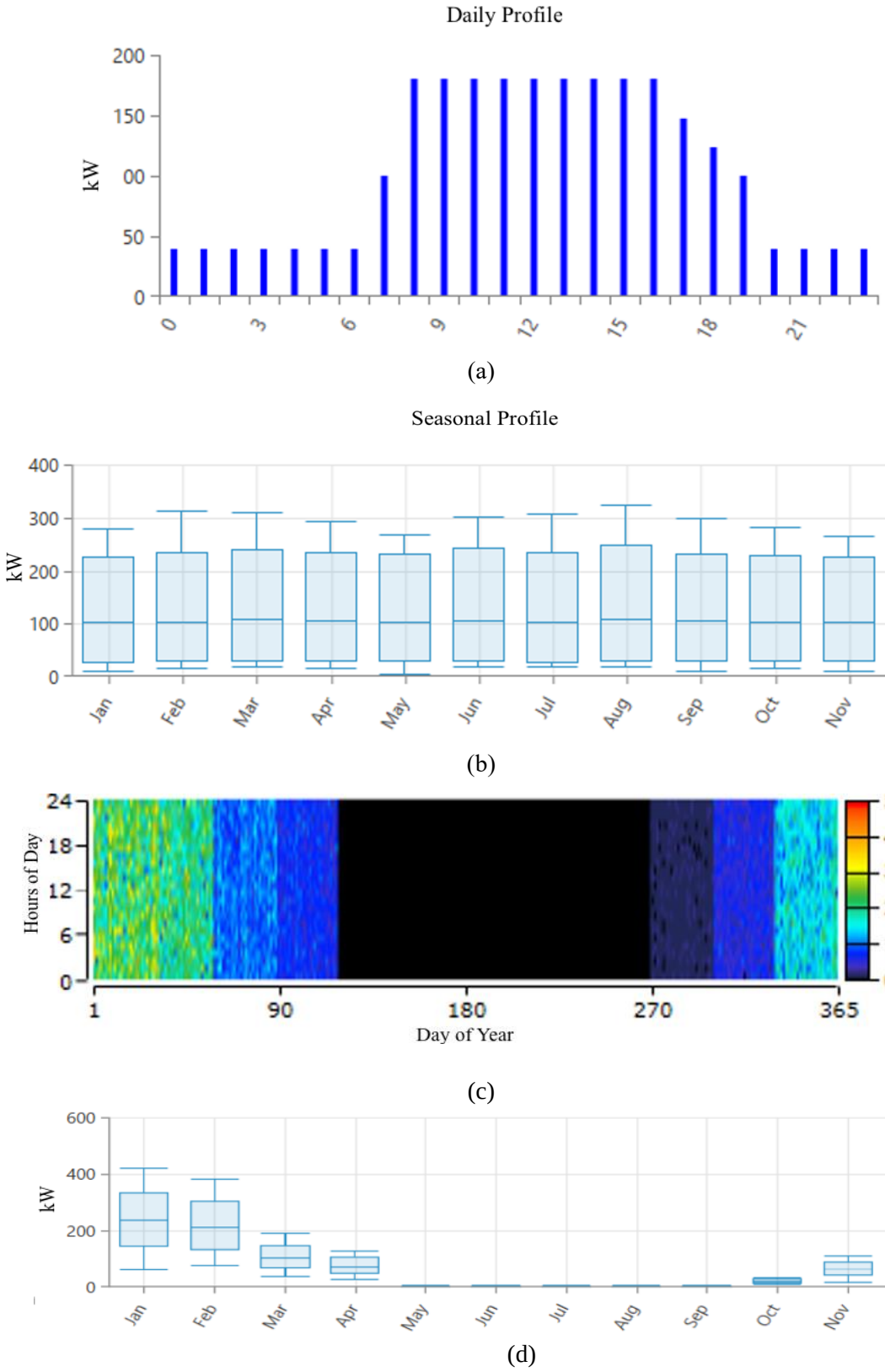


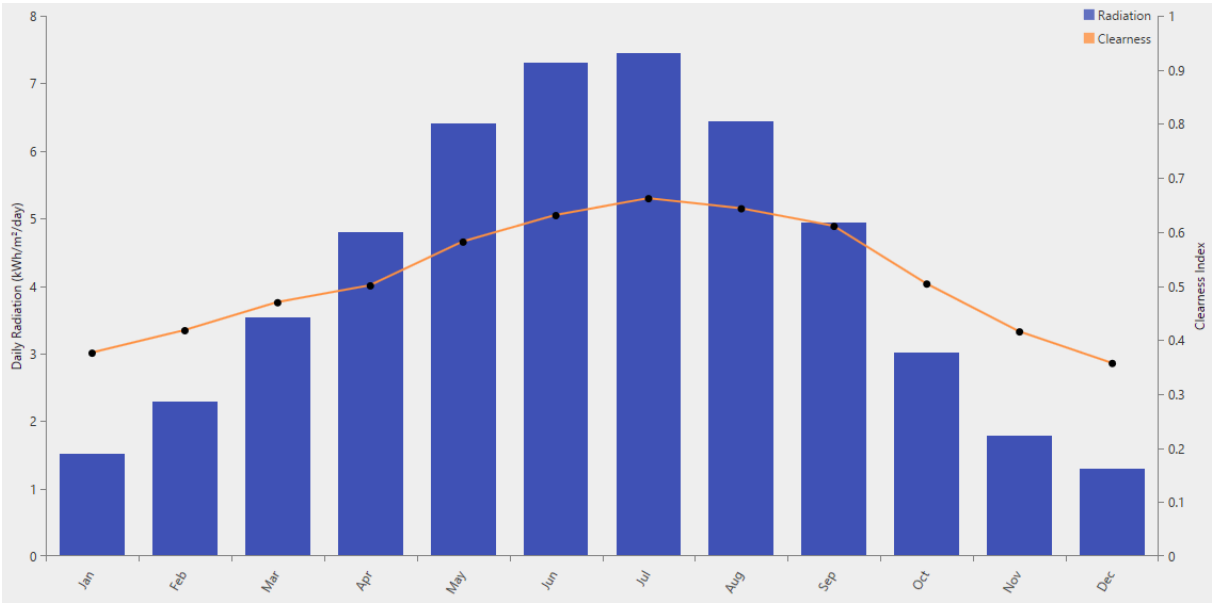
Figure 1. Load profiles (a) hourly (b)montly (c) thermal load (d) monthly distribution of thermal load requirement.

FULL TEXTS BOOK

The potential for solar panels to generate electricity from solar energy is directly proportional to the meteorological conditions of the region (Güven & Hatipoğlu, 2022). The solar energy data for the region were integrated into HOMER Pro software from NASA's database. These data were obtained from measurements taken over 22 years, from July 1983 to July 2024, and averaged. According to Figure 2 (a) , the region's solar energy potential increases during the summer months and decreases during the winter months, with an annual average daily solar energy potential of 4.23 kWh/m².

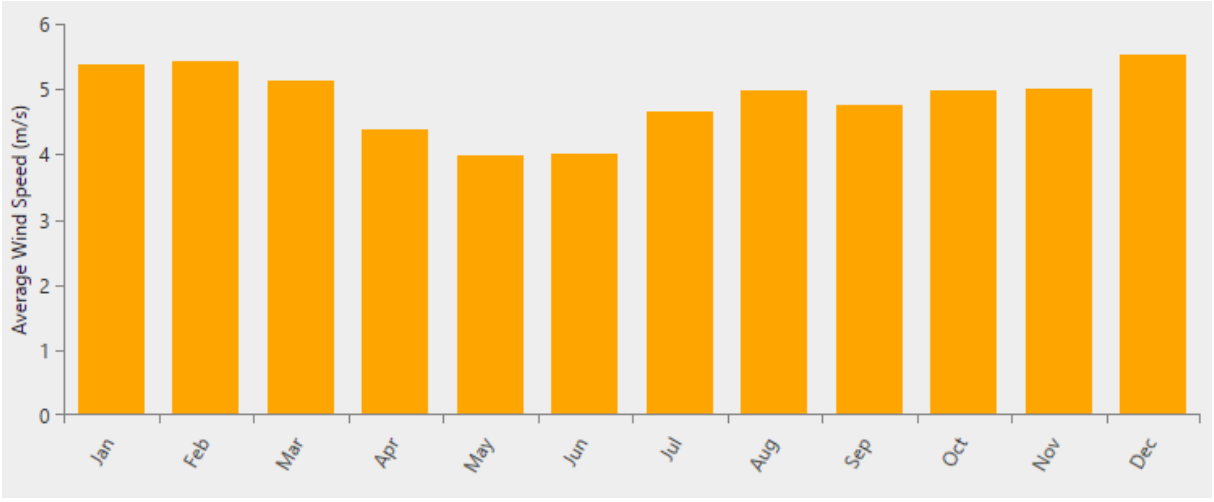
Given the high investment costs of wind turbines, the wind speed profile of a region is crucial for their deployment. The wind speed profile for the region was also obtained from NASA's database, which showed an average wind speed of 4.85 m/s. These wind speed data were based on 29 years of measurements taken at a height of 50 m from January 1983 to January 2024. The region's wind speed profile is illustrated in Figure 2 (b). It is evident that wind energy can serve as a complementary source during winter when solar energy is insufficient, and the synergistic effect of these two energy sources makes them among the most commonly used energy sources in hybrid systems.

Another important meteorological parameter for the region was temperature, which was also obtained from NASA's database. These data represent the average of 29 years of measurements taken between January 1983 and January 2024. As shown in Figure 2 (c), the temperature profile is higher during summer than during winter. The average temperature over the 29-year measurement period was 13.93°C.

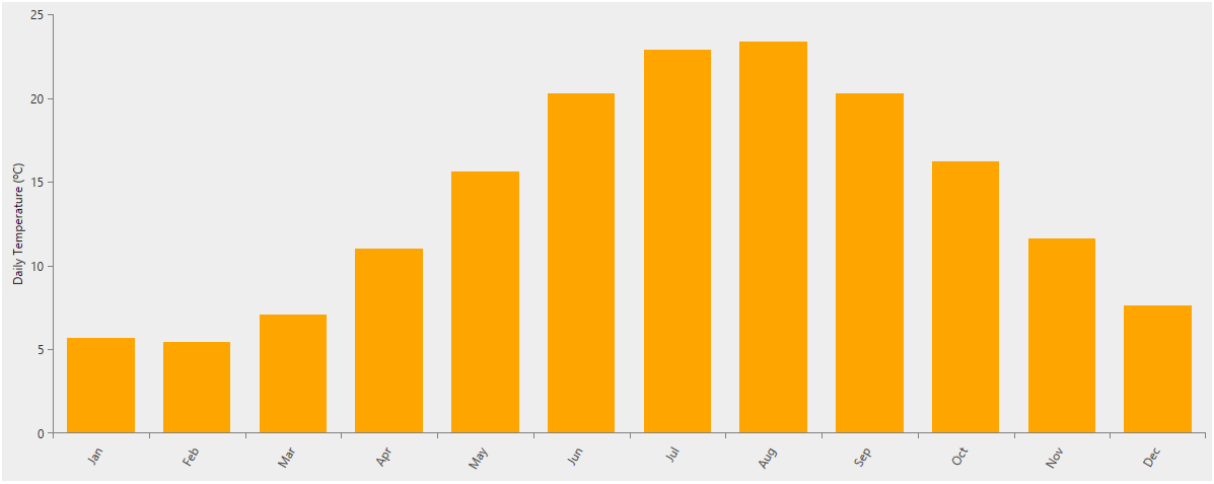


(a)

FULL TEXTS BOOK



(b)



(c)

Figure 2. Meteorological data (a) solar radiation (kWh/m^2/day), (b)wind speed (m/s), (c) ambient temperature(^{0}C).

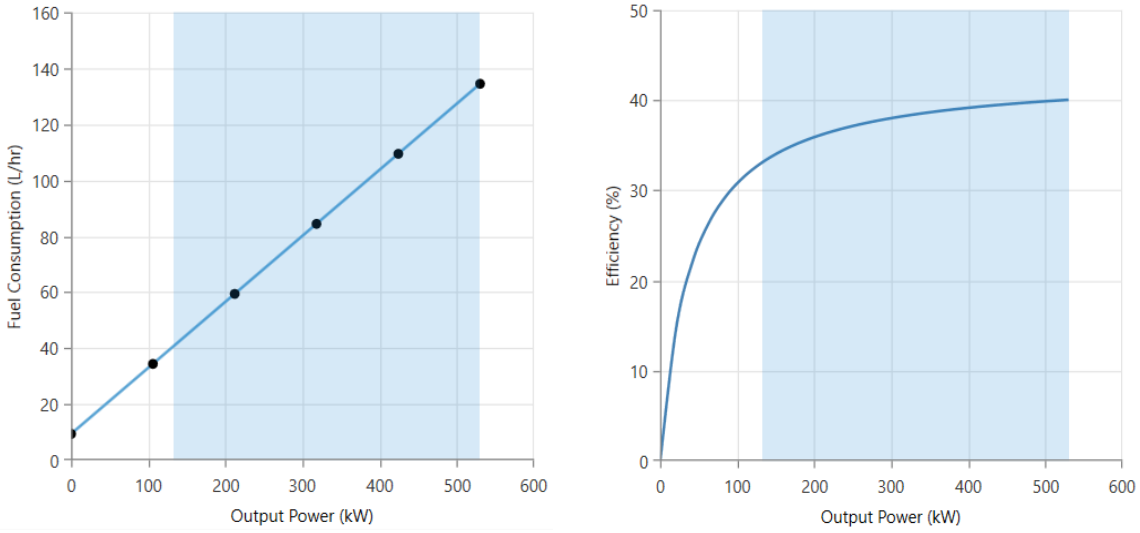
FULL TEXTS BOOK

Hybrid energy system components

Diesel Generator

According to previous research, the cost of diesel generators typically ranges from $250 to $500 per kW. For the diesel generator used in this project, a cost of $400/kW was considered. The price of diesel generators generally decreases inversely with capacity, meaning that generators with larger capacities have lower costs per kW. The fuel consumption and efficiency curves of the generators used in the hybrid energy system are presented in Figures 3(a) and (b). It can be seen that operating the generator close to its rated capacity improves efficiency and reduces the consumption of fuel per kW. In this study, the price of diesel fuel is assumed to be $1.27 per liter.

Figure 3. Diesel generator profiles: (a) fuel consumption (b) efficiency



(a) (b)

Here, to model the fuel consumption of the generator, a linear Equation (1) is used:

$$F_{DG} = a_1 P_{DG} + a_0 P_{DGR} \quad (1)$$

In this equation, F_{DG} represents the fuel consumption of the generator (in liters per hour, a_0 is the fuel cut-off coefficient (in liters per hour per kilowatt, P_{DGR} is the capacity of the generator in kilowatts, a_1 is the slope of the fuel curve (in liters per hour per kilowatt, and P_{DG} is the power output in kilowatts (Güven & Yücel, 2023).

Wind Turbine

One of the most suitable systems for reducing unit energy costs is the wind turbine system. However, due to high installation costs, low-capacity wind power systems are not economically viable (Nasser & Hassan, 2024). According to previous research, the installation cost of a wind turbine system is approximately $2000 per kW. The wind turbine used in the system has a capacity of 10 kW and an installation cost of $20,000. In addition to the installation cost, the replacement cost is $20,000, and the annual maintenance cost is $300. The power–speed curves for the respective wind turbines are shown in Figure 4.

FULL TEXTS BOOK

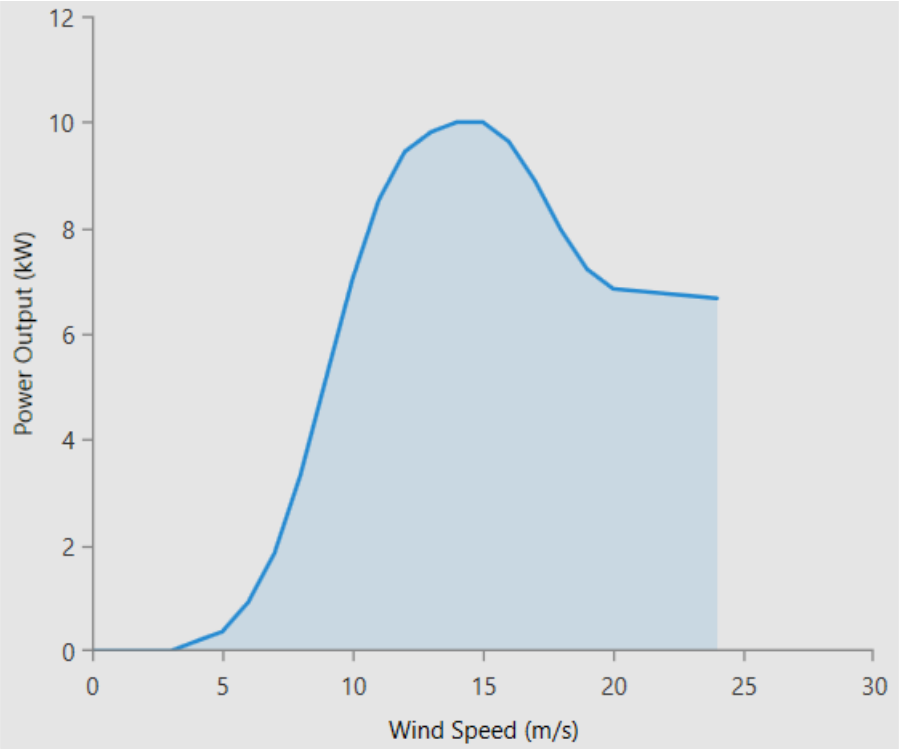


Figure 4. Power–speed curve of the wind turbine

$$P = \frac{1}{2} p C_p A v_\omega^3 \quad (2)$$

Equation (2) generally describes the relationship between the wind speed and the electrical output of a wind turbine. The relevant parameters typically include the swept area (A), air density (p), and wind speed (v). These factors together determine how efficiently a wind turbine can convert wind energy into electrical energy, depending on the specific design and environmental conditions (Güven et al., 2023).

Photovoltaic Panel

Solar panels are used to directly generate electrical energy from sunlight without the need for any moving mechanisms. Solar energy is one of the most important renewable energy sources capable of significantly meeting global energy demand. The panel used in the system is one of the integrated panels in HOMER Pro software, focusing on the critical parameter of cost per watt (Mussard et al., 2023). Currently, solar panel prices are around 35 cents per watt, with installation costs for solar panel systems typically around $1500/kW and replacement costs also approximately $1500/kW. The annual repair and maintenance cost was $20, which was used as a reference in the calculations.

The power output of a PV panel can be mathematically described by Equation (3):

$$P_{PV} = Y_{PV} f_{PV} \left(\frac{G_T}{G_{T,STC}}\right) \left[1 + \alpha_f (T_C - T_{C,STC})\right] \quad (3)$$

In Equation (3), P_{PV} (W) represents the current power output of the photovoltaic system. Y_{PV} (W) is the standard output power of the PV system under standard test conditions (STC), while f_{PV} (%) is the adjustment factor applied to account for real-life conditions affecting the PV system. G_T (W/m²) represents the solar irradiance incident on the PV module at any given moment, and $G_{T,STC}$ (1000 W/m²) represents the assumed irradiance under the STC at 25°C. The temperature coefficient of the PV module, α_f (%/°C), typically ranges from 0.3% to 0.5%, indicating the sensitivity of the PV output to temperature changes. T_C (°C) denotes the current temperature of the PV module, while $T_{C,STC}$ (°C)

FULL TEXTS BOOK

refers to the temperature of the PV module under the STC, which was set to 25°C (Güven and Poyraz, 2021).

When HOMER Pro software ignores the impact of the temperature coefficient [$\propto_f$ (%/°C)] on PV system performance, an alternative calculation method is used. This method, referred to as Equation (4), simplifies the process when the effects of temperature are minimal or when the precise impact of temperature variations is not significant (Güven, 2023a).

$$P_{PV} = Y_{PV}\, f_{PV} \left(\frac{G_T}{G_{T\,STC}}\right) \quad (4)$$

Batarya (BT)

In HOMER Pro software, battery modeling involves several key equations that describe the performance and behavior of a battery system. The primary equations used for battery modeling include the state of charge (SOC), charge and discharge efficiency, and the depth of discharge (DOD).

The system utilizes lithium-ion batteries with a capacity of 1 kWh each, and the cost is $350 per kWh. Similarly, the replacement cost is approximately $350 per kWh. The annual repair and maintenance cost is $25. The discharge depth, which significantly affects the number of battery cycles, was assumed to be 80%.

State of Charge (SOC)

SOC of a battery at any time t is given by Equation (5).

$$\mathrm{SOC(t)} = \mathrm{SOC(t-1)} + \left(\frac{P_{in}(t) - P_{out}(t}{C_{Bat}}\right) \quad (5)$$

Where $\mathrm{SOC(t)}$ is the state of charge at time t, $\mathrm{SOC(t-1)}$ is the state of charge at the previous time step, $P_{in}(t)$ is the power input to the battery at time t (charging), $P_{out}(t)$ is the power output from the battery at time t (discharging), and C_{Bat} is the capacity of the battery (Güven, 2023b).

Charge and Discharge Efficiency

The efficiency of the battery during charging (η_{charge}) and discharging ($\eta_{discharge}$) affects the net energy stored and retrieved by the battery:

$$E_{stored} = P_{in} \times \eta_{charge} \quad (6)$$

$$E_{retrieved} = P_{out} \times \eta_{discharge} \quad (7)$$

where E_{stored} is the effective energy stored in the battery and $E_{retrieved}$ is the effective energy retrieved from the battery.

Depth of Discharge (DOD)

The depth of discharge (DOD) represents the fraction of the battery capacity that has been used and is calculated as Equation (8):

$$DOD = 1 - SOC \quad (8)$$

Battery Life Cycle

The battery life cycle depends on the DOD and the number of charge–discharge cycles:

FULL TEXTS BOOK

$$L_{Battery} = \frac{N_{cycles}}{DOD}$$
(9)

Where $L_{Battery}$ is the battery life in terms of the number of cycles, and N_{cycles} is the total number of charge–discharge cycles that the battery can undergo. These equations collectively describe the behavior of the battery system in HOMER Pro, allowing for the simulation and optimization of battery performance within energy systems.

Bidirectional Converter

An inverter converts direct current (DC) to alternating current (AC). Although many electronic devices and systems operate on DCs, homes, businesses, and general power infrastructures typically use ACs. In this context, inverters play a crucial role in the conversion of energy from DC to AC. Inverter technology is used in a wide range of applications, from small-scale portable devices to large-scale solar and wind energy systems. Depending on their functions and areas of use, various types and features of inverters are available. The primary function of the inverters is to efficiently convert the DC input to the AC output, which is critical for achieving high energy efficiency. Some inverter models also provide additional functions such as voltage and frequency adjustments (Güven & Poyraz, 2021). In this system, the installation and replacement costs of the inverter are set at $300, with an annual maintenance cost of zero dollars and a projected lifespan of 15 years. The inverter capacity is then determined by Equation (10):

$$P_{inv} = \frac{E_{L,max}}{\eta_{DC/AC}} \quad (10)$$

In Equation (10), P_{inv} (W) represents the capacity of the power inverter, $E_{L,max}$ (Wh) denotes the peak energy demand of the load, and $\eta_{DC/AC}$ signifies the efficiency rate of the conversion from DC to AC (Singh and Kumar, 2023).

Thermal Load Controller

A thermal load controller (TLC) establishes a connection between a thermal load system and an electrical load system. Excess energy produced in the electrical system is transferred to the thermal load bus, preventing excessive energy use for heating. The cost per kW of the thermal load controller was calculated based on the $200 specified in HOMER Pro.

Boiler

HOMER pro software uses a boiler system to meet thermal loads and consumes diesel fuel as its energy source. The efficiency of the boiler used in the system was set at 85%.

Economic Analysis Inputs

The HOMER Pro software uses the annual real interest rate to calculate cost. The real interest rate is determined using the current interest rate and the inflation rate. The annual real interest rate is calculated using Equation (11):

$$i = (i' - f)/(1 + f)\ (1)$$
(11)

Where i represents the annual real interest rate, f is the annual inflation rate, and i' is the current interest rate. In this study, the current interest rate is assumed to be 42.50%, and the inflation rate is 39.61%. From these values, the real interest rate was found to be 2.07%.

FULL TEXTS BOOK

HOMER Pro simulation of Hybrid Renewable Energy System and Results

HOMER Pro is reliable software widely used for the sizing and optimizing of multiple energy sources, and it is also known as a hybrid optimization program. The software assists in performing a preliminary feasibility test for various RE configurations of different sizes and sensitivity analysis for different configurations of the desired energy systems. The software was developed by the US National Renewable Energy Laboratory (NREL) for grid-connected and off-grid applications. It runs on a Windows platform and is programed in C++ (Güven & Mengi, 2023).

Designing and configuring a microgrid involves a critical decision-making task in terms of component size, component design, and selection of a suitable location. The inflation rate, interest rate, and other technical specifications of the selected components are necessary for the cost assessment of these hybrid energy systems. Regarding decision-making, there are many options, depending on technology and the availability of energy sources.

HOMER Pro integrates optimization and sensitivity algorithms, thus simplifying the evaluation process. The optimal simulations adhere strictly to user-specified constraints, thereby minimizing the NPC value. Beyond performing energy balance assessments, HOMER Pro filters out infeasible designs and highlights viable configurations that guide users toward determining an ideal system blueprint. Moreover, this simulation rigorously examines a system's technical viability, ensuring that it addresses both electrical and thermal demands within the set constraints. The proposed platform also delves into the system's NPC, factoring in costs related to installation and ongoing maintenance. Spanning a full year or 8760 hours, HOMER Pro's simulation yields results in a structured table, supplemented with illustrative graphs and charts. These visualizations delineate technical and economic metrics, elucidate the techno-economic dynamics, and permit comparisons among hybrid energy system designs. The output is export ready for deeper analysis. The core elements of optimization include decision parameters such as PV dimensions, wind turbine count, battery numbers, and converter capacity; inclusion of renewable resources such as PV arrays and wind turbines; generator magnitude; and dispatch blueprint dictating operational strategies.

Figure 5 presents a concise schematic of the hybrid renewable energy systems, and Figure 6 presents a comprehensive flowchart detailing each phase of the HOMER Pro simulation process. The designed microgrid, as shown in Figure 5, is intended to meet both the electrical and thermal load requirements.

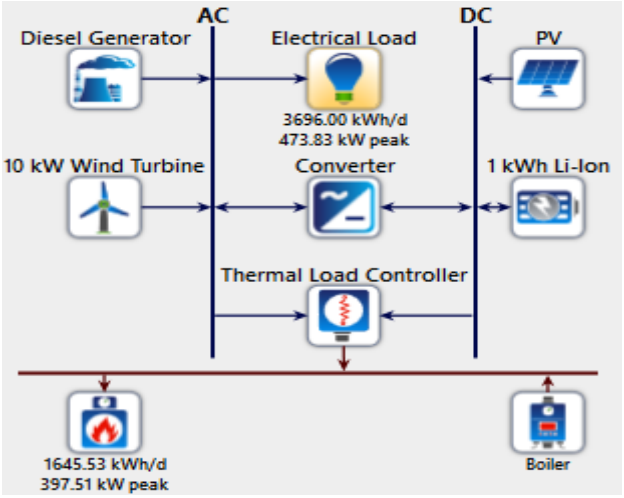


Figure 5. A schematic of the hybrid renewable energy system configuration was created using HOMER Pro software.

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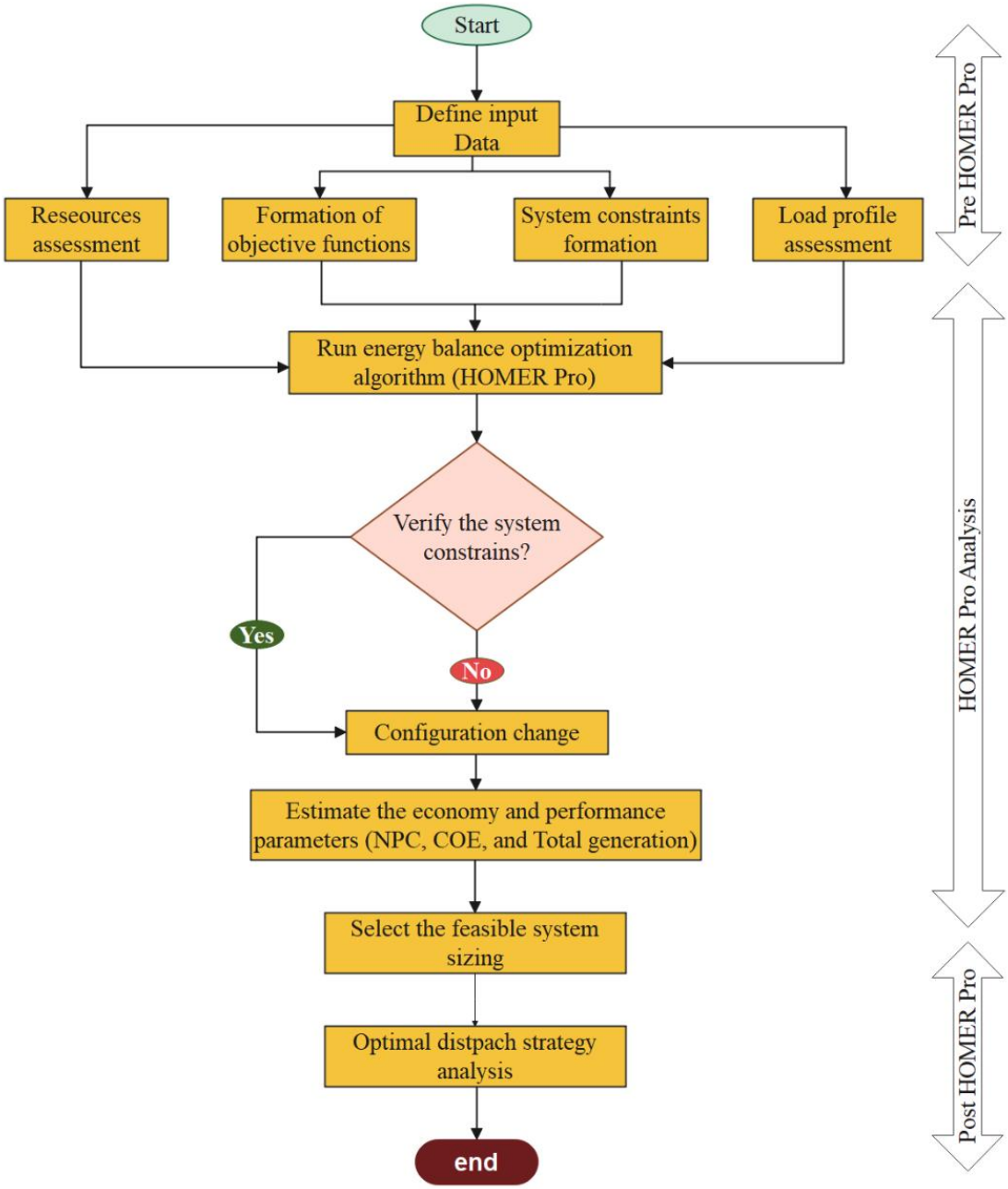


Figure 6. HOMER Pro optimization flow diagram.

RESULTS AND DISCUSSION

The simulations have led to the development of several potential systems that can be implemented in the region. Table 1 lists the results obtained by the four most suitable systems. The analyses utilized the region's meteorological data, with the diesel price assumed to be $1.27 per liter and the wind turbine height set at 24 meters. It was assumed that the generator only produced electricity with a generator startup load of 25%, and the scenarios considered constant system loads.

The simulation results show that the designed systems can effectively meet both the electrical and thermal load demands of the region. The comparison of different systems highlights the trade-offs between various configurations in terms of cost, efficiency, and sustainability. By analyzing these factors, it becomes evident that optimizing the balance between renewable and conventional energy sources is crucial for achieving both economic and environmental benefits.

FULL TEXTS BOOK

The results indicate that incorporating renewable energy sources, such as wind turbines and solar panels, significantly reduces the dependency on diesel generators, leading to lower operational costs and reduced carbon emissions. The inclusion of a thermal load controller further enhances system efficiency by utilizing excess electrical energy for heating, thereby minimizing energy wastage.

Moreover, the economic analysis underscores the importance of considering both installation and maintenance costs along with real interest rates to accurately evaluate the financial viability of the proposed systems. The calculated real interest rate of 2.07%, based on current interest and inflation rates, provides a realistic perspective on long-term investment and saving potential.

Table 1. Simulation results obtained using HOMER Pro.

PV panel (kW)	594	625	0	0
Wind Turbine (kW)	6	0	13	0
Diesel Generator (kW)	530	530	530	530
Battery(kW)	2,340	2,156	417	1,109
Thermal Load Controller (kW)	100	100	100	100
Converter(kW)	416	597	267	144
Dispatch	LF	LF	CC	CC
Net present cost (NPC) ($)	$11.4M	$11.7M	$13.4M	$14.6M
Cost of Energy (COE) ($)	$0.37	$0.38	$0.45	$0.49
Operating costs ($/yr)	$475,418	$494,206	$655,995.00	$717,724.00
Initial Capital ($)	$2.19M	$2.10M	$717,953.00	$663,435.00
Ren Fraction (REF) (%)	42	36.9	0	0
Total fuel consumption (L/yr)	217,538	231,127	384,431	426,834

The simulation was conducted under specified parameters to identify the most suitable systems for the region. The optimal unit energy cost was found to be $0.369. In the first system, the configuration included a 594-kW solar panel, a 6-kW wind turbine, a 530-kW diesel generator, a 2340-kWh battery storage system, a 100-kW thermal load controller, and a 416-kW converter. In the second system, a wind turbine was omitted, which increased the solar panel capacity to 625 kW, decreased the battery storage system to 2156 kWh, and reduced the renewable energy factor from 39.7% to 36.9%.

The removal of wind turbines had significant impacts: it prevented the generation of electricity during winter periods when solar panels are less effective, increased the operational load on the generator, and consequently raised fuel consumption from 217,358 to 231,127 liters. The primary disadvantage of wind turbines is their high installation costs, which increase the initial investment. However, it also contributes to reducing the emission values, as detailed in Table 2.

Table 2. Emission values of the optimization result.

Value	**Emission (kg/year)**
CO2	605302
CO	2618
Unburned Hydrocarbons	114
Particulate Matter	15,9
SO2	1488
NOx	2459

FULL TEXTS BOOK

A slight increase in the system's investment could facilitate the installation of a more environmentally friendly setup, reducing emissions while maintaining the same energy cost. Such enhancements should be considered in all systems to promote a sustainable world.

Impact of the Thermal Load Controller on the System

The thermal load controller significantly contributes to the system by recovering the excess electricity produced, thereby reducing the boiler's production and significantly lowering harmful gas emissions. As the primary power producers, photovoltaic panels generate excess energy during summer. However, during winter, the increased thermal load demand cannot be met by the excess energy produced by photovoltaic panels, as this excess energy cannot be utilized by the thermal load controller. To optimize the system's efficiency, it is recommended that the excess energy produced between May and October be utilized in various cooling systems. This could lead to a significant reduction in cooling energy consumption during summer. Figure 7 illustrates the surplus electricity produced and the thermal load demand throughout the year.

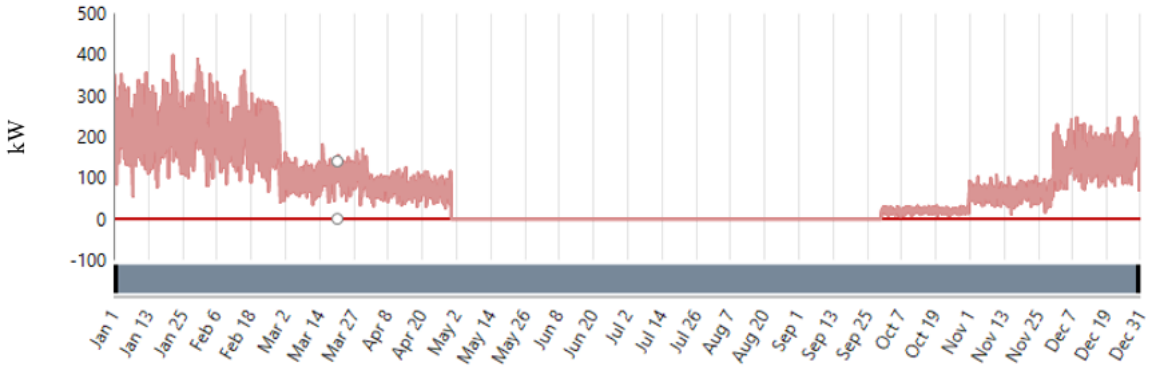


Figure 7. Surplus electricity produced and thermal load demand throughout the year.

Effects of Generator Performance Under Various Load Conditions

The simulation analysis performed the generator performance under different load conditions, which were categorized into three scenarios: 25%, 50%, and 75% load capacities. The analysis, conducted under scenarios of potential diesel price increases, showed that the unit energy cost could drop to $0.334/kWh if the generator operates at loads exceeding 75%. These results indicate that the generator's continuous high-efficiency operation results in lower fuel consumption and more cost-effective energy production. When operating at all load levels, the generator operated at an average capacity of 530 kW, consumed 161,885 L of fuel annually, and produced 587,032 kWh of electricity at an efficiency of 33.9%. However, when operating at a minimum of 75% capacity, the generator achieved an average capacity of 398 kW and an efficiency of 39.1%, indicating lower fuel consumption and higher electricity production. If diesel prices exceed $1.47 per liter, incorporating a wind turbine into the system is recommended.

Utilization of Generator Waste Heat

Generators generate significant heat loss during electricity generation, which can be harnessed through a cogeneration system to add an additional energy source to the system. The cogeneration system recovers the heat produced by the generator for use during thermal loads, thereby enhancing the energy efficiency. By increasing the heat recovery rate of the generator to 15%, the simulations indicate that the boiler fuel consumption can be reduced by 8,000 L annually. This also led to significant reductions in CO_2 and SO_2 emissions. The decreased fuel consumption also reduced the unit energy cost to $0.369. The impact of the generator's heat recovery rate on the unit energy cost and fuel consumption is illustrated in Figure 8.

FULL TEXTS BOOK

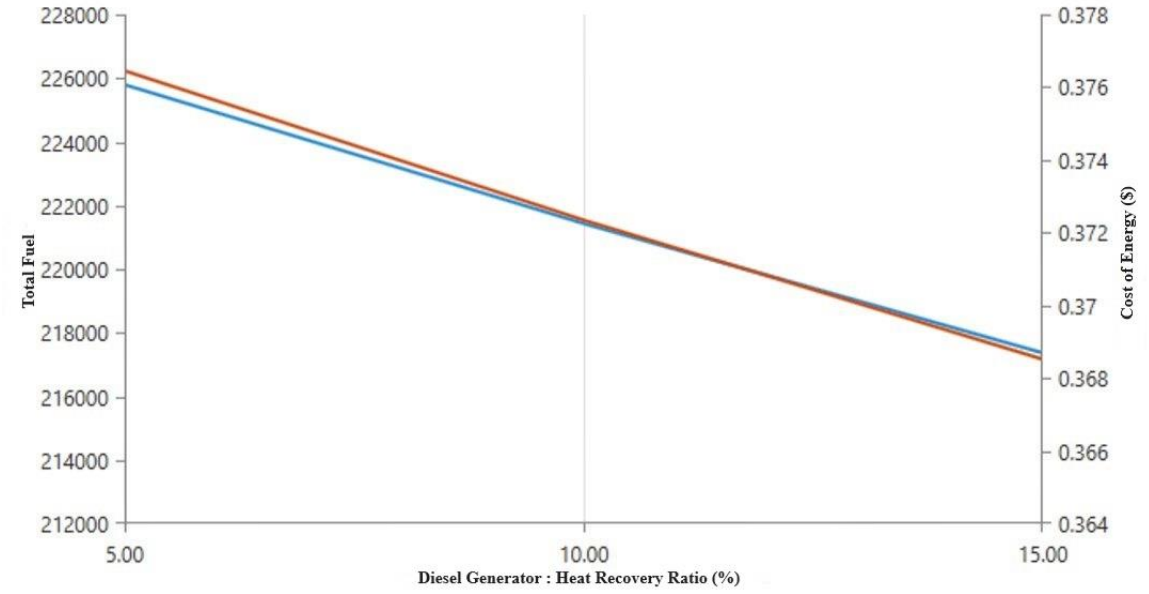


Figure 8. The impact of the generator's heat recovery rate on the unit energy cost and fuel consumption.

Impact of Solar Radiation on the solar system

The simulations conducted for the hybrid system in a region of Turkey with significant solar and wind potential demonstrate that the economic and technical parameters are optimized for local conditions. Sensitivity analyses were performed to understand potential changes if the same system were deployed in regions with higher solar radiation levels.

The analyses revealed that as the average daily solar radiation increases, solar panels operate more efficiently, producing more electricity with fewer panels. This improvement results in a reduction of the unit energy cost to as low as $0.350/kWh. Additionally, increased radiation during winter months allows the thermal load controller to utilize excess electricity more effectively, contributing more to the thermal load, reducing boiler operating times, lowering fuel consumption, and decreasing emission levels.

The analyses also indicated an increase in the renewable energy ratio within the system, reaching 43.4%. This increase signifies a reduction in the generator's efficiency, an enhancement in the solar panel's efficiency, and consequently, a reduction in the emission of harmful gases into the atmosphere. These sensitivity analyses provide crucial information for adapting system designs to different climatic conditions. A more detailed examination of these results is presented in Figure 9.

By leveraging higher solar radiation levels, the system can achieve better performance, lower operational costs, and reduce environmental impact. This adaptability is essential for optimizing hybrid energy systems across various geographic and climatic regions, contributing to a more sustainable energy future.

FULL TEXTS BOOK

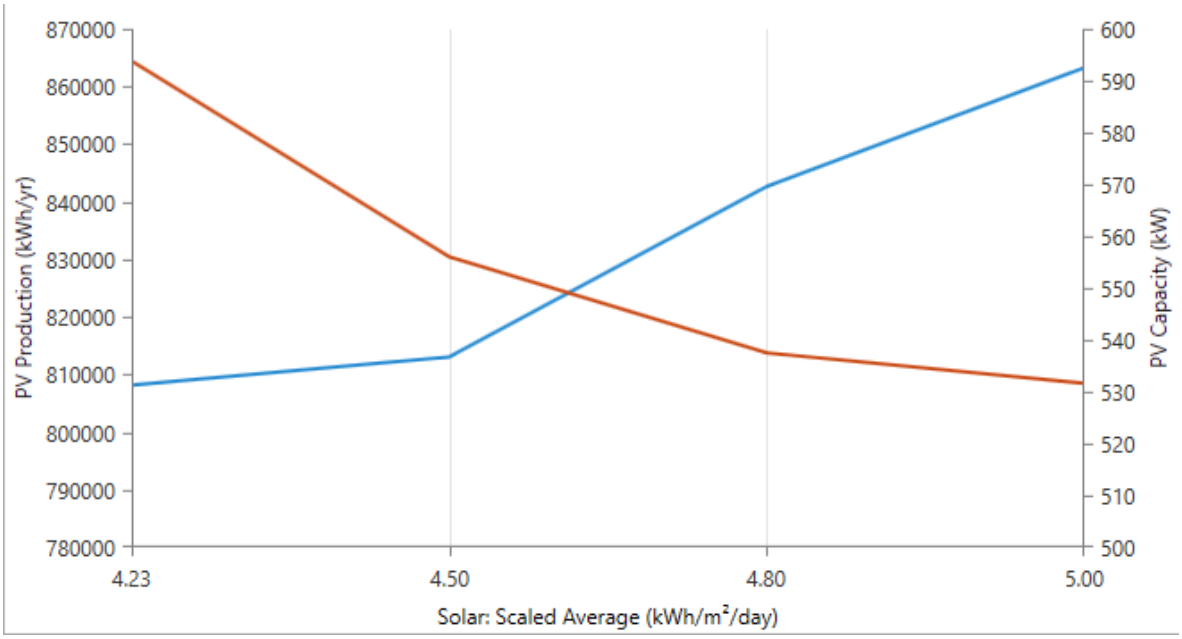


Figure 9. Impact of solar radiation on the production and capacity of PVs.

Impact of Average Wind Speed on the System

Simulations were conducted to examine the changes in system parameters if the hybrid system was installed in a region with higher wind potential. The analysis considered different average wind speeds (4 m/s, 4.85 m/s, and 5 m/s), yielding the following results:

When the average wind speed exceeds 4.85 m/s, the active use of wind turbines reduces the unit energy cost, which can increase to $0.379 under constant tower height and diesel price. The renewable energy production ratio decreases to 36.9%. Because wind speed is more consistent than solar radiation, the energy obtained from wind turbines remains more stable throughout the year. The thermal load controller can use the excess electricity from wind turbines during winter, thereby reducing the generator's electricity production and the boiler's thermal energy generation, leading to significant reductions in the emission rates.

These analyses indicate that optimizing the system based on wind energy potential can increase the unit energy cost and decrease the renewable energy ratio. The impact of wind speed and tower height on the proposed system and the energy cost change are shown in Figure 10.

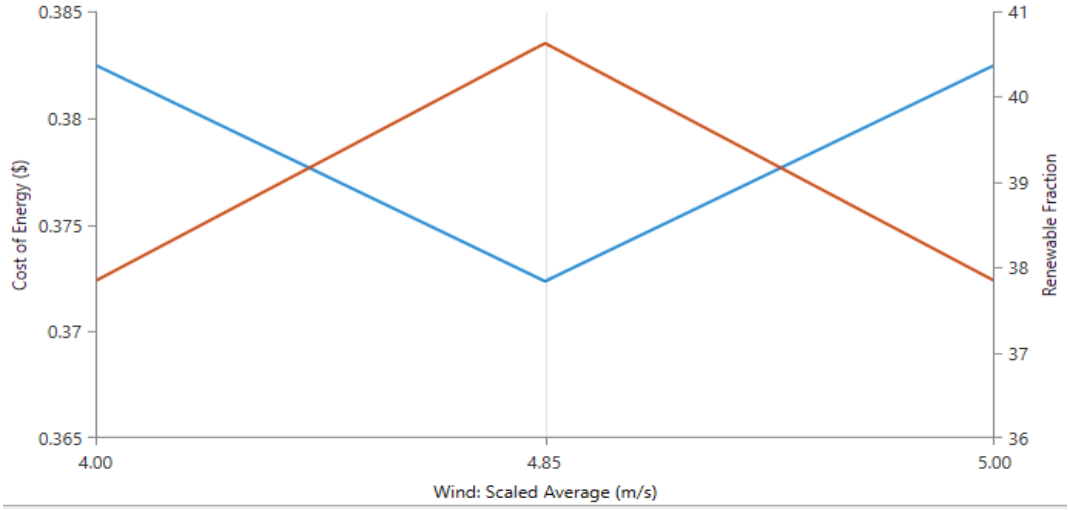


Figure 10. Impact of wind speed on energy cost and renewable fraction.

FULL TEXTS BOOK

Figure 10 illustrates the relationship between the average wind speed (m/s) and the cost of energy ($) and the renewable fraction (%). As the wind speed increases, the cost of energy initially decreases but then increases slightly, whereas the renewable fraction follows an inverse trend. This indicates the complex interplay between wind turbine efficiency, energy cost, and the proportion of renewable energy in the system.

Evaluation of All Optimization and Sensitivity Analyses

The optimization and sensitivity analyses determined the necessary characteristics for the system to operate at maximum efficiency as follows:

1. Effective Use of Batteries: Efficient battery utilization ensures that energy storage systems operate effectively. This allows energy generated from solar panels or other renewable sources to be stored and used when needed.
2. Operating the Generator at a Minimum of 75% Capacity: Running the generator at a minimum of 75% capacity ensures continuous and efficient electricity production. This contributes to the generator's efficiency and helps to maintain a low unit energy cost.
3. Utilization of generator waste heat: The waste heat from the generator provides a form of cogeneration, enhancing energy efficiency. This involves using waste heat to meet thermal load requirements, thereby reducing energy costs.
4. Use of Thermal Load Controller (TLC): The TLC connects the electrical load system to the thermal load system. This ensures that excess energy is utilized by the thermal load, thereby preventing energy waste.
5. Meeting Heating Needs with a Boiler System: The boiler system meets the thermal load requirements. This allows the system to address both electricity and heating needs.

When all these parameters are integrated into the system, the unit energy cost can be reduced to $0.327. A significant portion of electricity generation is provided by solar panels, and the effective use of generator waste heat and thermal load controllers enhances system efficiency while reducing environmental impacts.

During the summer months, the system relies heavily on solar panels for electricity generation, indicating that generators are used minimally during these periods. Excess electricity produced in summer can be stored in batteries or used directly.

It is observed that fuel consumption is higher during winter. This suggests that during periods when solar panel production is lower and thermal load demand is higher, the generator and boiler are used more frequently.

The annual fuel consumption is illustrated in Figures 11 and 12. These figures show the monthly fuel consumption, highlighting how it changes according to the system’s energy demand. This information is crucial for effective energy management and system optimization.

FULL TEXTS BOOK

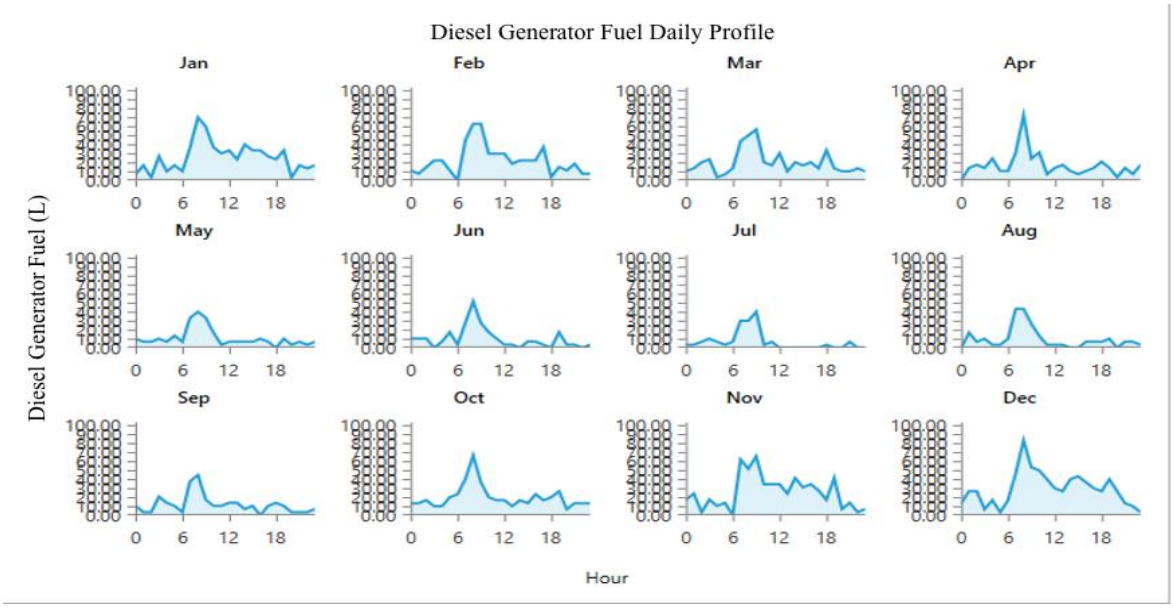


Figure 11. Diesel generator fuel daily profile.

This set of graphs shows the daily fuel consumption of the diesel generator for each month. This shows variations in fuel usage throughout the day and across different months, indicating higher consumption during winter months.

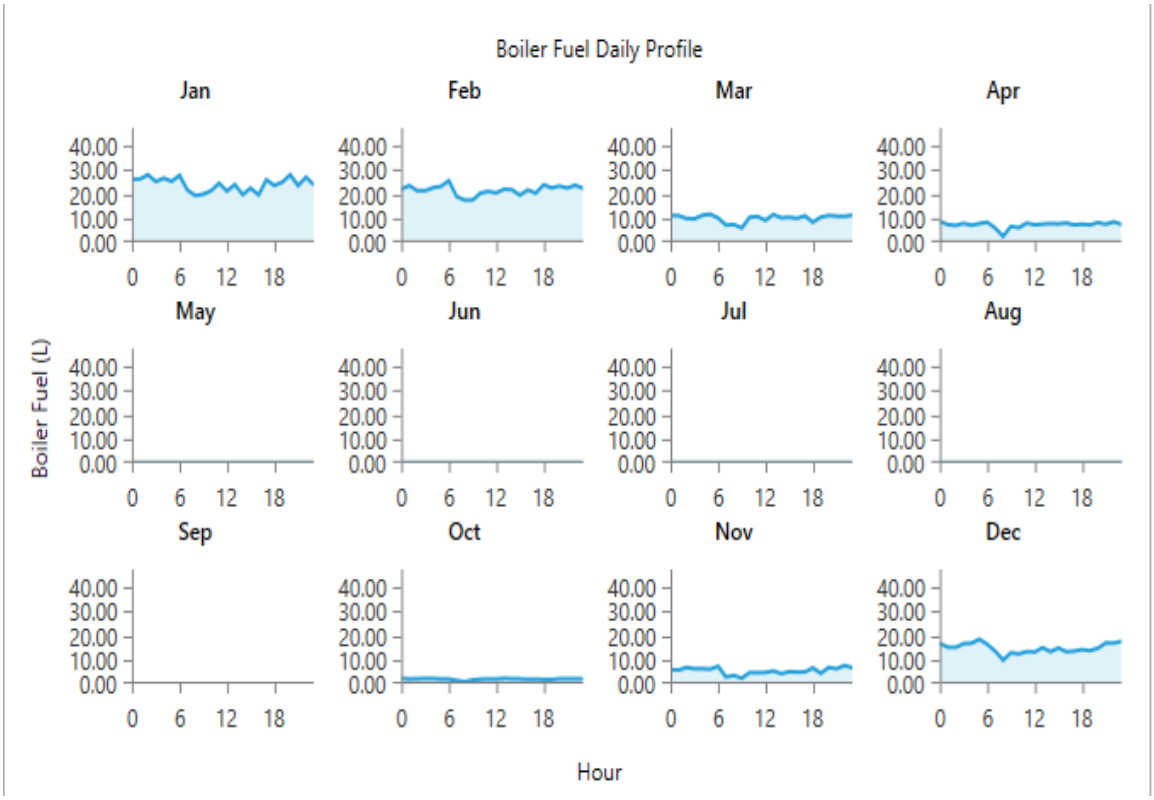


Figure 12. Boiler fuel daily profile.

This set of graphs illustrates the daily fuel consumption of the boiler for each month. The data reveal that boilers are used more during winter months, reflecting the increased thermal load demand during these periods.

By analyzing these figures, one can understand the system's fuel consumption patterns and identify opportunities for optimization and efficiency improvements.

The graph in Figure 13 illustrates how the unit energy cost of the system is affected by variations in average solar radiation and wind speed across Turkey. The analysis results indicate the following:

FULL TEXTS BOOK

- Wind Speed: In regions where the wind speed reaches 5 m/s, the unit energy cost increases to $0.379/kWh due to the use of wind turbines. This suggests that adding wind turbines in areas with moderate wind speeds does not necessarily reduce costs but can, in fact, increase them.
- Solar Radiation: In regions where solar radiation levels reach 5 kWh/m²/day, the unit energy cost decreases to $0.350/kWh. This highlights the efficiency of solar panels in high-radiation areas, leading to lower energy costs.

These results demonstrate that the varying solar and wind conditions across different geographic regions in Turkey can significantly impact energy costs. This highlights the need for an optimal system design that is tailored to these local conditions. The analysis shows that contrary to expectations, integrating wind turbines in regions with not significantly high wind speeds can increase the cost rather than decrease it.

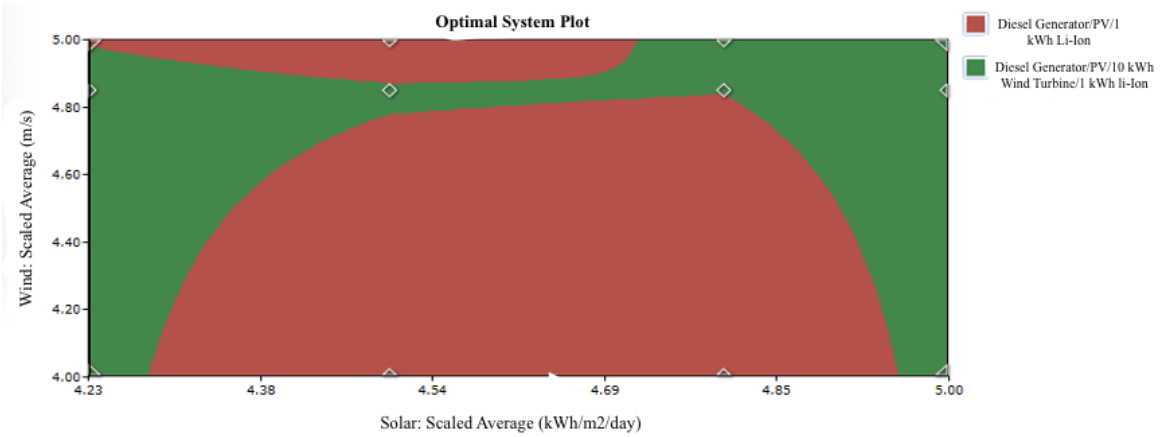


Figure 13. Optimal system type based on solar radiation and wind speed.

This graph illustrates the optimal system configuration for varying average solar radiation (kWh/m²/day) and wind speed (m/s) in Turkey. Regions with higher solar radiation benefit more from photovoltaic (PV) systems, resulting in lower energy costs, whereas regions with moderate wind speeds do not significantly benefit from adding wind turbines, potentially increasing the unit energy cost.

ConcluSION

This study analyzes hybrid systems capable of operating independently from the grid using the HOMER Pro program in regions where the electrical grid is either inaccessible or unreliable. The key findings of the analysis are as follows:

- Effective Use of Batteries in Hybrid Systems: This analysis determined the necessity of effectively utilizing batteries in hybrid systems. Efficient energy storage management allows the system to meet the electricity demand by storing energy produced from solar or wind sources for later use.
- Utilization of Generator Waste Heat: Reclaiming waste heat from generators positively contributes to system efficiency and energy costs. By using this waste heat to meet thermal loads, the system can benefit from energy savings and emission reductions.
- Cost Analysis: The system's installation cost was $2,303,319.44, with operational costs of $415,969.60 and a total net present cost of $10,358,090.00. The unit energy cost was found to decrease to $0.327/kWh, indicating that hybrid energy systems can achieve more economical energy prices than individual investments.

The results of the analysis suggest that hybrid systems can meet both electricity and heating needs more cost effectively over a 25-year period. This study demonstrates that hybrid energy systems that integrate renewable energy sources and energy storage systems offer economic and environmental benefits in off-grid areas. With technological advancements, the adoption of such systems is expected to become more widespread, and costs will decrease.

FULL TEXTS BOOK

These findings highlight the potential of hybrid energy systems to provide sustainable and efficient solutions for energy production in remote and off-grid locations. By leveraging renewable energy sources and optimizing energy storage and waste heat recovery, these systems can play a crucial role in reducing the dependency on fossil fuels, lowering emissions, and promoting a greener future.

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FULL TEXTS BOOK

A RARE CAUSE OF CHRONIC COUGH: TRACHEOCELE

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Samsun, Çarşamba Devlet Hastanesi

INTRODUCTION

Tracheocele is a herniation of the tracheal mucous membrane and is very rarely reported in the literature. It may be congenital defect or an acquiredlesion. Factors such as trauma, high pressure injuries, prolonged tracheostomies, obstructive tracheal diseases, recurrent infections causing obstruction and dilatation of the ducts of the mucous glands of the trachea play a role in the etiology.
Here we report a rare case found during computed tomography scanning for persistent cough.

CASE REPORT

A 32-year- old male patient was admitted to theemergency service with persistent cough and sputum. The paitent had no comorbidities and no history exposure. On physical examination, he had diffuse rhonchi and computerized thorax CT was ordered by the internal medicine department when his complaints did not resolve. She was referred to chest diseases by internal medicine.Thorax CT scan revealed a tracheocele in the right superior posterior lateral part of the trachea (Figure 1). There was no obstructive or restrictive deterioration in lung function tests. The patient was consulted to thoracic surgery because he was young. Bronchoscopy was planned by thorasic surger on after the dyspnea complaints regressed.Inhaler treatment was arrenged. At thefollow-up visit ,his cough was still present but this rhonchi had regressed. Bronchoscopy was performed by thoracic surgery. No tracheoesophageal fistula formation was observed and surgery was not considered.

DISCUSSION

Tracheoceles are air-filled cyst formations arising from the trachea and are extremely rare. It is usually detected by spontaneous cervicothorasic evaluation(1). The incidence of tracheocele is 2.4% (2). They usually present with chronic cough. Mostly right paratracheal (97.1%) and rarely left (2.9%) (3). Tracheocele is a sac consisiting only of respiratory epithelium , while tracheal diverticilum has cartilage content ,mucous glands and smooth muscle. (4)The etiology includes blunt chest trauma, chronic bronchopulmonary pathology,tracheotomy complication. Botti et al. Demonstared the presence of tracheosele in two brothers and showed that the etiology may be qualitative(5).
As in our case, they usually present with chronic cough, but hoarseneness, hemoptysis and dysphagia may be observed due to upper laryngeal nerve compression (6). Treatment options include observation, surgical resection and endoscopic treatments .Since it is a are condition, there are no spesicific gudielines. Conservative treatment include santibiotics,mucolytics ,broncodilators and pulmonary rehabilition.Accordimng to Lin et al. Surgical treatment is indicated only in the symptomatic congenital form, its benefit in theacquired form uncertain(7).

CONCLUSION

In our case, conservative approach was used, surgery was not considered and patient was followed up closely.

FULL TEXTS BOOK



Figüre 1

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FULL TEXTS BOOK

MANAGEMENT ACCOUNTING IN THE HOSPITALITY SECTOR: OPERATING STATEMENTS AND FINANCIAL STATEMENTS

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ABSTRACT
In this chapter, we review management accounting research in the hospitality sector, focusing on hotels and the ancillary activities. Hospitality management accounting is concerned with providing specialized internal information to managers who are responsible for directing and controlling operations within the hospitality industry. Decision makers need accurate information to the best decisions and Management accounting provides such information.
Keywords: Management Accounting, Hospitality Industry, Uniform System of Accounts for Hotels, Hotel accounting

Tourism and Hospitality continue to be one of the most critical sectors for economic development all over the world, and particularly in Azerbaijan. Tourism has a positive impact on the country's production volume, average gross income, and employment rate. Its role in economic development is indisputable. Azerbaijan has more than its nine 'climate zones' and oil industry to boast about at the moment. Hotel development is booming as the market begins to appreciate the economic upside offered by tourism. Of course, this in turn requires an in-depth research of management accounting in the hospitality industry.

Management accounting can aid companies in the hospitality industry to manage their resource spend. Managers can also make more informed business decisions by using the quantitative information derived from management accounting.

Hotel accounting is part of accounting practice in hospitality industry. Unlike conventional corporate accounting where one set of financial statement is used, in hotel accounting financial reports are made from various department before "consolidated statements" are made for the hotel. The main financial statements are no different from other accounting reports: (i) balance sheet, (ii) profit and loss, and (iii) statement of cash flow. These 3 statements are generated for the various department and evaluated department-by-department. [4]

The Uniform System of Accounts for the Lodging Industry, better known as the USALI, is the basis for accounting and benchmarking comparability in the lodging industry. The primary purpose of the Uniform System of Accounts for the Lodging Industry is to provide operating statements that are formatted to provide hotel owners, managers, and other interested parties with information and data that is pertinent to the unique operating environment of the lodging industry. The first edition was titled the Uniform System of Accounts for Hotels and was published in 1926 by the Hotel Association of New York City [4]. It represented the first successful organized effort to establish a uniform responsibility accounting system for the lodging industry and one of the first such efforts in any industry. In the first place, USALI has established itself in the accounting practice worldwide as a preferred model of information system for the purposes of financial accounting in big hotels and hotel chains in Europe and USA[4], as the system brings about greater comparability and consistency in preparing the internal and financial statements. The unification and standardization achieved by USALI is a prerequisite for its usage as a basis for cost control and income control at the hotel group level [4].

The statement of operations summarizes a company's revenues and expenses over the entire reporting period. The statement of operations is also known as a profit and loss (P&L) statement, statement of earnings, income statement, or statement of income. The Summary Operating Statements are divided

FULL TEXTS BOOK

into sections: Operating Revenue, Departmental Expenses, Undistributed Operating Expenses, Management Fees, Non-Operating Income and Expenses, and either Replacement Reserve or Interest, Depreciation, and Amortization and Income Taxes. The Uniform System includes only four revenue categories. The first two categories, Rooms and Food and Beverage, report the results of those departments. Operating revenue from any other department included in property operations – for example, a golf course, spa, laundry, or parking – is included in Other Operated Departments. The fourth revenue category is Miscellaneous Income, which includes such items as space rental, commissions, and interest income. There are three categories of departmental expenses, each of which relates to an operated department revenue category. In the schedules that accompany the Summary Operating Statements, departmental expenses are separated into as many as four groups: Cost of Sales, Cost of Other Revenue, Labor Costs and Related Expenses, and Other Expenses. Total Departmental Expenses is the sum of the amounts for all categories of departmental expenses. Total Departmental Profit is calculated by subtracting Total Departmental Expenses from Total Operating Revenue. The Total Departmental Profit percentage is calculated by dividing the amount of Total Departmental Profit by Total Operating Revenue. The Undistributed Operating Expenses section reports expenses that are considered applicable to the entire property. The Undistributed Operating Expenses are separated into five categories: Administrative and General, Information and Telecommunications Systems, Sales and Marketing, Property Operation and Maintenance, and Utilities. Gross Operating Profit is calculated by subtracting Total Undistributed Expenses from Total Departmental Profit. The Gross Operating Profit percentage is calculated by dividing the amount of Gross Operating Profit by Total Operating Revenue. Management Fees represents the cost for management services performed by a management company to operate the property as a whole. Income Before Non-Operating Income and Expenses is calculated by subtracting Management fees from Gross Operating Profit. The items included under Non-operating Income and Expenses include non-operating Income, Rent, Property and Other Taxes, Insurance, and Other non-operating expenses. Total Non-Operating Income and Expenses is the sum of the amounts shown for Rent, Property and Other Taxes, Insurance, and Other non-operating expenses offset by the non-operating Income amount. Earnings Before Interest, Taxes, Depreciation and Amortization (EBITDA) is determined by subtracting the Total Non-operating Income and expenses. Many management contracts, loan agreements, and owners specify the establishment of a reserve to accumulate the funds required for future replacement of furniture, fixtures, and equipment. These funds may also provide for certain capital improvements and the replacement of existing assets such as the major building systems. Replacement Reserve indicates the amount set aside for the period covered by the Summary Operating Statement, whether or not the reserve is actually funded. EBITDA Less Replacement Reserve is determined by subtracting Replacement Reserve from EBITDA. To reconcile the Net Income presented on the Summary Operating Statement to the Net Income presented on the Statement of Income, expenses typically paid by the owner are deducted from EBITDA[2]. These expenses include Interest, Depreciation, Amortization, and Income Taxes. Total Interest, Depreciation and Amortization is deducted from EBITDA to calculate Income Before Income Taxes. Income Taxes are then deducted from Income Before Income Taxes to calculate Net Income [3]. All revenues and expenses should be shown as a percentage of total operating revenue, except departmental expenses, which should be shown as a percentage of their respective departmental revenue.

A complete set of financial statements includes a Balance Sheet, a Statement of Income, a Statement of Comprehensive Income, a Statement of Owner's Equiity, a Statement of Cash Flows, and Notes to the Financial Statements that amplify the information presented in the basic statements. The Balance Sheet reflects the financial position of the business by detailing the assets, liabilities, and owner's equity as of a given date. The Statement of Income presents revenues and expenses associated with operations over a given period. The Statement of Comprehensive Income presents non-owner transactions that affect an entity's equity. The Statement of Owner's Equity summarizes transactions, including owner's

FULL TEXTS BOOK

transactions, affecting equity over a given period[3]. The Statement of Cash Flows presents information about the operating, investing, and financing activities that affected cash over a given period. It should be noted that the financial statements discussed have been developed following accounting principles generally accepted in the United States of America.

Accurate Financial statements are important because they contain significant information about a company's financial health. Financial statements help companies make informed decisions since they highlight which areas of the company provide the best ROI (return on investment)[3]. Shareholders need financial statements to evaluate their equity investments and help them make informed decisions as to how to vote on corporate matters. This tool acts as a metric for profitability by showing the amount of profit companies generate with a shareholder's investment. Employees use Financial Statements for assessing the company's profitability and its consequence on their future remuneration and job security.

ANNOTASİYA:

Bu məqalədə biz mehmanxanalara və yardımçı fəaliyyətlərə diqqət yetirməklə qonaqpərvərlik sektorunda idarəetmə uçotu tədqiqatlarını nəzərdən keçiririk. Qonaqpərvərlik idarəçiliyi mühasibatlığı qonaqpərvərlik sənayesi daxilində əməliyyatları idarə etmək və nəzarət etmək üçün məsul olan menecerlərə xüsusi daxili məlumatların verilməsi ilə məşğul olur. Qərar verənlər ən yaxşı qərarlar üçün dəqiq məlumata ehtiyac duyurlar və İdarəetmə uçotu belə məlumatları təmin edir.

Açar sözlər: İdarəetmə Uçotu, Qonaqpərvərlik Sənayesi, Otellər üçün Vahid Hesablar Sistemi, Otel uçotu

АННОТАЦИЯ:

В этой главе мы рассмотрим исследования управленческого учета в сфере гостеприимства, уделяя особое внимание отелям и вспомогательным видам деятельности. Управленческий учет в сфере гостеприимства связан с предоставлением специализированной внутренней информации менеджерам, которые несут ответственность за руководство и контроль операций в индустрии гостеприимства. Лица, принимающие решения, нуждаются в точной информации для принятия наилучших решений, и управленческий учет предоставляет такую информацию.

Ключевые слова: Управленческий учет, Индустрия гостеприимства, Единая система бухгалтерского учета гостиниц, Бухгалтерский учет в гостиницах.

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4. Generally Accepted Accounting Principles (GAAP or U.S. GAAP)

FULL TEXTS BOOK

PAGET'S BONE DISEASE DIAGNOSIS, TREATMENT, RISK FACTORS AND ACCELERATION OF THE DISEASE DUE TO DISRUPTION OF THE ENDOCRINE SYSTEM

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ABSTRACT
Paget's disease of bone is a chronic disease of the skeleton. In healthy bone, a process called remodeling removes old pieces of bone and replaces them with new, fresh bone. Paget's disease causes this process to shift out of balance, resulting in new bone that is abnormally shaped, weak, and brittle. Paget's disease most often affects older people, occurring in approximately 2 to 3% of the population over the age of 55.Many patients with Paget's disease have no symptoms at all and are unaware they have the disease until X-rays are taken for some other reason. When bone pain and other symptoms are present, they can be related to the disease itself or to complications that arise from the disease - such as arthritis, bone deformity, and fractures.
Keywords: Paget bone disease, Diagnosis, Treatment, Endocrine system

Paget's disease of bone is a chronic disease of the skeleton. In healthy bone, a process called remodeling removes old pieces of bone and replaces them with new, fresh bone. Paget's disease causes this process to shift out of balance, resulting in new bone that is abnormally shaped, weak, and brittle. Paget's disease most often affects older people, occurring in approximately 2 to 3% of the population over the age of 55.Many patients with Paget's disease have no symptoms at all and are unaware they have the disease until X-rays are taken for some other reason. When bone pain and other symptoms are present, they can be related to the disease itself or to complications that arise from the disease - such as arthritis, bone deformity, and fractures (Miao XY, Wang XL, Lyu ZH.,2021).

In most cases, treatment for Paget's disease involves taking medications to help slow or stop the progress of the disease.

For patients who have complications, surgery may be needed to realign deformed bones or to help fractures heal (Cronin O , Subedi D ,Forsyth L , et al .2020).

Paget's disease can affect any bone in the skeleton. It appears most often in the spine, pelvis, long bones of the limbs, and skull. It can be present in just one bone or in several bones. It can affect the entire bone or just part of it.In normal bone, a process called remodeling takes place every day. Bone is absorbed and then reformed in response to the normal stresses on the skeleton. More specifically:

Cells of the bone called osteoclasts absorb bone.

Cells of the bone called osteoblasts make new bone.

FULL TEXTS BOOK

In Paget's disease, osteoclasts are more active than osteoblasts. This means that there is more bone absorption than normal. The osteoblasts try to keep up by making new bone, but they overreact and make excess bone that is abnormally large, deformed, and fits together haphazardly.Normal bone has a tight overlapping structure, like a well-constructed brick wall. Bone afflicted by Paget's disease has an irregular mosaic pattern, as though the bricks were just dumped in place. The end result is bones that are large and dense, but weak and brittle. The bone is prone to fractures, bowing, and deformities (Mantovani G, Fagotti A, Franchi M.,2019).

Cause: The cause of Paget's disease is not known, but doctors have identified a number of risk factors that make someone more likely to develop the disease. These include: Genetics. Paget's disease tends to run in families. In as many as 25 to 40% of cases, another relative will also have the disease (Cronin O , Subedi D ,Forsyth L , et al .2020).

Age. Paget's disease occurs only rarely in people under the age of 40. It is more common as people age.Ancestry. It is more common in people of Anglo-Saxon descent and those who live in certain geographic areas, such as the United States, England, Australia, New Zealand, and Western Europe. It is not common in Scandinavia, China, Japan, or India.Environmental factors. Some studies suggest that certain environmental exposures may play a role in the development of Paget's disease. This has not been proven definitively, however.While there are no known ways to prevent Paget's disease from occurring, eating a healthy diet with sufficient calcium and vitamin D, and getting regular exercise, are important components in maintaining skeletal health and joint mobility (Gennari L, Rendina D, Merlotti D.,2022).

Symptoms: Many people with Paget's disease do not have any symptoms at all. The disease is often first discovered when X-rays are taken for another reason or when routine blood work indicates an elevated blood serum alkaline phosphatase level.In patients who do have symptoms, bone pain is the most common complaint. This pain can be related to active Paget's disease or to its complications, which include:

Fractures due to brittle bone.Deformity of bone, including bowing of the affected bone.Advanced arthritis in joints near the affected bone.Compression on neighboring nerves from enlarged bones, leading to a loss of sensation or movement (Adams C, Banks KP.,2023).

Other Symptoms: Symptoms can also arise from the effect of the disease on calcium levels in the blood stream. When Paget's disease is active in several bones, overactive osteoclasts may release enough calcium from the bone as they break it down to cause an elevated calcium level in the blood. This rare complication can lead to a number of symptoms, including:Fatigue,Weakness,Loss of appetite.Abdominal pain,Constipation.

Very rarely, Paget's disease can progress to a type of bone cancer called Paget's sarcoma. When this occurs, symptoms may include severe and unrelenting pain in the area affected by Paget's disease. Paget's sarcoma occurs in only about 1 percent of patients with Paget's disease. These patients are usually over the age of 70. This type of malignant bone tumor is very aggressive and has a poor prognosis. None of the medical treatments for Paget's disease are known to lower the risk for the development of Paget's sarcoma (Miao XY, Wang XL, Lyu ZH.,2021).

Diagnosis and Tests: In many cases, Paget's disease is discovered incidentally, when X-rays are taken or bloodwork is performed for some other reason. If this occurs, your doctor will perform a physical examination and order a number of tests to confirm the diagnosis (Mantovani G, Fagotti A.,2019).

X-rays. X-rays provide images of dense structures, such as bone. Paget's disease can usually be diagnosed by looking at an X-ray. A bone affected by Paget's usually appears larger and denser than a normal bone. It may also have a deformed shape (Choi YJ, Sohn YB, Chung YS.,2022).

In the very early stages of Paget's disease, when there is just overactive absorption of bone occurring, it can look like there is a hole in the bone. Later in the disease process, this darker area

FULL TEXTS BOOK

can take the shape of a V, with denser, thicker bone following behind it.Laboratory tests. A blood test called serum alkaline phosphatase may also be used to help confirm the diagnosis. In patients with Paget's disease, alkaline phosphatase levels are usually quite elevated - a reflection of the high bone turnover rate.Paget's disease can also be detected with urine tests that show rapid bone turnover (Mantovani G, Fagotti A.,2019).

Bone scan. A bone scan may be used to help determine which bones are affected. During this test, a very small amount of radioactive dye is injected into a vein. A special camera is then used to detect areas of the skeleton with an increased uptake of the radioactive material. These hot spots indicate areas where there is more bone turnover than normal. Paget's disease almost always looks hot on a bone scan, except when the condition has been present for a long time and has burned out (Adams C, Banks KP.,2023).

Biopsy. A biopsy is sometimes necessary to confirm the diagnosis of Paget's disease or to rule out other conditions.In a biopsy, a small sample of the affected bone is removed and examined under a microscope. The procedure can be performed under local anesthesia with a needle or as a small open operation (Panuccio VA, Tripepi R.,2020).

Management and Treatment: There is no cure for Paget's disease and no way to reverse its effects on bone. Treatment focuses on relieving symptoms and preventing future complications.If you do not have pain or other symptoms, no treatment is required. Your doctor may recommend simply monitoring your condition with regular office visits and periodic X-rays to watch for changes in the affected bone and to ensure that complications do not develop (Gennari L, Rendina D, Merlotti D.,2022).

If symptoms do occur, your doctor may recommend one or more nonsurgical treatments.

Nonsteroidal anti-inflammatory drugs (NSAIDs). Medications such as ibuprofen, naproxen, and aspirin can help relieve mild bone pain that arises from Paget's disease or from arthritis that may be associated with the disease.

Assistive devices. If your pelvis or leg is affected by the disease, using a cane can help relieve pain by decreasing the forces going through the bone. Using a cane can also help prevent falls, so there is less risk of fracture in the bone — a common complication of Paget's disease.

Wearing a brace can help relieve pain by preventing malalignment of the affected bones (Choi YJ, Sohn YB, Chung YS.,2022).

Bisphosphonate medications. When bone pain is more significant, medications called bisphosphonates are the treatment of choice. These drugs block osteoclasts and can be very effective in treating Paget's disease (McLaughlin MB, Awosika AO.,2023).

There are several types of bisphosphonates. Some are given by mouth (orally) and others are given as an injection (intravenously). Your doctor will talk with you about which type is best for you and how long you will need to take it.

During treatment with bisphosphonates, your doctor will perform blood tests periodically to check your alkaline phosphatase level. A falling alkaline phosphatase level and improvement in bone pain are indications that treatment is working (McLaughlin MB, Awosika AO.,2023).

Surgical Treatment: In some cases, surgery may be needed to treat the complications of Paget's disease, including:Bone fractures.Malalignment or deformity of bone.Severe arthritis. The surgical procedures used to treat fractures, malalignment, or arthritis in patients with Paget's disease are similar to those used to treat similar conditions in people with normal bone (Mantovani G, Fagotti A, Franchi M.,2019).

These procedures may include:

Internal fixation. This procedure can be used to treat fractures in bone affected by the disease. In internal fixation, bone fragments are first repositioned into their normal alignment, then held in place with screws, wires, pins, or metal plates attached to the outside of the bone.

FULL TEXTS BOOK

Osteotomy. An osteotomy can help relieve pain and restore alignment to weight-bearing joints that are affected by Paget's disease, especially the knee and hip. During the procedure, your doctor will remove a wedge of bone near the damaged joint in order to shift weight onto a healthier part of the joint.

Total joint replacement. In this procedure, parts of an arthritic or damaged joint are removed and replaced with a metal, plastic or ceramic device called a prosthesis. The prosthesis is designed to replicate the movement of a normal, healthy joint (Lillemon JN, Nardos R, Kaul MP.,2019).

Surgery may also be needed if an enlarged bone begins to compress nerves, especially in the spine or skull. In the rare case of Paget's sarcoma, surgery is almost always used to try to remove the tumor entirely. Chemotherapy and radiation therapy may also be used.

Because Paget's disease increases the blood supply to bones, your doctor may recommend taking bisphosphonates for a period of time before surgery to help reduce potential blood loss.Bones affected by Paget's disease may take longer to heal than normal bones. A longer period of rehabilitation may also be necessary (Kərimova R.C., Ağayeva A.H.,Abıyev H.Ə., Cəfərova Z.İ.,2023).

It's important that people with Paget's disease eat a good diet with enough calcium and vitamin D. Your doctor will check whether you have a calcium or vitamin D deficiency and may suggest supplements.

Calcium: The best sources of calcium are: dairy products such as milk, cheese, yogurt – low-fat ones are best,calcium-enriched varieties of milks made from soya, rice or oats,fish that are eaten with the bones (such as sardines).A daily intake of 1,000 milligrams (mg) of calcium should be enough, possibly with added vitamin D if you're over 60. Skimmed and semi-skimmed milk contain more calcium than full-fat milk. If you don't eat many dairy products or calcium-enriched substitutes, then you may need a calcium supplement. We recommend that you discuss this with your doctor or a dietitian (Panuccio VA, Tripepi R.,2020).

Vitamin D: Vitamin D is needed for the body to absorb and process calcium.Vitamin D is sometimes called the sunshine vitamin because it's produced by the body when the skin is exposed to sunlight. A slight lack (deficiency) of vitamin D is quite common in winter. Vitamin D can also be obtained from the diet (especially from oily fish) or from supplements such as fish oil. Oils made from the whole fish are best as fish liver oils often contain a lot of vitamin A, which can be harmful if you take too much (Lillemon JN, Nardos R, Kaul MP.,2019).

If you're worried about a lack of vitamin D, speak to your doctor about whether a vitamin D supplement would be right for you, especially if:you are over 60,you don't expose your skin to the sun very often,you have dark skin, which reduces the amount of vitamin D you can absorb from sunlight (McLaughlin MB, Awosika AO.,2023).

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FULL TEXTS BOOK

EMERGENCY ASSISTANCE DURING THE TREATMENT, DIAGNOSIS AND COMPLICATIONS OF SICKLE CELL ANEMIA, A GENETIC DISEASE THAT DEFORMS OXYGEN-CARRYING BLOOD CELLS

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ABSTRACT
Sickle cell disease (SCD) is the most common inherited blood disorder that affects your red blood cells. In SCD, a protein called hemoglobin, located within red blood cells, is abnormal. Hemoglobin is important. It's the molecule that carries oxygen in your blood and throughout your body.Normal red blood cells are round and flexible. This allows them to move easily through small blood vessels (capillaries) in your body to deliver oxygen to your organs and tissues. In SCD, there's an abnormal form of hemoglobin called hemoglobin S. This changes the shape of the red blood cell to a crescent shape and causes red blood cells to become rigid, lack flexibility and stick together.
Keywords: Genetic disease,Deformation of oxygen-carrying blood cells,Sickle cell anemia

Sickle cell disease (SCD) is the most common inherited blood disorder that affects your red blood cells. In SCD, a protein called hemoglobin, located within red blood cells, is abnormal. Hemoglobin is important. It's the molecule that carries oxygen in your blood and throughout your body.Normal red blood cells are round and flexible. This allows them to move easily through small blood vessels (capillaries) in your body to deliver oxygen to your organs and tissues. In SCD, there's an abnormal form of hemoglobin called hemoglobin S. This changes the shape of the red blood cell to a crescent shape and causes red blood cells to become rigid, lack flexibility and stick together (Gilpin-Macfoy F, Perilla MJ.,2023).

This can block blood flow, preventing oxygen from getting to the vital organs and tissues throughout your body. It can lead to serious complications including pain, infections, and organ damage and failure. Additionally, sickle-shaped cells don't last as long as normal-shaped red blood cells, causing a constant shortage of red blood cells and leading to anemia. Sickle cell disease is a lifelong condition. But there are treatment options that can reduce your symptoms and prolong your life.There are several types of sickle cell disease. The different types depend on the genes a person inherits from their parents (Mohamed Jiffry MZ, Hassan R.,2023).

Hemoglobin SS (HbSS): HbSS is a severe form, affecting 65% of people who have SCD. People with this form inherited one gene encoded with hemoglobin S from each parent. Most or all of your hemoglobin is abnormal, causing chronic anemia (Hajjaj OI, Cserti-Gazdewich C.,2023).

FULL TEXTS BOOK

Hemoglobin SC (HbSC): HbSC is a mild to moderate form that affects about 25% of people with the disease. People with this form inherited a hemoglobin S gene from one parent. They inherited another abnormal type hemoglobin C -from their other parent (Kərimova R.C.,Hüseynzadə X.R.,2023).

Hemoglobin (HbS) beta thalassemia: People with this form inherited a hemoglobin S gene from one parent. They inherited an abnormal type called beta thalassemia from their other parent. There are two subtypes:"Plus" (HbS beta +): This subtype affects about 8% of people with SCD and tends to be more mild."Zero" (HbS beta 0): This subtype affects about 2% of people with SCD and is more severe, similar to hemoglobin SS disease. There are other, more rare forms, including hemoglobin SD (HbSD), hemoglobin SE (HbSE) and hemoglobin SO (HbSO). People with one of these forms inherited one hemoglobin S gene and one gene that encodes with another abnormal gene (D, E or O).Sickle cell disease is an umbrella term for the many different types of sickle cell disorders. Healthcare providers reserve the term "sickle cell anemia" for the types of SCD that cause the most severe anemia. These types are hemoglobin SS and hemoglobin beta zero thalassemia (Beeman CM, Abrams MA.,2023).

Sickle cell trait vs. Disease: People who have sickle cell trait inherited a hemoglobin S gene from only one parent. They inherited a normal gene from their other parent. People with sickle cell trait typically don't have any symptoms of sickle cell disease. But ongoing research may show that these people may have symptoms. They can pass on the abnormal gene to their own children.Rarely, severe dehydration and intense physical activity can lead to serious health issues in people with sickle cell trait.

Symptoms and Causes: A genetic mutation in the HBB gene causes sickle cell disease. The HBB gene is responsible for making a part of the hemoglobin. People with SCD received two mutated HBB genes coded for abnormal hemoglobin - one from each parent.People inherit SCD in an autosomal recessive manner. This means each parent of a child with SCD carries one copy of the mutated gene, but they typically don't show signs and symptoms of the condition.

Certain groups of people are more likely to develop SCD, including: People of African descent, including African Americans.Hispanic Americans from South America and Central America.People of Mediterranean, Middle Eastern, Indian and Asian descent (Gilpin-Macfoy F, Perilla MJ.,2023).

Sickle cell disease symptoms begin to show when a child is about 5 to 6 months old. Signs and symptoms of SCD vary from person to person. Some people have mild symptoms, while others develop more serious complications. Sickle cell disease symptoms include:

Frequent pain episodes: Anemia, causing fatigue, paleness and weakness.Jaundice (yellowing of their skin and the whites of their eyes).Painful swelling of their hands and feet (Hajjaj OI, Cserti-Gazdewich C.,2023).

Sickle cell disease can affect many parts of your body. Some of the effects are acute (they start suddenly) and some are chronic (they last for a long time). Sickle cell complications begin early and continue throughout your life.

Pain:Pain is the most common complication of sickle cell disease. Sickled cells passing through blood vessels can get stuck and block blood flow, which causes pain. You may have an acute pain crisis, which is also called a sickle cell crisis, vaso-occlusive crisis (VOC) or vaso-occlusive episode (VOE). These pain crises may be mild or severe and can start suddenly and last for any length of time. Pain crises most often affect your chest, back, legs and arms. You might also have chronic pain, which is when pain lasts longer than six months (Beeman CM, Abrams MA.,2023).

Anemia:Red blood cells die early with sickle cell disease, which can lead to anemia. Anemia occurs when you don't have enough healthy red blood cells to carry oxygen throughout your body. Anemia can cause severe fatigue, along with jaundice, irritability, dizziness and lightheadedness (Slomski A.,2022).

Acute chest syndrome:Acute chest syndrome is a life-threatening medical emergency. It can cause lung injury, difficulty breathing and low oxygen to the rest of your body. This complication of SCD occurs when sickled cells block blood and oxygen from reaching your lungs.

FULL TEXTS BOOK

Blood clots: Sickled cells make it more likely for blood to clot. This increases your chances of developing a blood clot in a deep vein (deep vein thrombosis, or DVT). A DVT can break off and travel to your lungs (pulmonary embolism, or PE).

Stroke: When sickled cells get stuck in a blood vessel, it blocks blood flow to your brain. This makes it harder for your brain to get the oxygen it needs to work correctly. This can lead to a stroke. About 10% of people with SCD will have a symptomatic (clinical) stroke. Strokes are most common in people with sickle cell anemia (Slomski A.,2022).

Vision problems:Sickled cells can block blood flow in the blood vessels in your eyes. This blockage occurs most often in the retina of your eye. You may not have any symptoms and then suddenly have vision loss, which can lead to permanent blindness.

Priapism:Sickled cells in your penis can cause a persistent, painful erection (priapism). In addition to causing pain, priapism can cause permanent damage and erectile dysfunction. A prolonged priapism (lasting longer than four hours) is a medical emergency.

Organ damage and failure: People with sickle cell disease are at risk for problems related to their heart, lung, kidneys and other organs. This is because blood and oxygen aren't reaching them. SCD can lead to multi-organ failure.Many people with sickle cell disease have healthy pregnancies, but the risks are higher. SCD can increase the risk of high blood pressure, blood clots, miscarriage, low birth weight and premature birth (Mohamed Jiffry MZ, Hassan R.,2023).

Diagnosis and Tests: In the United States, hospitals test all babies for sickle cell disease as part of routine newborn screenings. This test pricks your baby's heel to get a sample of their blood. It checks for various other conditions, as well. Your healthcare provider can also diagnose sickle cell disease before your baby is born using prenatal testing.These tests include chorionic villus sampling and amniocentesis (Houwing ME, de Pagter PJ.,2019).

Management and Treatment: A bone marrow transplant (stem cell transplant) can cure sickle cell disease. The transplant requires a donor who's a healthy, genetic match, such as a sibling. In this procedure, you receive healthy marrow from the donor. However, only about 18% of people with SCD have a compatible donor. In addition, there are risks and complications involved with a transplant. Your healthcare provider will discuss these issues with you.Sickle cell disease treatment includes medications, transfusions, blood and marrow transplant and gene therapy. Sickle cell disease treatment may begin with antibiotics. Newborns with severe SCD will receive antibiotics twice a day until they're 5 years old to prevent infection (Christian J, Lanzkron S, Naik RP.,2022).

Other sickle cell disease medications:

Voxelotor: Voxelotor can prevent red blood cells from sickling and binding together. It may reduce the destruction of some red blood cells, which improves blood flow to your organs and lowers your risk for anemia (Ebert EP, Escobar JD, Costello AA.,2023).

Crizanlizumab: This medicine helps prevent sickled red blood cells from sticking to your blood vessel walls. This can improve blood flow and reduce inflammation and pain crises.

Hydroxyurea: Hydroxyurea can reduce or prevent several complications of SCD. This includes frequent pain crises, acute chest syndrome and severe anemia (Hajjaj OI, Cserti-Gazdewich C.,2023).

L-glutamine: This medication is a pain reliever that can help reduce the number of pain crises you have. Other pain medication options include nonsteroidal anti-inflammatory drugs (NSAIDs) and opiates.

Transfusions:Acute transfusions: Acute blood transfusions can help treat complications that cause severe anemia. Your provider may also use an acute transfusion to treat crises. This includes strokes, acute chest syndrome and organ failure.

Red blood cell transfusions: Red blood cell transfusions can help increase the number of red blood cells in your body and provide normal, non-sickled red blood cells (Houwing ME, de Pagter PJ.,2019).

A stem cell transplant can cure SCD. Sometimes called blood or marrow transplant, SCT requires a donor who's a good match, like a sibling, and ongoing studies are looking to optimize the transplant

FULL TEXTS BOOK

from alternative donors, such as birthing parents or siblings who only half-matched. Your healthcare provider will discuss the risks and benefits of this treatment in your specific case (Hajjaj OI, Cserti-Gazdewich C.,2023).

Gene therapy:Researchers are currently testing gene therapy to treat SCD. This calls for correcting an abnormal hemoglobin gene or putting a normal hemoglobin gene into a person's stem cells. There's promising early data and the hope is that gene therapy might one day be a routine treatment for SCD (Christian J, Lanzkron S, Naik RP.,2022).

First aid: Sickle cell disease can cause many different life-threatening complications. If the patient experiences any of the following complications, call or go to the nearest emergency room:

Severe pain.Symptoms of severe anemia, including fatigue, dizziness and shortness of breath.A temperature of 38.5 degrees Celsius.Vision problems.Difficulty breathing.Erection lasting for four or more hours.Symptoms of acute chest syndrome, including chest pain, coughing and fever.Symptoms of stroke, including sudden weakness, numbness on one side of your body and confusion (Kərimova R.C.,Hüseynzadə X.R.,2023).

Sickle cell disease is a lifelong condition. While there's a cure available, stem cell transplants aren't always available and come with many risks. However, early diagnosis and treatment can help reduce your symptoms and chances of complications. With ongoing care, you can go on to lead a full, active life (Ebert EP, Escobar JD, Costello AA.,2023).

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FULL TEXTS BOOK

BIOREMEDIATION OF WASTEWATER TOWARDS REDUCTION OF WATER POLLUTION

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ABSTRACT
In this study, bioremediation which is a relatively new environmental engineering technology for the reduction of the level of pollution was agued as a green and environmentally friendly alternative to remedying waste waters to control water pollution was the reason for this study. This field of engineering science has undergone more Intense investigation in recent time. Considering how the new waves of technology, industrialisation and urbanisation release numerous toxic compounds into natural water bodies, polluting both freshwater resources as well as marine water. This remediation process is focused on destroying, containing or immobilizing toxic waste materials present in the water sources. Several remediation processes and techniques have been proposed for efficient wastewater treatment, however most of them presenting some limitations, such as poor capacity, the generation of waste products, incomplete mineralisation and a high operating cost. The bioremediation of waste waters is divided into two broad categories: *In-situ* and *Ex-situ* treatment and it is highlighted that the remediation technology is preferred because it can be done either ways. Both methods have significant advantages and disadvantages. The bioremediation process for different waste waters is discussed in this paper as the preferred method since it is cost effective and also environmentally friendly where the limitations accrued to the other forms of remediation procedure do not apply.
KEYWORDS: Bioremediation, Contamination, Microorganisms, Pollution, Treatment, Waste water

INTRODUCTION
Technological and industrial advancement over the past centuries has led to record levels of pollution that now pose a serious threat to man and the environment. The generation and disposal of waste materials from several activities such as mining, chemical production, pharmaceuticals, agricultural practices, petrochemicals etc., have therefore continued to challenge scientists to come up with better and effective methods of dealing with such waste. The population explosions in the world together with developmental activities that come with it have resulted in an increase in the area of water pollution. The need to come up with tangible and viable solutions to water pollution problems has become more urgent and necessary than ever before. This is important due to the degradation and decadence of the environment that the improper and inappropriate disposal of these wastes would cause. Some wastes are released into aquatic bodies which ultimately find their way into other ecosystems and eventually human beings. For example, the improper or inadequate treatment of sewage effluent that is released into aquatic media will negatively impact on users and aquatic organisms (Mohammed, 2009). Rivers are among the most important sources of freshwater on the planet, and this is the main reason why river pollution needs serious attention worldwide. Water scarcity around the world makes the need to solve water pollution issues to be urgent. The availability and supply of clean water is a major concern throughout the whole world and is a challenge for most developing countries as a result of high cost of setting up and maintaining standard water treatment plants.

FULL TEXTS BOOK

In South Africa, water is recognized as a crucial element in the battle against poverty, the cornerstone of prosperity, and a limiting factor to growth. The National Water Act 36 of 1998 recognizes that basic human and environmental needs should be met and that the use of water in all aspects must be sustainable. According to Igbinosa and Okoh (2009), water quality data on fresh water in South Africa are scarce, there is also very little information available on the extent of water pollution in the country. Various surface and groundwater problems, however, are identified such as salinization, nitrate and fluoride pollution. Salinity or total dissolved inorganic compounds is a result of effluent discharges from waste water treatment plants, surface runoff, industrial processes, irrigation practices etc. Excess amounts of nitrate and nutrients in these waste waters leads to eutrophication, algal growth and overall deterioration of water sources and structure and function of aquatic ecosystems. Other water quality components of concern in South Africa's river catchments include microbial quality, sedimentation and silt, acidification, trace elements, oxygen consumption compounds and thermal pollution (National State of the Environment Report – South Africa, 1999; Wakelin *et al.*, 2008; Devlin and Broadie, 2023).

Most of South Africa's metropolitan areas are located on the watersheds of river catchments. The rivers draining away from these watersheds have the dual burden of providing water supplies and transporting waste material. Thus, the dams located downstream of urban and metropolitan areas have become progressively more contaminated during recent decades (Oberholster and Ashton, 2008). The Jukskei River in Gauteng, is surrounded by industrial areas, agricultural activities, water treatment plants, densely populated urban areas and informal settlements of Alexandra Township. Each of these activities deposits its wastes in the river. This has led to the steady increase of the level of pollution in the river and a significant decrease of water quality. This study is dedicated to the investigation of the effectiveness of bioremediation of wastewater to reduce water pollution in water bodies such as in Jukskei River. Global remediation strategies, even in South Africa have focussed heavily on physical and chemical properties (Bhadbhade, and Kanneker, 2002; Khungwayo, 2022). Even though these technologies are generally effective, the facilities are typically expensive to construct, its operation requires a high level of training, involves the use of hazardous chemicals and results in high volumes of waste. Although these methods have been historically applied with success, the scope for improvement using actively growing bacteria is vast, and this has been applied successfully worldwide (van Heerden *et al*., 2009).

Bioremediation is a technology that utilizes the metabolic potential of microorganisms to clean up contaminated environments by using microorganisms and fungi (Watatanabe, 2001; Anyasi and Atagana, 2022). It is a process used worldwide to treat contaminated sites, water sources and soil if there is a spillage of a contaminant in the soil. Bioremediation is the use of living organisms, primarily microorganisms to degrade environmental contaminants into less toxic forms (Van Heerden *et al*., 2009). This study seeks to investigate the effectiveness of bioremediation of waste water in water bodies, using Jukskei River, Gauteng, South Africa as a point of reference. Bioremediation strategies are often more beneficial than traditional strategies because it can be implemented *in situ* (directly at the site of the contaminant with no need to transport the contaminated material) (Anyasi et al., 2023).

BACKGROUND/RATIONALE

Pollution of rivers is a global challenge that has existed for a very long time. A river is polluted when it is either directly or indirectly altered due to human activity resulting in the modification of ecological systems to an extent that harm occurs to the resident aquatic life or humans (Lloyd, 1992; Ellis, 2005). Jukskei River in Gauteng is the river under study in this research. Campbell (1996) observed that there is a very high amount of pollution in most rivers such as the River under study. The pollution of this river has been going on for a long time and many strategies that have been prescribed have either not worked or have not been implemented correctly for various reasons (Campbell, 1996; Huizenga and Harmse, 2005; van Veelum, 2002). Observations are that the pollution in the river is at unacceptable

FULL TEXTS BOOK

levels and it has been getting worse by the day. Neswiswi, 2014). Water quality problems of the Jukskei River, especially high bacterial load, are related to urbanisation (van Veelum, 2002; Bart and Qayoom, 2021).

According to South African Department of Water Affairs and Forestry, Water Research Commission and City of Johannesburg, since Jukskei River is just adjacent to an informal settlement, the major sources of pollution come from human and animal waste and other waste resulting from human activities, bringing about large amounts of nutrients such as nitrogen, phosphorus, metals and other pathogens that are oxygen demanding pollutants (Cillie and Coombs, 2009). Most of the rivers that flow through urban areas are under pressure partly due to large and dense population that depend on the products and services the river provides (Ashton and Haasbroek, 2002; Buta et al., 2023). Jukskei river has not been spared, as it also flows through urban areas. (Matowanyika, 2010). This has put a huge strain on the environment as the informal settlements near and around Jukskei River either do not have proper sanitation services or the ones that are available cannot sustain the whole population, consequently, sewage and various forms of pollution end up draining into the river. The Alexandra Town Council has however, set up rudimentary facilities like stand in pipes, and portable toilets which are serviced on a daily basis but many people in the Sjwetla informal settlement situated right next to the banks of Jukskei River discard their waste and litter directly into the river (Sithole, 1991). Urban runoff from overflowing portable toilets, burst sewage pipes, backyard businesses, car washes and domestic sources are major sources of pollution of Jukskei River.

Wimberley (1992) report on Alexandra Township pollution clearly showed that the greatest impact on the Jukskei River was the increased concentration of nutrient and oxygen depletion because of the discharge of organic material with a high oxygen demand. It is evident that since most of the pollution from the township area is organic in nature, this has a direct negative impact on the aquatic life of all living organisms in Jukskei River. High nutrient concentration in the Jukskei River has been blamed for the eutrophication of the Hartbeespoort Dam as the Jukskei is a major tributary of the dam (Thornton and Ashton, 1989). One of the ways to spot water pollution is the observation of dead aquatic organisms like fish floating on the surface of the water and water that has an abnormal colour or bad smell (Goel, 1996). The measurement of levels of water pollution can be done in many different ways: physical, chemical and biological. Sampling for biological testing involves collection of plants and/or animals from the water body (Malmqvist, 2002). Depending on the type of assessment, organisms may be identified for bio survey, and returned to water body or maybe dissected for bioassays to determine toxicity. Physical parameters of water pollution can be detected using remote sensing techniques. Chemical pollution can be assessed using chromatography or similar techniques. It is against this background therefore that there is a need to undertake this research to assess the effectiveness of bioremediation of wastewater from Jukskei River.

Water is the livelihood of all life so if it is polluted, reduces its quality and as a result may lead to destruction of habitats, reduction and loss of biodiversity. Other effects of water pollution include loss of aesthetic value and/or appeal; as a result, rivers end up being perceived as less useful to residential areas through which they pass. Irrigation, livestock watering become less suitable and the river becomes less suitable for aquatic biota. It is also a legal obligation in terms of the National Water Act (Act number 36 of 1998) to prevent pollution and degradation of water sources such as the Jukskei River from occurring or continuing to recur. Local authorities need to be cognisant of such problems and associated effects so that remedial action and measures are put in place. The advantage of using bioremediation of wastewater in Jukskei River is that the technique is based on cleaning up contaminated sites by enhancing the natural process of biodegradation that occur in nature, hence it is less expensive and preserves the environment as opposed to alternative solutions. The material being treated through bioremediation generally does not have to be transported elsewhere, in other words, it is done in-situ. This research is of great importance because it will assist in making informed assessments on the

FULL TEXTS BOOK

effectiveness of bioremediation as a technique to be used in polluted rivers to reduce levels of pollution and to increase water quality. This will then allow its wider application to different water bodies that are polluted. It is highly probable that pollution of rivers will continue as long as human beings continue production at industries, agriculture and domestic activities. It is therefore important to have sustainable methods to reduce levels of pollution and restore water quality for the betterment of the livelihood of man and the ecosystem.

LITERATURE REVIEW

Bioremediation of wastewater is one of the prescribed methods to reduce pollution in rivers and other water bodies. It involves the degradation of organic contaminants, heavy metals, oil in the soil or water by the action of cultured microorganisms selected for their ability to metabolize the contaminants. Bioremediation uses biological agents such as bacteria or plants, to remove or neutralize contaminants, in polluted water or soil (Cummings SP, 2010; Ayinlara and Babalola, 2023). Bioremediation is a technology that utilizes the metabolic potential of microorganisms to clean up contaminated environments by using microorganisms such as bacteria and fungi (Anyasi and Atagana, 2023). Bioremediation is the use of living organisms to reduce or eliminate environmental hazards resulting from accumulation of toxic or hazardous waste (Gibson and Sayler, 1992). These two authors have a similar concept of what bioremediation is, as they emphasise on the use of living organisms to clean up contaminated environments. Bioremediation is the use of living organisms, primarily microorganisms to degrade environmental contaminants into less toxic forms. This technique is advantageous because it is a “green” method as it is environment friendly and it is generally considered cost effective. High levels of pollution in the river upset the balance in the aquatic ecosystems of water bodies therefore, it is essential to reduce the levels of pollution and the use of bioremediation is seen to be the most preferred from a sustainability point of view. Bioremediation produces a very small quantity of sludge therefore the problem of disposal of sludge is not an issue as opposed to other methods (Sanchez, 2015).

There are three types of bioremediation; they include biostimulation, bioaugmentation and intrinsic bioremediation. Biostimulation is when nutrients are released into the soil where there is need to remove contaminants. In this study, bioremediation of wastewater is selected ahead of physical and chemical techniques because of its impact on the environment and also the cost of the technique. Biological treatment methods are cheaper than chemical or physical treatment methods (Ayinlara and Babalola, 2023). The microbes grow very quickly and are able to remove the contaminants efficiently. Bioaugumentation is done when there are some special places where contaminants need to be removed e.g. municipal wastewater, however, the method is not very effective since it becomes difficult to control the growth of microbes as they may grow out of control. Intrinsic bioremediation is also called natural attenuation (Anyasi *et al*., 2022). It is usually used for soil or water that is contaminated with oil for example in underground tanks and pipes. This approach deals with stimulation of indigenous or naturally occurring microbial population by feeding them with nutrients and oxygen to increase their metabolic activity. The approach entails the introduction of certain microorganisms to the site of contamination. Sometimes the conditions are not suitable, in which case engineered systems have to be introduced to that particular site. Engineered in situ bioremediation accelerate the degradation process by enhancing the physio-chemical conditions to encourage the growth of microorganisms.

Initially, bioremediation was thought to be a difficult technique because it is carried out in the natural environment which contains diverse and uncharacterised organisms. During that time, the isolated, characterised microorganisms were thought to have a minor contribution on bioremediation. It was however noted that information on microbial population relevant to bioremediation was accumulating rapidly with the aid of molecular ecology approaches. In bioremediation, pure and acclimated mixed cultures of microorganisms are used for the removal of toxic metals from liquid wastes, which can result in detoxification and safe environmental discharge (Majumder *et al*., 2014). Bioremediation as an

FULL TEXTS BOOK

environmentally friendly process, takes advantage of a remarkable capacity by microorganisms to degrade or transform pollutants into secondary compounds that are compatible with the equilibrium of the local ecosystem. It was further noted that modern molecular techniques, including genomics, have identified unexpected microbial key players for nutrient removal and sludge bulking and/or foaming, and provided a number of insights into diversity, functions and niche differentiations of the predominantly uncultivated organisms.

A survey of the composition of industrial effluents showed that wastewaters from textile industry contain high concentration of Na_2SO_4 or NaCl (Gratia *et al*., 2009). Among more than 1 000 isolates collected in various cold environments the strain Anthrobacter psychrolalactophilus has been selected for its ability to grow exoenzymes at low temperature, its non-halophilic character and its growth versatility on various media (Gratia *et al*., 2009). The non-pathogenic strain, Anthrobacter psychrolalactophilus, displays a strong resistance to desiccation at room temperature and is suitable for freeze-dried bacterial starters. It was noted that when grown in synthetic wastewater at 10^oC, the strain induces a complete clarification of the turbid medium and effectively hydrolyses proteins to improve the bioremediability of organic compounds in wastewater. In a separate but similar study, it was discovered that the activity profile of the biocatalyst against pH, salts, temperature and target substrates, lactose operon 1 appears to be a good candidate for application in acid dye bath treatment (Trovaslet *et al*., 2007). A bacterium, *Pseudomonas lubricans*, isolated from heavy metal laden industrial wastewater has been shown to tolerate multiple heavy metals (Rehman *et al*., 2010). This investigation was to find ways of isolating and characterizing arsenic resistant bacterium from a contaminated environment using oxidize arsenite. In an assessment of the ability for its exploitation in metal detoxification and environmental bioremediation, this bacterium was used. It also shows the importance of this bacterium in bioremediation of industrial effluents because of its high level of tolerance for heavy metals. Its resistance to heavy metals was also verified. It was then tested for its ability to oxidize arsenite. The study also noted that *P. lubricans* was also resistant to other heavy metals for example cadmium, chromium, copper, mercury and nickel at different concentrations (Bala *et al*., 2022).

The water treatment potential of latex of *Calotropis procera* on domestic and industrial wastewater has shown that it has good coagulant and clarifying properties because it reduced the turbidity, colour, odour, pH, microbial load and total coliforms of all highly turbid samples (Okonko and Shittu, 2007). Samples of water were collected from different locations in the state of Lagos, Abeokuta and Ogun States of Nigeria and were treated with latex. The results obtained after using latex were compared to those using already known and established coagulants like *Moringa oleifera*, *Jatropha curcas*, FeCl3 and alum. The results using latex were significantly better in terms of pH, turbidity, odour and microbial load than those using the other methods. It can therefore be concluded that the biological treatment (bioremediation) could be the most cost effective method to prevent water pollution. This method can be recommended as one of the methods due to its low cost and simplicity. It is further evidence that the process of bioremediation is indeed a potentially effective option for the treatment of water even for domestic use.

Oil wastes either from petroleum or vegetable origin are considered as serious types of hazardous pollutants when they find their way into aquatic environments, since they are highly toxic to aquatic organisms and completely damages the ecology of beach areas (El-Bestaway and El Masry, 2004). This tells the environmentalist that emission of such oils has to be prevented but if and when it cannot be prevented, an immediate solution has to be identified and implemented. In a study to find out which bacterial strains were capable of biodegrading vegetable oil and grease using a sand biofilm. *Pseudomonas diminuta* were among the eight bacterial strains isolated from vegetable grease and oil contaminated industrial waste, four of which were able to degrade oil and grease. These were identified and investigated for oil and grease degradation either individually or in combinations. *P. diminuta*, produced the highest degenerative activity and was used in later studies of biofilm sand filter system for

FULL TEXTS BOOK

vegetable grease removal. The conclusions of this study indicated that a sand biofilm system was efficient in treating oily polluted wastewater of vegetable origin on the basis of bacterial isolates being used.

During a research on decontamination of wastewater, Margesin (2001) illustrated that waste water from a garage and a car wash with anionic surfactants and fuel oil hydrocarbons can be degraded using indigenous microorganisms. The indigenous microorganisms degraded both contaminants effectively after bio stimulation by an organic nutrient supply. After about 35 days, both contaminants were seen to have been reduced to near zero concentrations. In a study also to investigate the factors that promote bioremediation, Lei (2010) suggested that bacteria that were used in the bioremediation processes in sites that were contaminated can actually be grown anaerobically and can be used in the elimination of mixtures containing substances like benzene, toluene, ethylbenzene and xylenes (BTEX), total petroleum hydrocarbons (TPH), and trichloro ethane (TCE). The bioremediation of waste water containing phenol was done by Kaneka, (2008) who proposed the use of alkaliphilic bacteria. Based on its high solubility, phenol naturally becomes a major pollutant in the water bodies where waste from industries is deposited. Since the phenol bearing industrial waste water is alkaline, an alkaliphilic bacteria was isolated from sediments off an alkaline lake in Lorna. Alkaliphilic strains including *Bacillus cereus*, *Citrobacter freundii*, *Athrobacter specie*, were capable of removing phenol from waste water arising from industries manufacturing methyl violet and cunane-phenol. It was noted that the alkaliphilic bacteria studied, managed to remove 100% of the phenol from the industrial waste waters within 48 hours of incubation under shaking culture conditions at ambient temperature of around 28^{o}C. Monocrotophos, (MCP), an organophosphorus insecticide, is widely used to control insects on crops (Sekar, 2008). A comprehensive investigation on comparison of phytoremediation and bioremediation for altrazine from waste water contaminated with toxic pesticides was carried out (Sekar, 2008). This study made a profound discovery which turned out to be methods of degrading pollutants of agricultural origin. Altrazine, which is one of the major components of insecticides and herbicides, was used as a sample contaminant to be removed using each of the two methods. The results indicated that degradation of altrazine by phytoremediation was only 23% compared to 80% of bioremediation. This makes bioremediation method better preferred than the conventional methods. The Jukskei River is also found to contain pollutants from industries for example metals. The classic difficulty with the removal of metal ions is the fact that they do not precipitate out as hydroxides by simple pH adjustment. Moreover, these conventional methods are fast becoming inadequate to address current stringent regulatory effluent limits. Most of the methods are too costly to be implemented and have adverse effects to the environment (Ahluwalia and Goyal, 2007; Bala *et a*l., 2023). As a result, alternative cost-effective technologies and techniques should be implemented. The use of biological materials, including living and non-living microorganisms, to remove and recover toxic or precious metals from industrial wastewaters has received attention over the years due to good performance, availability and low cost of raw materials, (Benaissa and Elouchdi, 2007; Anyasi *et al*., 2023).

Water comprises 70% of the Earth's surface making it one of the most valuable natural resource (Krantz, 2011). Of this, about 97.5% is salt water and only about 2.5% is fresh water (Sandi & Darrin, 2012). This means that water is a fundamental element to all forms of life for various functions such as drinking, cleaning, as a reproductive medium, as habitat for aquatic organisms and for irrigation purposes (Ninhoskinson, 2011). Water makes up 50 to 90% of the body weight of most living organisms. It is also essential as a transport mechanism and for metabolic processes of most living organism (Sandi & Darrin, 2012). Pollution in rivers is a global problem that has existed for a very long time. This challenge has been a concern for environmentalists, and policy makers. It has always been considered that the global water crisis was the problem of water scarcity, but currently there is recognition that water quality is a major component of the problem (Zhulidov *et al*., 2001; Lorenzo *et al*., 2019).

FULL TEXTS BOOK

Water research in South Africa involves a variety of government departments' statutory bodies, industries and universities (Cillie & Coombs, 1979). Previous studies involving analysis of water quality in the South African aquatic systems have involved physio-chemical and microbial assessment (Lin *et al*., 2004; Mthembu, 2004; Anyasi *et al*., 2022). Bio-monitoring is another valuable assessment tool that is receiving increased use in water quality monitoring programmes of all types (Kennish, 1992). This involves the use of biological response to assess changes in the rivers. Indicators and indicator species and communities such as fish and algae are used for this purpose. This type of analysis assesses water quality from a pollution and human health perspective. Microbial assessment involves quantification of Escherichia coli (E coli) form of bacteria and provides an indication of the degree of faecal contamination and the presence of pathogenic organisms. This is very important in the context of water portability and safety. Water pollution is a major problem in the global context. It has been suggested that it is the leading cause of deaths and diseases worldwide (Pink, 2006). Many of South Africa's water sources have become polluted due to effluent discharge, sewage effluents, mine and agricultural activities (Walmsley et al, 1999). The term effluent is described by the Water Services Act of 1997 as human excreta, domestic sludge, domestic wastewater, grey water or wastewater resulting from commercial or industrial use. Human excreta from informal settlements for example Sjetlwa and domestic waste from Alexandra Township are the major contributors of domestic waste (Anyasi *et al*., 2022).

Domestic waste is defined as consisting of 90% of wastewater by volume that arises from domestic and commercial activities and premises and may include sewage, household waste from bathing, washing and toilets, (DWA, 2009). Most rivers that flow through urban areas are under pressure partly due to the large and dense human populations that depend on the products and services that these rivers provide. (Ashton and Haasbroek, 2002). Surface water quality problems are not unique to Jukskei River only, in fact, most South African Rivers that flow through informal settlements experience similar problems (Van Nierkerk, 2000). One main reason for the concern of contamination is the use of surface waters as recipients for wastewater. Most effluents from cities and industrial plants end up in rivers, streams or lakes (Rodriguez-Mozaz, 2004). Eutrophication, salination, sedimentation and microbial contamination are all symptoms of polluted water sources which require increasingly sophisticated technologies to render the available water fit for downstream use (Roux and Oelofse, 2010; Buta *et al*., 2023). Pollution of rivers, lakes, aquifers from domestic and industrial wastewater discharge, mining runoff and agrochemicals is now a growing threat to water resources in most countries in Southern Africa. The quality of water supplies in Southern Africa Development Committee (SADC) region, once taken for granted, is becoming the focus of major concern. Due to increasing urbanisation in the SADC region, experts say that most of the cities have not been able to develop basic utilities for water and environmental services (solid waste disposal systems, sewage treatment and agricultural pollution control) to keep pace with rapid population growth (Cillie and Coombs, 2009; Bhat and Qayoom, 2021). Anthropogenic activities are a major contributor to river pollution. A study by Ncube (2014) evaluates that the introduction of pollutants into the Vaal River could be as a result of a number of natural processes, but mainly by the influence of human activities within the catchment area. Vaal River is one of the largest rivers in South Africa and it is experiencing pollution in the same trend as any other river whose catchment area is influenced by human activities. Water is an important substance for man and the environment and in its different phases makes about 70% of the earth. According to the US Geographical Survey, only 3% of the world's water is fresh water, 68% of which is found in icecaps and glaciers, 30% is found as ground water. Only 0, 3% of fresh water is found in lakes, rivers and swamps. This makes water for human beings and other organisms very limited, hence should be protected. Data collected by Global Environment Monitoring system project indicated that about 10% of all rivers monitored may be considered polluted as they have a biological oxygen demand (BOD) more than 6, 5 mg/l (UNEP/WHO, 1998).

FULL TEXTS BOOK

In countries where potable water is in short supply such as South Africa, the presence of toxic metals such as lead, arsenic, cadmium and mercury in the environment is a cause for concern due to their health implications (Awofolu *et al*., 2005). As a result, efforts should be made to prevent and continually find ways of removing these toxicants from the aqueous media (Mohammed, 2009). An efficient and cost effective method needs to be discovered for the removal of contaminants/pollutants since their presence in water systems can affect the health of aquatic ecosystems and indirectly, man (Nicholas, 2005). Water quality is a parameter frequently used to determine levels of pollution. The higher the level of water pollution, the lower the quality of the water. Water quality is used to describe the chemical (phosphates and nutrients), physical (temperature, pH, conductivity and biological (bacteria, viruses, and parasites) components of water. Changes in water quality are used as indicators to establish the degree of pollution. Unmanaged human activities can cause deterioration of surface and groundwater quality (State of the Environment Report for Mogale City Local Municipality, 2011). Water quality can be changed or affected by both natural processes and human activities which lead to the pollution of water bodies (DWA, 2011). The measurement and evaluation of water quality in Jukskei River will be essential in assessment of the effectiveness of bioremediation of wastewater.

DISCUSSION ON THE REASON FOR THE STUDY

According to a study by the Water Research Commission (WRC), the state of most of South Africa's rivers continues to deteriorate (Sapa, 2009). There are clear indications from the relatively scanty water quality monitoring data available that water quality of most rivers in South Africa has deteriorated over the past 20 years (Oberholster, 2010). The WRC revealed at the Implementing Environmental Water Allocation (IEWA) conference in Port Elizabeth that some rivers in South Africa showed a huge deterioration in water quality (Sapa, 2009). South Africa is facing a water supply crisis caused by a combination of low rainfall, high evaporation rates, an expanding economy, which means more pollution and a growing population whose geographical demands for water do not conform to the distribution of exploitable water supplies. The water quality of these resources has also declined due to increased pollution caused by industry, urbanisation, afforestation, mining, agriculture and power generation (Ashton et al., 2008). Exacerbating factors are South Africa's outdated and inadequate water treatment and sewage treatment plant infrastructure and unskilled operators (Rietveld et al., 2009; Snyman et al., 2006). Water pollution is increasing in Jukskei River due to anthropogenic activities like farming, industrial activities, domestic activities and other commercial activities like informal businesses for example car washes and caravan food outlets along the river and its catchment. This pollution is a threat to biodiversity in Jukskei River and its tributaries. Owing to the catchment's position and associated land use activities, urbanisation, agriculture and industrial activities taking place along its boundaries, Jukskei River has gradually deteriorated in terms of its water quality and hydrological conditions. The river, which was once regarded as an asset to its immediate surroundings has become a liability.

CONCLUSION

Being that the aim of this study is to determine how the bioremediation technique can be employed to treat contaminated wastewater and prevent pollution in this rivers, and since environmental issues are similar worldwide, especially in developing countries, this study seeks to attempt to provide solutions on how waste treatment alternatives can be employed to provide environmental protection at a cost effective and environmental friendly procedure. It is imperative that the presence of pollutants in Jukskei River is contained using bioremediation. Literature has it that the pollutants in this water body threaten the livelihood of organisms in around the ecosystem of this river as well as human. Why bioremediation? Because it is safer for the environment that is being cleaned up, since natural organisms from the environment are used, therefore there are no unnatural products generated from the process. It

FULL TEXTS BOOK

is also cost effective because the organisms used are readily available in the environment. As the demand for water increases in line with human population pressure and economic development activities, river ecosystems will continue to deteriorate unless they are managed in a sustainable way. The exponential increase in the world population, the growing sophistication of its needs and activities for the maintenance of present day life style and the process of industrialization have not only resulted in vastly increased pressure and depletion of water resource but they have also caused generation of enormous quantities of waste (Fuggle and Rabie, 1992). Although some parts have higher rainfall than others, the average rainfall of 450 mm per annum is far below the global average of 860 mm per year. Thus, the reality is that South Africa has relatively little water available and several factors such as climate change, water pollution and international obligations, limit the amount of water that we have at our disposal (Oelofse and Strydom, 2010). It is against this background that solutions need to be found for treatment of wastewater from different anthropogenic activities that eventually find its way to water bodies. Such wastewater cannot be allowed to continue to pollute rivers for the sake of human beings that rely on river and which exist interdependently, for the protection of biodiversity in aquatic systems dam water for use, for the environment which sustains and supports various organisms and for the aesthetic value of water bodies as part of sustainable use of natural resources.

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FULL TEXTS BOOK

EVALUATION OF THE EFFECTIVENESS OF SEARCH AND RESCUE DOGS IN FINDING SURVIVORS DURING DISASTERS: THE CASE OF SERBIA, CROATIA, AND SLOVENIA

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ABSTRACT

Disasters, whether natural or human-induced, pose significant threats to human lives, property, and infrastructure. This study examines the effectiveness of search and rescue (SAR) dogs in locating survivors during disasters, with a focus on the experiences in Serbia, Croatia, and Slovenia. The primary goals are to evaluate training protocols, operational challenges, success rates, and the overall impact of SAR dogs in disaster scenarios. The findings indicate that SAR dogs greatly enhance the efficiency of disaster response operations. Their superior sense of smell, agility, and ability to manoeuvre through complex terrains make them crucial for quickly locating survivors. However, the performance of SAR dogs is affected by various factors, including the quality of their training, environmental conditions, and the coordination between handlers and dogs. The research highlights several challenges encountered by SAR dogs, such as extreme weather conditions, hazardous terrains, fatigue, and psychological stress. Additionally, limited resources and inconsistent training standards can hinder their effectiveness. The study underscores the importance of standardized training protocols, increased resource allocation, and better coordination among SAR teams. By addressing these challenges, the efficiency of SAR dogs can be further optimized, resulting in more effective disaster responses and higher survival rates. SAR dogs play an essential role in disaster management in Serbia, Croatia, and Slovenia. Ongoing investment in their training and welfare, along with improved operational protocols, will ensure their crucial contribution to saving lives during disasters. This study contributes to a broader understanding of the effectiveness of SAR dogs and provides practical recommendations for enhancing disaster response strategies.

Keywords: search and rescue dogs; natural disasters; disaster response; survivor; Serbia; Croatia; Slovenia; effectiveness; training standards; deployment protocols.

1. Introduction

Disasters, whether natural or human-induced, pose severe threats to human lives, property, and infrastructure (Cvetković, 2023a; Cvetković, Nikolić, & Lukić, 2024; Cvetković, Tanasić, et al., 2023; Cvetković & Šišović, 2023, 2024; Nikolić, Cvetković, & Ivanov, 2023). Also, disasters present profound threats to human lives, property, and the environment, causing widespread loss and disruption in communities across the globe (Cvetković, Čvorović, & Beriša, 2023; Cvetković et al., 2022; Cvetković, Nikolić, & Ivanov, 2023; Cvetković & Planić, 2022; Cvetković, Romanić, & Beriša, 2023; Cvetković et al., 2021; Phillips, 2014). These catastrophic events can be natural, like earthquakes, floods, hurricanes, and volcanic eruptions, or human-made, such as industrial accidents, terrorist attacks, and armed conflicts. Regardless of their origin, disasters often strike without warning, creating chaos and an immediate need for a rapid and effective response (Hasan & Sultana, 2024; Molnár, 2024; Starosta, 2023; Sudar, Cvetković, & Ivanov, 2024).

The initial hours and days after a disaster are critical for rescuing survivors and delivering emergency aid to the injured (Islam, 2023; Marceta & Jurišic, 2024; Ulal & Karmakar, 2023). In these circumstances, search and rescue teams are indispensable, utilizing various methods and technologies

FULL TEXTS BOOK

to find and free individuals trapped in debris or stranded by floods and other disasters. Prompt and efficient actions can be the difference between life and death for many victims (Cvetković, 2023b; El-Mougher, Abu Sharekh, Abu Ali, & Zuhud, 2023; Phillips, 2014; Sergey & Gennadiy, 2022; Shibru, Operea, Omondi, & Gichaba, 2022).

Nevertheless, conducting search and rescue operations is fraught with numerous challenges, including adverse weather, inaccessible terrain, limited resources, and logistical hurdles. Despite these obstacles, the international community is continually striving to improve disaster response capabilities through training, the advancement of new technologies, and enhanced cooperation among nations and organizations. Consequently, studying the effectiveness of different search and rescue methods and tools, including the deployment of specially trained dogs, is crucial for advancing disaster response and boosting the survival rates of those affected. By understanding and overcoming the challenges in these operations, we can help build more resilient communities equipped to handle future disasters more effectively (Ice, Dufour, & Stevens, 2015).

In such critical times, effective rescue operations become essential to minimize casualties and mitigate the impact of these events (Cvetković & Jovanović, 2021). Search and rescue (SAR) dogs play a crucial role in these operations, thanks to their extraordinary detection and search capabilities. Their exceptional sense of smell, agility, and speed enable them to locate survivors trapped under debris or in inaccessible areas where human rescuers might struggle to reach (Grandjean, 2007). In disaster response scenarios, the swift identification and rescue of survivors is crucial. Among the various methods employed, search and rescue (SAR) dogs are particularly notable for their exceptional ability to detect human scent, navigate through difficult terrains, and perform under conditions that might impede human rescuers. These canine heroes are indispensable assets in disaster situations, greatly improving the efficiency and success rates of rescue missions (Fischer et al., 2020).

SAR dogs represent a highly specialized and invaluable group of working dogs trained for diverse search and rescue missions. Their training equips them to locate survivors under rubble, in wilderness areas, or other challenging environments, making them indispensable during disasters. These dogs are distinguished not only by their rigorous training but also by their innate abilities, including a keen sense of smell, agility, and endurance. Historically, SAR dogs have demonstrated their worth as loyal and brave assistants, often risking their lives to save humans (Gerbec, 2010). The global effectiveness of SAR dogs in disaster response is well-documented, with numerous case studies highlighting their significant contributions. This research centres on the effectiveness of SAR dogs in Serbia, Croatia, and Slovenia—countries that have faced a variety of natural and human-made disasters over the years. The distinct geographical and socio-political landscapes of these regions provide a rich context for examining how SAR dogs are integrated into their disaster management systems (Kovačević & Petrović, 2018).

The training and preparation of SAR dogs are vital to their effectiveness. These dogs undergo rigorous training from a young age to refine their natural abilities and acquire new skills tailored for search and rescue missions. Their training includes exposure to diverse environments, scents, and simulated disaster scenarios, ensuring they are well-prepared for actual operations. Psychological resilience is also a key focus, as SAR dogs must remain calm and focused amidst the chaos of disaster scenes (Moehlmann & Otto, 2017). Training SAR dogs begins at an early age, with basic commands and behaviours. As they mature, their training becomes more specialized and challenging, incorporating simulations of real-life disaster scenarios.

Trained SAR dogs can identify human scents under layers of concrete, earth, and other materials, making them essential members of rescue teams (Otto et al., 2019). Additionally, the psychological readiness of SAR dogs is crucial. They must remain calm and focused in chaotic and stressful situations, achieved through continuous training and positive reinforcement methods. This readiness is also ensured by rigorous selection processes, focusing on both genetics and early behavioural traits (Otto et al., 2019).

FULL TEXTS BOOK

However, the successful deployment of SAR dogs depends not only on the dogs but also on their handlers. The relationship between a SAR dog and its handler is symbiotic, requiring coordination, communication, and trust for effective operations. This study examines these dynamics, underscoring the necessity of comprehensive training programs that encompass both technical skills and the handler-dog relationship (Bryson et al., 2019). Despite their heroic contributions, SAR dogs and their handlers face numerous challenges. Field conditions can be extremely harsh, including working in earthquake rubble, flooded areas, or mountainous regions with avalanches. These dogs are exposed to physical injuries, stress, and exhaustion, necessitating meticulous care and support from their handlers and veterinary teams (Jones et al., 2004).

In Serbia, Croatia, and Slovenia, the operational environment presents unique challenges and opportunities for SAR teams. These countries have developed specific protocols and standards for using SAR dogs, shaped by their respective legal and organizational frameworks. By analyzing these protocols and the experiences of SAR teams in recent disasters, this study aims to provide insights into best practices and areas for improvement (Mlađan & Cvetković, 2020). Recent disaster case studies in these countries offer valuable lessons on the deployment and effectiveness of SAR dogs. The responses to the 2014 Balkans floods and the 2020 Zagreb earthquake, for instance, highlighted both the successes and the challenges faced by SAR teams. These events emphasized the importance of continuous training, sufficient resources, and international cooperation in enhancing the capabilities of SAR dogs (Mijalković & Cvetković, 2013).

This study provides a comprehensive theoretical and conceptual framework for understanding the role and significance of SAR dogs, international standards, and the legal frameworks governing their use. It also examines the organization of rescue services with dogs in Serbia, Slovenia, and Croatia. The research focuses on the conditions under which SAR dogs operate during disasters, the obstacles they encounter, and the cultural differences in the perception and treatment of dogs within rescue operations. A detailed case study is presented on the use of SAR dogs following the earthquake in Turkey, highlighting the rescue operations involving SAR teams from Serbia, Slovenia, and Croatia. This case study provides specific examples of the challenges faced by these dogs and their handlers and evaluates the effectiveness of their deployment in life-saving efforts post-disaster. The findings underscore the significant role SAR dogs play in disaster scenarios.

2. Background and Significance of Search and Rescue Dogs in Disaster Response

Rescue dogs, also known as search and rescue (SAR) dogs, are specially trained canines whose main function is to assist in locating missing or trapped individuals during disasters. Their exceptional sense of smell, agility, and rigorous training render them invaluable in situations where human capabilities are limited. SAR dogs are trained not only to find survivors but also to perform specialized tasks tailored to the nature of the emergency. Fischer et al. (2020) emphasize that SAR dogs significantly enhance the efficiency of rescue missions worldwide due to their unique abilities and comprehensive training. According to Milojević (2023), a rescue dog can be of noble (pedigree) or mixed breed origin. These dogs are registered as vital assets by state or private legal entities, and trained for specific tasks within these entities' operational scope. Generally referred to as "service dogs," they are integral to various rescue missions (Milojević, 2023). Milojević's definition further explains that rescue dogs can also be privately owned, provided they are specially trained under clearly defined legal frameworks and within specific time intervals. When privately owned rescue dogs are deployed, both the owner and the trainer authorized by the owner must be involved (Milojević, 2023).

In literature, rescue dogs are mainly categorized based on their purpose into three primary groups (Milojević, 2023): a) dogs that search by following a known or unknown track; b) dogs that search above or below the ground surface; c) dogs that perform searches on the water surface.

FULL TEXTS BOOK

Additionally, there are sledge dogs and draft dogs used for transportation in snow or difficult terrains. These dogs can transport injured individuals, essential search and rescue equipment, medical supplies, and even deceased bodies, ensuring a dignified burial. Consequently, they are also considered a type of rescue dog (Milojević, 2023). These three primary categories of SAR dogs are defined based on their training methods for locating individuals. Tracking dogs can work on a leash or off-leash, keeping their noses close to the ground, following the exact trail left by the missing person. They primarily respond to specific ground scents, detecting items like clothing or places where the person stayed (Jones et al., 2004).

Air-scenting dogs, on the other hand, can work effectively in areas shared with other rescue teams. Operating typically off-leash, these dogs can cover large areas quickly and are trained to detect the scent of living people, deceased individuals, or body parts. Air-scenting dogs do not require a scent item from the missing person, making them more flexible than tracking dogs (Jones et al., 2004). Once these dogs identify a human scent, they follow it to its source, quickly recognizing when they lose the scent and changing direction until they return to the point of highest scent concentration. The handler usually searches the area in a grid pattern against the wind. Besides search and rescue missions, air-scenting techniques are also used by police dogs to locate explosives, drugs, or crime scene evidence (Jones et al., 2004).

Water search dogs conduct searches while riding in boats, from the shore, or while swimming. On boats, the dog and handler typically position themselves at the bow. Upon detecting a victim's scent, the dog signals the handler by lowering its nose into the water or displaying anxious behaviour such as scratching the boat, biting the water, whining, barking, or jumping into the water to get closer to the scent source. If the boat moves away from the scent, the dog will shift from one side of the boat to the other, trying to "catch" the scent. If no scent is detected during the boat ride, the dog remains calm (Hardy, 1992).

Rescue dogs have a rich history, dating back to the 17th century when monks in Switzerland used Saint Bernard dogs to locate travellers lost in snowstorms. Known for their strong build and keen sense of smell, these dogs were the precursors to modern SAR dogs. Over time, the role of rescue dogs has evolved significantly, encompassing various breeds and specialized training techniques tailored to different disaster scenarios (Mantrailing, 2022). Modern SAR dogs undergo extensive training from a young age, starting with basic obedience and progressing to advanced search techniques. Otto et al. (2019) note that SAR training includes exposure to a wide range of environments, scents, and simulated disaster scenarios to ensure they are well-prepared for actual operations. This rigorous training helps dogs develop the necessary skills and psychological resilience to remain calm and focused amidst the chaos of disaster scenes.

The success of SAR operations relies heavily on the symbiotic relationship between the dog and its handler. Effective communication, coordination, and trust are essential for successful operations. Bryson et al. (2019) stress the importance of comprehensive training programs that cover both technical skills and the handler-dog relationship, highlighting the necessity of a cohesive partnership for optimal performance in rescue missions. Despite their heroic contributions, SAR dogs and their handlers face numerous challenges. Harsh field conditions, such as earthquake rubble, flooded areas, or mountainous regions with avalanches, can expose these dogs to physical injuries, stress, and exhaustion. Therefore, meticulous care and support from handlers and veterinary teams are crucial to maintaining the dogs' well-being and effectiveness (Jones et al., 2004).

In Serbia, Croatia, and Slovenia, SAR teams operate under specific protocols and standards shaped by their respective legal and organizational frameworks. Analyzing these protocols and the experiences of SAR teams in recent disasters provides valuable insights into best practices and areas for improvement. Case studies, such as the responses to the 2014 Balkans floods and the 2020 Zagreb earthquake, highlight both the successes and challenges faced by SAR teams, underscoring the importance of continuous training, sufficient resources, and international cooperation to enhance the capabilities of SAR dogs.

FULL TEXTS BOOK

3. Historical Overview of the Use of Search and Rescue Dogs

For millennia, dogs have been indispensable partners to humans, assisting in various tasks. In the 17th century, monks at the Hospice of the Great St. Bernard in Switzerland bred a specific dog breed, now known as the St. Bernard, to locate human tracks buried under snow. Numerous accounts document these dogs guiding lost individuals through the snow to the safety of the monastery (Mantrailing, 2022). One of the most renowned St. Bernards, Barry, served at the hospice from 1800 to 1812 and is credited with saving forty lives. In 1812, Barry was moved to a monastery in Bern, Switzerland's capital, where he died in 1814. His preserved body is currently on display at the Natural History Museum in Bern (Gerritsen & Haak, 2014).

The Industrial Revolution brought significant societal changes, leading to new roles for dogs. Military campaigns further advanced dog training. Around 1885, the German (Prussian) army began utilizing dogs as pack animals for transporting ammunition and supplies and as guards for military installations. Jean Bungartz, a German animal painter, writer, and book illustrator, developed training programs for dogs to locate wounded soldiers. In 1890, he founded the "Deutschen Verein für Sanitätshunde" (German Association for Medical Dogs), training dogs for war voluntarily, with the army covering the costs while private individuals conducted the training (Mantrailing, 2022).

In 1903, Bern's chief of staff, Berdez, published "Anleitung zur Dressur und Verwendung des Sanitätshundes" ("How to Train and Use Medical Dogs"), with illustrations by Bungartz (Mantrailing, 2022). Despite these advancements, early 20th-century economic hardships and limited understanding of dogs' potential hindered widespread support. By 1911, the war ministry had abandoned the use of dogs. However, World War I saw a resurgence in the use of medical dogs. Initially, only a few were employed, but as the war continued, their numbers increased to over 4,000. These dogs were privately owned or recruited from breeders. During World War I, over 30,000 dogs were used, with only 10% returning to their owners (Mantrailing, 2022). Training techniques evolved, and interest in preserving medical dogs persisted. Public perception of dogs in Germany improved, with civilians primarily supporting their popularity, though training remained under military jurisdiction (Mantrailing, 2022).

Heroic stories of dogs during World War I and II represent some of the earliest organized search and rescue teams involving dogs. Military, ambulance, and Red Cross dogs were used on battlefields to locate the wounded and deliver first aid (Jones et al., 2004). In 1940, Ferdinand Schmütz began systematically training dogs for avalanche search and rescue. During World War II, the use of dogs increased significantly, with over 200,000 dogs in service across all fronts, 25,000 of whom died on the German front. The demand for military dogs was so high that pets were requisitioned for service (Mantrailing, 2022). Two types of dogs were in use at the time: those using air scent to locate wounded soldiers and avalanche dogs. In the final years of World War II, rubble search dogs were also trained. The development of these dogs began when dogs repeatedly found people under the rubble of bombed houses by chance. With the help of just four dogs, over 35 people were found alive (Mantrailing, 2022). After World War II, the concept of rubble search dogs spread from England, and efforts were made to properly train these dogs. In Switzerland, work with disaster dog teams began in 1968. In 1972, the "Schweizerische Verein für Katastrophenhunde" (Swiss Association for Disaster Dogs) published a training guide. Public awareness of the importance of these dogs grew, especially after earthquakes in Italy in 1967, Romania in 1977, and Algeria in 1980, significantly increasing their use and trust (Mantrailing, 2022). However, in Germany, scepticism towards dogs led to more investments in technology. Civilians again took responsibility for training search and rescue dogs (Mantrailing, 2022). Disaster protection responsibilities were assigned to individual states, with search and rescue teams assisting, including fire departments and privately formed teams. The "Bundesverband für das Rettungshundewesen e.V." (Federal Association for Rescue Dogs) now acts as a regulatory body (Mantrailing, 2022).

FULL TEXTS BOOK

In the former Yugoslavia, the first avalanche rescue seminar was organized in 1952 by the police, mountain rescue service, and alpine enthusiasts in the village of Tamarje, Slovenia. Similar efforts followed for rubble search dogs, with the first seminar in 1977 during the construction of a highway near Vrhnika, organized by the Slovenian Kennel Club, police, and mountain enthusiasts (Vasiljević, 2023). In the 1980s, Serbia made pioneering attempts at working with avalanche dogs. Ilija Latinović, a physical education professor from Kikinda, initiated these efforts on Šar Mountain. Sixteen years later, Serbia had its first rubble and avalanche rescue dog. In 2009, the Ministry of Defense created an internal program, and in 2010, the Ministry of Interior, in collaboration with France, established a rescue dog department, training ten dogs. The Rescue Dog Training Association in Niš started its program in 2013, and in 2019, the Water Rescue Association prepared its first water rescue dog. By 2023, the Mountain Rescue Service had its first five certified dogs (Vasiljević, 2023).

4. Comparative Analysis of Search and Rescue Dog Operations in Natural Disasters: Case Studies from Serbia, Croatia, and Slovenia

4.1. Organization and Deployment of Search and Rescue Dogs in Serbia

National teams for the training and utilization of rescue dogs in Serbia operate under the auspices of the Ministry of Defense and the Ministry of Internal Affairs. Civilian associations such as the Rescue Dog Training Association in Niš, the Water Rescue Association, the Mountain Rescue Service, the Club for Training Sporting and Service Dogs in Belgrade, and various individuals also play crucial roles in this field. The Dog Training Center, a division of the Ministry of Defense, offers specialized training for veterinary services and advanced courses for experts, covering training, retraining, breeding, and healthcare for defence system dogs. Located at the "Prince Mihailo" barracks in Niš, the centre comprises command, logistics, a training company, and a breeding and reproduction unit. Its primary responsibilities include training and professional development for veterinary staff, soldiers, non-commissioned officers, civilians, and international trainees, along with organizing veterinary service courses. The centre also extends its services to entities outside the Serbian Armed Forces and the Ministry of Defense (see further and more at https://www.vs.rs/sr_cyr/jedinice/vojska-srbije/komanda-za-obuku/centar-za-obuku-pasa).

The Center conducts various specialized professional courses, including:

a) Training handlers and guard service dogs: Focuses on the fundamental tasks of guarding and securing facilities or territories.

b) Retraining guard service dogs and their handlers: Emphasizes retraining dogs to respond appropriately in specific situations, such as aggressive behaviour towards intruders.

c) Training handlers and protective service dogs: Prepares dogs and handlers for protection and security tasks.

d) Retraining protective service dogs and their handlers: Specializes in retraining dogs for high-risk scenarios.

e) Training handlers and dogs for special actions: Prepares dogs and handlers for specialized tasks such as locating missing persons or detecting hazardous substances.

f) Training handlers and dogs for rubble and avalanche searches: Essential for rescue missions in debris or snow avalanche scenarios.

g) Tracking service dogs and their handlers: Trains dogs and handlers for tracking and locating specific targets.

h) Retraining tracking service dogs and their handlers: Focuses on refining the responses of tracking dogs in unpredictable or risky situations.

i) Training handlers and dogs for mine and explosive detection: Critical for identifying and marking mines or explosive materials.

FULL TEXTS BOOK

j) Retraining dogs for mine and explosive detection: Specializes in dogs' reactions when encountering dangerous materials.

k) Training handlers and dogs for detecting psychoactive substances: Vital for the detection of drugs or other psychoactive substances.

l) Retraining dogs for detecting psychoactive substances: Focuses on refining dogs' quick and precise reactions in specific contexts.

These courses comprehensively cover the essential aspects of training dogs for specialized rescue and search missions, equipping them for various scenarios to protect and save lives or detect hazardous materials. The Dog Training Center was established in September 2020 from the Dog Handlers Training Company and the Breeding and Training Company of the Logistics Training Center, continuing the tradition of the 40th Center for Training Dog Handlers and Dogs of the SFRY Ministry of Defense, founded on October 21, 1957 (https://www.vs.rs/sr_cyr/jedinice/vojska-srbije).

The Ministry of Internal Affairs houses the Sector for Emergency Situations, which includes the Administration for Fire and Rescue Units and Civil Protection. This Administration ensures timely and lawful oversight of fire and rescue units, including those of legal entities and volunteer fire brigades. It also coordinates their efforts during major emergencies, directly impacting regional units' effectiveness in improving fire and rescue operations. Key tasks include organizing and coordinating fire and rescue units, equipping them with necessary materials and technology, enhancing emergency response readiness, managing activities during significant emergencies, drafting laws and regulations, supervising volunteer fire societies, and educating, equipping, and training civil protection units, alongside destroying explosive remnants of war (http://prezentacije.mup.gov.rs/).

Fire and Rescue Units (FRU) are the first to respond to emergencies, aiming to save lives and protect health, property, and the environment. They collaborate with other relevant entities to mitigate emergency consequences. Emergency Management Administrations in Belgrade, Niš, Novi Sad, and Kragujevac feature fire and rescue brigades, while Departments for Emergency Situations have fire and rescue battalions. Since 2017, efforts have been ongoing to select, train, equip, and recruit new members. Specialized teams for water rescue and rubble rescue operate within the FRU, and firefighters receive special training for technical interventions in traffic and hazardous material incidents. FRUs work with other Ministry of Internal Affairs units (Helicopter Unit, Gendarmerie, Special Anti-Terrorist Unit), other ministries, the Serbian Armed Forces, and services during joint emergency actions. They also provide international assistance during natural disasters and other accidents outside Serbia, adhering to international agreements (http://prezentacije.mup.gov.rs/).

Within the Administration, the Specialist Team for Rubble Rescue and the Center for Dog Handler Training, equipped with trained rescue dogs, play pivotal roles. They are responsible for managing dog handlers, maintaining the health and training of service dogs, and conducting daily training for various tasks. Handlers are stationed in Novi Sad, Belgrade, Kragujevac, Niš, and Valjevo, with some training taking place in Moldova and Turkey. These teams also collaborate effectively with the Slovenian Civil Protection and their instructor (Vasiljević, 2013).

A notable member of this specialist team is Zigi, a Belgian Shepherd Malinois, who participated with the Serbian team in Turkey, searching for survivors in the rubble following the devastating earthquake in February 2023, saving two lives. Zigi has completed basic obedience and rescue training and has participated in international exercises in Ljubljana in 2017 and 2019, as well as searches for missing persons at the "Technical-Overhaul Institute" in Kragujevac. He has been actively involved in numerous open space searches for missing persons in areas like Zaječar, Niš, and Valjevo. Zigi is under the care of his handler, Mili Radojević, a firefighter-rescuer and member of the Specialist Team for Rubble Rescue (MUP RS, 2023).

The Mountain Rescue Service (MRS) of Serbia conducts searches for missing persons, frequently involving lost hikers. The MRS team studies the terrain, develops strategies, and searches the area,

FULL TEXTS BOOK

providing medical assistance and ensuring the safe return of the missing. Since early 2014, MRS dog handlers and rescue dogs have been actively participating in rescue missions. MRS dogs undergo training that typically spans around two years, after which the handler and dog must pass an exam to demonstrate their readiness for the most challenging tasks. MRS has several dogs that have completed this training and have participated with their handlers in various rescue missions (https://www.gss.rs/predstavljamo-nove-clanove-gss-a).

In February 2024, a training session for avalanche search and rescue dogs was held on Kopaonik, in collaboration with the Club for Sporting and Service Dogs Belgrade. This session included MRS dogs and other dogs trained in Serbia, now internationally licensed for forest searches, enhancing Serbia's capability with dogs trained and licensed for avalanche rescues (Tanjug, 2024).

The training and utilization of rescue dogs in Serbia are relatively recent and still developing. Significant investment is required in training handlers and dogs and increasing their numbers, particularly by the state. The growing enthusiasm from the civilian sector, with individuals joining organizations, undergoing training, obtaining licenses with their dogs, and participating in various operations, is a positive development. An increase in the number of trained handlers and rescue dogs for various conditions and circumstances is anticipated in the future.

4.2. Protocols and Training Standards for Search and Rescue Dogs in Croatia

The Croatian Mountain Rescue Service (HGSS) operates as a national, voluntary, professional, humanitarian, and non-partisan organization recognized for its public significance. Its primary goals are to prevent accidents, conduct rescue operations, and provide initial medical assistance in mountainous and other inaccessible terrains, as well as in emergencies requiring specialized knowledge and technical rescue equipment, all aimed at preserving human life, health, and property (Croatian Mountain Rescue Service, 2024). HGSS encompasses mountain rescuers who cover the entire territory of Croatia. The operation of HGSS is governed by the Civil Protection Act and the Croatian Mountain Rescue Service Act, enacted by the Croatian Parliament on June 30, 2006 (Croatian Mountain Rescue Service, 2024).

HGSS collaborates with various governmental bodies, local self-governments, institutions, the Croatian Armed Forces, health and social institutions, the Croatian Mountaineering Association, and other legal and natural persons in fields such as culture, sports, tourism, nature protection, traffic, and the environment. Additionally, it works closely with public institutions and relevant authorities to protect and preserve mountain nature and the environment. HGSS's activities also extend to urban areas and non-mountainous regions, including operations in high-rise buildings, tunnels, pipes, traffic accidents, and at sea, as well as during extreme sports events like paragliding, mountain biking, and rafting. Besides rescue operations and providing first aid in remote areas, HGSS emphasizes education and prevention to avoid accidents, particularly in mountaineering (Croatian Mountain Rescue Service, 2024).

HGSS currently has 68 active search teams with dogs. Thirty-six of these teams are licensed and trained for searches in non-urban areas, while the others are in training. Dogs entering HGSS undergo long-term training and can start the licensing process at eighteen months old, which lasts an entire day. Before licensing, they must pass obedience and socialization exams. HGSS has advanced significantly in standardizing its K9 rescue teams. Internal protocols for accessing, testing, and licensing these teams include numerous rules for their use. Among these protocols is the "Regulation on Licensing HGSS Search Teams," which outlines exercises such as marking, handling and direction, abseiling, path searching, open terrain searching, inaccessible terrain searching, persistence, conditioning, and independence in work. Another important document is the "Regulation for Mantrailing Exams," which involves finding and tracking human trails (Croatian Mountain Rescue Service, 2024).

The establishment of search dog teams in Croatian firefighting began in 2010 when Zoran Laslavić, a member of DVD Opatija, in collaboration with JVP Opatija and the Firefighting Association of Primorje-Gorski Kotar County, started training a Belgian Malinois for search purposes. After the training, Zoran and his dog "Ginger Runningwild - Rain" joined JVP Opatija, marking the beginning of

FULL TEXTS BOOK

the use of search dogs in firefighting. Following Opatija, other units joined the project, including JVP Zadar, JVP Osijek, DVD Kras Šapjane, JVP Čakovec, DVD Lipovljani, DVD Karlovac, JVP Split, DVD Halubjan, DVD Plamen Višnjan, JVP Dubrovačko Primorje, JVP Mljet, JVP Pula, DVD Čačinci, DVD Slatina, DVD Omiš, and DVD Sunger. Today, around 23 firefighting K-9 teams operate in Croatia, ensuring that the entire country is covered within an hour's reach of the nearest K-9 team (K9 Vatrogasci, n.d.).

Firefighting K-9 teams are licensed for various tasks, including (K9 vatrogasci, n.d.): a) searching for missing persons under rubble; b) searching for missing persons in nature; c) searching for missing persons in avalanches; d) helicopter-assisted activities. In addition to their basic training at the Firefighting K-9 Training Center in Šapjane, these teams participate in specialized training sessions covering various rescue segments, with the most recent being helicopter training (K9 vatrogasci, n.d.).

The Croatian Association for Search Dog Training (HUOPP) was founded on June 14, 2004, though its members began their first rescue efforts in the summer of 1999 at an international summer camp for rescue dogs in Slovenia. In 2005, HUOPP became a member of the International Search Dog Organization (IRO), and from April of the same year, HUOPP members became active participants in specialist civil protection units for rubble rescue (https://www.huopp.hr/o-nama/).

Search dog handlers must master various skills, and their exams consist of theoretical and practical parts, including (https://www.huopp.hr/o-nama/): a) hazards in rubble; b) hazards in mountains; c) orientation and topography; d) basic techniques of mountaineering and speleology; e) first aid for humans; f) first aid for dogs. In 2009, HUOPP established the Rijeka Search Dog Group, followed by the Zagreb Search Dog Group in 2011. Today, HUOPP has a total of 16 members in Zagreb and Rijeka (https://www.huopp.hr/o-nama/).

4.3. Effectiveness and Challenges in Using Search and Rescue Dogs in Slovenia

The Rescue Dog Unit of Slovenia, known as Enota reševalnih psov Slovenije (ERPS), functions within the Commission for Rescue Dogs under the Slovenian Cynological Association. Comprising 18 units within various cynological societies, ERPS includes organizations such as KD Ljubljana, KD Šmarna Gora, KD Krim, KD Storžič, KD Naklo, KD Žiri, KD Tolmin, KD Nova Gorica, KD Obala, KŠP Prečna-Novo Mesto, K9 Dog Lovers Club, KD Brežice, KD Zagorje, KD RP Celje, KD Zg. Savinjske Doline, KD Kamnik, KD Izvinite, and KD Logatec. These units consist of handlers and dogs trained to rescue victims from rubble, and avalanches, and to search for missing persons in various terrains. Depending on their performance in tests and exams, these handlers and rescue dogs are allocated to Regional Units, the Missing Persons Search Group (SIP), and the National Intervention Unit (MERP), which is qualified for large-scale disaster interventions both domestically and internationally. This unit is also part of the MUSAR (Middle Urban Search and Rescue) team within the Administration of the Republic of Slovenia for Protection and Rescue (URSZR) (Gerbec, 2010).

ERPS organizes numerous events for its members as part of its annual training. At the beginning of each year, seminars for beginners are held, offering both theoretical and practical knowledge crucial for rescue dog handlers. Additionally, the Rescue Dog Commission conducts a five-day winter and summer training annually, focusing on avalanche rescue in winter and rubble and field searches in summer. Further training and education take place at the Police Training Center in Gotenica and the Educational Center for Protection and Rescue in Ig, along with regular joint exercises for all units and international training sessions (Gerbec, 2010).

The Association of Rescue Dog Handlers' Associations and Clubs of Slovenia, or Zveza društev in klubov vodnikov reševalnih psov Slovenije, was established in November 1995 to unite clubs and societies primarily focused on training handlers and dogs for rescue tasks. That same year, the founding associations left the Rescue Dog Unit of Slovenia and the Slovenian Cynological Association. The founding assembly saw the inclusion of the Association of Rescue Dog Handlers of Slovenia, the Rescue Dog Handlers' Club of Kranj, and the Rescue Dog Handlers' Club of Postojna. Later, in 1999, the

FULL TEXTS BOOK

Cynological Society for Rescue Dogs of Maribor joined, followed by the Burja Koper Rescue Dog Society in 2008 (Gerbec, 2010).

The Association collaborates with various individuals and organizations, such as Civil Protection and the Mountain Rescue Service of Slovenia, municipalities, regions, and the state. Members have participated in numerous domestic and international rescue operations and successfully competed in national and international competitions and trials. Knowledge level tests are conducted by domestic judges, and the exams are aligned with the difficulty of international IPO exams. Organizational, professional, and financial matters are managed by the Board of Directors, comprising representatives of member associations and the president, while the Expert Commission oversees the coordination, workflow, annual training programs, and proficiency testing for handlers and dogs (Gerbec, 2010).

The Association of Rescue Dog Handlers of Slovenia (Društvo vodnikov reševalnih psov Slovenije) is a voluntary, amateur organization founded in 1994, focusing on amateurism and humanitarian activities. The association has over fifty handler-rescue dog pairs trained to search for missing persons in natural settings, buried under rubble, and in avalanches. They have participated in international rescue missions, assisting earthquakes in Egypt, Turkey (twice), and Sumatra in 2009. The association's involvement in the IPO organization, particularly through its vice president Dr. Dušan Nećak, has helped achieve one of its goals of integrating its expertise and high professional training into international rescue activities (Gerbec, 2010).

The Rescue Dog Handlers' Club of Postojna (Klub vodnikov reševalnih psov Postojna) is a voluntary association that trains handlers and rescue dogs. Covering municipalities such as Bloke, Cerknica, Divača, Hrpelje-Kozina, Ilirska Bistrica, Komen, Loška Dolina, Pivka, Postojna, and Sežana, the club assists around 74,000 residents but also operates beyond their territory if necessary. They cooperate with various organizations needing their assistance, such as firefighters, police, and the Mountain Rescue Service. Due to the specific terrain, they also train their dogs to search in caves, aiding cave rescue teams (Gerbec, 2010).

Founded in 1997, the Cynological Society for Rescue Dogs of Maribor (Kinološko društvo za reševalne pse Maribor) focuses on training rescue dogs. They have trained several handlers and rescue dogs equipped with theoretical knowledge about mountain hazards, rubble, veterinary first aid, first aid for injured persons, radio communication, field orientation, rope techniques, and dog psychology. The society collaborates with the Municipality of Maribor and the Protection and Rescue Service, extending their work to the municipalities of Podravje, Prekmurje, and Koroška. The Cynological Society for Rescue Dogs of Maribor is a co-founder of the Rescue Society Organizations of Slovenia for international aid and was granted humanitarian organization status by the Ministry of Health of the Republic of Slovenia in 2010. The association is also verified by the Organization for the Coordination of Humanitarian Assistance in Case of Natural Disasters at the United Nations (Gerbec, 2010).

The Burja Rescue Dog Society (Društvo za reševalne pse Burja), founded in August 2008, is dedicated to saving human lives. To stay current with rescue dog training developments, they regularly participate in competitions, exercises, and seminars domestically and internationally. Despite being a young association, they have many experienced members involved in Slovenia's protection and rescue system and the international IPO unit. Among their ranks is a world champion from 2008 and a world vice-champion from 2009, the dog Kan, who works closely with Roman Starman, the president of the Burja Rescue Dog Society (Gerbec, 2010).

The Mountain Rescue Service (Gorska reševalna služba) of Slovenia has a history dating back to 1912, with the primary mission of voluntarily assisting people in mountain accidents and difficult-to-access terrains. Operating throughout Slovenia, the Mountain Rescue Service is an association of independent, voluntary, non-profit mountain rescue societies and mountaineering societies with registered rescue activities. They perform humanitarian tasks of public importance: protection, rescue, and assistance in mountain environments and during natural and other disasters when safety, health, and lives are at risk.

FULL TEXTS BOOK

The Mountain Rescue Service's operations are geographically divided into 17 regions in Slovenia. They conduct rescue, preventive, and other actions and activities according to their rules and regulations. Members join as trainee mountain rescuers and can specialize further upon obtaining their mountain rescuer license, including becoming rescue dog handlers (Gerbec, 2010).

Significant advancements have been made in training rescue dogs within the Mountain Rescue Service of Slovenia. Handlers now purposefully select future rescue dogs from puppyhood, ensuring consistent training from an early age. The handler and dog go through all training phases together, both in winter avalanches and summer missing person courses. After completing their training, they are placed on an alert list following a two-day annual test. Rescue pairs on the alert list participate in all rescue operations in their home Mountain Rescue Service station's area. They also assist other stations when needed, although the team leader on the ground is always from the home station. This is especially common in avalanche rescue operations, which are often prolonged and physically and mentally demanding (Gerbec, 2010).

The organization of rescue dog handlers within the Administration of the Republic of Slovenia for Protection and Rescue (URSZR), an agency under the Ministry of Defense, focuses on developing national protection programs against natural and other disasters, proposing research and development projects, preparing risk and hazard analyses, and implementing preventive measures in emergency prevention, as well as rescue and assistance in emergencies. URSZR includes rescue dog handlers in its protection, rescue, and assistance forces, which comprise units and services of associations and other non-governmental organizations, companies, institutions, and other organizations, civil protection units, services, and authorities, police, and the Slovenian army (Gerbec, 2010).

The Rapid Intervention Unit MUSAR (Enota za hitre intervencije MUSAR) was established in 2001 by order of the Minister of Defense, defining its organization and equipment criteria. The unit was created following bilateral mutual assistance agreements, particularly with neighbouring countries, to provide aid both domestically and internationally. MUSAR participates in international humanitarian and rescue operations within the frameworks of the UN, NATO, EU, and other international organizations. EHI (state rapid intervention rescue unit) is designed for particularly demanding rescue interventions, requiring rapid action during earthquakes, floods, landslides, and other large-scale disasters. EHI comprises 221 members from state units, civil protection services, and other protection, rescue, and assistance forces under state jurisdiction or co-financed by the state (URSZR, 2009).

The Technical Rescue Squad is a subunit of EHI, including the Mechanized Rescue Platoon, the Technical Search Department, the Dog Search Team, and MUSAR. This team encompasses all units performing search and rescue operations for buried and missing persons using dogs and technical means, as well as rescuing and caring for found persons. The Dog Search Team conducts protection, rescue, and assistance tasks independently or with other EHI units, performing search and rescue for buried victims of natural and other disasters, assisting survivors, and locating missing persons in major disasters. The team includes three administration members and two dog search units, each with a commander and nine rescue dog handlers, totalling 23 members. Members who pass the international exam join the MUSAR unit after a preliminary exam (URSZR, 2009).

The MUSAR platoon is organized, equipped, and trained to independently conduct search and rescue operations for large-scale natural disaster victims abroad. It operates within the EU Civil Protection Mechanism and follows the guidelines and methodology of the UN International Search and Rescue Advisory Group. The unit includes seven rescue dog handlers. Organizationally, the MUSAR platoon consists of a search group, a rescue group, a medical care group, and a logistics support group. The search team comprises 12 members, including the leader (a member of the EHI Dog Search Unit), four geophonists (from the EHI Technical Search Department), and seven rescue dog handlers (from the EHI Dog Search Unit) (URSZR, 2009).

FULL TEXTS BOOK

The MUSAR platoon has a total of 47 members. The core group consists of operational firefighters with additional technical rescue skills, while other groups or members from different EHI units join the MUSAR platoon. The platoon must be capable of performing its tasks in smaller formations when transportation limitations prevent the entire unit from operating abroad (URSZR, 2009).

The State Intervention Unit (Državna intervencijska enota - MERP) requires handlers to pass exams outlined in the Regulations for Testing Knowledge and Skills of Rescue Dogs and Handlers of the Slovenian Rescue Dog Unit for Rubble (IRP-R). Handlers must have passed all six handler exams and be of legal age. When applying for testing, handlers must submit a written statement of voluntary participation in MERP as civil defence members in Slovenia's protection and rescue system. The regulations specify that trial searches cover larger areas (500 to 2000 square meters), with markers buried up to 1.5 meters deep. Various distractors may be used, and dogs must not wear collars or leashes for safety reasons. Searches during trials occur both day and night, lasting up to 36 hours with a maximum of seven searches. Light usage is permitted at night, and a maximum of three searches can be conducted consecutively, with a minimum 20-minute rest between searches. Each search lasts 20 minutes, with a maximum of 14 markers allowed, and one search area may have no hidden marker (Gerbec, 2010).

In addition to searching, each participant must pass tests in rope techniques, providing first aid to the injured dogs, physical fitness for handlers, and using a handheld radio. Successful rescue pairs based on these results are placed in the state intervention unit MERP, with their placement valid for one year (Gerbec, 2010).

5. Challenges and Limitations Faced by Search and Rescue Dogs During Operations in Disasters

We are witnessing rapid technological advancements that significantly enhance our quality of life and accelerate progress in fields like science and medicine. Yet, despite these modern marvels, human ingenuity alone remains insufficient for finding loved ones trapped under debris. In contrast, a well-trained search and rescue (SAR) dog can effectively perform this critical task. During earthquakes, snow avalanches, or when individuals are lost in forests, SAR dogs prove to be invaluable partners in rescue missions. The term "partner" is used intentionally, as the dog is as vital as the handler for a successful rescue operation. Both must work in harmony and understand each other (Gerbec, 2010).

When the handler's excellent skills and the dog's consistent, systematic training are combined with loyalty and genuine friendship, they form a coordinated, efficient, and indispensable human-animal team. This partnership remains irreplaceable in rescue missions, even amidst numerous modern technological achievements (Gerbec, 2010). Dogs have the ability to detect scent particles at a ratio of 1 to 1,000,000,000,000 (one trillion), compared to traditional analytical instruments that can detect at a ratio of only 1 to 1,000,000,000 (one billion) (Otto et al., 2019). For decades, SAR dogs have been successfully used to search for missing persons or individuals buried in avalanches or rubble. Despite the development of technical detectors, SAR dogs remain irreplaceable due to their unparalleled speed and efficiency in locating missing persons in inaccessible terrains (Schneider et al., 2005).

SAR dogs are often selected from working lines renowned for their strong olfactory abilities and tireless work ethic, driven by rewards such as toys or food (Otto et al., 2019). These dogs use their keen sense of smell during searches and are trained to identify specific scents, which are combinations of various chemicals. For example, hunting dogs learn to identify the scents of specific animals, drug detection dogs identify the scent of narcotics, and SAR dogs are trained to recognize and pinpoint human scents (Jones et al., 2004). Numerous instances underscore the importance of SAR dogs during disasters. Notable examples include the devastating earthquake in the Avellino region of southern Italy in November 1980 and the Mexico City earthquake in September 1985, where more than 200 people were rescued from the rubble thanks to the efforts of SAR dogs (Gerritsen & Haak, 2014). Globally, the

FULL TEXTS BOOK

critical role of well-trained SAR dogs is widely acknowledged. Experiences from past rescue operations consistently highlight the necessity of a well-trained dog and its handler for successful rescues.

Search and rescue dogs face a myriad of challenges in the field that can affect their performance and safety. Below are some key factors:

a) Environmental conditions (extreme weather conditions such as heavy rain, snow, high temperatures, or strong winds can hinder the dogs' ability to scent and navigate effectively);
b) Hazardous terrain (debris, sharp objects and unstable surfaces can pose physical dangers to the dogs, increasing the risk of injury);
c) Contaminated areas (exposure to hazardous materials, chemicals, and biological contaminants can affect the dogs' health and impair their performance);
d) Fatigue and exhaustion (extended hours of work without adequate rest can lead to physical and mental exhaustion, reducing the dogs' efficiency and effectiveness);
e) Distractions (the presence of other animals, loud noises, and chaotic environments can distract the dogs and make it difficult for them to focus on their search tasks);
f) Psychological stress (the high-stress environment of disaster scenes can cause anxiety and stress in dogs, impacting their ability to perform);
g) Limited access to resources (in remote or heavily damaged areas, there may be limited access to food, water, and medical care for the dogs, affecting their overall well-being and performance);
h) Communication challenges (difficulties in communication between the dogs and their handlers due to noise, distance, or obstacles can impede the effectiveness of search operations);
i) Training limitations (differences in training methods and the level of preparedness among search and rescue teams can affect the dogs' ability to perform optimally in various disaster scenarios);
j) Health issues (pre-existing health conditions or injuries sustained during operations can limit a dog's ability to participate in search and rescue missions effectively);
k) Time sensitivity (the urgency of locating survivors quickly can place immense pressure on the dogs and their handlers, sometimes leading to rushed or less thorough searches);
l) Adaptation to different scents (in multi-disaster scenarios or areas with diverse human populations, the dogs may need time to adapt to different scents, potentially delaying search operations);
m) Navigational difficulties (in complex structures or densely populated areas, dogs may face challenges in navigating through narrow passages, collapsed buildings, or other obstacles)
n) Interference from untrained animals (stray animals or pets in the disaster area may interfere with the search dogs' work, causing confusion and delays);
o) Limited deployment time (the physical and mental limits of the dogs require frequent rotation and rest periods, which can reduce the overall time available for search operations).

6. Conclusion and Recommendations

The assessment of search and rescue (SAR) dogs' effectiveness in locating survivors during disasters in Serbia, Croatia, and Slovenia highlights the crucial role these expertly trained canines play in disaster response. The study reveals that SAR dogs are invaluable due to their exceptional sense of smell, agility, and ability to navigate difficult terrains, which significantly boost the efficiency and success rates of rescue missions. Key factors impacting the effectiveness of SAR dogs include the quality of their training, environmental conditions during operations, and the coordination between handlers and dogs. The research identifies several challenges that SAR dogs encounter, such as extreme weather, hazardous terrain, fatigue, psychological stress, and limited resources. Addressing these issues is vital for optimizing the performance and well-being of SAR dogs.

The study underscores the necessity for standardized training protocols, sufficient investment in resources, and improved coordination among SAR teams. Ongoing training and support for both dogs and handlers are essential to maintaining high-performance levels during rescue missions. Additionally,

FULL TEXTS BOOK

the research points to the importance of international cooperation and the exchange of best practices to refine SAR dog deployment strategies. In summary, SAR dogs are an indispensable part of disaster response teams in Serbia, Croatia, and Slovenia. Their ability to swiftly and effectively locate survivors makes them a critical asset in saving lives during disasters. Continued investment in training, resources, and international collaboration will ensure that SAR dogs remain at the forefront of effective disaster management, thereby enhancing the resilience of communities and their capacity to respond to future disasters.

To further enhance the effectiveness of SAR dogs in disaster response, the study proposes several key recommendations:

a) It is essential to develop and implement standardized training protocols across all SAR teams. This ensures consistent, high-quality training for both SAR dogs and their handlers. Regular drills, exposure to various environments, and advanced training techniques tailored to specific disaster scenarios should be included.

b) More resources should be allocated for the training, care, and deployment of SAR dogs. This includes funding specialized training facilities, veterinary care, and the acquisition of necessary equipment.

c) Improving coordination and communication among SAR teams, both domestically and internationally, is crucial. Establishing clear communication channels and collaborative frameworks will facilitate better resource sharing and more efficient deployment of SAR dogs during disasters.

d) Providing psychological support and ensuring the welfare of SAR dogs and their handlers is vital. Addressing the mental and physical health of both dogs and handlers helps maintain high-performance levels and ensures long-term effectiveness.

e) Raising public awareness about the role and importance of SAR dogs in disaster response is important. Educational campaigns can help garner support and funding for SAR programs and foster a greater appreciation for these canine heroes.

f) Ongoing research and development in SAR dog training and deployment should be encouraged. Innovations in training methods, scent detection technologies, and health monitoring can further enhance the capabilities of SAR dogs.

g) Strengthening international collaboration and sharing best practices among countries is essential. Participation in international training exercises, conferences, and knowledge exchange programs will contribute to the continuous improvement of SAR dog deployment strategies.

SAR dogs are a crucial part of disaster response teams in Serbia, Croatia, and Slovenia. Their remarkable ability to swiftly and efficiently locate survivors makes them indispensable for saving lives during emergencies. Ensuring continued investment in their training, and resources, and fostering international collaboration will keep SAR dogs at the cutting edge of effective disaster management. This, in turn, will enhance the resilience of communities and their preparedness for future disasters. Implementing the recommendations from this study will not only boost the effectiveness of SAR dogs but also contribute significantly to the overall improvement of disaster response strategies in the region.

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FULL TEXTS BOOK

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FULL TEXTS BOOK

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FULL TEXTS BOOK

LEGAL AND ORGANIZATIONAL FRAMEWORK FOR THE USE OF SEARCH AND RESCUE DOGS IN DISASTERS: A COMPARATIVE ANALYSIS BETWEEN SERBIA, CROATIA, AND SLOVENIA

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ABSTRACT

This study critically explores the legislative frameworks and national regulations of Serbia, Croatia, and Slovenia concerning the engagement, training, and responsibilities of search and rescue dogs and their handlers.. The goal is to offer a thorough understanding of how these dogs and their handlers are engaged, trained, and managed in each country. By carefully analyzing the legal foundations, the study aims to clarify the rights, duties, and responsibilities of all parties involved, ensuring that search and rescue dog deployments are conducted within a structured and lawful framework. Such an understanding is crucial for improving disaster management and ensuring a coordinated response to various emergencies. The findings reveal that although each country has strong legal provisions for deploying search and rescue dogs, there are significant differences in the detail and scope of these regulations. Slovenia is notable for its detailed guidelines, regular evaluations, and licensing processes, setting a high standard. Croatia benefits from strong institutional support and active international collaboration, which greatly enhances its disaster response capabilities. On the other hand, Serbia, despite having a solid foundational framework, could improve by better coordinating with non-governmental organizations and aligning more closely with international standards. Key areas for improvement include harmonizing standards, enhancing training programs, increasing public awareness, better resource allocation, and adopting new technologies. By addressing these issues, Serbia, Croatia, and Slovenia can further strengthen their legal and institutional frameworks, ensuring their search and rescue teams are better prepared for disasters. This study emphasizes the need for continuous improvement through collaboration, standardization, and innovation to maximize the effectiveness of search and rescue operations involving dogs.

Keywords: search and rescue dogs; disasters; disaster response; survivor; legal framework; organizational framework; Serbia; Croatia; Slovenia.

1. Introduction

Disasters are extreme events that have a severe negative impact on people, property, and the environment (Cvetković, 2020, 2022; Cvetković, Romanić, & Beriša, 2023; Cvetković, 2023; El-Mougher, Abu Sharekh, Abu Ali, & Zuhud, 2023; Rajani, Tuhin, & Rina, 2023; Starosta, 2023; Ulal & Karmakar, 2023). They can be natural, such as earthquakes, floods, hurricanes, volcanic eruptions, and droughts, or they can be caused by human actions, such as industrial accidents, nuclear incidents, war conflicts, and terrorist attacks (Cvetković & Šišović, 2024). During these disasters, people face loss of life, injuries, psychological trauma, and loss of property (Baruh, Dey, & Dutta, 2023; Chakma, 2023; Cvetković & Jelena Planić, 2022; Dukiya & Adelete, 2022; El-Mougher et al., 2023; Faicel, 2022; Hossen, Nawaz, & Kabir, 2022; Mohammed & Maysaa, 2022; Ulal & Karmakar, 2023). Such situations often lead to population displacement, food and water shortages, disruptions of communication and energy networks, and serious economic consequences (Al-Ramlawi, El-Mougher, & Al-Agha, 2020; Chakma, Hossain, Islam, Hasnat, & Kabir, 2020; Cvetkovic & Martinović, 2020; Cvetkovic, 2019;

FULL TEXTS BOOK

Hussaini, 2020; Kaur, 2020; Olawuni, Olowoporoku, & Daramola, 2020; Thennavan, Ganapathy, Chandrasekaran, & Rajawat, 2020). Damage to infrastructure further complicates rescue and recovery efforts.

Protection and rescue tactics in the event of disasters encompass a range of activities aimed at risk reduction, rapid response, and long-term recovery (Cvetković, Nikolić, & Lukić, 2024; Cvetković & Šišović, 2024; Cvetković, 2024; Grozdanić, Cvetković, Lukić, & Ivanov, 2024; Sudar, Cvetković, & Ivanov, 2024). Prevention and preparedness include activities focused on reducing disaster risk through urban planning, building more resilient structures, educating the population, establishing early warning systems, and conducting emergency drills (Cvetković, Čvorović, & Beriša, 2023; Cvetković & Grbić, 2021; Cvetković & Jelena Planić, 2022; Cvetković, Tanasić, Ocal, et al., 2023; Cvetković & Šišović, 2023; Nikolić, Cvetković, & Ivanov, 2023; Oral, Yenel, Oral, Aydin, & Tuncay, 2015; Yang et al., 2015). The response involves the rapid mobilization of rescue teams, providing emergency medical assistance, evacuating endangered residents, securing temporary shelters, and distributing essential supplies such as food and water. Effective response requires well-coordinated efforts from various services and organizations.

Recovery involves long-term activities focused on rebuilding infrastructure, providing psychological assistance to survivors, revitalizing the economy, and strengthening social resilience (Cvetković, Tanasić, Živković-Šulović, & Milojević, 2023; Cvetković et al., 2021; Tanasić & Cvetković, 2024). The recovery process often takes years and requires significant investment and international aid. The goal of mitigation is to reduce the impact of future disasters by developing and implementing policies that will decrease community vulnerability. This includes improving building standards, enhancing natural barriers, and promoting sustainable practices.

Effective disaster protection and rescue requires a comprehensive approach that includes preparation, rapid response, adequate recovery, and continuous efforts to reduce risk. International cooperation, the exchange of knowledge and resources, as well as continuous education and training, are key to enhancing disaster response capacities and protecting lives and property (Tanasić & Cvetković, 2024).

Search and rescue dogs are invaluable assets in disaster response scenarios due to their specialized training and innate abilities (Cvetković & Miljković, 2024). These dogs are uniquely skilled at finding survivors in difficult conditions such as rubble, wilderness, and other disaster-affected areas. Their extraordinary sense of smell, agility, speed, and endurance make them indispensable during emergencies. Historically, they have shown unwavering loyalty and courage, often risking their lives to save humans (Gerbec, 2010). Training for search and rescue dogs starts when they are young, focusing initially on basic obedience and fundamental skills. As they mature, their training becomes more complex, incorporating real-life scenario simulations to prepare them for actual disasters. This rigorous training enables them to detect human scents beneath layers of concrete, earth, and other materials, making them crucial members of rescue teams (Otto et al., 2019).

Furthermore, the psychological readiness of these dogs is crucial. They need to remain calm and focused amid chaos and stress, achieved through continuous training and positive reinforcement. The selection process is stringent, starting with prenatal selection of breeding pairs with ideal genetics and followed by early-age assessments to identify dogs with the right characteristics and instincts (Otto et al., 2019). However, search and rescue dogs and their handlers face significant challenges. Working conditions can be extremely tough, such as navigating through earthquake debris, flooded areas, or avalanche-prone mountainous regions. These conditions expose the dogs to physical injuries, stress, and fatigue, requiring careful attention and support from their handlers and veterinary teams to maintain their health and effectiveness (Jones et al., 2004).

After extensive deliberations and discussions, all nations associated with the International Canine Federation (FCI) and all members of the International Rescue Dog Organization (IRO) adopted the FCI-IRO International Standards for Testing Rescue Dogs. Following the establishment of international

FULL TEXTS BOOK

standards for search and rescue dog testing known as "IPO-R" (Internationale Prüfungsordnung für Rettungshunde-Prüfungen) in 1993, we now have globally recognized and official exams for search and rescue dogs (FCI & IRO, 2019). The name IPO-R, derived from the German term "Internationale Prüfungsordnung für Rettungshunde-Prüfungen," translates to "International Regulations for Testing Rescue Dogs" (FCI & IRO, 2012). These standards enable handlers to collaborate using uniform testing programs, facilitating comparisons of training methodologies across different countries. This harmonization aims to elevate the training quality of search and rescue dogs to an optimal international level (FCI & IRO, 2012). Developed collaboratively by the "FCI/IRO" Commission, these standards received approval from both the "FCI" Executive Committee and the "IRO" General Assembly (FCI & IRO, 2019).

These internationally recognized standards serve as a foundational framework for organizations dedicated to the training and deployment of search and rescue dogs. The readiness tests for these dogs are governed by national and international organizations responsible for their deployment, and they aim to qualify individual dogs for further specialized training. Successfully passing these tests validates the dog's training and readiness to achieve search and rescue dog status in specific disciplines (FCI & IRO, 2019). The readiness and suitability of a dog for specific rescue missions are assessed and certified exclusively by the deploying organization. In such cases, additional criteria may be imposed, including regular re-evaluation through specific tests, completion of alpine training courses, adherence to age restrictions, endurance assessments, equipment regulations, and other relevant requirements (FCI & IRO, 2012).

Testing can be conducted year-round, except under circumstances where the safety and health of participants and animals cannot be assured. For major events, such as national and world championships or large-scale tests, there are technical limitations regarding the number of participants and the scheduling of exams (FCI & IRO, 2019). Rescue dog tests can be performed in individual phases, such as conducting tracking tests separately from obedience tests across all disciplines and levels. In such cases, only one phase is evaluated at a time. Results from these single-phase tests are recorded in the results book with corresponding scores and remarks, indicating that only one phase has been completed. Full evaluation and certification are granted only after successful completion of all required phases, such as both tracking and obedience (FCI & IRO, 2019). There are also specific IRO conditions that both the handler and the dog must meet to be eligible for testing (FCI & IRO, 2019): the handler must apply for the exam within the specified timeframe; the handler must be adequately equipped and properly trained for the specific exam discipline; the handler must report to the responsible judge before the first exercise and after the last one; each handler is required to complete all phases of the test, even if the minimum points for passing a particular phase have not been achieved; in cases of illness, injury, or other justified reasons, the handler must inform the test coordinator if they need to withdraw from the test; failure to do so will result in disqualification; all participants must adhere to regulations concerning animal welfare, safety, and environmental protection as stipulated by the host country; any use of force is strictly prohibited throughout the event. any form of rough or excessive force against the dog will be subject to sanctions.

The conditions that the dog must meet to take the exam (FCI & IRO, 2019) include: minimum age for testing: level "V" - preliminary testing - 15 months, level "A" - test - 18 months, level "B" - test - 20 months; a dog that cannot be identified with a microchip will not be allowed to participate in the exam; dogs of all sizes, breeds, and pedigrees are eligible to participate in search and rescue dog exams; a dog is permitted to participate in no more than two exams during a single event; a dog that fails an exam may retake it after a mandatory waiting period of 5 days; a dog may be disqualified for inappropriate behavior, such as aggression towards strangers or other dogs, or abandoning its handler or working area; the judge will allow the handler up to three opportunities to recall their dog and bring it under control. Failure to do so will result in exclusion from the exam.

FULL TEXTS BOOK

Given the vital role of search and rescue dogs, examining the legal and organizational frameworks that govern their deployment and training is essential. This study focuses on the legislative frameworks and national regulations in Serbia, Croatia, and Slovenia. By comparing these countries, we aim to understand how search and rescue dogs are integrated into national disaster response systems. The goal is to identify strengths and areas for improvement in each country's approach, ensuring these canine units operate within a structured and lawful framework, thereby enhancing their effectiveness in disaster management operations. This analysis is crucial for policymakers, trainers, and rescue teams, as it offers insights into best practices and legal standards that can be adopted or adapted to improve the deployment of search and rescue dogs in emergencies.

2. Comprehensive Legal Framework for the Deployment of Search and Rescue Dogs in Serbia, Slovenia, and Croatia

The legal framework governing the use of search and rescue dogs is crucial for ensuring a coordinated and effective response during emergencies and disasters. This section provides an in-depth analysis of the legal provisions regulating the deployment and utilization of search and rescue dogs in Serbia, Croatia, and Slovenia. Understanding these legal frameworks is essential to facilitate a harmonized and efficient response to various disasters. Additionally, identifying potential weaknesses in these regulations is key to making informed recommendations and implementing improvements to enhance future disaster response efforts. Furthermore, this section underscores the importance of well-defined legal guidelines governing the operations of search and rescue dogs. Such guidelines ensure that the dogs are deployed appropriately and ethically and provide a clear outline of the handlers' roles and responsibilities. By examining these aspects in detail, we can identify areas where the legal framework may need strengthening or updating.

Through this detailed exploration, we aim to generate valuable insights for policymakers and practitioners regarding best practices and legal standards for optimizing the use of search and rescue dogs in disaster scenarios. This knowledge base will be instrumental in formulating constructive recommendations and identifying potential areas for legislative improvement, thereby enhancing the overall capacity and readiness of disaster response systems. Ultimately, by comprehensively understanding and improving the legal frameworks surrounding the use of search and rescue dogs, we can significantly contribute to more effective and efficient disaster response strategies, ensuring that these invaluable animals are utilized to their fullest potential in times of crisis.

2.1. Comprehensive Legal Framework for Deploying Search and Rescue Dogs in the Republic of Serbia

The Constitution of the Republic of Serbia ("Official Gazette of RS", No. 98/2006 and 115/2021), as the nation's supreme legal document, states in Article 25 that "human life is inviolable" (Constitution of the Republic of Serbia, 2021). This fundamental principle means that every person whose life is in danger has an essential right to be rescued and protected. The National Security Strategy of the Republic of Serbia ("Official Gazette of RS", No. 94/2019) identifies natural disasters and technical-technological accidents as significant risks and threats to national security. When such events occur, rescue teams are mobilized to address the consequences and safeguard human lives through coordinated and effective response efforts (National Security Strategy, 2019).

The Law on Disaster Risk Reduction and Emergency Management ("Official Gazette of RS", No. 87/2018) in Article 11 explains that disaster risk reduction includes various measures like "mitigating harmful consequences... enhancing readiness for response and ensuring an efficient reaction" (LDRREM, 2018). Furthermore, Article 13 of this law specifies the components of the disaster risk reduction and emergency management system, which includes fire and rescue services, police, the Serbian Army, Mountain Rescue Service, citizens, citizen associations, and other organizations crucial

FULL TEXTS BOOK

to the system's development and functionality. This article also emphasizes that service/search and rescue dogs are an integral part of the disaster risk reduction and emergency management framework (LDRREM, 2018). Article 33 of this law recognizes the Red Cross of Serbia, the Mountain Rescue Service, and the Firefighting Association of Serbia as entities of special significance. These organizations support competent state authorities in their duties. When members of humanitarian organizations and associations participate in protection and rescue operations, they are granted civil protection member status (LDRREM, 2018).

Regarding the care of endangered and affected individuals, including searching for missing persons, Article 62 states that the responsible emergency management headquarters oversees care until the conditions are met for the competent state authority to assume responsibility. The Red Cross of Serbia, associations, and citizens collaborate in these care tasks, enabling the engagement of rescue teams or individuals with specially trained dogs for locating missing persons (LDRREM, 2018). Besides that, article 69 lists the rescue of individuals buried in the rubble as one of the critical actions for saving people from collapsed structures (LDRREM, 2018). Article 70 addresses protection and rescue from floods and accidents on water and underwater, while Article 71 regulates the organization and implementation of rescue operations in inaccessible terrains, such as mountain rescues, snow avalanche rescues, cave rescues, and similar scenarios. The Mountain Rescue Service, including a dog-assisted rescue team, participates in these operations upon the request of the competent service (LDRREM, 2018).

The Animal Welfare Law ("Official Gazette of RS", No. 41/2009) defines a service animal as an animal trained and used for duties by certain state authorities, including service dogs and horses. Articles 10 and 11 elaborate on all aspects of animal training (Animal Welfare Law, 2009).

The Law on Police of the Republic of Serbia ("Official Gazette of RS", No. 6/2016, 24/2018, and 87/2018), Article 116, specifies the conditions under which a service dog can be deployed as a means of coercion. This law states that a service dog may be used when conditions for the use of physical force, a service baton, or firearms are met, and when necessary to restore disrupted public order and peace. The use of a service dog involves releasing the dog onto a person or using it to block passages, with or without a protective muzzle, and on or off the leash (Law on Police, 2018).

The Regulation on Special and Specific Police Units ("Official Gazette of RS", No. 47/2018, and others) in Article 16 mentions the inclusion of service dogs as part of the special equipment within the Special Anti-Terrorist Unit (SAJ). Article 31 lists the special equipment of the Gendarmerie, which includes equipment for police dogs and their handlers. Chapter 7, Article 55, states that the police brigade has a specialized unit responsible for the reproduction, breeding, selection, preliminary training, and training of service dogs, as well as the training of handlers and trainers of service dogs (Regulation, 2024).

2.1. Comprehensive Legal Framework for Deploying Search and Rescue Dogs in Slovenia

The Constitution of the Republic of Slovenia ("Official Gazette of RS", No. 33/91-I, 42/97 – UZS68, 66/00 – UZ80, 24/03 – UZ3a, 47, 68, 69/04 – UZ14, 69/04 – UZ43, 69/04 – UZ50, 68/06 – UZ121,140,143, 47/13 – UZ148, 47/13 – UZ90,97,99, 75/16 – UZ70a in 92/21 – UZ62a), explicitly states in Article 17 that "human life is inviolable." Additionally, Article 35 guarantees the inviolability of an individual's physical and mental integrity, underlining the nation's commitment to protecting its citizens (Constitution of the Republic of Slovenia, 2021).

Complementing these constitutional protections, the Police Tasks and Powers Act of the Republic of Slovenia ("Official Gazette of RS", No. 66/09 – official consolidated text, 22/10, 26/11 – Constitutional Court decision, 58/11 – ZDT-1, 40/12 – ZUJF, 96/12 – ZPIZ-2, 15/13 – ZNPPol and 15/13 – ZODPol), Article 86, regulates the use of police dogs by law enforcement officers. These dogs are trained to physically apprehend or bite individuals when the use of force is justified, ensuring law enforcement can maintain order and safety (ZPOL, 2013).

FULL TEXTS BOOK

The Police Canine Training Section in Slovenia is tasked with several key responsibilities, ensuring that both dogs and their handlers are prepared for diverse operational needs (ZPOL, 2013): providing comprehensive training programs for police dog handlers and dogs for both general and special purposes; breeding and raising police dogs to maintain a robust and capable force; conducting field operations such as locating blood traces, other biological evidence, corpses, and determining the causes of fires; ensuring the well-being of the police dogs through proper care and medical attention; providing healthcare not only for police dogs but also for those belonging to the Ministry of Justice and the Tax Administration of Slovenia; adhering to the guidelines outlined in the Instructions on Training, Use, and Care of Police Dogs and the Regulations on the Acquisition and Management of Police Dogs.

General-purpose police dogs are employed for tracking, searching for individuals and objects, free searching, defence, building inspections, forest and natural terrain inspections, and working without a muzzle, enhancing the police force's operational capabilities (ZPOL, 2013). Special-purpose dogs, on the other hand, are meticulously trained to detect illegal drugs, explosives, weapons, gunpowder traces, shells, blood, other biological traces, corpses, causes of fires, and tobacco products. They play a crucial role in inspecting terrain, vehicles, buildings, and luggage (ZPOL, 2013).

The Protection Against Natural and Other Disasters Act of the Republic of Slovenia, Article 21, acknowledges the importance of volunteer organizations, including kennel clubs, search and rescue dog handlers' associations, and the Mountain Rescue Service. These civil sector associations are integral to search and rescue operations, emphasizing community involvement in disaster response (ZPOL, 2012). Moreover, the Animal Protection Act (Zakon o zaščiti živali (ZZZIV), "Official Gazette of RS", No. 38/13 – official consolidated text, 21/18 – ZNOrg, 92/20, 159/21, and 109/23) addresses various issues related to dogs, including ownership, breeding and sale, transportation, mandatory training, and proper care. This comprehensive approach ensures that the welfare of dogs is maintained, whether they are pets or service animals.

Further elaborating on the organizational structure, the Regulation on the Organization, Equipment, and Training of Forces for Protection, Rescue, and Assistance ("Official Gazette of RS", No. 92/07, 54/09, 23/11, 27/16), Article 28, specifies that rescue teams with dogs are organized by the Kennel Club of Slovenia and the Association of Rescue Dog Handlers of Slovenia. These teams are strategically distributed across regions, ready to respond to emergencies. Their tasks include searching for missing persons, rescuing survivors in collapsed structures, and providing necessary assistance. Notably, the activities of these organizations are co-funded by the Administration of the Republic of Slovenia for Protection and Rescue, ensuring they have the necessary resources and equipment (Uredbo, 2016). Article 25 of this regulation outlines the responsibilities of the Mountain Rescue Service of Slovenia, including avalanche victim rescue using specially trained dogs. This specialized training is crucial for effective response in mountainous terrains (Uredbo, 2016). Additionally, the Regulation on the Implementation of Protection, Rescue, and Assistance with the Use of Aircraft, Articles 10 and 11, includes canine rescue teams in aerial rescue operations, highlighting the versatility and importance of search and rescue dogs in various scenarios (Uredbo o izvajanju zaščite, reševanja in pomoči z uporabo zrakoplovov, "Official Gazette of RS", No. 46/98, 42/05, 21/16).

Also, article 5 of the Rules on Record-Keeping, Allocation, and Summoning of Civil Defense Members and Other Protection, Rescue, and Assistance Forces mandates that the administration maintain detailed records of Civil Protection members, professionals, and volunteers by local jurisdiction. This includes the critical role of search and rescue dog handlers, ensuring that all personnel are accounted for and efficiently mobilized in emergencies (Pravilnik o evidenci, razporejanju in pozivanju pripadnikov Civilne zaščite ter drugih sil za zaščito, reševanje in pomoč, "Official Gazette of RS", No. 51/06 and 113/05).

Similarly, the Rules on Notification and Reporting in the Protection Against Natural and Other Disasters System, Article 11, require commanders to report on searches for missing persons or other police-led

FULL TEXTS BOOK

interventions. This includes operations involving various units, services, and operational formations, such as search and rescue dog handlers, ensuring comprehensive and coordinated reporting (Pravilnika o obveščanju in poročanju v sistemu varstva pred naravnimi in drugimi nesrečami obsega, "Official Gazette of RS", No. 42/12).

Lastly, the statute of the Sports Kennel Club "Logatec" highlights its commitment to protection, rescue, and assistance in natural and other disasters. The club focuses on training search and rescue dogs, organizing seminars, lectures, travel, and training events related to search and rescue dog training. It also maintains close relationships with the Administration for Protection and Rescue, the Ministry of Defense, the Mountain Rescue Service of Slovenia, internal affairs bodies, and other rescue organizations, both domestically and internationally. This network ensures a robust and well-coordinated response capability (Statut Športno kinološko društvo Logatec, 2015).

2.1. Comprehensive Legal Framework for Deploying Search and Rescue Dogs in Croatia

The Constitution of the Republic of Croatia (NN 56/90, 135/97, 08/98, 113/00, 124/00, 28/01, 41/01, 55/01, 76/10, 85/10, 05/14) guarantees the right to life for every individual in Article 21, underscoring the state's commitment to safeguarding its citizens. This assurance means that in the event of a disaster, a coordinated rescue mission will be launched to protect and preserve human lives (Ustav RH, 2014). Expanding on this commitment, the Law on the Civil Protection System (NN 82/15, 118/18, 31/20, 20/21, 114/22) explicitly recognizes "canine activities" as vital to the civil protection system. This highlights the importance of incorporating specialized canine units into disaster response strategies. Furthermore, Article 63 of this law outlines the participation of civil protection operational forces in international activities, which includes deploying rescue dogs as key components of rescue teams (Zakon o sustavu civilne zaštite, 2022).

Animal Protection Act, article 5 of the (NN 102/17, 32/19) addresses prohibited actions to ensure animal welfare, explicitly mentioning protections for sporting and service dogs. This legislation underscores the ethical treatment and protection of animals in service roles, ensuring they are not subjected to abuse or neglect (Zakon o zaštiti životinja, 2019). In Croatia, the Croatian Kennel Club's Committee for Rescue Dog Work has established comprehensive regulations for the operation of rescue dogs. These regulations initially issued in 2005 and most recently amended in late 2021, provide a structured approach to training and deploying rescue dogs.

The "Regulation on the Organization of Courses, Exams, and Competitions for the Work of Rescue Dogs and Exams for Rescue Dog Handlers" (Pravilnik o organizaciji tečajeva, ispita i natjecanja za rad spasilačkih pasa i ispita za vodiče spasilačkih pasa, 2016) details the methods and conditions for training, conducting exams, and attaining the status of an active rescue dog handler. It specifies the organization of classes, exams, and competitions, and provides thorough guidelines for evaluating the competencies of dogs and handlers (HKS, 2016). Additionally, the "Regulation on the Work of the Committee for Rescue Dog Work" (Pravilnik o radu Povjerenstva za rad spasilačkih pasa, 2016) governs the structure, jurisdiction, and operational procedures of the Croatian Kennel Club's Rescue Dog Work Department, ensuring systematic and efficient management of rescue dog activities (HKS, 2016).

The "Regulation on Professional Staff for Rescue Dog Work" (Pravilnik o stručnim kadrovima za rad spasilačkih pasa, 2016) addresses the qualifications and responsibilities of professional staff involved in rescue dog operations. This includes active handlers, instructors, and FCI/IRO judges, setting standards for their roles and training requirements (HKS, 2016). The International Canine Federation (FCI) Commission for Working Sports Dogs developed the "FCI Regulation for Conducting International Exams for Working Sports Dogs and International Exam for Tracking Dogs," adopted by the FCI in 2018 and effective from January 1, 2019. The Croatian Kennel Club's Sports Dog Working Department translated this document into Croatian, enhancing the development and improvement of working sports

FULL TEXTS BOOK

cynology in Croatia. This regulation aims to assess dogs' capabilities for specific tasks and enhance their health and working abilities, ensuring a high standard of performance and welfare (HKS, 2020).

The Statute of the Croatian Kennel Club addresses several issues related to rescue and working dogs, providing a comprehensive framework that supports their activities. Article 12 states that organizing work exams for rescue dogs is among the Club's activities. Article 23, item 2, highlights the establishment of specialized associations for dog training to develop and expand cynological culture and activities. Finally, Article 51 indicates that the Executive Board appoints a committee for rescue dogs as part of its expert committees, ensuring dedicated oversight and development of rescue dog activities (HKS, 2015). Furthermore, Article 15 of the Statute of the Croatian Mountain Rescue Service (HGSS) specifies that "associates" include HGSS members who, after completing the basic course, undergo specialist training of interest to HGSS. This includes dog handlers for search and rescue, emphasizing the critical role of specialized training in enhancing rescue operations (HGSS, 2018).

On December 8, 2023, the Firefighting Association of the Republic of Croatia, under Article 5 of the Firefighting Act (NN 125/19, 114/22, 125/19, 155/23), adopted the Program for Training and Testing the Operational Capabilities of Firefighting Rescue Teams with Dogs. This program ensures the readiness of both professional and volunteer firefighters, along with search dogs, for interventions requiring search and rescue operations due to building collapses, landslides, and technical assistance in non-urban areas (HVZ, 2023).

The program outlines the conditions for enrollment, participant categories, duration, and implementation methods. It also specifies the personnel and technical requirements, final testing procedures, and competencies acquired upon completion, ensuring a comprehensive approach to training and operational readiness (HVZ, 2023).

6. Comparative Analysis of the Normative and Institutional Frameworks for Search and Rescue Dogs in Serbia, Slovenia, and Croatia

The analysis reveals that the normative and institutional frameworks for search and rescue dogs in Serbia, Slovenia, and Croatia share significant similarities while also displaying differences stemming from each country's unique approach to protection and rescue operations. Slovenia is noted for its comprehensive normative framework and high training standards, while Croatia benefits from robust institutional support and active international collaboration. Serbia, though it has a solid foundation, could enhance its capabilities by improving cooperation with the non-governmental sector and adopting international standards.

Comparing these systems offers valuable insights for all countries aiming to strengthen their rescue capacities: a) regulations and laws governing the work of search and rescue dogs are clearly defined in all three countries. However, the level of detail varies, with Slovenia having the most comprehensive framework that includes regular evaluations and licensing; b) central state institutions provide strong institutional support across all three nations. Croatia and Slovenia distinguish themselves with high training standards and regular exercises, whereas Serbia has potential for improvement through better engagement with the non-governmental sector; c) participation in international exercises and experience exchanges enhances the capabilities of search and rescue dog teams. Slovenia and Croatia are particularly active in this regard; d) standardization of equipment and operational protocols is highly developed in Slovenia and Croatia, ensuring consistency and efficiency. Serbia could benefit from aligning its standards with international norms; e) financial support is crucial for maintaining effective rescue teams. While Croatia and Slovenia have stable funding through state budgets and international funds, Serbia needs to enhance its financial resources by engaging more with the private sector and seeking international donations; f) training programs are well-established in all three countries, but they differ in approach and frequency. Croatia and Slovenia conduct regular national and international exercises, while Serbia could improve by increasing the number of specialized training

FULL TEXTS BOOK

sessions; g) Slovenia and Croatia have developed volunteer networks and include them in exercises and operations. Serbia could enhance volunteer engagement through better-organized programs and support; h) the adoption of new technologies, such as drones and advanced communication tools, can significantly improve rescue operations. Slovenia and Croatia have started implementing these technologies, while Serbia should intensify its efforts in this area; i) providing psychological support for rescuers, including dog handlers, is essential for maintaining their mental health and operational efficiency. Slovenia and Croatia include psychological support in their programs, and Serbia could further develop these services; j) regular evaluation and monitoring of rescue teams and their dogs are crucial for continuous improvement. Slovenia has detailed evaluation procedures, whereas Serbia and Croatia could benefit from introducing additional metrics and regular assessments; k) raising public awareness about the role of search and rescue dogs helps garner support and understanding for their work. Slovenia and Croatia conduct public awareness campaigns, and Serbia could enhance its efforts through media campaigns and educational programs; l) effective integration of search and rescue dogs into local communities boosts operational efficiency. Croatia and Slovenia have successful integration programs, while Serbia could improve by fostering stronger connections with local authorities and communities; m) ensuring legal protection for search and rescue dog handlers and the dogs themselves is vital for their safety and well-being. Slovenia and Croatia have established legal frameworks for this purpose, and Serbia could enhance this aspect by enacting specific laws and regulations; n) flexibility in deploying search and rescue dogs across different scenarios, such as urban disasters, natural disasters, and searches for missing persons, increases their utility. Slovenia and Croatia have developed diverse training modules for various situations, while Serbia could broaden its training scope; o) regular exchange of best practices and lessons learned among countries can significantly enhance rescue team capacities. Slovenia and Croatia actively participate in regional and international forums for experience sharing, and Serbia could benefit from increasing its involvement in these activities to improve its practices and standards.

While each country has made significant strides in utilizing search and rescue dogs, continuous improvement through collaboration, standardization, and innovation is essential for maximizing their effectiveness in rescue operations.

6. Recommendations

Based on the comparative analysis of the normative and institutional frameworks for search and rescue dogs in Serbia, Slovenia, and Croatia, several recommendations can be made to enhance the legal regulation and effectiveness of these operations across all three countries. First, the harmonization of standards is crucial. Slovenia should continue to lead by example with its detailed normative frameworks and regular updates to maintain alignment with international standards. Croatia can improve by enhancing the specificity of its existing laws and regulations to match Slovenia's comprehensive evaluations and licensing processes. Serbia should prioritize aligning its national laws with international standards, such as the FCI-IRO International Standards for Testing Rescue Dogs, and implement regular evaluations to ensure high training standards.

Institutional support and coordination are also essential. Slovenia and Croatia should maintain strong institutional backing through central state institutions, emphasizing high training standards and regular exercises. Serbia can improve by fostering better cooperation with non-governmental organizations (NGOs) and enhancing coordination between state and local agencies involved in disaster response. International collaboration should be strengthened in all countries by participating in international exercises and exchange programs to enhance the capabilities of search and rescue dog teams. Active involvement in regional and international forums can facilitate the sharing of best practices and lessons learned.

FULL TEXTS BOOK

Standardization of equipment and protocols is necessary for consistency and efficiency in rescue operations. Serbia should align its equipment standards and operational protocols with those of Slovenia and Croatia to improve interoperability during joint international missions. Financial support and resource allocation are crucial for maintaining effective rescue teams. Croatia and Slovenia should continue to secure stable funding through state budgets and international funds, ensuring sustained operational readiness. Serbia needs to increase its financial resources by engaging more with the private sector and seeking international donations, establishing dedicated funding channels for continuous training and equipment upgrades.

Training programs must be robust and current. Croatia and Slovenia should maintain regular national and international exercises, while Serbia should increase the frequency and specialization of its training sessions to enhance continuous education for handlers and dogs. Volunteer engagement is vital for effective operations. Serbia should develop structured volunteer programs, providing volunteers with regular training and including them in exercises and operations. The adoption of new technologies, such as drones and advanced communication tools, should be intensified across all countries, ensuring teams are trained in their use to maximize effectiveness.

Psychological support services for rescuers, including dog handlers, are essential for maintaining mental health and operational efficiency. Serbia should develop comprehensive psychological support services, learning from the models established by Slovenia and Croatia. Public awareness campaigns about the role of search and rescue dogs should be enhanced, particularly in Serbia, through media campaigns and educational programs to foster public support and understanding of their critical work. Community integration of search and rescue dogs should be improved in Serbia by building stronger connections with local authorities and community groups, increasing operational efficiency and community support.

Legal protection for search and rescue dog handlers and the dogs themselves is vital for their safety and well-being. Serbia should enact specific laws and regulations to protect their rights and ensure comprehensive coverage for all aspects of their work. Flexibility in deploying search and rescue dogs across various scenarios, such as urban disasters, natural disasters, and searches for missing persons, should be increased in Serbia by broadening training programs to cover a wider range of situations. Finally, a culture of continuous improvement should be fostered in all countries through regular reviews and updates of legal frameworks to incorporate best practices and new insights, enhancing collaboration, standardization, and innovation.

7. Conclusion

This comparative analysis of the normative and institutional frameworks for search and rescue dogs in Serbia, Slovenia, and Croatia reveals both common strengths and distinct national approaches. Slovenia is distinguished by its comprehensive legal framework and stringent training standards, ensuring a high level of preparedness and operational efficiency. Croatia benefits from strong institutional support and active international collaboration, which enhances its disaster response capabilities. Serbia, while having a solid foundational framework, stands to gain significantly from increased cooperation with non-governmental organizations and the adoption of international standards.

Key findings indicate that all three countries have well-defined regulations governing the use of search and rescue dogs, yet the specificity and comprehensiveness of these regulations vary. Slovenia leads in detailed normative guidelines, regular evaluations, and licensing processes, setting a benchmark for others to follow. Croatia's robust institutional framework supports continuous training and active international engagement, while Serbia could enhance its system through better resource allocation and standardized procedures. Financial support remains crucial for maintaining effective rescue operations. Stable funding sources in Croatia and Slovenia contrast with Serbia's need for improved financial strategies, including engaging the private sector and seeking international donations.

FULL TEXTS BOOK

Additionally, the adoption of new technologies, such as drones and advanced communication tools, is essential for modernizing rescue operations across all three nations. The importance of psychological support for rescuers, public awareness campaigns, and effective community integration are emphasized as critical components of a successful search and rescue framework. Legal protections for handlers and dogs, flexibility in deployment scenarios, and regular exchange of best practices are also vital for enhancing the overall capacity and readiness of rescue teams.

While each country has made significant strides in utilizing search and rescue dogs, continuous improvement through collaboration, standardization, and innovation is essential. By adopting these recommendations, Serbia, Slovenia, and Croatia can further enhance their legal and institutional frameworks, ensuring their search and rescue teams are optimally prepared to respond to any disaster.

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FULL TEXTS BOOK

MULTIDIMENSIONAL POVERTY STATUS CORRELATES OF RURAL HOUSEHOLDS IN KADUNA STATE OF NIGERIA

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ABSTRACT
After the work of Alkire on multidimensional poverty, literature exhibit a paradigm shift in the methodological approach of investigating poverty in the society. A shift from only income- economic approach to a social approach that encapsulates a wider livelihood dimensions- education, health, standard of living has taken a lead in the literature of poverty. Consequently, in view of this methodological gap in the study area, this research on multidimensional poverty status of rural households was undertaken to serve as one-stop solution to the engine growth of rural economy. Using a multi-stage sampling technique, a total of 120 households is selected and information elicitation was done by the use of well-structured questionnaire complemented with interview schedule in the year 2022. Besides, the collected information was synthesized with the aid of both descriptive and inferential statistics. Empirically, the study area is populated by an economic viable and healthy labour force, literate, agrarian and technologically exposed, globally integrated and had a viable social capital pool. However, the rural population is characterized by a vulnerable household size, credit paucity, gender stereotype, and cultivation of uneconomic holdings. Furthermore, multidimensional poverty is riffed in the study area and the rural populace suffered deprivation in at least two dimensions. Besides, vulnerability to poverty owes unsustainable large household size and lackluster towards livelihood enhancement innovative measures. Moreover, an advisory service is the major driving force that regulates the intensity of multidimensional poverty intensity in the study area. Nevertheless, self-help, social, religious and medical measures were the poverty coping strategies adopted in the study area. Therefore, the study calls for gender mainstreaming so as to arrest poverty vicious cycle among the women folk; and, provision of augmenting assets in order to enable these rural poor overcome distress sale that owes to uneconomic scale of operation.
Keywords: Poverty; Multidimensional; Livelihood; Households; Rural Area; Nigeria

Introduction

The experience of poverty, in accordance with Sadiq (2015a) and Sadiq *et al*.(2018a), extends beyond not having enough money- lack of income. As a result, there is a lack of knowledge, a loss of influence, and little to no control over fundamental life choices. Poverty occurs from the lack of necessary assets and possibilities to which every person is entitled, in addition to when a set of fundamental necessities are not provided (Sadiq, 2015b; Sadiq *et al*., 2018b). Globally, over several government and population, poverty has remained the long-time standing reproach. In 2019, the National Bureau of Statistics and the World Bank International Labour Organization both claim that this reprehensible situation is to blame for the high rate of illiteracy that exists among people worldwide, particularly women (Ndimele, 2022). Due to its complexity, it has grown difficult to resolve and has proven harmful to both human life and the natural world (Aluko and Mbada, 2020; Bello *et al*., 2022).

FULL TEXTS BOOK

Approximately 413.3 million people lived in extreme poverty on the African continent in 2015 (Osabohiene *et al*., 2021), with Sub-Saharan Africa having the greatest rate of hunger-related deaths. Sub-Saharan Africa's (SSA) pervasive poverty contributes to the region's underdeveloped infrastructure. According to Muhammad and Sidique (2019); Osabohien *et al*. (2021) and other sources, the population's higher growth rate has led to rising unemployment, particularly among young people, which is thought to be one of the main reasons of poverty among Africans, particularly Nigerians. Furthermore, because of the worsening effects of poverty and hunger, the majority of the population is now without hope. More than 70% of the disposable earnings of poor households is used to meet food needs, but at least 31.5 percent of children under the age of five are underweight (Roser and Ritchie, 2019; Sulaimon, 2022).

The vast agricultural richness of Nigeria offers tremendous potential for growth for the broader economy as well as the rural sector. Rising poverty is still a significant problem in the nation, despite its abundant natural resources (Sadiq *et al*., 2018a; Oyewunmi and Obayelu, 2023). Despite having a wealth of natural resources and human capital, Nigeria's staggering poverty rate has earned it the moniker "the poverty capital of the world," with approximately 100 million of its citizens living in conditions of extreme destitution (Jaiyeola and Bayat, 2019; Jaiyeola and Bayat, 2020; Adeyonu *et al*., 2022). The fact that a significant portion of the country's population live in destitution in a nation with plenty of natural resources, a robust oil industry, and a growing agricultural sector is highly upsetting (Sadiq *et al*., 2018a; Abubakar, 2022).

Rural individuals are more likely than urban ones to experience poverty and to remain there for a longer period of time (Kyzyma, 2019; Ashagidigbi *et al*., 2020; Gambo *et al*., 2022). Rural residents continue to experience extreme poverty and deep deprivation, which is frequently made worse by violent conflicts & a high risk of catastrophes (Cuaresma *et al*., 2018; Aminu *et al*., 2022). Women in particular continue to suffer the most from this situation. According to reports, the proportion of Nigerians experiencing hunger has increased from around 29 percent as of 2000 to a staggering 33 percent in 2010, suggesting that this increase may be the cause of the failure to meet the 2015 target of 14.5 percent of the population falling below the hunger level. Additionally, according to Sadiq *et al*.(2018b), 40% of households across the nation's geopolitical regions are food insecure. In the year 2022, it cascaded to seventy percent (NBS, 2022), thus concomitantly blurring the possibility of halving poverty by 2030 as envisaged by SDGs. It should be mentioned that the population of India is seven times more than that of Nigeria (Farrell and Nijkamp, 2019). According to Khan and Cheri (2016), among Nigeria's six geopolitical zones, the North-eastern area has the highest death rate, the largest percentage of males without a high school certificate, and second to Northwest with highest percentage of females without an educational attainment.

Additionally, poor health and low education contribute to the cycle of poverty, according to Sadiq (2015a&b); Sadiq and Sani (2022). When cheaper, more delectable items are imported, local farmers also lack motivation to produce locally grown food. As a result, local farmers are forced to lower their prices, thus lowered their income. The result is a drop in farm production the next year, which keeps the poverty cycle in motion. Age, sex, education, health, asset ownership, and other household variables are heavily weighted in the available research on the factors that determine poverty. These are regarded as opportunities and capacities for a certain household, or, to put it another way, to seize the human and material capital that establishes how vulnerable a normal household might be. According to the aforementioned, understanding the factors that contribute to rural poverty are essential for establishing policies that aim to reduce it as well as for understanding its causes.

According to a study on the impact of human capital & capacities on rural destitution in Nigeria, there are considerable geographic disparities in the likelihood that a household will become impoverished. This was revealed by the impact of local factors on rural poverty. Regardless of whether a rural household is working on a farm or not, human capital has a lowering impact on the likelihood that they

FULL TEXTS BOOK

will be poor. Considering how long a remote area of Kaduna State has existed, additional infrastructure development is anticipated. However, the area's poor infrastructure is a major concern for economic growth as it affects productivity and lowers farm households' potential for realizing their potential, which results in poor productivity in agriculture, low levels of income, a decline in standard of living, and an elevated prevalence of poverty among rural residents.

In Nigeria, the majority of agricultural production happens in rural areas where, ironically, poverty is most prevalent and severe. This study is designed to investigate the pattern & drivers of poverty among farming families in Kaduna State, in the North Western area of Nigeria. Poverty is a significant restraining factor for farming households. To the best of our knowledge, the literature review revealed little to no documented evidence of a multidimensional approach to poverty in the study area, despite convincing arguments that poverty is multifaceted as opposed to unidimensional, which is the main motivation beneath the conceptualization of this research. In summary, the literature evaluation on poverty in the studied area has knowledge, empirical, methodological, and population research gaps. Therefore, this study aims to close the knowledge gap with persuading facts and data.

In lieu of the foregoing, this research aimed to address the challenge posed by multidimensional poverty-a social matrix in the study area. The broad objective of the research centered on the multidimensional poverty correlates of rural households in Nigeria's Kaduna State. The specific objectives were to: describe the socio-economic characteristics of the households in the study area; determine the multidimensional poverty status of the households in the study area; determine the factors responsible for households' vulnerability to multidimensional poverty; determine the driving force of households' multidimensional poverty correlates; and, determine the poverty coping strategies adopted by households in the study area.

Research Methodology

The state is situated in the high plains of northern Nigeria. Besides, in the Nigeria's north, it is located in the Northwest geopolitical zone. The Kaduna state can be found between latitude 38'58" N & 25'36" equatorial north and longitude 22'14" E and 7 32'00" equatorial east. The state is situated alongside the Kaduna River, an important Niger River tributary. The state is traversed by the Kaduna River, a branch of the Niger River. It originates on the Jos Plateau in Vom, 18 miles (29 kilometers) southwest of Jos town, and flows northwest until a bend 22 miles (35 kilometers) northeastern of Kaduna town. Prior to finishing its 340-mile (550-kilometer) discharge to the Niger River at Mureji (opposite Pategi), it takes a southwesterly and southerly route. Although its lower half has carved out some gorges, including the 2-mile (3-kilometer) granite ravine at Shiroro, above its entrance into the expansive Niger floodplains, the majority of its route is in broad savanna woodland. Short, dispersed trees, shrubs, and grasses make up the Sudan Savannah type of vegetation cover. Although there is a sizable amount of clay present, the soil is primarily loamy to sandy. There are seven states that border the state.

The state is rated third in terms of population (about 9, 231, 390 at a 3% annual growth rate), and fourth in terms of total land area (46,053 km^2). As of 2021, the state's per capita GDP and GDP at purchasing power parity (PPP) were $2,905 and $27.88 billion, respectively. The human development index (HDI) was also 0.511 according to http://kdsg.gov.ng/. Rocks can be found in Kogoro Hill and Zaria and during the rainy season, many communities are vulnerable to seasonal flooding. Kaduna experiences two seasons: a dry season that is hot as well as partly cloudy, and a wet season that is hot, muggy, and gloomy. Over the year, the ambient temperature seldom descends beneath 50 °F or soars beyond 102 °F, typically fluctuating around 55 °F & 95 °F.

Using a multi-stage sampling technique, a total of 120 rural households constituted the sample size for the study. Conveniently, given the characteristic similarity of the rural areas in the state, one Local Government Area viz. Kachia was selected. Subsequently, in view of population density and agrarian activities, six (6) out of twelve (12) wards/taluks were purposively chosen. The chosen wards/taluks

FULL TEXTS BOOK

were Gumel, Kachia, Awon, Ankwa, Sabon-Sarki and Kurmin-Musa. Afterwards, two (2) villages were randomly chosen from each of the selected wards/taluks. Thereafter, from each of the selected villages, ten (10) households were randomly chosen in a freelance, thus given total households of 120. Furthermore, a well-structured questionnaire complemented with interview schedule was the instrument used for data elicitation and the data were collected during the year 2022. Analytically, in descending order, the study objectives were achieved using descriptive statistics, Alkire's multidimensional poverty index, Heckman's model, decision tree regression and exploratory factor analysis.

Model specification

1. Multidimensional poverty index (MPI): The MPI is a composite indicator of poverty that accounts for both the distribution of deprived areas and their prevalence (Table 1). The various indexes involved in MPI measurement are presented below (Sadiq and Sani, 2022):

Multidimensional headcount ratio (H): Is the proportion of persons who have been classified as multidimensionally poor, i.e. those who fall below the poverty line, and is expressed as:

$H = \frac{q(k)}{n}$ …… (1)

The number (or headcount) of multidimensionally poor persons according to parameter k is *q(k)*.

$(q(k) = \sum_{i=1}^{n} p_k(x_i, z))$ ……..(2)

The average deprivation share across the poor is defined as the intensity of poverty A, often known as the breadth of poverty. This is presented as:

$A = \sum_{i=1}^{q} c_i(k)/q(k)$ ……(3)

The percentage of the *d* indicators in which the average multidimensionally poor person is deprived is the intensity of poverty.

The measure M_0 is the so-called adjusted headcount ratio when α = 0. M_0 refers to the headcount ratio of multidimensional poverty H, poverty incidence, multiplied by poverty intensity A:

$M_0 = HA$ …… (11)

When$\alpha = 1$, the measureM_1, adjusted poverty gap, defined as the weighted average of indicator-specific poverty gaps is used. M_1 can be calculated as the product of H, A, and the average poverty gap among the poor G.

$M_1 = HAG$……(4)

$G = \sum_{i=1}^{n}\sum_{j=1}^{d} g_{ij}^{1}(k)/\sum_{i=1}^{n}\sum_{j=1}^{d} g_{ij}^{0}(k)$ ……(5)

Finally, when $\alpha = 2$, the adjusted squared poverty gap is calculated as the weighted average of the indicator-specific squared poverty gaps. M_2 can be calculated as the product of H, A, and the average squared poverty gap among the poor S, i.e. the severity of poverty.

$M_2 = HAS$ ……(6)

$S = \sum_{i=1}^{n}\sum_{j=1}^{d} g_{ij}^{2}(k)/\sum_{i=1}^{n}\sum_{j=1}^{d} g_{ij}^{0}(k)$……(7)

Seth and Alkire (2014) as reported by Sadiq and Sani (2022) suggested an additively decomposable inequality measure that is a positive multiple of "variance" and has within-group and between-group components. The inequality measure I^q employs the vector of deprivation scores of the *q* impoverished people $c_i(k)$ to quantify inequality among the poor at the national or sub-national level.

$I^q = \frac{\tilde{\beta}}{q}\sum_{i=1}^{q}[c_i(k) - A]^2$ ……(8)

To calculate the measure of inequality, the difference between each poor person's deprivation score and average intensity is squared, then the squared distances are added together and multiplied by a constant $\tilde{\beta}$. We set $\tilde{\beta}$ =1/25 since the poor's deprivation ratings vary from 1/5 to 1. This is the greatest permissible number for the inequality gauge, guaranteeing that the inequality gauge is constrained between zero and one, given the spectrum of deprivation scores. Nevertheless, a lower degree of poverty or a decline in

FULL TEXTS BOOK

poverty does not necessarily mean that every region or demographic categories have experienced an equal reduction in poverty (Sadiq and Sani, 2022).

Table 1: Dimensions and indicators of multidimensional poverty construct

Dimension	Indicator	Deprivation cut-off	Weigh t
Education	Year of schooling	No one has completed five years of schooling	1/12
	Child school enrolment	No school age child (1-6years) is attending school	1/12
Health	Health care services	No access to health care service	1/18
	Morbidity	Suffers illness	1/18
	Child mortality	Any case of a child within age 1-5 that is dead	1/18
Living standard	Electricity	No access to electricity	1/24
	Drinking water	No access to safe drinking water	1/24
	Light asset	Didn't own more than one of the following assets: radio, television, telephone, bicycle, scooter or refrigerator	1/24
	Heavy asset	Didn't own a car or truck	1/24
Environment	Sanitation	Household has no access to good toilet or improve but share with other household	1/18
	Housing	House floor made with mud, dung, clay	1/18
	Cooking fuel	Use firewood, dung, charcoal as fuel	1/18
Social connection	Autonomy	Household decision making on the use of income is not participatory	1/12
	Social capital	Member of household is not a member of cooperative	1/12
Empowerment	Social challenge	Problem of domestic violence	1/24
	Political instability	Problem of social/political unrest	1/24
	Self-defense	Problem of personal security	1/24
	Social safety net	Didn't trust government social investment prrogramme (E.g. farmers/traders monie)	1/24

2. Heckman's model: The model is composed of two dependent variables- decision (equation 10) and outcome (equation 11) variables (Sadiq *et al*., 2021; Sadiq and Sani, 2023). As a result, the model was chosen because it has the ability to adjust for sample selection bias. As presented by Sadiq et al.(2021) the model is as follow:

$Y_i = f(X_1, X_2, X_3 \ldots\ldots\ldots\ldots\ldots\ldots X_n)$ …….. (9)

$Y_{it} = \beta_0 + \beta X_{it} + \varepsilon_i$ …….. (10)

$Y_i^* = \alpha + X\beta + \gamma IMR + \varepsilon_i$…….. (11)

$Y_i^* = \alpha + X_1\beta_1 + X_2\beta_2 + X_3\beta_3 + \cdots . + X_n\beta_n + \gamma IMR + \varepsilon_i$…… (12)

Where,Y_{it} = MPI status (non-poor =0, poor = 1); Y_i* = latent observation of i[th] processor (index); $X_1 - X_n$= Explanatory variables; IMR= Inverse Mill's ratio; β_0 = Intercept;β_{1-n} = regression coefficients;

FULL TEXTS BOOK

γ= Lambda; and, ε_t = Stochastic. Predictor variables- age (years); gender (male =1, otherwise = 0); marital status (married =1, otherwise=0); education (years); farming experience (years); farm size (hectare); annual income (₦); extension contact (yes= 1, otherwise =0); membership of association (yes=1, otherwise=0); sickness (yes =1, otherwise = 0); household size (HHS) (numbers); co-operative membership (yes= 1, otherwise = 0); credit access (yes =1, otherwise =0); and, mobile phone (yes =1, otherwise =0).

Results and Discussion

Socio-economic Characteristics of Rural Households

A perusal of Table 2 shows that the study area is populated by an economic active labour force (42 years), thus a stimulus that should enable them to strive for a sustainable livelihood. Besides, given that majority of the households have education beyond first school leaving certificate (10 years) coupled with adequate farming experience (30.8 years), the rural households are expected to be rational in taking up sustainable livelihood enterprise that should ease them from the vicious cycle of poverty. Besides, the study area has a healthy labour force as evident by majority (73.3%) who reported no case of ill-health during the last production season. In other words, there is less challenge of morbidity as empirically established in the study area. This is a testimony that government and non-governmental efforts in containing killer diseases- malaria, typhoid, cholera, and meningitis have yielded positive result, thus enhancing labour productivity. However, most of the households maintained a large household size, with the tendency of a household being vulnerable to poverty except if it is composed of able-bodied men with income remittance. Besides, in the absence of augmenting assets- livestock rearing, light machinery equipment and agro-enterprise, hardly can the tiny and uneconomic holdings (2.23 hectares) maintained by most of the households contain poverty in the study. Further, gender is skewed towards the male given that gender stereotype phenomenon will not permit a woman to take the position of a primary household when she has a living husband. Therefore, given the cultural affinity on gender stereotype, women households are likely to be constrained with access to productive assets, thus easing their vulnerability to vicious cycle of poverty. Though, credit facilities is very poor (78.3%) in the study but the households have the opportunity of exploring the social capital as an economic buffer against poverty due to the engagement of majority (73.3%) in co-operative organizations. Also, most of the households have the opportunity of innovative technological and marketing tools that will buffer their livelihood given the adequate extension /advisory services among the majority (66.7%). Nevertheless, majority of the households have family responsibility to carter for, globally integrated-use mobile phone devices, relied on personal savings as income source; and take to farming and off-farm as major and minor occupations respectively.

Table 2: Socio-economic profile of rural households

Item	Frequency	Percent	Item	Frequency	Percent
Age			**Credit access**		
<=29	16	13.3	No	94	78.3
30-39	35	29.2	Yes	26	21.7
40-49	39	32.5	**Total**	**120**	**100**
50-59	21	17.5	**Co-operative memb.**		
60-69	5	4.2	No	32	26.7
70-79	4	3.3	Yes	88	73.3
Total	**120 (42.11)**	**100 [11.54]**	**Total**	**120**	**100**

FULL TEXTS BOOK

Education			**Extension contact**		
Primary	18	15	No	40	33.3
Secondary	72	60	Yes	80	66.7
Tertiary	20	16.7	**Total**	**120**	**100**
Non-Formal	10	8.3	**Marital status**		
Total	**120 (10.43)**	**100 [3.96]**	Single	14	11.7
Farming experience			Married	91	75.8
<=9	1	0.8	Widowed	14	11.7
10-19	17	14.2	Widowed	1	0.8
20-29	40	33.3	**Total**	**120**	**100**
30-39	35	29.2	**Mobile phone**		
40-49	16	13.3	No	2	1.7
50-59	9	7.5	Yes	118	98.3
60-69	2	1.7	**Total**	**120**	**100**
Total	**120 (30.83)**	**100 [11.69]**	**Income source**		
Sickness			Friends & Co-op.	5	4.2
No	88	73.3	Inheritance	41	34.2
Yes	32	26.7	Personal saving	74	61.7
Total	**120**	**100**	**Total**	**120**	**100**
Household size			**Major occupation**		
1-3	7	5.8	Civil servant	7	5.8
4-6	52	43.3	Fishing	1	0.8
>=7	61	50.8	Farming	107	89.2
Total	**120 (6.67)**	**100 [2.20]**	Trading	5	4.2
Farm size			**Total**	**120**	**100**
Marginal	3	2.5	**Minor occupation**		
Small	58	48.3	Civil servant	1	0.8
Medium	38	31.7	Fishing	1	0.8
Large	21	17.5	Farming	45	37.5
Total	**120 (2.22)**	**100 [3.38]**	Trading	42	35
Gender			Causal work	31	25.8
Female	24	20	**Total**	**120**	**100**
Male	96	80			
Total	**120**	**100**			

Source: Field survey, 2022

Note: values in ( ) and [ ] are mean and standard deviation respectively

Multidimensional Poverty Status of Households

The empirical evidence of the multidimensional poverty in the study area showed that at the threshold poverty point of 33%- deprived of two poverty dimensions out of six dimensions, 74.88% of the studied population are multidimensional poor (Table 3). Further, at the severe poverty level of 50%- deprived of three dimensions out of the six dimensions, a total of 41.63% of the study population are multidimensional poor. Moreover, at both the threshold and severe poverty levels, the poor on the average are being deprived of at least three dimensions as justified by the poverty intensity percentages of 53.02 and 60.36% respectively. Besides, 39.70 and 25.12% respectively are severely poor at the poverty threshold and severity points as indicated by the index of adjusted poverty. In other words, the

FULL TEXTS BOOK

share proportions of the total potential deprivation suffered by the poor in the society are 39.70 and 25.12% at the poverty threshold and severity levels respectively.

Furthermore, at the poverty threshold and severity points respectively, the index of the adjusted poverty gap shows that 35.18 and 16.50% of the poor are sensitive to both the number of deprivation they faced and the depth of the deprivation. Thus, if a person becomes more deprived in a particular indicator, the adjusted poverty gap will increase. Contrarily, if the shortfall from the deprivation cut-off in any of the indicators is reduced, then poverty plummets even if the person remains poor. In addition, at the poverty threshold and severity levels respectively, the index of adjusted poverty severity reveals that 17.37 and 6.79% of the poor to be sensitivity to number of deprivations they experienced, deprivation depth and deprivation inequality among them. Moreover, contribution-wise, at lower and higher poverty levels respectively, it was observed that the poor suffered more deprivation in the environment vis-à-vis 32.49 and 37.54%; then followed by empowerment - 21.94 and 22.26% (Figure 1). However, deprivation in education has the least contribution to the multidimensional poverty at both lower and higher poverty levels vis-à-vis 5.82 and 2.42% respectively. Therefore, it can be inferred that majority of the households in the study area are experiencing multidimensional poverty and are at least deprived in not less than three livelihood dimensions. Nevertheless, environmental, empowerment and standard of living dimensions need proactive intervention so as to minimizing the corrosive effect of poverty in the study area.

Table 3: Multidimensional poverty index of rural households

Index	**k= 0.33 (2D)**	**k= 0.50(3D)**
Head count	0.74875	0.41625
Adjusted	0.530152	0.603579
Gap	0.886251	0.656785
Severity	0.437612	0.27029
MPI(M_0)	0.396951	0.25124
MPG (M_1)	0.351799	0.16501
MPS(M_2)	0.173711	0.067908
Inequality	0.00045	0.00024

Source: Field survey, 2022

Table 3: Continued ……

Dimension	**Index contribution to MP**		**Percent contribution to MP**	
	k= 0.33 (2D)	**k= 0.50(3D)**	**k= 0.33 (2D)**	**k= 0.50(3D)**
Education (EDU)	0.031563	0.027083	7.951225	10.77988
Health (HLT)	0.037222	0.026667	9.377023	10.61404
Living standard (LS)	0.070042	0.042125	17.6449	16.76686
Environment (ENV)	0.112917	0.066771	28.44597	26.57656
Social connection (SC)	0.058646	0.036563	14.77406	14.55284
Empowerment (EMP)	0.086563	0.052031	21.80683	20.70981
Total	0.396951	0.25124	100	100

Source: Field survey, 2022

FULL TEXTS BOOK

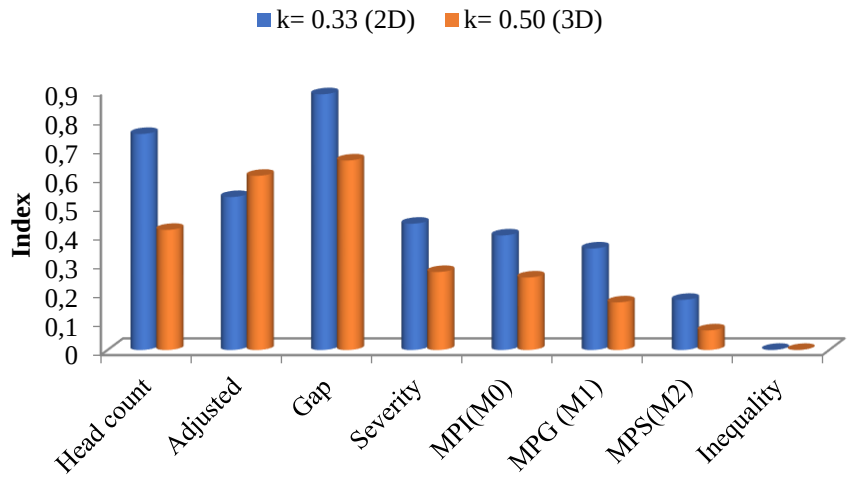


Figure 1a: MPI of rural households

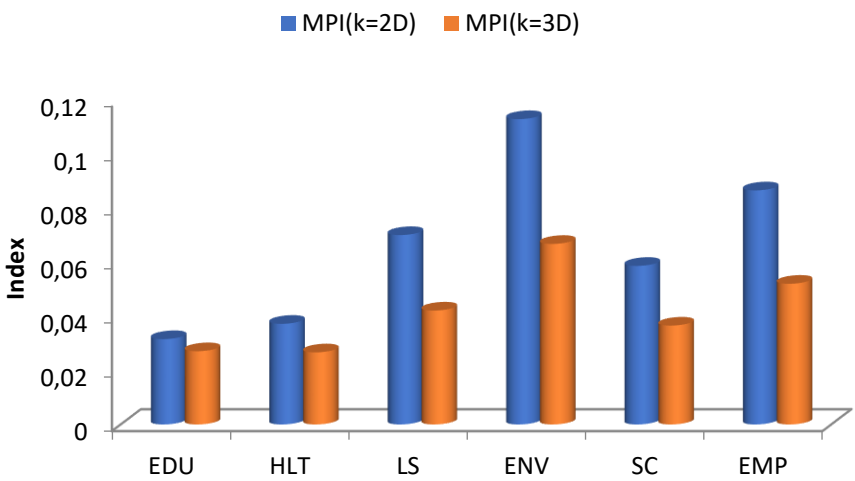


Figure 1b: Dimensions' index contribution to MPI

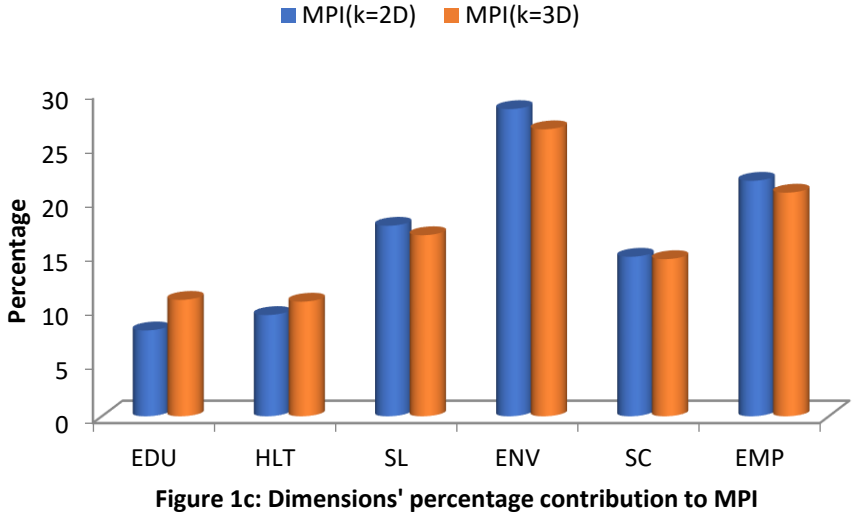


Figure 1c: Dimensions' percentage contribution to MPI

FULL TEXTS BOOK

Determinants of Multidimensional Poverty Intensity

Using the maximum likelihood Heckit, the covariates that influenced multidimensional poverty (MP) in the study area were determined (Table 4). The Wald Chi^2 being within the plausible margin of 10% probability level indicates that the chosen model is best fit for the specified equation. Besides, the equations are independent as evident by the plausibility of the LR Chi^2 at 10% degree of freedom. More so, the non-significant of the Mill's inverse ratio at 10% error gap entails that there is no problem of sample selection bias in the use of non-zero MP index; thus, the outcome model is important in discerning the covariates that determine the intensity of the MP. Nevertheless, the covariates in the outcome model have no case of inter-dependence as evident by their respective variance inflation factors (VIF) that are within the plausible threshold value of 10.0. Thus, holding on to the above diagnostic tests, it can be adjudged that the captured parameters can be used for prediction with accuracy, certainty and consistency.

The empirical evidence showed that the rural households' multidimensional poverty status is influenced by age, education, farming experience, farm size and household size; whereas, the MP intensity is subject to credit access as evident by their respective parameter estimates that are within the plausible margin of 10% error gap. Age decreases the probability of a household being multidimensional poor as evident by the negative significant of its respective coefficient. *Ceteris paribus*, increase in labour productivity which inturn stimulates income stream positively, has the tendency to enable youthful-to-middle aged households to escape the vicious cycle of poverty. However, at the peak age point- old age, this is most unlikely due to decline in labour productivity except households that are composed of able-bodied men despite having an old aged household head. Therefore, by marginal implication, a unit increase in age will decrease the probability of a rural household not to be multidimensional poor by 7.5%. Literacy decreases the probability of a household being multidimensional poor as evident by the negative significant of its respective coefficient. Literacy will enable rural households to engage in pluractivity so as to boast their income stream, thus decrease their vulnerability to poverty. Therefore, the marginal implication of a unit increase in educational achievement will decrease the tendency of a rural household to be non-multidimensional poor by 8.5%. Farm size decreases the likelihood of a household being multidimensional poor significantly. The negative relationship of the farm size suggests that economies of scale and crop diversification effects of larger farms reduce households' vulnerability to multidimensional poverty. Conversely, small-scale farmers are more exposed to multidimensional poverty owing to their deficiency in economic capital base, diseconomies of scale and marketed surplus. Thus, the marginal implication of a unit increase in a farm size will decrease the chances of a rural household to be non-multidimensional poor by 29.40%. Contrary to a prior expectation, farming experience increases the likelihood of a household to be multidimensional poor. Complacency due to previous failed innovation will affects future innovative technologies, marketing and business innovations, thus exposing households with adequate years of farming experience to multidimensional poverty. Therefore, the marginal implication of a unit increase in farming experience will increase the chances of a rural household to be multidimensional poor by 6.5%. Household size increases the probability of a household to be multidimensional poverty. The negative relationship of household size coefficient suggests that large households composed mainly of women and children will surely affect income stream due to incursion of high expenditure on food and medics; and little or no income remittance by the multiple hands from external sources, thus makes them susceptible to multidimensional poverty. Therefore, the probability of a large household being multidimensional poor for a unit increase in household size against a small household will be 14.94%. Furthermore, empirically, it was deduced that access to credit decreases intensity of multidimensional poverty significantly because credit will offer households the means to venture expansion. The inverse relationship of access to credit suggests that households that lack credit facilities are at the mercy of poor business going concern due to lack of additional business investment, thus vulnerable to multidimensional poverty. Therefore, the marginal and elasticity implications of decrease in the multidimensional poverty intensity of rural households with credit facilities against those with none will be 5.89 and 2.57% respectively.

FULL TEXTS BOOK

Table 4: MP intensity determinants of rural households

Items	Coefficient	SE	t-stat	Elasticity	VIF
Decision stage					
Constant	1.1323	0.9434	1.200^{ns}	-	-
Age	-0.0747	0.0328	2.273**	-	-
Gender	0.2832	0.3452	0.820^{ns}	-	-
Marital status	0.1330	0.3000	0.443^{ns}	-	-
Education	-0.0853	0.0329	2.590***	-	-
Farm exp.	0.0654	0.0339	1.929*	-	-
Farm size	-0.2939	0.1689	1.740*	-	-
Income	9.358e-07	6.812e-07	1.374^{ns}	-	-
Extension contact	0.0279	0.2677	0.104^{ns}		-
Sickness	-0.0302	0.2979	0.101^{ns}	-	-
Household size	-0.0497	0.0661	2.259**	-	-
Outcome stage					
Constant	0.7053	0.1005	7.016***	-	-
Co-opt. membership	-0.0143	0.0252	0.568^{ns}	-0.0195	1.055
Credit access	-0.0589	0.0262	2.249**	-0.0257	1.055
Mobile phone	-0.1325	0.1039	1.275^{ns}	-0.2380	1.008
Lambda	-0.0766	0.1297	0.590^{ns}	-	-
Rho	-0.6998				
Sigma	0.1094				
Wald Chi^2	8.64[0.034]**				

Source: Field survey, 2022

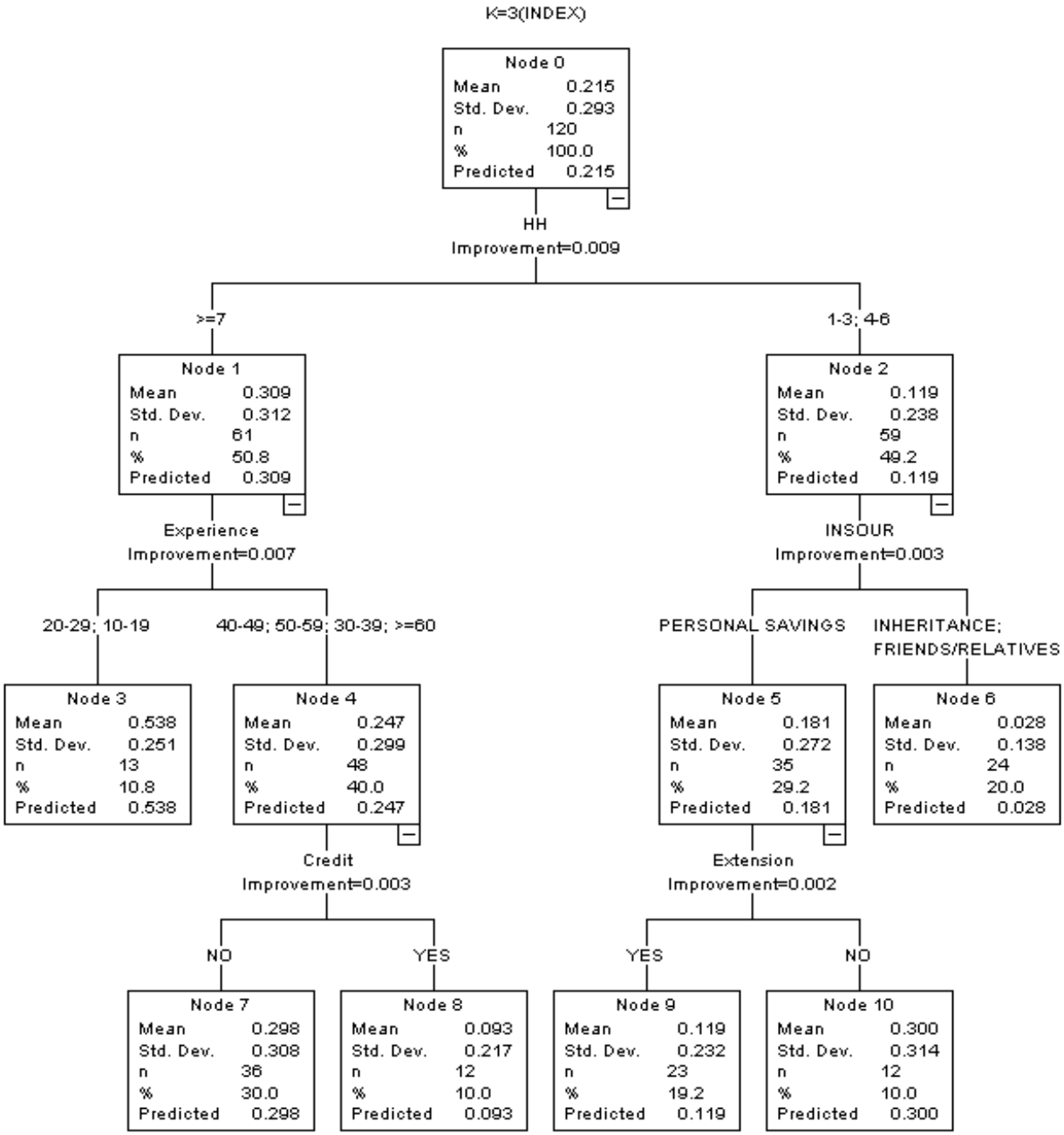
Note: Values in ( ) and [ ] are standard error and probability level respectively. ***, **, * & ns are significant at 1, 5, 10% and non-significant respectively. Threshold VIF is 10.0

Correlates of Multidimensional Poverty Intensity of Households

The model summary of the tree regression model indicated that only five out of fifteen selected predictors made significant contribution in determining intensity of multidimensional poverty, thus the automatic exclusion/ dropping of the remaining predictors (Figure 2). These significant variables are household size, farming experience, income sources, credit access and extension contact. Besides, the tree model is a simple one as it has 11 nodes, 6 terminal nodes and truncated at 3 depths. The decision rules are designed in the root (node 0), branch (nodes: 1, 2, 4 and 5) and the leaf (nodes: 3, 6, 7, 8, 9 and 10) views. Empirically, household size is the best predictor of multidimensional poverty intensity and it divides the households into two groups viz. large household size (>=7) (node 1) and merged small-medium household sizes (<= 6) (node 2). The results showed that large households will have poverty intensity of 30.9% against their counterparts (small-medium households) that will have MP intensity of 11.9%. Further, farming experience and income sources respectively happened to be the best predictors of MP intensity of large (node 1) and small-medium households (node 2). Based on farming experience, two groups were identified: households with farming experience between the ranges of 10-29 years (node 3) will have MP intensity of 53.8% while those with farming experience above 29 years (node 4) will have MP intensity of 24.7%. For the households with farming experience between 10-29 years, farming experience is the only best predictor of their MP intensity. On the basis of income sources, two groups were identified: households with personal savings as an income source (node 5) will have an MP intensity of 18.10% while those with merged inheritance and friends/relatives as income sources (node 6) will have MP intensity of 2.8%. For the households with merged inheritance and friends/relative income sources, income source is the only best predictor of their MP intensity. The MP intensity of node 5 was determined by credit access and on that basis two groups were identified: for households with no credit facilities (node 7), their MP intensity will be 29.8% while the MP intensity of

FULL TEXTS BOOK

households with credit access (node 8) will be 9.3%. The households in node 5 had extension contact to be the determinant factor of their MP intensity and it split the group into two viz. those with contact and none. For households with extension contact, their MP intensity will be 11.90% while those with no extension contact will have MP intensity of 30.0%. Nevertheless, the accuracy of the prediction based on the risk estimate of 0.061 indicates that the MP intensity prediction of 6.10% of the sampled population is wrong; i.e., the risk of misclassifying a household's MP intensity is approximately 6.10%. Thus, it can be inferred that 93.90% of the households' MP intensity were accurately predicted.



Risk estimate = 0.061 (0.007)

Figure 2: Decision tree regression of multidimensional poverty correlates of households

Note: HH= Household size; INSOURC = Income source; value in ( ) is standard error

FULL TEXTS BOOK

Poverty Coping Strategies of Rural Households

The results of the varimax rotation identified four interpretable poverty coping strategies adopted by the rural households as evident by their respective Eigen values that exceeded unity (Table 5). Besides, the R-matrix has a common factor and it's not an identity matrix as indicated by the Kaiser-Meyer-Olkin (KMO) value of 0.773 and the plausibility of Bartlett's test of Sphericity at 1% probability level, respectively. In addition, he KMO value is within the acceptable recommended threshold posited by Keiser (1974); Field (2005); Sadiq *et al*.(2017); Sadiq *et al*.(2018a&b). Further, each factor has an internal consistency in its factor loadings as evident by their respective Cronbach's Alpha test of reliability that is not less than the acceptable margin of 0.70. In social science, Nunnally (1978); Nunnally and Bernstein (1994); Prunomo and Lee (2010); Sadiq *et al*.(2017); Sadiq *et al*.(2018a&b) cited a threshold not less than 0.70 to be satisfactory. The empirical evidence showed the cumulative variance of the extracted four factors to be 60.85: wherein, the variances of factors 1, 2, 3 and 4 respectively are 28.60, 15.23, 9.81 and 7.20%.

For the extracted factors, factors loadings with absolute value less than 0.40 were dropped as rightly done by Bagheri and Fami (2016); Sadiq *et al*.(2017) and Sadiq et al.(2018a&b). Besides, in labeling a factor with two loadings, only the higher factor was considered (Sadiq et al., 2018a&b). The extracted factors adopted as poverty coping strategies by the households are labeled self-help measure, social measure, religious measure and medical measure. Factor 1, labeled self-help measure, showed rural households concern on the use of reduced frequency of eating, eat less preferred food, food purchase on credit, and seeking food assistance from friends/relatives as coping strategies against poverty. Factor 2, labeled social measure, showed rural households concern on the use of alms begging; fasting and praying; and, government social safety net as coping strategies against poverty. Factor 3, labeled religious measure, showed rural households concern on the use of aids from religious organization as a coping strategy against poverty. Factor 4, labeled medical measure, showed rural households concern on the adoption of family planning as a coping strategy against poverty.

Table 5: Coping strategies adopted by the rural households

Strategies	**F1**	**F2**	**F3**	**F4**
Reducing the frequency of eating per day	0.803			
Eating of less preferred food	0.779			
Purchase food on credit	0.846			
Seeking help from friends/relatives	0.766			
Consumption of stored produce meant for planting			-0.446	0.476
Selling off farm implement/selling assets	0.7			
Children hawking	0.479			
Engaged in non-farming activities	0.513		0.594	
Borrowing money from cooperatives	0.43			
Family planning/use of inceptives				0.807
Withdrawing children from school	0.418			
Begging for alms		0.865		
Result to fasting and prayer		0.866		
Aids from NGOs	0.42	0.465		
Aids from religious organization			0.776	
Aids from Government social intervention programme		0.809		
Eigen value	4.576	2.437	1.57	1.153
Variance %	28.598	15.234	9.812	7.204

FULL TEXTS BOOK

Cronbach's Alpha	0.837	0.736	0.702	0.746
KMO	0.773			
Bartlett's Test	0.000***			

Source: Field survey, 2022

Note: Measured on four scale continuum basis (frequently; occasionally; rarely & not used)

*** means significant at 1%

Conclusions and Recommendations

In lieu of the findings, it was hedged that the labour force of the rural population is not only production but also mentally and physically fit for any given economic task; agrarian and technological exposed, thus capable of simulating innovative challenges; globally integrated; and, possessed a potential social capital asset. Unfortunately, the rural populace is challenged with unsustainable household size, credit facility deficit, uneconomic holdings and gender stereotype. Furthermore, it was inferred that multidimensional poverty has subtly infiltrated the rural populace as households suffered deprivation in at least two livelihood dimensions. Besides, unsustainable large household size and lackluster towards livelihood enhancement innovative measures were the significant chasm of susceptibility to multidimensional poverty. However, the intensity of multidimensional poverty revolves round extension service provision in the study area. As coping strategies against poverty, measures viz. self-help, social, religious and medical were adopted in the study area. Consequently, the study recommends the need for gender mainstreaming as a measure to mitigate poverty vicious cycle among the women; and, provision of augmenting assets so as to complement the productivity of households' business turnover ratio.

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MANAGEMENT OF THE ECONOMY IN THE CONDITIONS OF RESPECTING THE PROTECTION OF THE NATURAL ENVIRONMENT AND PRIMARY HEALTH PROTECTION OF THE POPULATION AS A CARRIER OF ECONOMIC ACTIVITY

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ABSTRACT
Management of the economy in the conditions of respecting the protection of the natural environment can be connected with the existence of quality primary health care for the population. It is of great importance because the population is the carrier of economic activity in a large number of cases, even for many years. Observing the management of the economy and the primary health care of the population as the bearer of economic activities is of great importance for the functioning of the real economy. Factors that influence such an observation are the improvement and promotion of health care, the preservation of the health of the population, but also continuous cooperation with the economy of an economy. Such observation goes in the direction of team observation of all activities at the social level, but also within the interdisciplinary approach to this issue. The development of the primary health care of the population depends on other segments of society in addition to health (education, social protection, ecology, economy, etc.) and social activities (education, economic development, economy, management, etc.), which the authors pointed out in this study highlighting the connection of all the stated factors that should work in harmony in order to achieve socio-economic action.
Key words: approach, health care, youth, health.

1. INTRODUCTION

Observing the management of the economy and the primary health care of the population as a carrier of economic activities is of great importance for the functioning of the real economy, with the note that special attention must be paid to the development of socio-economic and economic relations in an economy, especially if it is an economy that wants to is rapidly developing [1-14].

There are numerous factors that can influence such an observation, such as the improvement and promotion of health care, the preservation of the health of the population, but also the continuous cooperation with the economy of an economy, however, those responsible for planning should always take into account the strength of the economy, its impact on the tertiary sector, that is, on the health system of one economy [15-22].

Such observation goes in the direction of team observation of all activities at the social level, but also within the interdisciplinary approach, which is included in the framework of the functioning of health and economic development, the health of the population as a carrier of future economic activities [23-30].

FULL TEXTS BOOK

2. DEVELOPMENT AND FLOW OF PRIMARY HEALTH CARE

Implementation and development and flow of primary health care in developing countries in figure 1-3.

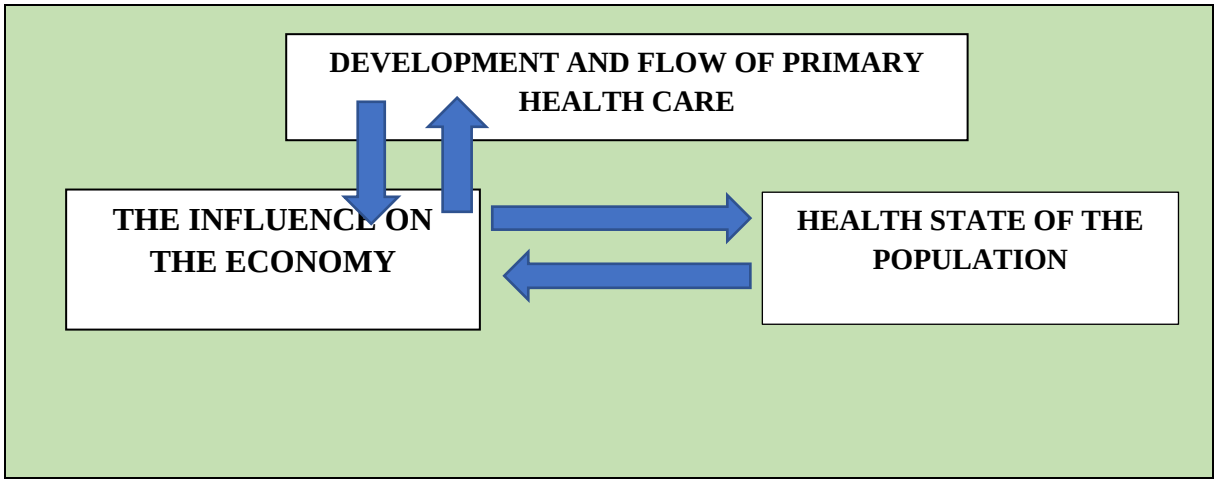


Figure 1: development and flow of primary health care

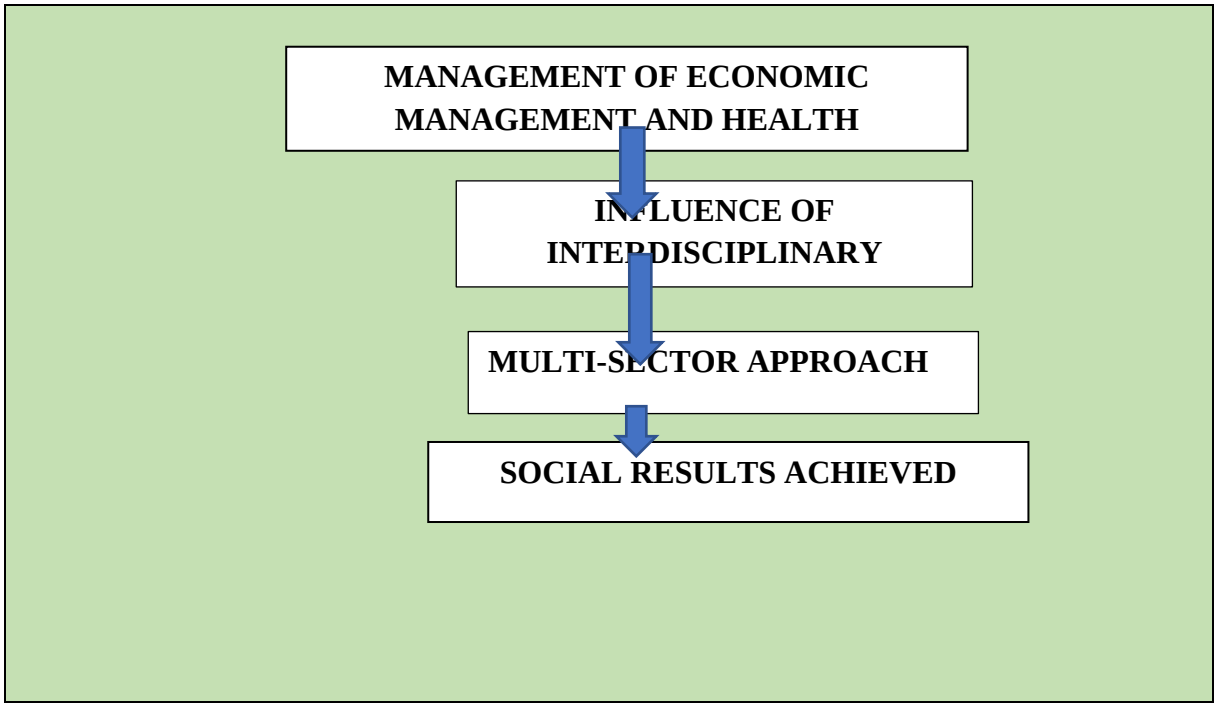


Figure 2: social results achieved

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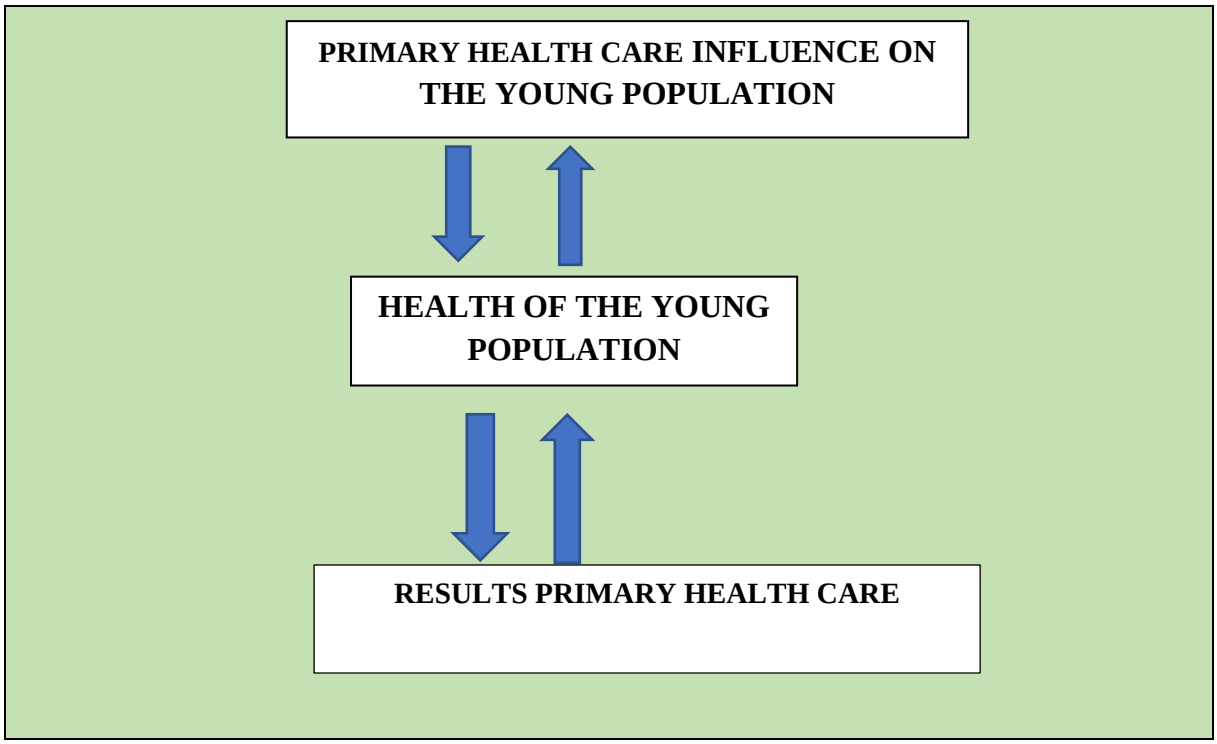


Figure 3: results primary health care

CONCLUSION

Development and flow of primary health care has a strong impact on the health of the general population in a country. This is important for the functioning of numerous legal entities in the country, especially one that strives for strong progress and development, which is impossible to achieve without a healthy population. In addition, the paper highlights the importance of interdisciplinary observation of this issue as well as the inter-sector connection of numerous subjects so that the result is positive in terms of improving the health of the general population, which the authors have highlighted in this paper and shown in figures 1-3, where the highlighting of the results is dominated such activities.

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FULL TEXTS BOOK

PRIMARY HEALTH CARE AS THE BASIS OF ECONOMISATION BETWEEN THE ECONOMY AND HEALTH AND ALL WITH THE GOAL OF IMPROVING THE HEALTH AND WORKING ABILITY OF THE BROAD POPULATION CONSIDERED IN TERMS OF ENVIRONMENTAL PROTECTION

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ABSTRACT
Primary health care as the basis of economisation between the economy and health care is a very important form of organizing economic activities. Such observation is aimed at finding the conditions for improving the health and working capacity of the broad population, which is of great importance if it is viewed in terms of environmental protection as one of the important factors of economic management.Primary health care as the basis of economizing between the economy and health, and all with the aim of improving the health and working capacity of the general population, should be interpreted as the basis of numerous activities in a country that wants to have a healthy working-age population that will be able to develop the country in the coming period. Activities on this plan are building a system of health care for workers, health care for students, health care for dental medicine, health care for geriatrics, and health care for skin and lung diseases of the general population, all with the aim of optimizing overall health as a category that is necessary for the normal development of economic activities.
Key words: approach, health care, youth, health.

3. INTRODUCTION

Primary health care should be seen as the basis of economy between the economy and healthcare, all with the aim of improving the health and working ability of the general population, which was emphasized by numerous authors in their works [1-15].
The goal of every economy is to have a healthy working-age population that will be able to develop the country in the coming period, because only a healthy working-age population can contribute to the economic and any other progress of the country [16-21].
Activities on this plan are the construction of a system of health care for workers, health care for students, health care for dental medicine, health care for geriatrics, and health care for skin and lung diseases of the general population, all with the aim of optimizing the overall health of the general population, which is observed in categories from young to the category of the population that is about to retire, and all within the radon capable population of a country [22-30].

FULL TEXTS BOOK

4. DEVELOPMENT AND FLOW OF PRIMARY HEALTH CARE

Implementation optimization of primary health care in developing countries is presented in figure 1-3.

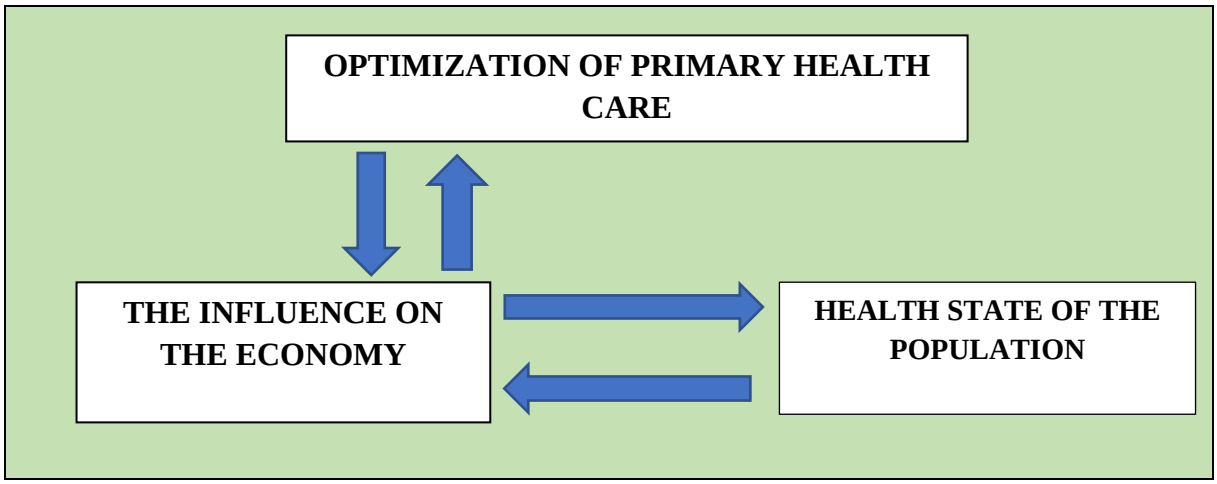


Figure 1: optimization of primary health care.

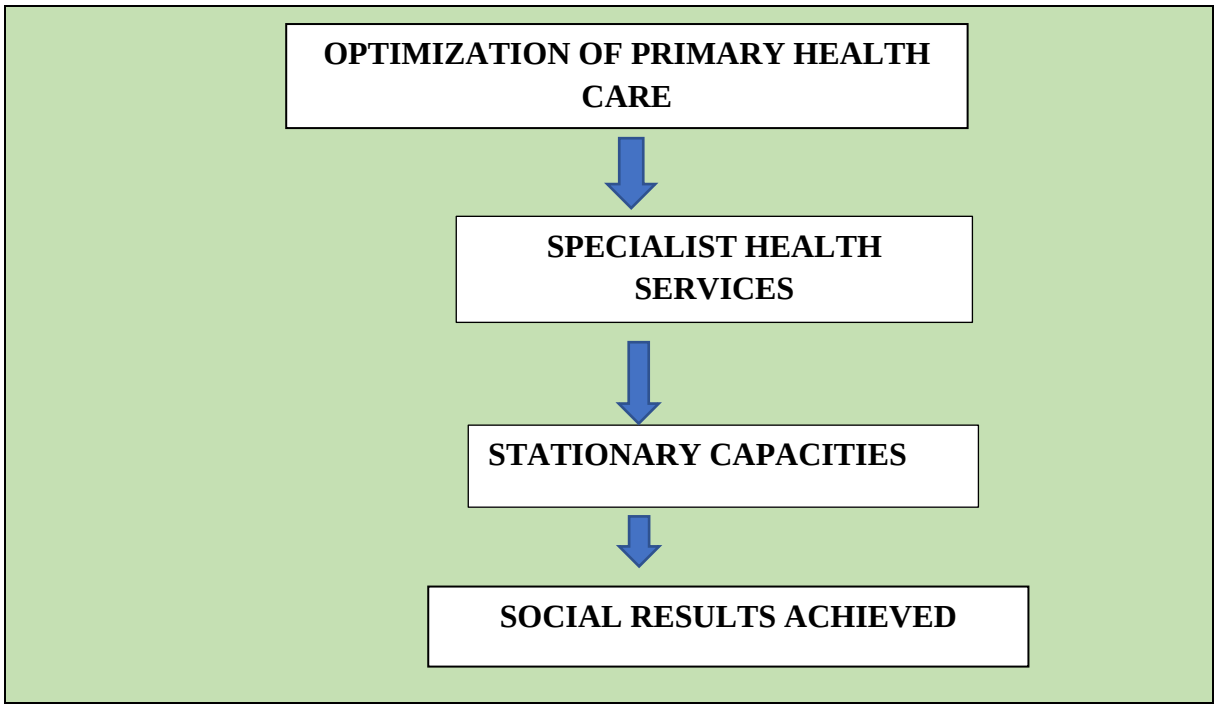


Figure 2: social results achieved and optimization of primary health care.

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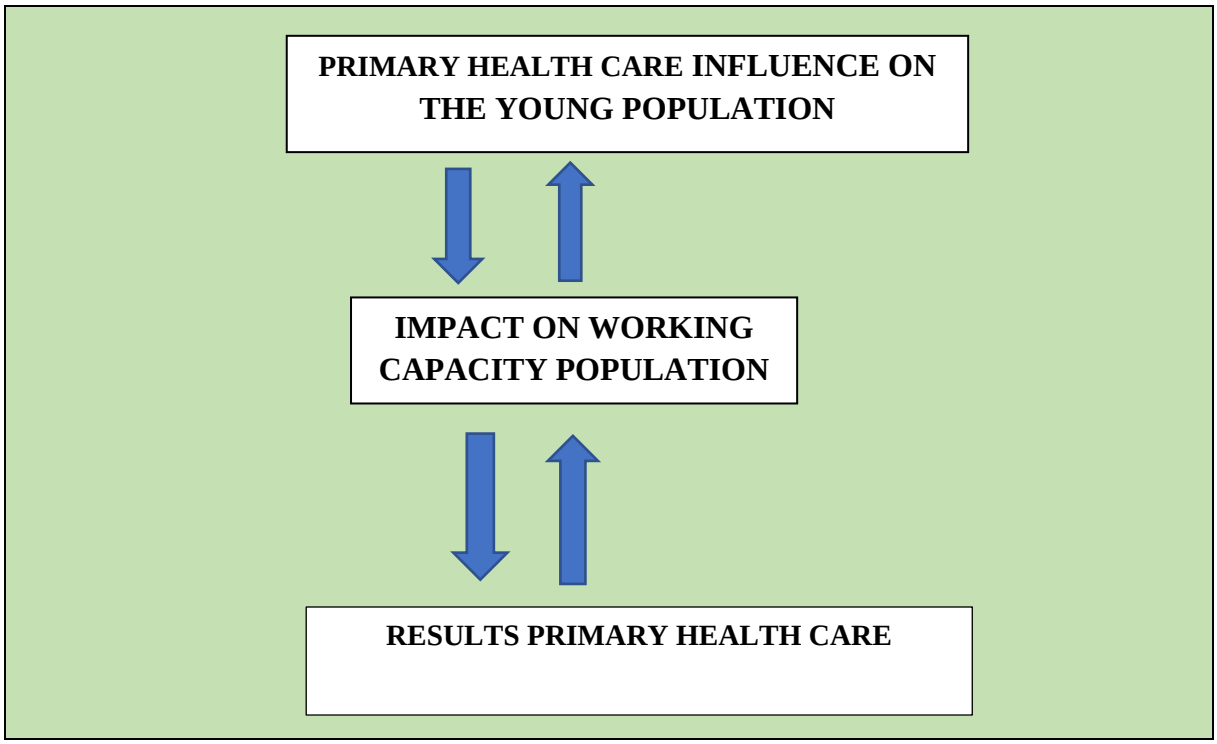


Figure 3: results primary health care and impact on working capacity population.

CONCLUSION

The paper highlights the importance of the impact of primary health care on the working-age population of an economy. This is the primary goal of any normal and realistic economy that wants to have real development. This is presented in Figures 1-3. Primary health care as the basis of economy between the economy and healthcare is the key to creating a healthy working-age population, all with the aim of improving the health and working ability of the general population, because that is the only way to establish a working-age working population, which is the result of such activities that have inter-sectoral impact, social and economic, that is, the impact on the general health of the working-age population.

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FULL TEXTS BOOK

AZERBAİJAN'S ENERGY RESOURCES AND REGIONAL DEVELOPMENT: THE ROLE OF OIL AND GAS

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ABSTRACT
This thesis examines the relationship between Azerbaijan's economy, which is based on energy resources, and regional development. By investigating the challenges and successes encountered by countries with energy resources like Azerbaijan in their regional development processes, it helps us better understand the impact of energy policies on regional economies. The aim of this thesis is to thoroughly examine the impact of Azerbaijan's energy resources, especially oil and natural gas, on regional development. In this context, the goal is to evaluate the contribution of energy resources to regional economies and to contribute to the development of regional development strategies. The objectives of the thesis can be summarized as the analysis of Azerbaijan's energy resources, the impacts of oil and natural gas on regional development, the evaluation of energy policies, the identification of successful/unsuccessful projects, and the development of recommendations for sustainable energy use. The original value of this thesis lies in its detailed examination of the relationship between Azerbaijan's energy resources and regional development, and its contribution to the broader literature on energy policies and regional development. Additionally, by presenting Azerbaijan's experiences as an example for other countries with energy resources, it holds international significance. The thesis aims to deeply investigate the impacts of Azerbaijan's energy resources on regional development using quantitative and qualitative research methods such as literature review, statistical data analysis, fieldwork, and comparative analysis.
Keywords: Energy Policies, Regional Development, Oil and Natural Gas, Azerbaijan Economy, Sustainable Energy Use

Introduction

This thesis examines the impact of Azerbaijan's energy resources, particularly oil and natural gas, on regional development. The study aims to analyze the economic and social development effects of these resources and the variations across different regions. The literature review is based on existing knowledge. Aliyev and Akgün (2019) highlight the contribution of oil agreements during Azerbaijan's economic independence process in the 1990s and the development of Baku and Absheron. Muradov (2012) compares the strategies of Germany and Azerbaijan, addressing economic development and regional inequalities. Gunton (2009) examines the role of natural resources in regional development, noting that while natural resources provide economic advantages, they pose risks if mismanaged. Sevinç (2011) evaluates the effectiveness of regional development policies in Turkey, finding that regional inequalities persist and lack of local participation creates problems. Akpınar (2013) explores the transition in Turkey's regional development policies from central authorities to local economic actors.

This thesis aims to conduct an in-depth examination of the impact of Azerbaijan's rich energy resources, especially oil and gas, on regional development. The study's purpose is to understand the role of oil and gas in regional development processes and to closely examine their effects on economic growth, social development, and regional inequalities. The objectives of the thesis include analyzing the history and current state of Azerbaijan's energy sector, investigating the impact of oil and gas on economic growth

FULL TEXTS BOOK

and regional development disparities, evaluating how oil and gas revenues affect regional inequalities, and determining the impact of energy resources on regional development policies and strategies. These objectives aim to understand the impact of Azerbaijan's energy resources on regional development and contribute to shaping future energy policies.

This thesis is designed as a research study that systematically examines the impact of Azerbaijan's energy resources, oil and gas, on regional development. The main methods of the study are document analysis, data collection, and comparative analysis. Document analysis will comprehensively review existing written sources related to energy policies, regional development theories, and Azerbaijan's energy sector based on the literature review. The data collection process will include data on Azerbaijan's energy production, economic indicators, and regional development, gathered from reliable sources. Comparative analysis aims to identify similarities, differences, and success factors by comparing Azerbaijan's energy policies and regional development strategies with international examples. This methodology aims to provide a comprehensive, knowledge-based, and critical assessment of the research.

Conceptual Framework

General Assessment of Azerbaijan's Economy and the Role of Oil in the National Economy

Since gaining independence, Azerbaijan has made significant progress in its economy compared to other countries. The presence of rich energy resources serves as one of the catalysts attracting foreign investors to the sector, thereby promoting economic growth. Economic development in Azerbaijan continues within a stable macroeconomic environment. Currently, the results of socio-economic progress in the Republic of Azerbaijan indicate that the economy is functioning steadily and showing improvements in most macroeconomic indicators. The implementation of complex structural changes in the economy and the adoption of extensive measures to enhance the competitiveness of domestic production have positively influenced the overall quality of socio-economic development.

Table 1. Azerbaijan macroeconomic indicators (mln, manat)

	2014	2015	2016	2017	2018	2019	2020	2021
GDP	59014.1	54380.0	60425.2	70337.8	80092.0	81896.2	72578.1	93203.2
population income	39472.2	41744.8	45395.1	49187.9	53103.7	56769.0	55754.1	57206.8
Average monthly nominal salary, manat	444.5	466.9	499.8	528.5	544.6	635.1	707.7	732.1
State budget revenues	18400.6	17498.0	17505.7	16516.7	22508.9	24398,5**	26077,9**	26631,7**
of GDP, %	31.2	32.2	29.0	23.5	28.1	29.8	35.9	28.6
expenses	18709.0	17784.5	17751.3	17594.5	22731.6	24425.9	26416.3	27422.4
of GDP, %	31.7	32.7	29.4	25.0	28.4	29.8	36.5	29.5
People's savings in banks	7188.4	9473.9	7448.7	7561.2	8375.4	8637.9	8177.9	9241.5

FULL TEXTS BOOK

Investments directed to the economy	21890.6	20057.4	22706.4	24462.5	25877.0	24986.6	22484.0	25313.8
Current account balance, million US dollars	10430.5	-222.5	-1363.4	1684.6	6051.1	4364.9	-227.6	8291.6

Source: State Statistics Committee of the Republic of Azerbaijan, https://www.stat.gov.az/
Macroeconomic Indicators of Azerbaijan (2014-2021)

Between 2014 and 2021, Azerbaijan experienced significant changes in its macroeconomic indicators. GDP increased from 59,014.1 million manats in 2014 to 93,203.2 million manats in 2021. Population income rose from 39,472.2 million manats to 57,206.8 million manats. The average nominal monthly wages increased from 444.5 manats to 732.1 manats. Despite fluctuations, state budget revenues rose from 22,508.9 million manats in 2018 to 26,631.7 million manats in 2021, while expenditures reached 27,422.4 million manats from 18,709.0 million manats. The public's savings in banks generally increased, rising from 7,188.4 million manats to 9,241.5 million manats. Investments peaked at 25,877.0 million manats in 2018, then fell but reached 25,313.8 million manats in 2021. The current account balance, which had a surplus of 10,430.5 million USD in 2014, recorded a deficit of 227.6 million USD in 2020, and a surplus of 8,291.6 million USD in 2021.

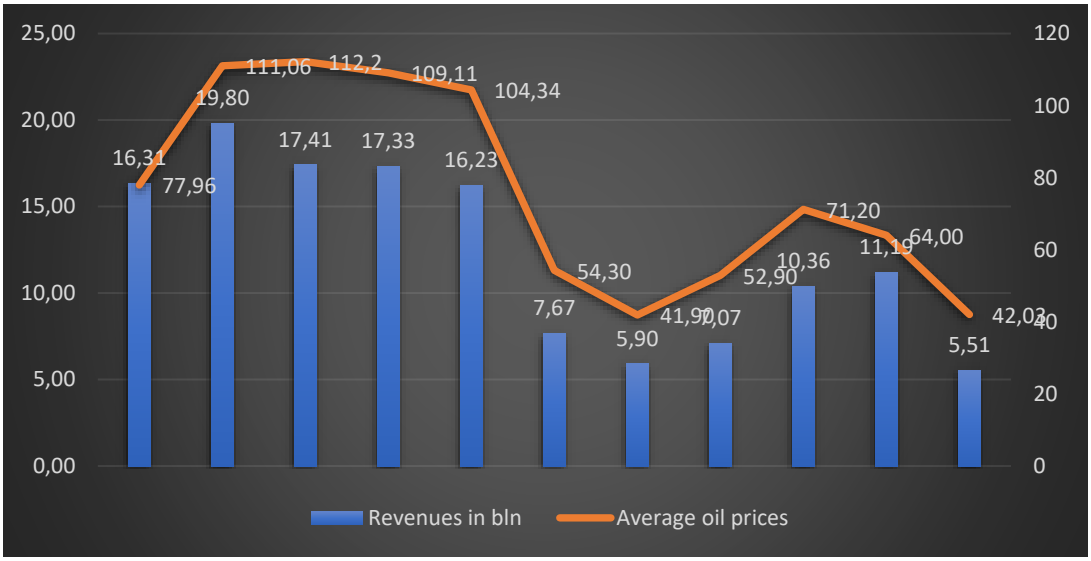
The agricultural sector plays a crucial role by contributing to food security, job creation, and economic growth. Farming and livestock support rural development, reduce unemployment, and alleviate poverty. Agricultural reforms and privatization policies have led to increases in various agricultural products. Agriculture is divided into two main categories: crop production and livestock.

The industrial sector supports economic growth, job opportunities, and technological advancement. Industrial reforms that began in 2004 contributed to the sector's growth by directing oil and gas revenues into industry. Entrepreneurship and the private sector have been supported in Azerbaijan, with a significant portion of the country's GDP coming from the private sector.

Before independence, Azerbaijan made progress in various economic sectors, including agriculture and services. However, post-independence economic collapse occurred due to factors such as trade slowdowns, the cessation of financial support from Moscow, and the transition to a market-oriented economy, causing GDP to decline until 1996. The conflict with Armenia also worsened the economic situation, leading to the displacement of nearly one million people.

FULL TEXTS BOOK

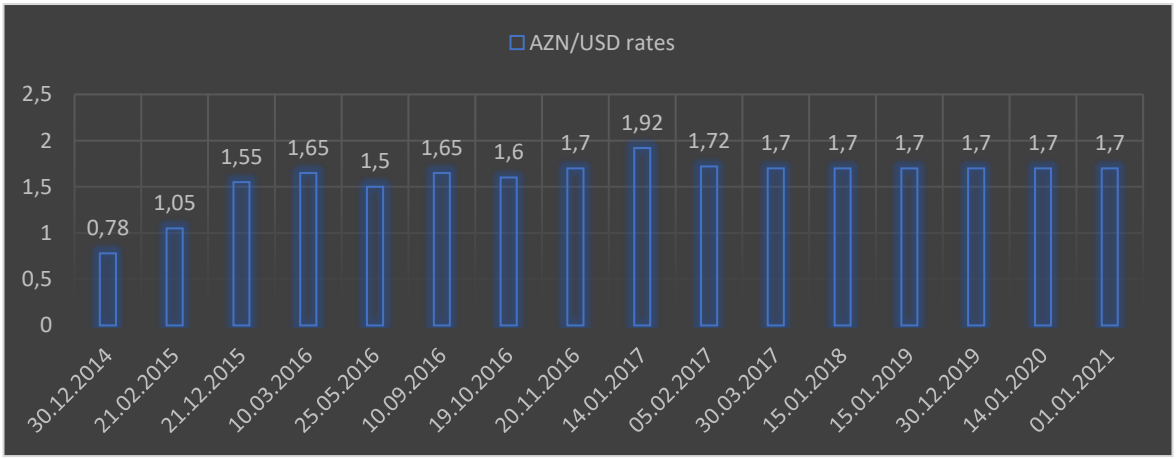
Table 1. Oil revenues (in billions of US dollars) and average oil sales price (in US dollars)



Source: State Statistics Committee of the Republic of Azerbaijan, https://www.oilfund.az/

Brent crude oil prices peaked at $112.2 per barrel in 2013 but fell to $54.3 in 2015 and further to $45.13 in January 2015. The impact of this decline on the Azerbaijani manat became apparent after February 2015. By 2016, oil prices had dropped to $41.90, and the exchange rate of the manat rose to 1.55 USD. Since 2014, global oil prices have fallen due to oversupply and decreasing demand, affecting oil exporters like Azerbaijan. The fluctuations in oil prices led to a depreciation of the manat. The State Oil Fund of Azerbaijan (SOFAZ) plays a crucial role in mitigating these effects. The increase in the exchange rate in 2016 reflects the connection between oil prices and the manat.

Table 2. Exchange rate dynamics of the Azerbaijani manat, USD/manat



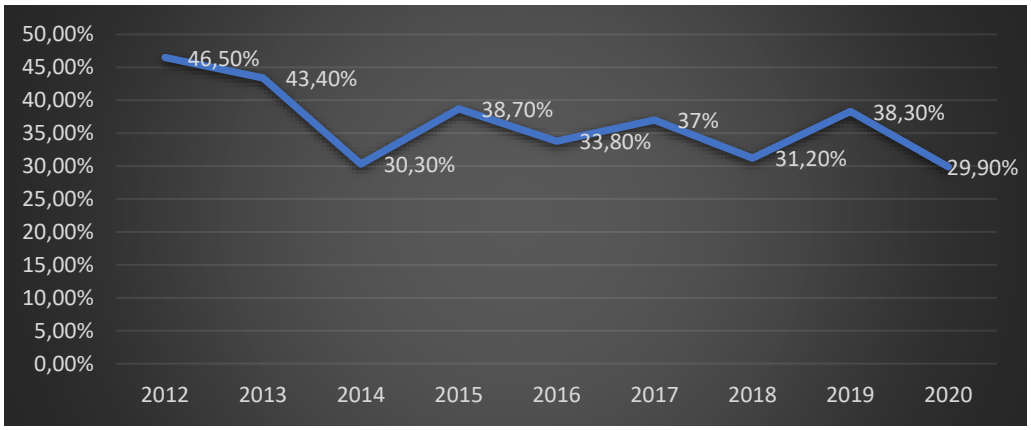
Source: State Statistics Committee of the Republic of Azerbaijan, https://www.stat.gov.az/

The decline in oil prices in 2016 affected the exchange rate of the manat in February 2017, and 1 manat became equal to 1.92 US dollars. The manat then stabilized against the US dollar at 1.70. SOFAZ supervised these measures to ensure exchange rate stability. GDP per capita in 2020 was 7,262.8 manats, down 5% compared to 2019. The IMF estimated GDP per capita in 2020 at US$14,430.9, indicating a decline of 5.4%. Nominal incomes of the population decreased by 1.8%, reaching 55,726.1 million manats, and per capita income decreased by 2.5%, reaching 5,587.6 million manats. However, the

FULL TEXTS BOOK

average monthly nominal wage increased by 11.4% to 707.3 manats. Non-oil sector spurred economic growth, accounting for 70.1% of GDP.

Table 4. Share of the oil sector in GDP



Source: State Statistics Committee of the Republic of Azerbaijan, https://www.oilfund.az/

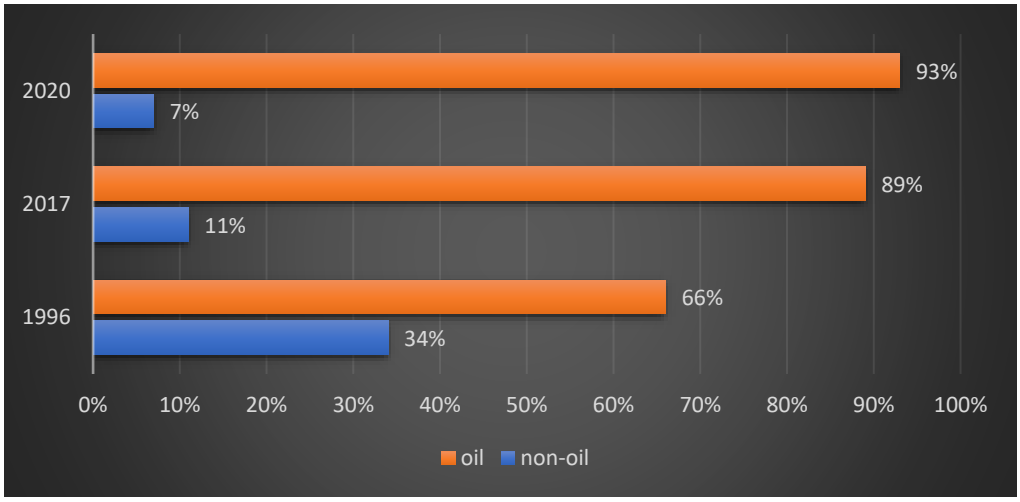
In 2020, oil revenues played a critical role in ensuring the country's fiscal stability. Specifically, transfers from the State Oil Fund of Azerbaijan (SOFAZ) to the state accounted for 12.2 billion manats, which was 49.4% of total state budget revenues. These transfer payments were not dependent on fluctuations in crude oil prices, underscoring their importance in maintaining a balanced budget. During the same period, state budget revenues were recorded at 24.6817 billion manats, while expenditures amounted to 26.4163 billion manats. Consequently, the state budget experienced a deficit equivalent to -2.4% of GDP. It is essential to note that the state budget deficit represents the difference between government revenues and expenditures, indicating that expenditures exceeded available revenues in 2020.

Azerbaijan's state budget expenditures are directed toward various key sectors and areas. Among these are defense and security expenditures, which prioritize the nation's protection and security. Additionally, there are expenditures for industry, construction, and investments aimed at promoting economic growth and development. Agriculture, forestry, and fisheries expenditures support activities in these fields, while transportation, road, and communication expenses are allocated to strengthen the country's infrastructure and connectivity. Municipal services and related expenses serve public services and utilities. The budgets of state authorities and local self-governance offices, as well as expenditures for the judiciary, security forces, and judicial offices, also fall within this scope. Social expenditures aim to improve the population's well-being and cover areas such as social welfare, education, health, and culture, prioritizing the provision of essential services and support to citizens. Lastly, the budget includes expenses related to media and sports, recognizing the importance of media outlets and sporting events in society.

In 1996, non-oil products accounted for 34% of Azerbaijan's exports, while oil products constituted 66%. By 2017, non-oil exports had decreased threefold, with oil products rising to 89%. In 2020, due to the pandemic, non-oil exports fell to 7%, while oil exports increased to 93%. This situation highlights the dependence on oil and underscores the need to diversify the economy (SSCAR, 2020).

FULL TEXTS BOOK

Tabella 5. Quota dei settori petroliferi e non petroliferi sulle esportazioni totali, 1996, 2017 e 2020



Source: State Statistics Committee of the Republic of Azerbaijan, https://www.stat.gov.az/

Policy Challenges in Azerbaijan

Azerbaijan's over-reliance on oil and natural gas resources is one of the greatest policy challenges for its economy. The oil and gas markets are constantly fluctuating, with prices changing due to geopolitical tensions, supply-demand dynamics, and other factors. These fluctuations pose risks to Azerbaijan's fiscal stability and economic performance. Therefore, investing in and diversifying non-oil sectors is crucial. Diversification can reduce sensitivity to oil price fluctuations and contribute to economic growth. In this direction, it is necessary to invest in non-oil sectors and promote innovation and entrepreneurship. Additionally, cooperation between technology and academia is important as it can foster innovation and increase the competitiveness of non-oil sectors.

The government can support the agricultural sector by providing access to credit, promoting modern agricultural techniques, and facilitating market connections. Investments aimed at increasing the competitiveness of the manufacturing sector can facilitate the export of non-oil products. Investments are also necessary for the development of tourism, including the promotion of cultural heritage and natural attractions and the simplification of visa procedures. Another important factor accompanying economic growth is the inadequate institutional structure. There are concerns regarding transparency, accountability, and the rule of law. Therefore, strengthening institutional structures and combating corruption is essential. Well-functioning institutions build confidence among domestic and international investors and encourage long-term investment.

Azerbaijan should undertake reforms in public administration, the judiciary, and anti-corruption measures. Simplifying administrative processes and digitizing services can increase transparency. Ensuring an independent and impartial judiciary system is also important. These steps can help ensure Azerbaijan's long-term economic stability by promoting economic diversity and improving the business environment.

Main Oil and Gas Agreements and Energy Balance

We will address the issue of transporting oil, the most important type of hydrocarbon from Azerbaijan, to its consumption destination. Pipelines are one of the most profitable means used for this purpose. In 1997, the first oil crossing the Azerbaijan-Russia border reached the Black Sea via the Baku-Grozny-Novorossisk Line. This line aimed to transport oil to a point where Russia could set oil prices. As part of efforts to transport Azerbaijan's oil to the global market, the Baku-Supsa Oil Pipeline, signed in 1995, became operational in 1999, was closed in 2006, but reopened in 2008. The Baku-Tbilisi-Ceyhan Oil Pipeline facilitated the transport of Azerbaijan's oil to the Mediterranean. This project made Turkey an important transit country for energy. The Baku-Ceyhan Pipeline starts from Baku, reaches Turkey via

FULL TEXTS BOOK

Georgia, and then reaches Ceyhan. This 1726 km long pipeline is a result of cooperation between Azerbaijan, Georgia, and Turkey. Oil is reliably transported through this pipeline with diameters of 42 inches and 34 inches, and a design pressure of 100 bars. The shareholders of the Baku-Tbilisi-Ceyhan Pipeline include BP Exploration (Caspian Sea) Ltd., SOCAR, Unocal BTC Pipeline Ltd., Statoil BTC Caspian Ltd., TPAO, ENI, TOTAL, Itochu Oil Exploration (Azerbaijan) Inc., INPEX, Conocophillips, and Delta-Hess (BTC) Ltd. The pipelines are at the heart of an energy corridor connecting the Caspian Sea to the Mediterranean, aiming to reduce dependence on the Middle East and strengthen the U.S. influence in this region.

Impact of Oil Revenues and Public Expenditures on the State Budget

Oil and gas sector tax revenues are crucial and form the main source of income for the budget in Azerbaijan. However, this highlights the budget's dependence on oil revenues. Managing oil revenues includes efforts to reduce the state budget's dependency on the oil sector. The State Oil Fund of Azerbaijan (SOFAZ) collects oil revenues and transfers them directly to the state. Additionally, taxes collected from companies operating in the oil sector are a significant source of income. While the proportion of tax revenues from the oil sector to total tax revenues varies, it is generally high. However, fluctuations in oil prices can affect these revenues. The changes in state budget expenditures before and after the oil boom reflect the budget's dependency on oil revenues. Especially in the post-boom period, budget expenditures increased rapidly.

The use of different energy sources in Azerbaijan plays a critical role in determining the dynamics of the country's energy sector and energy policies. This section will present a comparative analysis by examining the use of various energy sources available in Azerbaijan. This analysis aims to understand Azerbaijan's strategies for meeting energy needs and to shed light on the process of shaping future energy policies.

Table 9. Energy balance (Thousand tons of oil equivalent)

	2015	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Production	61,084.2	59977.6	57036.0	58133.4	61,724.7	60,458.3	66,202.0	66,451.8
import	308.1	628.7	2 521.6	2 019.7	302.8	278.5	307.2	2,887.8
Export	- 46,055.5	- 45 295.3	- 43 276.3	- 44 235.5	- 44,417.5	- 43,479.0	- 48,552.9	- 49,771.7
international shelters	-324.2	- 229.8	- 208.5	- 155.8	-353.9	-378.6	-460.1	-454.0
International marine sanctuaries	-51.0	- 49.2	- 45.1	- 43.8	-31.2	-32.7	-28.0	-8.2
International aviation shelters	-273.2	- 180.6	- 163.4	- 112.0	-322.7	-345.9	-432.1	-445.8
Stock changes	556.8	338.7	- 566.0	- 171.1	-170.5	-236.4	70.4	-458.5
total supply	**15,569.4**	**15419.9**	**15506.8**	**15590.7**	**17085.6**	**16642.8**	**17566.6**	**18655.4**
Own use by energy industries	**1,167.0**	**1133.0**	**1147.7**	**1085.6**	**1,128.2**	**928.7**	**940.8**	**846.8**
Casualties	**1,325.0**	**1 017.6**	**972.0**	**831.6**	**925.1**	**868.5**	**906.8**	**740.3**
final consumption	**9,110.4**	**9 462.2**	**9 361.2**	**9 894.3**	**11,348.5**	**11,264.1**	**12,053.7**	**13,297.8**
Final energy consumption	**8,242.2**	**8 613.0**	**8 258.5**	**8 653.9**	**9,549.4**	**9,453.8**	**10,041.0**	**11,019.1**
Industry and construction	**1,341.7**	**1 563.6**	**1 098.1**	**1 047.1**	**1,515.7**	**1,513.0**	**1,566.3**	**1,793.0**
iron and steel	66.6	42.6	59.9	61.4	56.5	50.5	63.2	67.2
Chemistry and petrochemistry	275.2	396.6	189.9	193.6	441.2	511.6	481.8	603.7

FULL TEXTS BOOK

non-ferrous metal	74.8	76.2	64.7	76.0	80.3	72.7	76.4	81.5
non-metallic minerals	266.0	346.3	316.9	274.9	295.7	407.5	453.1	504.0
handling equipment	9.3	2.8	1.7	1.0	0.5	0.5	0.5	0.5
Machines	43.3	39.6	31.7	27.4	35.4	32.7	31.4	53.2
Mining and quarrying	17.8	24.2	18.5	29.1	27.7	32.5	33.9	33.6
food and tobacco	392.0	400.6	221.5	172.9	305.3	187.1	213.9	221.6
Paper, pulp and printing	6.0	5.8	4.5	5.9	8.6	7.4	8.2	9.5
Wood and wooden products	3.7	2.8	4.5	2.9	3.8	4.5	3.6	3.7
Textiles and leather	12.1	19.7	21.8	23.9	27.9	20.7	24.4	21.4
Structure	**144.2**	168.0	142.2	159.8	207.5	170.2	157.1	165.9

Table 9 shows in detail the energy balance of Azerbaijan in thousand tons of oil equivalent between 2015 and 2022. This table includes various components of the country such as energy production, imports, exports, international shelters and stock changes. First, it is important to consider the balance of the table between production and consumption. The increases in production show that the country's energy production capacity is generally increasing steadily. However, differences between imports and exports may affect Azerbaijan's energy trade balance. In particular, a decrease in export figures may indicate changes in the country's foreign trade balance. Additionally, factors such as international refuges and stock changes should also be taken into account. These factors can affect the country's energy policies as well as its international relations. For example, changes in international havens may reflect Azerbaijan's role and relations in energy markets. At the bottom of the table there are details about the final energy consumption. This section includes data on energy consumption of industry, transportation, agriculture and other sectors. This data is important for understanding the impacts of different sectors on energy use.

Table 10. Production of energy products, (Thousand tons of oil equivalent)

	2015	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Crude oil (including gas condensate)	42,835.5	42,240.9	39,810.4	39,939.9	38,588.7	35,533.3	35,583.1	33,593.2
Natural gas	17,947.3	17,463.5	16,967.6	17,920.2	22,871.8	24,712.6	30,395.6	32,613.5
oil plant gas	219.0	234.5	217.1	216.8	245.4	230.9	249.5	190.8
liquefied gases	195.2	226.1	240.6	244.1	237.9	228.0	320.0	289.9
car gasoline	1,263.1	1,190.0	1,254.1	1,223.5	1,198.6	1,204.2	1,306.0	1,332.8
White petroleum jet fuel	709.8	646.7	606.2	730.2	687.2	535.3	507.1	588.8
Diesel fuel (gas oils)	2,794.9	2,289.6	1,884.2	2,189.0	2,285.7	2,222.6	2,529.2	2,234.3
Liquid fuel	329.2	404.7	239.6	108.2	128.4	62.5	107.9	79.0
naphtha	214.8	193.3	184.6	220.1	261.2	234.7	392.5	292.2
petroleum coke	192.1	155.7	171.1	184.0	179.7	148.5	193.2	158.7
petroleum bitumen	168.0	175.2	231.9	283.2	254.4	366.5	354.2	335.8
lubricating oils	24.7	9.3	37.6	50.3	34.2	35.0	56.0	43.1

FULL TEXTS BOOK

Other petroleum products	349.7	383.7	593.5	615.4	635.8	635.8	665.6	697.2
Heat energy	156.8	175.7	158.7	295.2	338.1	329.6	354.2	340.7
Electricity-Total	2,123.2	2,146.0	2,091.6	2,169.7	2,242.3	2,222.2	2,398.4	2,497.4
from him:								
SES Electricity	140.8	168.5	150.2	152.0	134.6	92.0	109.8	137.2
Wind power	0.4	2.0	1.9	7.1	9.1	8.3	7.9	7.2
solar energy	0.4	3.0	3.2	3.4	3.8	4.0	4.8	5.2
Electricity obtained from burning waste	15.6	15.0	14.6	13.9	16.8	17.2	16.6	17.7
Wood	81.4	33.4	36.4	35.6	33.7	23.2	20.0	15.4

The table shows Azerbaijan's production of energy products between 2015-2022. While crude oil production decreased, natural gas production increased. Among petroleum-derived products, the production of car gasoline generally increased, while diesel fuel was stable. Electricity production has increased, especially the amount of electricity obtained from renewable sources has increased every year.

Table 11. Total energy supply

	2015	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Crude oil (including gas condensate), thousand tonnes	6,578.1	6,053.6	5,928.5	6,178.4	6,245.6	5,967.4	6,690.0	6,357.0
Natural gas, million cubic meters	11,414.8	11,193.7	10,872.1	11,076.1	12,554.6	12,664.4	13,125.9	13,943.9
SES's electricity, million kWh	1,637.5	1,959.3	1,746.4	1,768.0	1,564.8	1069.5	1277.3	1595.7
Wind electricity, million kWh	4.6	22.8	22.1	82.7	105.4	96.1	91.4	83.3
Solar energy, million kWh	4.6	35.3	37.2	39.3	44.2	47.0	55.2	60.9
Natural bitumen and natural asphalt, thousand tons	7.1	1.0	1.6	1.1	1.4	1.3	1.4	1.6
Liquefied gases, thousand tonnes	-19.1	-35.4	-48.7	-52.7	-3.2	8.0	-3.3	-1.5
Car gasoline, thousand tons	91.3	111.4	92.1	112.0	195.8	11.8	150.7	264.6
White petroleum type jet engine fuel, thousand tons	-493.3	-395.9	-257.0	-347.5	-366.4	-386.8	-396.5	-419.0
Other types of white oil, thousand tonnes	13.5	14.6	2.5	22.5	4.4	17.0	0.0	4.3
Diesel fuel (kerosene), thousand tons	-1,640.6	-1,278.9	-617.4	-707.9	-787.1	-895.7	-1,117.9	-521.7

FULL TEXTS BOOK

Fuel oil, thousand tons	84.3	281.5	102.6	-64.2	-49.2	-2.8	64.8	-70.1
Naphtha, thousand tons	13.9	3.9	-6.0	-5.3	-13.5	76.0	18.1	-12.5
Petroleum coke, thousand tons	-254.7	-204.6	-224.1	-238.2	-235.2	-192.6	-253.7	-206.6
Petroleum bitumen, thousand tons	3.0	-4.6	11.5	-12.1	-16.9	-118.6	-176.1	-82.8
Lubricants, thousand tons	20.8	26.0	11.8	-2.0	28.3	22.4	9.2	42.3
Other petroleum products, thousand tons	5.4	15.2	-0.1	-	0.6	-2.4	5.5	57.9
Electricity, million kWh	-157.5	-981.1	-1,174.7	-1,314.0	-1,354.0	-1014.2	-1521.8	-2860.3
Firewood, thousand tons	163.9	68.7	71.9	70.7	65.6	46.8	43.5	31.9
Other fuel types, thousand tonnes	12.5	7.0	6.4	12.3	22.9	22.0	20.1	30.6

Table 11 shows Azerbaijan's energy supply for 2015-2022 in detail. There are changes in crude oil and natural gas production: While crude oil decreased, natural gas increased. In renewable energy, solar and wind energy production increased. Among petroleum derivatives, while there is an increase in car gasoline, there are decreases in some products. Azerbaijan's energy portfolio and consumption trends vary on a seasonal and resource basis.

Method

One method used in the thesis studies involves a qualitative approach to evaluate the impact of Azerbaijan's oil industry on regional development. This method involves conducting an in-depth analysis to understand the regional economic, social and environmental impacts of the industry using previous studies, reports and similar sources. Previous studies and reports provide information in this field by examining the impacts of Azerbaijan's oil industry on regional development. Based on these data, researchers use qualitative analysis techniques to evaluate the oil industry's contribution to regional economic growth, employment, infrastructure development, and other impacts on society.

Qualitative methods include a variety of techniques to understand individuals' experiences, attitudes, and perceptions. These techniques include focus groups, interviews, and content analysis. Researchers conduct in-depth analysis of the views and experiences of local people, businesses and public institutions in the region about the impacts of the oil industry. These interviews and analyzes provide an important perspective for understanding the oil industry's impacts on regional development. Qualitative methods can also be used to examine social and environmental changes in the region. Researchers can use these methods to understand the impact of the oil industry on social dynamics and environmental impacts on local society. For example, they may address issues such as the oil industry's impact on water resources or transformations in the local economy.

Regional Inequalities and Resource Allocation

An important condition for sustainable and balanced development in the country is to ensure the same level of overall social and economic development of the country, its population and the impact of all its regions. The territory of Azerbaijan seems to be divided into two different regions according to the level of social-economic development and economic potential: In the first region, the city of Baku, which constitutes only 7% of the country's total area and where up to 30% of the population lives, and the Absheron peninsula, which has approximately 75% of the economic potential. -80 of them were

FULL TEXTS BOOK

collected. In the other region, economic activity is lower in the regions that cover 93% of the remaining area of the country and 70% of the population, only 20-25% of the country's economy is shaped.

In 2019, the total production volume across the country was 88.9 billion manats. Most of this production fell on Baku and Absheron. For example, the amount produced in Baku accounts for 68.9%, while the shares in the remaining regions are lower. This inequality also causes differences in per capita income and basic services between regions. For example, per capita income in Baku is quite high compared to other regions.

This inequality in the regional development of the country is based on many factors such as economic-geographical location, natural conditions and resources, settlement level of the population, area and land structure. While State Programs address these differences in terms of regional development, measures such as land and agricultural reforms have also been taken. However, factors such as the problems experienced in occupied regions and the centralization of the economy pose significant challenges for regional development.

In order to solve these inequalities, regional development strategies and investments need to be distributed in a balanced manner. Additionally, attracting business and domestic and foreign investors and strengthening state-private sector cooperation can play an important role in reducing differences between regions. However, more effort and coordination is required for this process to be successful.

Regional development in the context of the main directions of the strategic road map for the development perspective of the country's economy

Sustainable, competitive and diversified development of the country's regions is one of the priority regional policies of the state. The long-term economic policy initiated by Heydar Aliyev has created favorable conditions for macroeconomic stability and continuous development. This policy has led to the emergence of a large entrepreneurial class and an increased role of the private sector in economic and social development. Significant successes have been achieved in the integration of the country into the international economic system, and economic reforms have been developed with modern approaches compatible with international economic challenges. However, new economic conditions and international processes show that the decline in oil revenues and the complex macroeconomic environment have a negative impact on the country's development. Responding to these challenges and minimizing the impact of the oil crisis are key priorities. In addition, a comprehensive assessment of the current economic situation and the development of an economic development strategy suitable for the post-oil era are priorities to ensure the continuity of economic and regional policies and reforms. The adopted Strategic Road Maps will create conditions for sustainable economic development of the country. These roadmaps will strengthen the country's position in the international economic environment with goals such as attracting investment, creating a competitive environment, providing access to international markets and developing human capital in response to international economic challenges.

In order to improve the economic environment in the regions, small and medium-sized entrepreneurship should be encouraged in the post-oil era. The development of small and medium-sized entrepreneurship is important to increase its impact in the national economy, expand access to global markets and increase the efficiency of the labor market. To achieve these goals, strategic steps should be taken such as developing the normative-legal framework, increasing access to financial resources and creating cooperation environments. Additionally, new policies and regulations need to be implemented for the development of the agricultural sector in the regions. Accelerating the production and processing of agricultural products will lead to new developments in the socio-economic life of the regions and contribute to their continuous development.

State programs on regional socio-economic development, their features and results

The government's regional socio-economic development policies may differ in several ways:

FULL TEXTS BOOK

Equalization of Regional Development Policy: This policy aims to eliminate or balance inequalities between regions. In Azerbaijan, socio-economic development programs for the mentioned regions fall into this category.

Focused Development Policy: This policy focuses on priority development of certain regions. For example, Gabala and Khachmaz regions have been highlighted for tourism development. Steps have also been taken towards its transformation into industrial hubs through the creation of industrial zones, for example, the establishment of industrial zones in Masalli, Sabirabad and Neftchala.

Synergy Policy: This policy aims to synchronize development and promote cooperation and coordination between regions.

Differentiated Policy: This policy envisages the establishment of special economic zones or clusters in different regions.

Changing Existing Administrative Mechanisms: More effective mechanisms need to be created to eliminate socio-economic inequality between regions and ensure balanced development. The establishment of regional clusters stands out as an effective mechanism based on global experience.

For the success of these policy approaches, a cluster approach in which businesses, suppliers, industries and supporting institutions specialized in specific geographical regions work collaboratively is important. State programs and strategies implemented in Azerbaijan in recent years have focused on eliminating inequality between regions and ensuring balanced development.

Results

This comprehensive research, conducted in the context of Azerbaijan's energy resources and regional development, examines in detail the effects of the country's energy sector on regional development. It is emphasized that the oil and gas industry, with its economic potential concentrated especially in the city of Baku and the Absheron peninsula, accentuates regional inequalities in the country and causes imbalances in resource allocation. This thesis reveals the economic and social differences between Azerbaijan's territories, making it clear that economic concentration, especially in the city of Baku and the Absheron peninsula, leaves other regions behind. This situation shows that the overall development of the country must be sustainable and balanced.

In the section where the impacts of the oil and gas industry are examined, the differences in production, income distribution and basic capital investments between different economic regions of the country are analyzed in detail. In this context, the advantages of economic activity in the Baku-Absheron region compared to other regions are emphasized.

In addition, it is revealed that differences between regions in per capita gross domestic product, population income and other economic indicators are an important determinant in terms of socio-economic development levels. This analysis particularly reveals the dramatic gap between the city of Baku and other regions. The research evaluates in detail the differences experienced by the country's various economic regions in terms of energy, industry, banking and basic capital investments and provides numerical data showing the inequalities between these regions. These data reveal how great an economic weight the Baku-Absheron region has, especially when compared to other regions.

In addition, another important point emphasized by the thesis is that Azerbaijan's successes in the energy sector are achieved by the implementation of strategic state programs for regional development and economic growth. It is stated that the "Socio-Economic Development State Programs of the Regions of the Republic of Azerbaijan" between 2004 and 2013 and subsequent programs caused significant increases in the general economic indicators of the country. These programs aim to focus on non-oil sectors and reduce inequalities between regions, particularly by balancing the effects of the oil-based economy.

As a result, this thesis on Azerbaijan's energy resources and regional development reveals that the country's achievements in the energy sector and the strategic state programs implemented accordingly play an important role in regional development and economic growth. However, more efforts are

FULL TEXTS BOOK

required to eliminate the inequalities created by the oil-based economy and ensure sustainable development.

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FULL TEXTS BOOK

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FULL TEXTS BOOK

INSECTICIDAL AND TOXICITY STUDIES OF HELIOTROPIUM INDICUM LEAF EXTRACTS

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ABSTRACT

The leaf extracts of *Heliotropium indicum* obtained by sequential extraction method in hexane, ethyl acetate, methanol and water were screened for insecticidal activity on the weevils of rice, sorghum, maize and cowpea at different extract concentrations of 0.01 g/ml, 0.02 g/ml, 0.04 g/ml and 0.08 g/ml and exposure time of 24-96 h. This cage experiment was performed in triplicate and the number of dead weevils were counted and recorded each day for four days. Following phytochemical analysis of the extracts, a toxicology study was conducted on the extracts using Wistar rats. The serum liver and kidney function tests were carried out through enzyme function tests after repeated administration of the extracts. The parameter assessed were the biochemical, hematological, and histopathological functions. The control group had serum ALT, AST and ALP levels of 39.6, 93.55, and 93.55 IU/L, whereas, group 2 had 47.07, 112.17, and 34.13 IU/L enzyme levels, respectively. Moreover, the group 3 enzyme levels were 31.99, 107.57, and 23.34 IU/L, while the fourth group had 36.00, 101.48, and 35.15 IU/L, respectively. Renal function tests revealed that the serum creatinine level was 0.43 mg/dL, whereas; the uric acid and BUN urea levels were 0.14 µmol/L and 0.23 µmol/L, respectively. Similarly, compared with those of the control group, the haematological test of the rat groups showed consistent leukocyte and reticulocyte levels. The liver and kidney were assayed by histopathology, and the results showed no noticeable alteration in the architectural integrity of the investigated tissues, except for minor lesions in the livers of group 2 rats. The study established the scientific rationale for the use of *Heliotropium indicum* as safe biopesticides to control stored grain insect pests.

Keywords: *Heliotropium indicum*;Insecticidal; Haematological; Histopathological

Introductıon

Plants often enhance their survival by possessing toxic properties that protect them from predators. Such toxicity has led to research on the biochemistry and physiology of numerous plant species, which have revealed active ingredients with potential clinical applications. Many of the over 200,000 known plant species use toxins as a defense mechanism against natural enemies in different parts such as leaves, stems or roots. However, these same toxic components can pose risks to human health affecting various systems like skin, lungs, liver, kidneys ,bladder, bone, neurology and cardiovascular system. A particular example is *Heliotropium indicum* L., a plant belonging to Boraginaceae family commonly referred by other names among Nigerian communities such as "Agogo igun" for Yoruba people while Hausa community called it "Kalkashin korama". Studies have been conducted on leaf extracts from *H.indicum* on insect pests of stored grains and also analyzing its toxic effects on Wistar rat kidney and liver. This plant is widely distributed tropical & non-tropical herbaceous flora (Jose and Adesina,2014). The plant has been reported by Sarkar *et al*., (2021) and Chunthorng-Orn *et al*.,(2016) as having a long traditional use for various ailments, such as bone fractures, wounds, fevers, eye infections, menstrual irregularities, nerve disorders and kidney problems. *Heliotropium indicum* hails from certain areas of Africa and multiple tropical Asian nations. It is a perennial or annual herb according to Rahman *et al*., (2011) reaching 15 to 50 cm high when it grows. *H.indicum* L. contains various chemical compounds including pyrrolizidine alkaloids, tannins, saponins, indicacine-N-oxide and heliotrine. These alkaloids give the plant anti-inflammatory, antibacterial properties that could potentially aid in wound healing or stimulate menstruation if taken over several days. The use of *H.indicum* extracts has been known to treat a range of conditions including abscesses, skin lesions and ulcers; it has also shown notable antitumor efficacy without causing liver damage when indole-N-oxide is present. However there have been instances where hepatotoxicity was observed among people with leukemia despite no apparent cause for its toxicity (Rahman *et al*., 2011; Ashidi and Lawal, 2017). Thus, this study investigates the

FULL TEXTS BOOK

insecticidal and toxicological effects from the leaf extracts of Heliotropium indicum for controling insect pests of stored grains

Objectives:
The objectives of this study were to:
i. Extract bioactive constituents from the leaf of *H.indicum*,
ii. Determine the insecticidal activity of the leaf extracts on weevils of stored grains
iii. Conduct biochemical, hematological and histopathological tests on the rats tissues upon administration of the leaf extracts of *Heliotropium indicum*

Materials and methods
To remove dust and foreign materials, the freshly collected leaves were washed under running tap water before being drained on shelves in a well-ventilated shaded area for two weeks to prevent degradation of volatile compounds. Following this, they were pounded with mortar and pestle into a coarse powder which was stored separately in an airtight polythene bag prior to solvent extraction.

Preparation of crude extracts
Following the method of Ncube et al., (2008) with slight modification, about 416 g coarse powder of *H.indicum* was mixed with 1248 mL n-hexane (1:3 w/v) in a stopper glass container for 72 h while occasionally shaking it. Subsequently, it was decanted and filtered through Whatman No.4 filter paper. After that, the damp solid hexane residue left was air-dried resulting in 408 g. The process was repeated for ethyl acetate, methanol and water to obtain their respective crude extracts (Goselle *et al*.,.2017)

Phytochemical Screening
The crude leaf extracts of *H.indicum* L., were subjected to phytochemical screening using the methods outlined in Marjoka *et al*.,(2016) and Samatha *et al*., (2012) to detect the presence of secondary such as alkaloids, saponins, flavonoids, steroids, terpenoids ,cardiac glycosides tannins and phenols.

Insect culturing procedures
The grain weevils were cultured on their substrates: rice, sorghum, maize and cowpea by first cleaning the substrates and disinfected them in a deep freezer before being taken out to equilibrate. Ten pairs of adult *Sitophilus species* and *Callosobruchus maculatus* were then introduced into kilner jars containing 20 g of each substrate which was held tightly with muslin clothes on raised platforms within trays filled with oil covering their entire surface. The cultures were kept separate in insect cages for offspring emergence while regular recycling was done to ensure sufficient supply of insects at mean temperature/relative humidity levels.

Insecticidal activity test
The method of Asawalam et al., (2006)., was used for the determination of mortality. About twenty grams (20 g) of clean uninfected grains were weighed into a l L kilner jar. Then, an aliquot of 0.01 g/mL, 0.02 g/mL, 0.04 g/mL and 0.08 g/mL of hexane, ethyl acetate and methanol leaf extracts of *H. indicum* were measured with the aid of a micropipette and mixed with the 20 g of clean substrates inside the kilner jars. The mixture was thoroughly mixed together by gently shaking the kilner jars. The jars were left open for 40 mins to allow the solvents to evaporate. Thereafter, ten copulating pairs (10 males:10 females) of less than 4 days-old adult *S. oryzae, S.granarius. S.zeamais*, and *C. maculatus* were introduced to each of the kilner jars and covered with muslin clothes. Each treatment was replicated three (3) times, and data on percentage adult mortality was obtained after 24 - 96 h post-treatment.

$$\% \text{ mortality} = \frac{\text{Number of dead insect}}{\text{Total insect infestation}} \times 100 \quad (1)$$

Animal Diet and Administration of Extracts
Twenty Wistar rats (n=20) were acclimatized for a week by feeding them with a standard rat diet and tap water before the commencement of the experiment. They were housed in plastic cages with good ventilation and were randomly separated into four groups of five rats each: group 1 as the control, group 2 received hexane extract, group 3 received ethyl acetate extract and group 4 received methanol extract.

FULL TEXTS BOOK

The animal procedures were approved by NILAR (National Institute of Laboratory Animal Resources)(US), Committee on Care, Use of Laboratory Animals, and National Institutes of Health (US). Division of Research Resources (1985). Guide for the Care and Use of Laboratory Animals,National Academics, 87 in accordance with the guidelines of the Animal Research Report of In Vivo Experiments (ARRIVE) guidelines for use of Experimental Animals. Group1 continued on their normal everyday rat diet, while groups 2 - 4 had both regular food and water along with measured amounts of respective extracts every three days for twenty-one days until completion, while monitoring weight changes weekly throughout this period.

Animal treatments and experimental design

During the experiment, *H. indicum* extracts were administered orally to rats in groups 2, 3, and 4 for duration of twenty-one days in various concentrations (100 mg/kg body weight up to161 mg/kg body weight). The toxicological effects were monitored through analyses on blood samples as well as liver and kidney tissue. Haematological, and biochemical analyses were conducted along with histopathology that aimed at analyzing the levels of toxicity between these three distinct extract groups used during administration, while control group received the vehicle (DMSO) over the course of this period after which all animals involved in this study were sacrificed for analysis.

Physiological parameters

Throughout the study, various physiological parameters were measured on a weekly basis, including weight of the rats in each group. Additionally, behavioral and physical characteristics such as food and water intake patterns, sleep quality and frequency of cuddling or running around were monitored to identify any deviations from normal rat behavior- along with observations regarding coat appearance or fecal condition for assessing cleanliness levels overall.

Animal sample collection for analysis

Before being sacrificed, every animal was given a thorough dose of chloroform in order to make them fully anesthetized. To expose the posterior vene cava and internal organs, laparotomy was promptly performed on each deceased rats. Roughly eight samples were then obtained for analysis of histopathological and biochemical parameters; this involved removing liver and kidney tissues that underwent 10% formalin preservation specifically for such testing purposes.

Biochemical function tests

The measurement of serum enzyme activity was conducted using readily available kits, in accordance with the manufacturer's instructions. Assessments for liver function included determining the levels of serum alanine aminotransaminase (ALT), aspartate aminotransferase (AST), and alkaline phosphatase (ALP); while parameters such as creatinine, uric acid and urea levels were used to measure renal function

Haematological tests

In accordance with OECD 423 and 407 test guidelines, the protocols for this investigation adhered to the Guidelines for Care and Use of Laboratory Chemicals. The experiment utilized male Wistar rats (*Rattus norvegicus*) totaling twenty in number. To determine hematological parameters including red blood cell (RBC) count, white blood cell (WBC) count, hemoglobin concentration (HB), packed cell volume (PCV), capillary tube microhematocrit method was used to measure PCV whereas RBCs and WBCs were manually counted using a modified Neubauer counting chamber. Shali's procedure evaluated HB levels, while manual differential counts using Leishman stain assessed leukocytes types such as eosinophils, basophils lymphocytes monocytes neutrophils which were then categorized based on percentage rates under microscopic observation.

Histopathological examinations

After harvesting, the livers and kidneys of rats were immersed in 10% formalin for two days to fix them. An automatic tissue processor was employed to embed the samples within paraffin wax after dehydrating using an ethanol gradient (70%, 80%, 90%, and 100%) with each step lasting for 90 mins. Xylene cleansing procedures were repeated twice over a period of two hours (2 h) before infiltration by

FULL TEXTS BOOK

paraffin wax which also took about four hours (4 h) total duration. Rotary microtome was used to cut sections measuring five micrometers apart from one another, while utilizing Hematoxylin & Eosin staining as described by Oduah *et al*., (2010), followed by subsequent imaging under light microscopy equipped with a camera in line with the guidance of Suresh et al., (2020).

Statistical analysis

The information collected underwent statistical analysis through SPSS one-way analysis of variance (ANOVA) for triplicate measurements, with significance being evaluated at a level of P≤0.05. The mean±SEM was utilized to determine significant variances between the control group and three experimental groups in various results such as cumulative weight performance.

Results and discussion

Phytochemical screening

Table i shows the secondary metabolites detected in the leaf extracts of *H.indicum*.

Table i: Phytochemical screening of three extracts of *H.inducm* leaves

Phytochemical	Observation		
	HE	EE	ME
Tannin	+	+	+
Saponin	-	-	+
Alkaloids	-	+	++
Cardiac Glyco	+	-	+
Teroenoids	+	+	+
Flavonoids	-	+	++
Steroids	+	+	++
Phenols	+	+	+

- = absent + = present in trace amount, ++ =present

HE= hexane extract, EE= ethyl acetate extract, and ME= methanol extract

Insecticidal activity of *Heliotropium indicum* extracts

Tables ii-v show the insecticidal activity of *Heliotropium indicum* leaf extracts on *Sitophilus species* and *Callosobruchus maculatus*.

Table ii: Effects of leaf extract of *H.indicum L* on mortality of *Sitophilus oryzae* (rice weevils)

Extract	**Substrate**	**Conc. (g/mL)**	**Mortality (Mean±SE)**			
			24 h	48 h	72 h	96 h
Hexane	Rice	0.01	0.0±0.00	5.0±0.00	10.0±0.00	15.0±0.00
		0.02	0.0±0.00	5.0±0.00	10.0±0.00	20.0±0.00
		0.04	0.0±0.00	1.7±1.67	5.0±2.89	23.3±6.01
		0.08	1.7±1.67	5.0±0.00	16.7±1.67	36.7±1.67
EA		0.01	0.0±0.00	0.0±0.00	3.3±1.67	10.0±2.89
		0.02	0.0±0.00	0.0±0.00	6.7±1.67	15.0±2.89
		0.04	0.0±0.00	3.3±1.67	10.0±2.89	20.0±2.89
		0.08	6.7±1.67	15.0±2.89	31.7±4.41	50.7±6.67
MeOH		0.01	0.0±0.00	5.0±0.00	10.0±0.00	18.3±1.67
		0.02	6.7±1.67	11.7±1.67	21.7±1.67	38.3±3.33
		0.04	8.3±1.67	13.3±1.67	28.3±1.67	46.7±1.67
		0.08	10.0±0.00	20.0±0.00	33.3±1.67	63.3±1.67
Control		0.00	0.0±0.00	0.0±0.00	0.0±0.00	0.0±0.00
Cypermet		0.5 ml	68.0±4.41	76.7±6.67	96.7±3.33	100.0±0.0

Values are expressed as the mean ± SEM at the P<0.05 level of significance

Table iii: Effects of leaf extract of *H.indicum L* on mortality of *Sitophilus granarius* (sorgum weevils)

FULL TEXTS BOOK

Extract	Substrate	Conc. (g/mL)	Mortality (Mean±SE)			
			24 h	48 h	72 h	96 h
Hexane	Sorghum	0.01	0.0±0.00	0.0±0.00	0.0±1.67	1.7±1.67
		0.02	0.0±0.00	0.0±0.00	2.0±2.00	10.0±2.89
		0.04	0.0±0.00	0.0±0.00	3.3±1.67	13.3±1.67
		0.08	0.0±0.00	1.7±1.67	11.7±1.67	30.0±2.89
EA		0.01	0.0±0.00	0.0±0.00	1.7±1.67	8.3±3.33
		0.02	0.0±0.00	3.3±1.67	8.3±4.41	15.0±5.77
		0.04	1.7±1.67	5.0±2.89	11.7±4.41	23.3±3.33
		0.08	5.0±0.00	10.0±0.00	20.0±2.89	43.3±4.41
MeOH		0.01	3.3±3.33	10.0±2.89	18.3±4.41	35.0±2.89
		0.02	6.7±3.33	13.3±4.41	23.3±3.33	40.0±2.89
		0.04	6.7±1.67	23.3±4.41	35.0±8.67	60.0±8.66
		0.08	13.3±1.67	31.7±1.67	53.3±3.33	90.0±2.89
Control		0.00	0.0±0.00	0.0±0.00	0.0±0.00	0.0±0.00
Cypermet		0.5 ml	68.0±4.41	76.7±6.67	96.7±3.33	100.0±0.0

Values are expressed as the mean ± SEM at the P<0.05 level of significance

Table iv: Effects of leaf extract of *H.indicum L* on mortality of *Sitophilus zeamais* (maize weevils)

Extract	Substrate	Conc. (g/mL)	Mortality (Mean±SE)			
			24 h	48 h	72 h	96 h
Hexane	Maize	0.01	0.0±0.00	8.3±1.67	18.3±1.67	41.7±8.82
		0.02	0.0±0.00	10.0±2.89	25.0±2.89	55.0±2.89
		0.04	1.7±1.67	13.3±1.67	30.0±2.89	60.0±2.89
		0.08	8.3±1.67	20.0±2.89	36.7±1.67	71.7±3.33
EA		0.01	0.0±0.00	5.0±0.00	10.0±0.00	16.7±1.67
		0.02	0.0±0.00	5.0±0.00	13.3±1.67	23.3±4.41
		0.04	3.3±1.67	13.3±3.33	21.7±4.41	36.7±7.26
		0.08	13.3±1.67	35.0±2.89	58.3±3.33	90.0±2.89
MeOH		0.01	0.0±0.00	0.0±0.00	15.0±0.00	55.0±11.54
		0.02	0.0±0.00	5.0±0.00	21.7±1.67	76.7±4.41
		0.04	3.3±1.67	13.3±1.67	36.7±3.33	91.7±6.01
		0.08	11.7±1.67	26.7±4.41	50.0±5.00	96.7±1.67
Control		0.00	0.0±0.00	0.0±0.00	0.0±0.00	0.0±0.00
Cypermet		0.5 ml	68.0±4.41	76.7±6.67	96.7±3.33	100.0±0.0

Values are expressed as the mean ± SEM at the P<0.05 level of significance

Table v: Effects of leaf extract of *H.indicum L* on mortality of *Callosobruchus maculatus* (cowpea weevils)

Extract	Substrate	Conc. (g/mL)	Mortality (Mean±SE)			
			24 h	48 h	72 h	96 h
Hexane	Cowpea	0.01	0.0±0.00	3.3±1.67	11.7±6.01	28.3±9.28
		0.02	1.7±1.67	8.3±1.67	18.3±4.41	40.0±5.00
		0.04	3.3±1.67	6.7±3.33	15.0±0.00	46.7±1.67
		0.08	3.3±1.67	10.0±2.89	31.7±3.33	66.7±6.01
EA		0.01	1.7±1.67	6.7±1.67	13.3±1.67	23.3±4.41

FULL TEXTS BOOK

	0.02	1.7±1.67	6.7±1.67	15.0±2.89	30.0±5.01
	0.04	6.7±1.67	18.3±3.33	36.7±4.41	60.0±5.77
	0.08	11.7±1.67	35.0±2.89	61.7±1.67	93.3±1.67
MeOH	0.01	0.0±0.00	5.0±2.89	16.7±7.26	28.3±8.82
	0.02	5.0±0.00	16.7±1.67	33.3±4.41	56.7±6.01
	0.04	3.3±1.67	10.7±1.67	28.3±1.67	76.7±4.41
	0.08	5.0±2.89	18.3±6.01	31.7±7.26	96.7±1.67
Control	0.00	0.0±0.00	0.0±0.00	0.0±0.00	0.0±0.00
Cypermet	0.5 ml	68.0±4.41	76.7±6.67	96.7±3.33	100.0±0.0

Values are expressed as the mean ± SEM at the P<0.05 level of significance

Cummulative Weight

The rats' average body weight was measured over a period of 28 days as depicted in Fig.i. The cumulative weight was calculated by subtracting the initial arrival weight from their final pre-sacrifice weight following an overnight fast, and dividing by two.

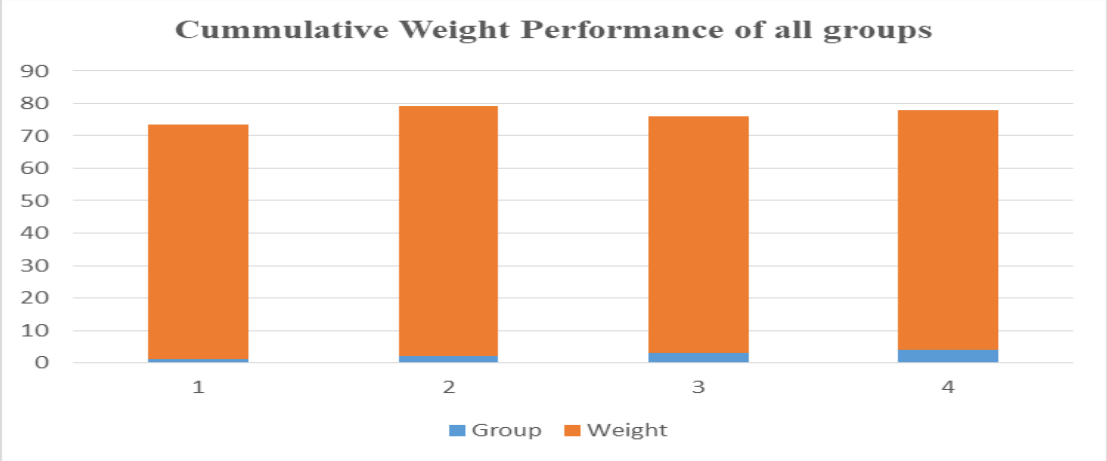


Fig. i: Cumulative weight performance of rats administered leaf extracts of *Heliotropium indicum*

Biochemical functions

Figures ii-iv demonstrate the acute toxicity of *H.indicum* L leaf extracts on Wistar rats, as determined through a cage experiment (measured in IU/L).

Liver function test

Alanine aminotransaminase (ALT)

Fig.ii shows the serum ALT levels of Wistar rats given *H.indicum* L extracts .

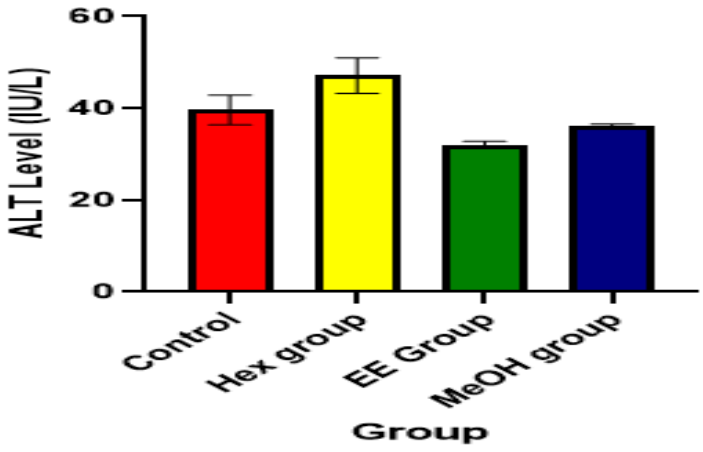


Fig.ii: Serum ALT levels in the liver of *H.indicum*-treated rats

FULL TEXTS BOOK

Aspartate aminotransferase (AST)
Fig.iii shows the serum AST levels of Wistar rats administered extracts of *Heliotropium indicum* L.

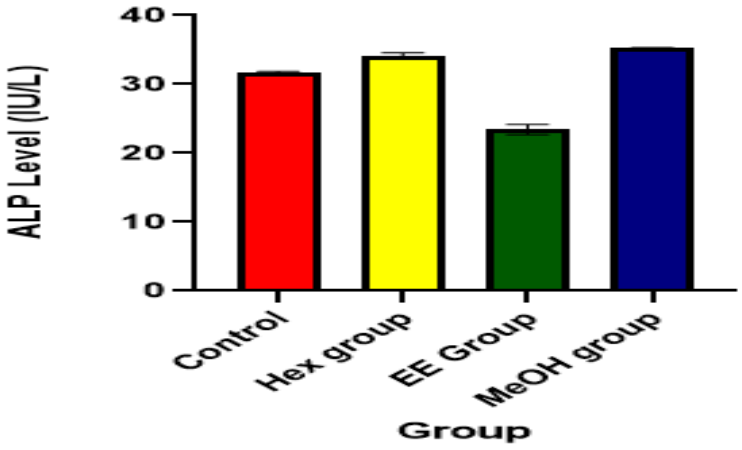


Fig.iii: Serum AST levels in the livers of rats administered leaf extract of *H.indicum*

Alkaline phosphatase (ALP)
Fig.iv shows the serum ALP levels in Wistar rats administered extracts of *Heliotropium indicum* L

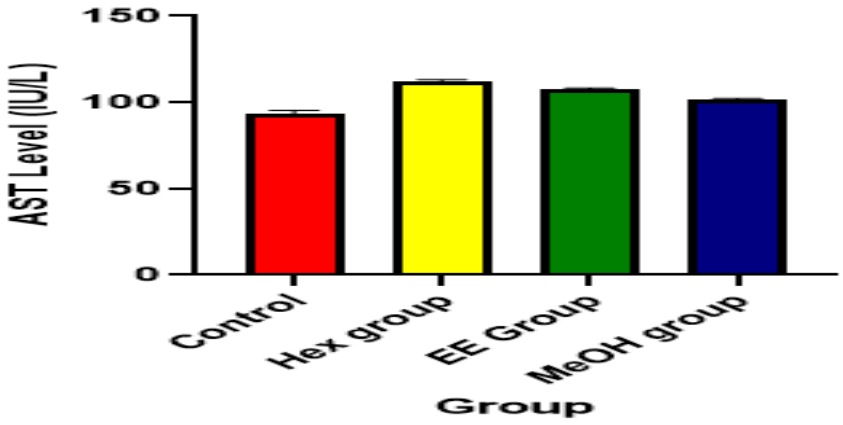


Fig.iv: Effect of serum ALP levels in the livers of rats administered leaf extract of *Heliotropium indicum*

Renal function assessment
Table vi shows the indicators of kidney function in Wistar albino rats that were given leaf extracts from *H.indicum* L.

Table vi: Effect of leaf extracts of *H.indicum* on the Renal function of Wistar rats

Group	**Mean ± SEM**		
	Creatinine	Uric Acid	Urea
1	0.4±0.01[a]	0.1±0.00[a]	0.2 ±0.00[a]
2	0.4±0.00[a]	0.1±0.00[a]	0.2±0.00[a]
3	0.5±0.01[a]	0.1±0.00[a]	0.2±0.00[a]
4	0.4±0.00[a]	0.1±0.00[a]	0.2±0.00[a]

FULL TEXTS BOOK

The values are expressed as the mean ± SEM at the P<0.05 level of significance
1= control, 2= hexane extract group, 3=ethyl acetate extract group, 4= methanol extract group

Haematological findings

Tables vii and viii depict the haematological parameters observed in rats treated with *H.indicum* leaf extracts.

The leukocyte levels in the plasma of experimental rats are displayed in Table vii, while Table viii shows the reticulocyte counts of the experimental rats.

Table vii: **Leukocyte counts of Wistar rats administered *H.indicum* leaf extract**

Group	N	Leukocytes % (Mean±SEM)					
		WBC X10^9/L	NEUT	LYM	EOS	BAS	MONO
1	5	8.2±1.33^a	29.6±1.28^a	69.2±1.59^a	0.40±0.24^a	0.40±0.24^a	0.40±0.24^a
2	5	7.5±1.20^a	29.4±0.81^a	70.0±0.70^a	0.20±0.20^a	0.00±0.00^a	0.40±0.24^a
3	5	9.4±0.84^a	30.2±1.28^a	69.4±1.03^a	0.00±0.00^a	0.20±0.20^a	0.60±0.24^a
4	5	10.3±1.06^a	29.2±1.71^a	71.4±1.36^a	0.20±0.20^a	0.00±0.00^a	0.00±0.00^a

The values are expressed as the mean ± SEM

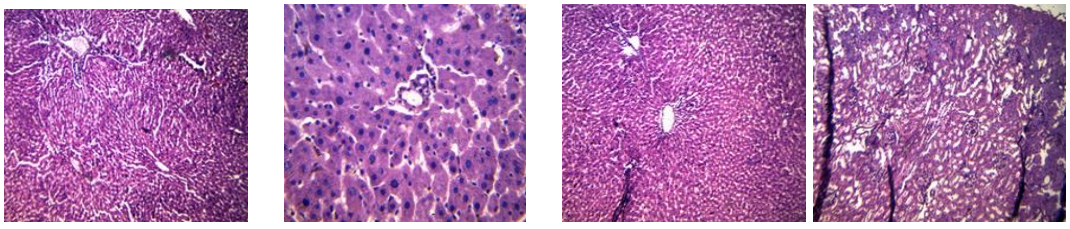
Table viii: **Reticulocyte counts in Wistar rats administered *Heliotropium indicum* leaf extract**

Group	N	Reticulocytes (Mean±SEM)					
		PVC%	RBC Million cells/mcL	HB (g/dl)	MCV (fl)	MCH(Pg)	MCHC (g/dl)
1	5	39.4± 1.44^a	6.7±0.27^a	13.8± 0.29^a	59.2±0.50^a	19.7±0.16^a	33.3±0.04^a
2	5	44.0± 1.52^a	7.4±0.24^a	14.7±0.50^a	59.8±0.11^a	19.9±0.02^a	33.4±0.08^a
3	5	41.8± 3.22^a	7.0±0.37^a	13.9±0.73^a	60.0±0.11^a	20.0±0.05^a	33.3±0.02^a
4	5	39.6± 2.41^a	6.4±0.32^a	13.1±0.47^a	61.8±1.56^a	20.4±0.43$_a$	33.0±0.15^a

The values are expressed as the mean±SEM at the P<0.05 level of significance

Histopathological findings

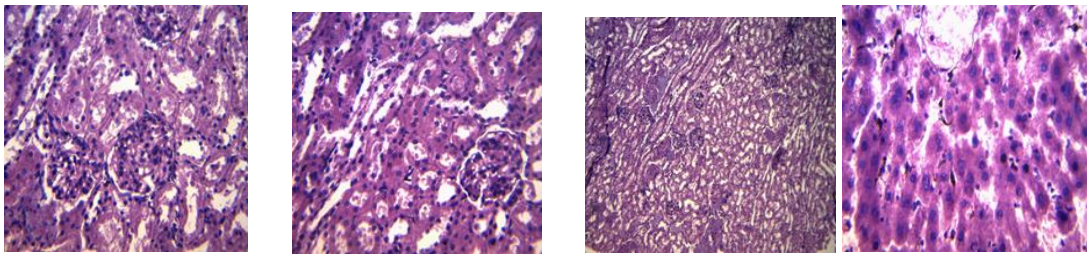
Plates (i) and (ii) show the histopathological results for the livers and kidneys of the experimental rats



1L$_1$ **2L$_2$** **3L$_3$** **4L$_4$**

Plate i: Histopathology of livers of *H.indicum*-treated rats

FULL TEXTS BOOK



$1K_1$ **$2K_2$** **$3K_3$** **$4K_4$**

Plate ii: Histopathology of kidneys of *H.indicum* –treated rats

Discussion

Phytochemical analysis

Table i illustrates that *H.indicum* leaf extracts contain various phytochemicals including alkaloids, tannins, saponins, cardiac glycosides, terpenoids and phenols. These types of chemicals are known to cause toxic effects in plants. The plant has been traditionally used for wound healing purposes in folk medicine due to the presence of compounds like tannins which have shown wound-healing properties (Shoge *et al*., 2011).

Insecticidal activity

The leaf extracts of *H.indicum* L., exhibit insecticidal activities and can serve as biopesticides for controlling stored grain pests. Table ii displays the mortality percentage of *Sitophilus oryzae* after being exposed to different extract concentrations, with hexane causing a 36% mortality rate, while ethyl acetate and methanol caused higher rates at 50.3% and 63.3%, respectively, after exposure for 96 h at a concentration of 0 .08 g/ml; however, the lowest mortality rate was observed in hexane-exposed insects measured 24 h postexposure (1.7%). Similarly observed is that Table iii illustrates how Sorghum weevils respond differently when given various doses: Hexane induces just about 30% mortality on it, but both Ethyl acetate's and methanol's caused around 43-90 % mortality levels within tested insects and within 24 – 96 h postexposure. Table vi revealed that hexane extract at 0.08 g/ml inflicted 71.7% mortality on *Sitophilus zeamai s*(maize weevil) 96 h postexposure.; whereas at the same concentration and exposure time, ethyl acetate and methanol extracts caused 90% and 96.7% mortality on maize weevil and the lowest mortality of 1.7% was caused by hexane extract. Also, Table v showed that hexane extract caused 66.7% mortality on *Callosobruchus maculatus* (cowpea weevil) at 0.08 g/ml 96 h post exposure, while ethyl acetate and methanol extract caused 93.3%, and 96.7%, respectively at the same concentration and exposure time. But hexane and ethyl acetate caused the least mortality of 1.7 % at 0.01 g/ml and 0.02 g/ml 24 h post exposure.

The result thus far showed that ethyl acetate and methanol extracts had a high degree of insecticidal activities similar to cypermethrin. The ability of these extracts to cause mortality can be attributed to contact effect of the extracts on the weevils. Lajide *et al.,* (1998) had also reported the effectiveness of some plant powders in controlling *Sitophilus zeamais* by using insect adult mortality. *H.indicum* extracts caused high mortality to *Sitophilus zeamais* and *C. maculatus* suggesting that all the extracts have toxic effects on the insects. Cypermethrin has been very effective in controlling adult *S. zeamais* and *C. maculatus* which agrees with Asawalam *et a*l., (2006) who reported 100% mortality to *Sitophilus zeamais* when treated with Cypermethrin stored maize. *H.indicum* may have been potent because of the presence of toxic substances which may have disrupted the normal respiratory activities of the weevils; resulting in asphyxiation and subsequent death. Results obtained from this study demonstrated active potentials of this plant product as plant-derived insecticides against stored grains' weevils, and provide a scientific rationale for the use of this botanical as alternative to synthetic insecticides in post harvest protection of stored grains

Cumulative weight

Figure (i) shows the rats' weight performance, which increased cumulatively across all groups. However, no notable statistical difference ($P \leq 0.05$) was observed between the experimental groups that received *H.indicum* extracts and the control group. As time passed with repeated extract administrations, an increase in animal weight occurred within each group.

FULL TEXTS BOOK

Biochemical functions

The ALT, AST, and ALP enzyme biomarkers were utilized to track the soundness and harm of liver construction by a serum called "ALT". These techniques are useful in diagnosing clinical instances of liver toxicity (Andreu et al., .1998) Fig.(ii-iv) showed the impact of *H.indicum* extracts on serum alanine amino transferase (ALT), aspartate amino transferase (AST), alkaline phosphatase (ALP) levels. The ALT levels of the control group, shown in Fig. ii, were 39.6±3.23 IU/L while groups 2-4 had ALT levels of 47.07±3.89, 31.99±0.75 and 36.00±0.51. There was no significant difference (P≤0.05) between any experimental group's ALT levels compared to that of a control sample, though the rats administered with hexane extract displayed an elevated but insignificant increase above normal range. In terms of mean values across all samples tested - including both controls and those from experimental groups, there was no much variation observed.

The serum AST levels in the three test groups were compared with those in the control group. Fig. iii shows that the serum AST level in the control group was 93.55±1.77, while groups 2, 3 and 4 had AST levels of 112.17±0.99, 107.57±0.57, and 101.48±0.69 IU/L, respectively. The administration of the extracts of *H.indicum* leaves did not significantly ($p< 0.05$) increase the AST levels compared with those in the control group, although a slight increase in the AST level was observed in group 2 compared with that in the control group. However, there was no significant difference in the AST levels between the experimental groups and the control group.

In Fig.(iv), the average levels of ALP enzymes in three groups of rats are displayed and compared to those in a control group. The serum concentration for ALP was 31.66±0.16 IU/L among the control group, while groups 2,3, and 4 had concentrations of 34.13±0.45 IU/L, 23..34±0.75 IU /L , and 35.15±0.11 IU/L, respectively. A minor decrease was observed (P≤0.05) within group 3 rats given ethyl acetate extract. However, no significant difference existed between the three groups and control group at (P≤0.05).

The liver, kidney, red blood cells (RBCs), pancreas and biliary ducts of the heart are the primary sources for these enzymes. To diagnose whether injuries have occurred in organs like the liver or kidneys, serum AST and ALT levels are taken into account. Studies have shown that when body tissue is damaged, it leads to an increased release of alanine transaminase (ALT) and aspartate transferase (AST) into bloodstream resulting in higher serum enzyme count directly correlating with greater tissue damage (Ammari *et al*., 2023). The ALP test can determine if bile ducts blockage has happened, while also checking for disorders tied to bone condition or any kind of internal harm inflicted on one's liver. Increased amounts of ALP is observed to circulate around the plasma once their organ tissues experience some form of trauma, such as bile-duct obstruction in the intrahepatic cholestasis level due to infestation from infiltrative diseases related, specifically linked back mainly towards those located inside the livers themselves(Ammari *et al*., 2023).

Kidney function

Table v showed the parameters utilized in determining renal function. In the Table, the mean creatinine level for the control group is 43.9±0.01 µmo/L, while group 2 had mean level of 42.4±0.00 µmo/L, group 3 had a value of 44.6±0.01 µmo/L, and group 4 had 43.8±0.00 µmo/L; and no notable significant difference was observed between the three groups compared to the control group. Creatine phosphate produces creatinine that is then excreted by kidneys via blood circulation. An upsurge in bloodstream's level of creatinine indicates abnormal kidney functionality as nearly two percent (2%) creatine is converted into creatinine everyday (Harita *et al*., 2009).

Table v also showed the uric acid levels for groups 2, 3, 4 and the control group. It can be observed that the mean uric acid level for group 2, 3 and 4 are 0.14±0.00 µmol/L, 0.11±0.00 µmol/L and 0.14±0.00 µmol/L in comparison to the control group with a level of about 0.12±0.00 µmol/L The findings indicated that there was no significant difference in uric acid levels within the experimental groups compared to the control (P≤0.05). It is important to note that elevated circulating serum uric acid has been linked closely with renal disease as well as hypertension (Harita *et al*., 2009).

Also, Table v revealed the mean urea level of 22.3±0.00 mg/dL for group 2, while group 3 and group 4 had mean urea level of 24.4±0.00 mg/dL, 23.1±0.00 mg/dl. On the other hand, the control group urea level was 23.1±0.00 mg/dL. Urea is transported from liver cells through arteries towards renal tissues

FULL TEXTS BOOK

where they are then filtered respectively by the kidney.It can be observed from Table v that the urea levels of the test rats were similar to those in the control group.

A recent study in Japan has discovered that men have a higher chance of developing type-2 diabetes due to their lower blood serum creatinine levels. Therefore, it would be intriguing to investigate the detrimental consequences of administering *Heliotropium indicum* L extracts on male Wistar rat's liver and kidney muscles by analyzing specific serum enzyme biomarkers such as alanine aminotransaminase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP) along with creatinine.

The kidneys play a crucial role in removing waste substances like urea and toxins from the blood, which are then expelled as urine. In cases where kidney issues are suspected, medical professionals may examine creatinine levels along with urea nitrogen levels during blood tests. Moreover, healthy kidneys also purge uric acid and creatinine through urinary secretion to keep the body free of additional wastes. However, high concentrations of these three compounds within the bloodstream can imply potential renal damage (Harita *et al*., 2009).

White Blood Cell Counts

Table vii displays the WBC counts of rats administered extracts of *H.indicum* leaves. Group 2 had a count of 7.54±1.20 x10^9/L, while groups 3 and 4 administered with ethyl acetate and methanol extract were found to have higher counts of 9.36±0.84x10^9/L , and10.32±1.06 x $l0^9$/L, compared to those in the control group that received only the vehicle (8.l6±l.33x$l0^9$/L). These results imply normal WBC counts exhibited by all animals following administration of the plant extracts. It can also be observed that the WBC components of the experimental rat groups: eosinophils, basophils, monocytes and lymphocytes showed similar trend and are consistent with the counts in the control group with no significant difference at (P≤0.05) level of significance. Meanwhile, the Cleveland Clinic reports had it that a low WBC count occurs when there is fewer neutrophils than normal which indicates a compromise of the immune system arising from insufficient white blood cells needed for immune function against infections or inflammatory agents.

The Red Blood Cell Count (RBC)

Table viii displays the percentages of red blood cells (RBCs) in experimental rats. The control group had a percentage RBC count of 6.66±0.27, while groups 2, 3 and 4 showed counts of 7.26±0.24, 6.86±0.37 and 6.44±0.32, respectively. The available data in Table viii shows that compared to the control group at significance level (P≤0.05), there were no significant differences across all three experimental groups regarding their RBC levels. It is worthy of note that low RCB counts may result from infection or medical conditions characterized by anaemia as indicated by Cleveland Clinic research findings. Elevated RBC results could suggest other underlying health issues. In this study report however, the measured RBC account for each of the three (3) test groups was consistent compared with the normal control group. Other important metrics such as haemoglobin concentration (Hb), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), and mean corpuscular haemoglobin concentration (MCHC) did not vary significantly beyond statistical levels at (P≤ 0.05) observed among the experimental groups and the control group.

Histopathological findings

After analyzing the liver and kidney tissues of the experimental rats, it was found that administering *H.indicum* L., leaf extracts (as depicted in Plates i-ii) did not affect their structural integrity. The results demonstrated that all three groups receiving leaf extracts had consistent architectural integrity with the control group's organs. Additionally, when comparing microscopic analysis data from each group to controls', accumulated extract percentages showed no significant impact on any examined animal population.

Conclusion and Recommendations

The findings from this study revealed that *Heliotropium indicum* L leaf ethyl acetate and methanol extracts can serve as effective biopesticides at 0.08 g/ml, presenting a safer option to synthetic insecticides against stored grain weevils. The research also showed that there is no significant difference in ALT levels for all the rat groups administered the leaf extracts of *Heliotropium indicum* compared with the control group (P≤0.05). This evidence shows that this plant can be used as plant-based

FULL TEXTS BOOK

pesticides while indicating their potential benefits over conventional alternatives on a dosage-dependent basis; thus producing scientific grounds supporting this approach.

Recommendations

The study proposes utilizing this plant in a dose-dependent manner. For those consuming it as an herbal remedy for ailments, it is advised to consume minimal quantities to avoid potential harm to their organs. This is because excessive ingestion of the plant may lead to elevated levels of serum liver biomarker enzymes and alter the structural integrity of the liver tissue.

Conflict of interest

No conflicts of interest are claimed by the authors in this research paper, and proper citation was given to all relevant sources. This work is an extract derived from the lead author's original PhD thesis.

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FULL TEXTS BOOK

ISOLATION AND IDENTIFICATION OF THE AIR MYCOFLORA OF THE JOSEPH SARWUAN TARKA UNIVERSITY, MAKURDI MICROBIOLOGY LABORATORIES

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ABSTRACT

Background- Air-borne Fungal contamination in Laboratories and Hospitals is becoming a serious problem worldwide and the Characterization of such contaminants offers hope for treating some Hospital and Laboratory Acquired Infections (LAI). Therefore, there is need to determine the fungal contamination sources, isolate and identify the contaminants when performing standard microbiological manipulations in the Microbiology laboratories of Joseph Sarwuan Tarka University, Makurdi.

Methods-The open plate technique was employed while sampling the different microbiology laboratories of JOSTUM. Potato Dextrose Agar (PDA) supplemented with chloramphenicol to inhibit the growth of bacteria was used for the enumeration of fungal concentrations in the laboratories... Media- filled petri dishes were exposed to the air for about (20) minutes. The exposed plates were later transported to the general purpose laboratory (B40) and the plates were afterwards incubated at room temperature (30 ± 2^0c) for about (3-4) days after which the observed fungal growths were sub-cultured and identified microscopically.

Results: The air-borne fungal isolates were identified and enumerated at various exposure points in the five (5) microbiology laboratories of Joseph Sarwuan Tarka University, Makurdi (JOSTUM), using cultural and morphological characterization.

A total of nine (9) fungal isolates were obtained from the indoor environments of the (5) microbiology laboratories, which were represented by 8 genera, with two species of *Aspergillus*. The isolated fungal organisms included; *Aspergillus niger, Aspergillus flavus, Mucor spp, Neurospora spp, Penicillium spp, Rhizopus spp, Cephalosporium spp, Alternaria spp* and *Cladosporium spp*.

Conclusion: The study reveals that a great deal of harmful and pathogenic air-borne fungi are present both in the indoor and outdoor environments of the microbiology laboratories of JOSTUM. The quality of air which we breathe must be pure and free from any kind of harmful pathogens. The indoor and outdoor environments must be kept clean always in order to check these pathogens in the air.

Keywords: Air Mycoflora, characterization, isolates, Potato Dextrose Agar (PDA), air quality

1. Introduction

Air mycoflora is the study of fungi of the atmospheric origin (Wikipedia, 2021). Though fungi inhabit the atmosphere, they represent only but an allochthonous population of the air microbes since no microbe is ultimately a native of the atmosphere. They are either transported by terrestrial or aquatic activities and become deposited in the air which originally never constituted their habitation. On the other hand, the study of microscopic harmful fungi found in the air we breathe is referred to as aeromycoflora (Syeda *et al.*, 2017).

FULL TEXTS BOOK

Fungi are multicellular, achlorophyllous, heterotrophic, eukaryotic and spore bearing microorganisms surrounded by a well-defined cell wall made up of chitin with or without cellulose along with many other complex organic molecules (Illondu *et al.*, 2016). Fungi consist of an enormous group of organisms; about 90,000 fungi species have been described, although some estimate the true number of species to be about 1.5 million (Joanne *et al.,*2017).

Fungi are unique organisms due to their morphological, physiological and genetic features. They are able to colonize all matrices (soil, water and air) in natural environment in which they play key role in maintaining the ecosystem's equilibrium (Hussain *et al.,* 2014). Fungi secrete enzymes which breakdown solid materials to soluble compounds for absorption through their outer walls. They vary greatly in their ability to utilize different types of substrates. Although; some species that are obligate parasites are only able to utilize substrates from living host tissue (Cullings *et al.*, 2010). Examples include*; Amblyospora, Encephalitozoon,Enterocytozoon and Nosema*, all of which belong to the sub-class micosporidia.

Air serves as a transport or dispersal medium for fungi and other microorganisms. They occur in relatively small number in air when compared with soil or water and constitute the dominant group of air microflora scattered everywhere in both outdoor and indoor environments.

Many common infections in both human and animals can spread by airborne transmission (Shams-Ghahfarokhi *et al.,* 2014). Airborne transmission increases the opportunity of human exposure to pathogenic mycoflora during breathing the polluted air or contamination of food and water (Durugbo *et al.,* 2012; Fernstrom & Goldblatt, 2013; Martinez-Herrera *et al.,* 2016). Airborne fungi are the most important part of human pathogens which cause several human health problems such as allergic, contagious, infectious, and respiratory diseases (Gots *et al.,* 2003).

2. Materials and Methods

2.1 Air Sample Collection

The microbiological samples were collected from (5) microbiology laboratories of Joseph Sarwuan Tarka University, Makurdi using the exposed prepared plate techniques.

Preparation of Potato Dextrose Agar (PDA)

A 39g of the powdered potato dextrose agar was weighed into 1L conical flask and thoroughly suspended in distilled water. It was sterilized in an autoclave at 121^0C, for 15 minutes. The autoclaved media was placed to cool to about 40^0C after which a little quantity of sterile antibiotic (chloramphenicol) was added in other to make it selective against bacteria, the mixture was poured into the petri dishes under sterile conditions.

Identification of fungal strains

The colonial features of the fungal colonies were studied as well as the morphological features of the fungi were studied using compound microscope. The determination of the morphological structures of fungi was carried out after being mounted in lacto-phenol cotton blue covered with cover slip. The fungal types were analyzed for each day with the isolates being identified based on morphological and microscopic characteristics using standard mycological texts and manuals (Kidd *et al.,* 2016).

Identification of pure colonies using morphological characteristics

The fungal isolates were identified using cultural characters, morphology and by examining spore arrangements (Barnett and Hunter, 1972) after observing under a microscope.

Data Analysis

Isolation of pure cultures was carried out based on morphological differences where colony form, elevation, pigmentation and size were the distinguishing factors for fungi contaminants. Data on incidences of fungal contamination were transformed using square root method.

The occurrence frequency and relative abundance were computed depending on colony forming unit (CFU) of fungal species, genera or a fungi group to show the exposure risk of collected fungi as described by (Chan *et al.,* 2008).

FULL TEXTS BOOK

3. Results

The air-borne fungal isolates were identified and enumerated at various exposure points in the five (5) microbiology laboratories of Joseph Sarwuan Tarka University, Makurdi (JOSTUM), using cultural and morphological characterization.

A total of nine (9) fungal isolates were obtained from the indoor environments of the (5) microbiology laboratories, which were represented by 8 genera, with two species of *Aspergillus*. The isolated fungal organisms included; *Aspergillus niger, Aspergillus flavus, Mucor spp, Neurospora spp, Penicillium spp, Rhizopus spp, Cephalosporium spp, Alternaria spp* and *Cladosporium spp*.

The different sizes of the microbiology laboratories are represented in the table 1.0. The table gives a description as to the sizes of the laboratories, with the New Biology Laboratory being the biggest and the Research Biology Laboratory being the smallest in size.

The number of colonies / plate counts which represent the mean of duplicate plates at every exposure points in the laboratories are shown in the table 2.0. The table reveals that the new biology laboratory (NBL) had the highest number of colony counts (29) with the least counts gotten from the research biology laboratory (RBL) (8), whereas, the entomology/ epidemiology lab (B41), the general purpose lab (B40) and the biochemistry lab (B10) had the colony counts of (21), (19) and (12) respectively.

Table 3.0 enumerates the population of air-borne fungal isolates of the different microbiology laboratories of JOSTUM per cubic metre of the coliform forming units. The new biology lab had the highest air-borne fungal contamination with the total of (7.3×10^2 Cfu/m^3) whereas the least contamination was recorded in the research biology laboratory (2.0×10^2 Cfu/m^3), (B40). (B41) and (B10) had the counts of (4.8×10^2Cfu/m^3), (5.3×10^2 Cfu/m^3) and (3.0×10^2 Cfu/m^3) respectively.

Table 4.0 presents the different fungal isolates with their corresponding frequencies of occurrence in (%). *Aspergillus flavus* and *Cladosporium spp* were the most isolated with the frequency of occurrence (19.05%) each, while *Neurospora*, *Penicillium* and *Rhizopus* had the least occurrence frequency (4.76%) each, whereas *Mucor spp*, *Cephalosporium* and *Alternaria*, had the counts of (14.29%) each.

Table 5.0 gives a representation of the cultural and morphological characterization of the air-borne fungi that were isolated from the microbiology laboratories of JOSTUM.

Table 1.0 Measurements of the various Microbiology laboratories of JOSTUM in cubic metre

Laboratory	Size (m^3)
B10	980.68
B40	983.89
B41	515.68
NBL	2795.63
RBL	488.86

Table 2.0 Air-borne fungal counts at various exposure points in five microbiology laboratories of JOSTUM

Exposure points	No of colonies/plate				
	B10	B40	B41	NBL	RBL
Front entrance	3	2	3	8	3
Back entrance	2	2	3	2	1
Front window	4	4	9	10	2
Back window	7	7	4	7	2
Centre	3	1	2	2	0
Total	12	19	21	29	8

Key:
Plate counts = Mean of duplicate plates
B10 =Biochemistry Laboratory

FULL TEXTS BOOK

B40 = General Purpose Laboratory
B41 = Entomology/Epidemiology Laboratory

Table 3.0 Population of air-borne fungi per cubic metre from the five microbiology laboratories of JOSTUM

Laboratory	**Colony Forming Unit per cubic metre (Cfu/m^3)**
B10	3.0×10^2
B40	4.8×10^2
B41	5.3×10^2
NBL	7.3×10^2
RBL	2.0×10^2

Table 4.0 Air-borne fungal isolates identified at various exposure points in the five Microbiology laboratories of JOSTUM with their frequencies of occurrence

Fungal Isolates	**Laboratory**					**Frequency (%)**
	B10	B40	B41	NBL	RBL	
Aspergillus niger		+	-	-	-	+ 9.25
Aspergillus flavus		+	+	-	+	+ 19.05
Mucor spp		-	+	+	+	- 14.29
Neurospora spp	+	-	-	-	-	4.76
Penicillium spp	-	-	-	+	-	4.76
Rhizopus spp		-	-	-	+	- 4.76
Cephalosporium spp		-	-	+	+	- 9.52
Alternaria spp		-	+	+	+	- 14.29
Cladosporium spp		+	+	+	+	- 19.05

Key: + = present - = absent

FULL TEXTS BOOK

TABLE 3: Cultural and morphological characterization of air-borne fungi isolated from five Microbiology laboratory of JOSTUM

Fungal Isolate	Media	Growth	Front view	Back view	Hyphae	Conidiophore/sporangiophore
Aspergillus niger	PDA	Rapid	White turning to Yellow and then Dark-brown	reddish	septate	erect branching
Aspergillus flavus	PDA	Moderate	yellow becoming dark yellow	gold green	septate	upright terminating in globose swelling
Mucor spp	PDA	Rapid	Cottony white becoming dark-grey		non septate no stolon or Rhizoid	erect forming terminal globose swelling
Neurospora spp	PDA	Rapid	whitish to brown		septate	ovate
Penicillium spp	PDA	Moderate green		yellow	septate	branched
Rhizopus spp	PDA	Rapid	Cottony white becoming dark grey	whitish	non septate No stolon or rhizoid	sporangiophore arise
Cephalosporium spp	PDA	Slow	Whitish becoming rose colour		septate	clear
Alternaria spp	PDA	Rapid	olivaceous green	black	septate	branched
Cladosporium spp	PDA	Slow	grey-green	black	septate	branched

Discussion

Air-borne fungi usually spread their spores in the ambient air. Qualitative knowledge of the spread of these fungi in our laboratories is of great importance to avoid several respiratory diseases such as asthma and rhinitis that can occur in humans (Menezs *et al.,* 2004). It is therefore, important to evaluate the quality of the air whether indoor or outdoor in the laboratory environments. The number and type of airborne fungi can be used to determine the degree of cleanliness of the laboratories. This study revealed that a great deal of fungal species is found in the microbiology laboratories of JOSTUM.

The most dominant fungal genera in the findings were *Aspergillus* and *Cladosporium* (19.05%) each, due to the ability of their spores to easily spread in various aerobic environments (Asan *et al.,* 2003). In particular, *Aspergillus* is characterized by production of small spores which are a widespread in air environment of tropical regions (Rosas *et al.,* 1992). However, previous study suggested that fungal spores spread from outdoor to indoor environment through staff, students, visitors and ventilation systems (Kiasat *et al.,* 2017).

High occurrence frequency of *Mucor spp*, *Alternaria* and *Cephalosporium* (14.29%) each, were also recorded in the laboratory fungi population. This indicates that potential infections of respiratory allergy may occur due to inhalation spores of *Mucor* and *Alternaria* (Bush and Prochnau, 2004; Menezs *et al.,* 2004). Conversely, low occurrence frequency was also observed in *Neurospora spp, Penicillium spp and Rhizopus spp*. The variation witnessed in the concentrations of the fungal isolates in the different microbiology laboratories could be attributed to the fact that the new biology laboratory (NBL) being the biggest in size (2795.63m^3) tends to habour more of the fungal spores as compared to the other laboratories. Conversely, the research biology laboratory (RBL) being the smallest (488.86m^3) had the least of contamination. This could be inferred that the laboratory size can affect the concentration of air-borne fungi. Similarly, this variation could be as a result of the fact that more persons often enter the new biology laboratory as compared to the other laboratories. The findings agree with the work of (Shafiq *et al.,* 2019) on the "prevalence of fungal contamination in some biology laboratories"

However, *Aspergillus, Penicillium and Alternaria*, which were called allergenic fungi, can colonize in indoor environments thereby increasing fungi exposure levels. Human exposure to fungal aeroallergens due to increase asthma severity (Gabriel *et al.,* 2016).

It was further observed that the front and the back windows as points of exposure had more of the fungal contamination while the centre as point of exposure had the least of contamination

The results of this study are comparable with previous studies (Asan *et al.,* 2003; Kumari *et al.,* 2016; Shelton *et al.,* 2002) which isolated similar fungi in indoor environment. In other words, fungi species isolated here are endemic to indoor environments.

Conclusion

The study reveals that a great deal of harmful and pathogenic air-borne fungi are present both in the indoor and outdoor environments of the microbiology laboratories of JOSTUM. The quality of air which we breathe must be pure and free from any kind of harmful pathogens. The indoor and outdoor environments must be kept clean always in order to check these pathogens in the air. The indoor environment must be cleaned, properly ventilated and kept dry using dehumidifiers. Most importantly is that we maintain personal hygiene not only for ourselves but also for the safety of others. Fungal propagules are microscopic and produced in large quantities and disperse very easily and quickly. They are contagious and human pathogenic fungi are more dangerous and show immediate skin and lung infections upon slightest contact or inhalation. Air conditioners and other gadgets must be cleaned from time to time to check the pathogens. Harmless disinfectants vapours can be sprayed and fumigation also helps in cleaning the air around us from these pathogens. The outdoor environment must be cleaned regularly and garbage disposed properly and on time. Ultimately, sense of cleanliness of personal and environmental hygiene would greatly engender good air-quality around us thereby limiting the exposure risks of fungal contaminations.

Recommendations

The consequences of air contamination with fungi indicate that much is to be done in identifying and managing air quality deficiencies and seeing that the microbiology laboratories of JOSTUM and it outdoor environments are contaminated by fungal spores, and owing to health challenges of these fungal spores, it is therefore recommended that the sampled laboratories and by extension, other non-microbiological laboratories of the university should be sanitized and fumigated periodically. To further reduce fungal growth, the environment must be kept clean.

Lastly, I strongly recommend that more related researches should be carried out periodically for possible discovery of new fungal genera associated with indoor environments of the laboratories. Conclusively, the researcher regrettably admits that the research couldn't utterly meet its intended objectives due to the short duration required for the completion of the work and as such, further recommends for a more intensive approach subsequently to enable the exploration of more fungal genera of the microbiology laboratory of JOSTUM.

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JÜT ELYAF TAKVİYELİ POLYESTER ESASLI KOMPOZİTLERİN MEKANİK ÖZELLİKLERİNİN İNCELENMESİ

INVESTIGATION OF MECHANICAL PROPERTIES OF JUTE FIBER REINFORCED POLYESTER BASED COMPOSITES

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ÖZET

Kompozit malzemeler neredeyse her alanda giderek daha fazla trend haline gelmiştir. Bunun birçok nedeni olup kompozitlerin özelliklerinin karşılaştırılabilir olması, endüstrilerde kullanılan geleneksel malzemelerden daha iyi olması, yüksek mukavemet/ağırlık oranı, hafiflik gibi temel sebepler başta gelmektedir. Kompozit sektöründe büyük miktarlarda polimer bazlı sentetik elyafların kullanımı, yüksek maliyetlerine rağmen bertaraf sorunlarıyla sonuçlanmıştır. Endüstriyel atıkların her geçen gün yüksek miktarlarda ortaya çıkması sorunu daha da büyütmektedir. Son yıllarda, doğal elyafın olağanüstü mukavemete, düşük yoğunluğa sahip olması nedeniyle birçok araştırma doğal elyaf kompozitlerine odaklanmıştır. Jüt, iyi stabiliteye sahip, düşük maliyetli, geri dönüştürülebilir, düşük yoğunluk, çevre dostu, düşük maliyet, biyolojik olarak parçalanabilen doğal bir elyaftır. Jüt elyaf genellikle tekstil sektöründe halı, kilim, çuval, halat gibi ürünlerde tercih edilmektedir. Karbon ve cam fiberle karşılaştırılabilir özelliklere sahip olup daha ucuzdur. Jüt, doğal olarak oluşan ve biyolojik olarak parçalanabilen elyaftır. Mukavemet, ısı iletkenliği ve satın alınabilirlik önemli hususlar olduğunda jüt lifi sentetik elyaflar için mükemmel bir alternatiftir. Ayrıca jüt lifleri çevresel olarak sürdürülebilir. Jüt elyaf takviyeli kompozitler günümüzde önemli bir çalışma alanıdır.

Bu çalışmada doğal elyaf grubundan olan jüt elyaf atıkları değerlendirilerek kompozit elde edilmiştir. Matris malzemesi olarak doymamış polyester reçinesi kullanılmıştır. Metil etil keton peroksit sertleştirici olarak kullanılmıştır. Atık jüt elyaf öncelikle 2 mm boyutlarda kesilerek kullanılmıştır. Teflon kalıba açık döküm yöntemiyle ağırlıkça %1, 2 ve 3 oranlarında jüt elyaf içeren kompozit numuneler hazırlanmıştır. Numunelerin Izod darbe, çekme, sertlik gibi mekanik özellikleri incelenmiş, ayrıca kırık yüzeylerden SEM görüntüleri alınmıştır. Sonuç olarak jüt elyaf ilavesinin mekanik özellikleri kayda değer şekilde artırdığı ve kompozit uygulamalarında 2 mm boyutlarında takviye edici olarak kullanılabileceği tespit edilmiştir.

Anahtar Kelimeler: Jüt Elyaf, Polyester Reçine, Mekanik Özellikler, Yeşil Kompozit

ABSTRACT

Composite materials have become increasingly trendy in almost every field. There are many reasons for this, the main reasons being that the properties of composites are comparable, being better than traditional materials used in industries, high strength/weight ratio, and lightness. The use of large amounts of polymer-based synthetic fibers in the composite industry has resulted in disposal problems despite their high costs. The emergence of industrial waste in large quantities every day further exacerbates the problem. In recent years, much research has focused on natural fiber composites because natural fiber has extraordinary strength, low density. Jute is a low-cost, recyclable, low density, environmentally friendly, low cost, biodegradable natural fiber with good stability. Jute fiber is

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generally preferred in the textile industry for products such as carpets, rugs, sacks and ropes. It has properties comparable to carbon and glass fiber and is cheaper. Jute is a naturally occurring and biodegradable fiber. Jute fiber is an excellent alternative to synthetic fibers when strength, thermal conductivity and affordability are important considerations. Additionally, jute fibers are environmentally sustainable. Jute fiber reinforced composites are an important field of study today.

In this study, jute fiber waste, which is a natural fiber group, was evaluated and a composite was obtained. Unsaturated polyester resin was used as matrix material. Methyl ethyl ketone peroxide was used as a hardener. Waste jute fiber was primarily used by cutting it into 2 mm dimensions. Composite samples containing 1, 2 and 3% jute fiber by weight were prepared by open casting method in Teflon mold. Mechanical properties of the samples such as Izod impact, tensile and hardness were examined, and SEM images were taken from the broken surfaces. As a result, it has been determined that the addition of jute fiber significantly increases the mechanical properties and can be used as a reinforce in composite applications in sizes of 2 mm.

Keywords: Jute fiber, Polyester Resin, Mechanical Properties, Green Composite

GİRİŞ

Jüt elyaf, jüt bitkisinin (Corchorus spp.) kabuğundan elde edilen doğal bir liftir. Jüt, ekonomik olarak önemli bir lif bitkisi olup, pamuktan sonra dünyanın en önemli ikinci doğal elyafıdır. Jüt bitkisi, tropikal iklim koşullarında iyi gelişir. Bangladeş dünyanın en büyük jüt üreticisidir ve toplam dünya üretiminin yaklaşık %50'sini karşılar. Bangladeş'ten sonra en büyük jüt üreticisi ülkeler Hindistan ve Çin'dir. Dünya jüt üretimi yıldan yıla değişiklik gösterebilir. Ancak, genel olarak dünya jüt üretimi yılda 3-4 milyon ton civarındadır. Bangladeş ve Hindistan, bu üretimin büyük kısmını sağlar (Arabacı, 2009; Atav, 2001).

Jüt elyaf birçok kullanım alanı vardır. Tekstil ve ambalaj sektöründe çuvallar, çantalar, halılar, kilimler ve döşemelik kumaşlar gibi ürünlerde kullanılır. Özellikle tarım ürünlerinin ambalajlanmasında yaygın olarak kullanılır. Jüt ipleri ve fileleri, tarımda ve bahçecilikte, toprak erozyonunu önlemek için jüt geotekstil ürünlerde, dekoratif ürünler, el sanatları ve hediyelik eşyalar yapımında, Biyolojik olarak parçalanabilir olması nedeniyle çevre dostu ambalaj ve izolasyon malzemesi olarak kullanılır. Jüt, kaliteli kâğıt üretimi için de kullanılır. Jüt elyaf, ısı ve ses yalıtımı özelliklerine sahiptir ve bu nedenle izolasyon malzemesi olarak kullanılabilir (Özdemir & Genç, 2019; Sharma 2024; Özes 2016; Prabhuram et. al. 2023).

Jüt, çevre dostu bir ürün olması, biyolojik olarak parçalanabilirliği ve geri dönüştürülebilirliği ile modern dünyada sürdürülebilirlik açısından önemli bir yere sahiptir. Jüt elyafın kimyasal yapısı, esas olarak selülozdan oluşur, ancak diğer bileşenler de bulunur. Jüt elyafın kimyasal bileşimi olarak selüloz, hemiselüloz, lignin, pektin, mumlar, su ve diğer maddelerden oluşur Taşgın & Kandemir, 2023; Robson et. al. 2024).

Selüloz, %60-70 oranında yapıda mevcut olup jüt elyafın ana yapısal bileşenidir ve bitkilerin hücre duvarlarını oluşturur. Selüloz, jüt elyafın mekanik dayanıklılığını ve esnekliğini sağlar. Hemiselüloz, %15-20 oranında olup bitki hücre duvarlarının destekleyici bir bileşenidir ve selüloz lifleri arasında bir bağlayıcı olarak işlev görür. Hemiselüloz, jüt elyafın su emme kapasitesini artırır. Lignin, %12-15 oranındadır, bitki hücre duvarlarını sertleştiren ve güçlendiren bir polimerdir. Jüt elyafının sertliğini ve dayanıklılığını artırır. Pektin, bitki hücrelerinin arasındaki boşlukları dolduran ve suyu tutmaya yardımcı olan bir polisakkarittir. Mumlar, jüt elyafının yüzeyinde su geçirmez bir tabaka oluşturur. İki yapı da yaklaşık %0.2-1 oranındadır. Su, jüt elyafın %10-12'sini oluşturabilir. Ayrıca, küçük miktarlarda proteinler, yağlar, mineral maddeler ve diğer organik bileşikler de bulunabilir (Ahmed et. al. 2022; Madhavi et. al. 2020)

Jüt Elyafı, Selüloz ve lignin bileşenleri sayesinde jüt elyaf, mekanik olarak dayanıklı ve sert bir yapıya sahiptir. Selüloz ve hemiselüloz içeriği, elyafın esnekliğini ve uzama kapasitesini sağlar. Hemiselüloz ve pektin, jüt elyafının su emme kapasitesini artırır, bu da elyafın nem tutma yeteneğini artırır. Doğal bileşenlerinden dolayı jüt elyaf, biyolojik olarak parçalanabilir ve çevre dostudur (Öktem & Yıldırım, 2020; Karacor & Özcanlı 2022; Mutlu, 2011; Bilgili et. al. 2018).

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Jüt elyafının bu kimyasal yapısı, onun çeşitli endüstriyel ve ticari uygulamalarda yaygın olarak kullanılmasını sağlar. Bunun neticesinde ise çok miktarda atık jüt elyaf ortaya çıkmaktadır. Bu çalışmada ise atık jüt elyaflar 2 mm boyutlarında kesilmiş olarak polyester matris içinde takviye edici olarak kullanılmıştır. Jüt elyaf kompozitlerde kullanımı ile alakalı çok sayıda çalışma vardır ancak atık kısa jütlerin kompozitlerde kullanımı ile alakalı literatür çalışması sınırlıdır. Hazırlanan numunelerin mekanik özellikleri ve kırık yüzey morfolojisi incelenerek kompozit malzemelerde kullanılabilirliği değerlendirilmiştir.

DENEYSEL ÇALIŞMA

Malzemeler

Bu çalışmada genel amaçlı kompozit uygulamaları için geliştirilmiş polyester reçine kullanılmıştır. Uygun vizkozitesi ile elyafları kolayca ıslatabilmekte, düşük hacimsel çekmesi, mekanik özellikleri ise iyidir. Polyester reçine içerisinde kobalt naftalat hızlandırıcı bulunmaktadır. Reçine sertleştiricisi olarak metiletilketonperoksit, (MEK-Peroksit) kullanılmıştır. MEK-Peroksit, polyester ve vinilester gibi reçineler için kullanılan sertleştiricidir (Kartal & Güneş, 2024; Kartal & Uzunyol, 2024).

Numunelerin Hazırlanması

Numuneler, kısa jüt elyaf ve doymamış polyester reçinesinin bir kombinasyonudur. Atık jüt elyaf 2 mm boyutlarında kesilerek farklı oranlarda polyestere ilave edilerek kompozit numuneler elde edilmiştir. Teflon kalıpta açık döküm yöntemi kullanılarak polyester reçinesine ilave edilmiştir. Katkı oranı %1 oranında başlayarak (%1, 2 ve 3) her bir oranda kompozit numuneler hazırlanmış ve doyuma ulaşmıştır. Polyester matris içerisinde 2 mm boyutundaki jüt elyaf doyum oranı %3 olarak tespit edilmiştir. %4 dökümde ıslatma problemi sebebiyle numune hazırlanamamıştır.



Şekil 1. Jüt elyaf kesilme öncesi ve sonrası görüntüleri

Tablo 1. Kompozit numunede elyaf, reçine ve sertleştirici oranları

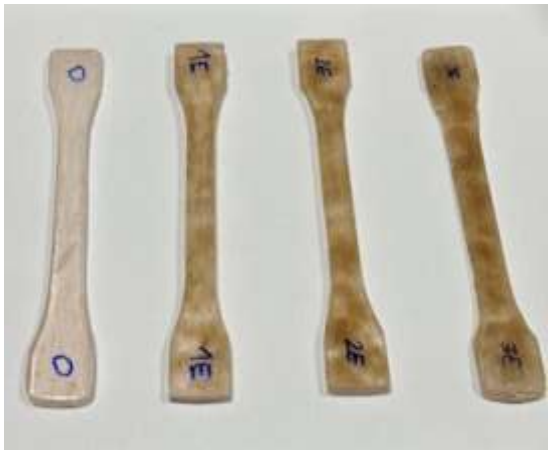
Elyaf Oranı, (ağırlıkça, %)	Reçine Oranı	Sertleştirici oranı
0	100	1,5
1	100	1,5
2	100	1,5
3	100	1,5

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Kompozit numunelerin çekme deneyi, ISO 527 standardına göre 5 mm/dk çekme hızında, çentiksiz darbe deneyi 5,4 J Izod çekici kullnılarak yapılmıştır. Sertlik testi Shore D test cihazında, kırık yüzeylerin SEM görüntüsü Marmara Üniversitesi Nanoteknoloji ve Biyomalzemeler Uygulama ve Araştırma Merkezi Laboratuvarında gerçekleştirilmiştir.

BULGULAR VE TARTIŞMA

Bu çalışmada, atık jüt elyaf takviyeli kompozit üretilmiş ve mekanik özellikleri incelenmiştir. Matris malzemesi olarak kompozit dünyasında en yaygın kullanımını olan genel amaçlı doymamış polyester reçinesi kullanılmıştır. Elyaf olarak farklı sektörlerde yoğun olarak kullanılan jüt elyaf atıkları tercih edilmiştir. Böylece çevreye duyarlı bir kompozit üretimi hedeflenmiştir. Çekme testi için hazırlanan kompozit numunelerin görüntüsü şekil 2'de verilmiştir. Şekil 2'den de anlaşıldığı gibi renksiz olan reçineye elyaf ilavesiyle elyafın kendi rengi geçmiştir. Elyaf oranı arttıkça renk daha da koyulaşmıştır.



Şekil 2. Numunelerin görüntüsü

Elyaf takviyeli kompozitlerin çekme mukavemeti, matrise ilave edilen elyaf yapısına, boyutuna ve oranına bağlı olarak değişkenlik göstermektedir. Ayrıca kompozitte ara yüzey özellikleri de çok önemlidir. Kompozitlerde elyaf kullanımı çok yaygın olup mekanik özellikleri arttırmakta olduğu bilinen bir gerçektir. Ancak kompozitlerde kullanılan elyaf oranının bir üst sınır değeri vardır.

Numunelerin çekme mukavemeti, E modülü ve % uzama değerleri tablo 2'de verilmiştir. Bu çalışmada elyaf miktarının artmasıyla numunelerin çekme mukavemeti saf polyestere göre artmıştır. Ağırlıkça %1 elyaf ilavesiyle bile %10 oranında çekme mukavemeti artmıştır. Elyaf oranı %3 olduğunda ise çekme mukavemeti %17 oranında artmıştır. Bu artış elyafla reçine arasında iyi bir ara yüzey bağı gerçekleştiğini göstermektedir. Elyaf boyu kısa da olsa elyaf oranı arttıkça çekme mukavemetinin artmasına neden olduğu yapılan birçok çalışmada belirtilmektedir (Kartal et. al 2019)

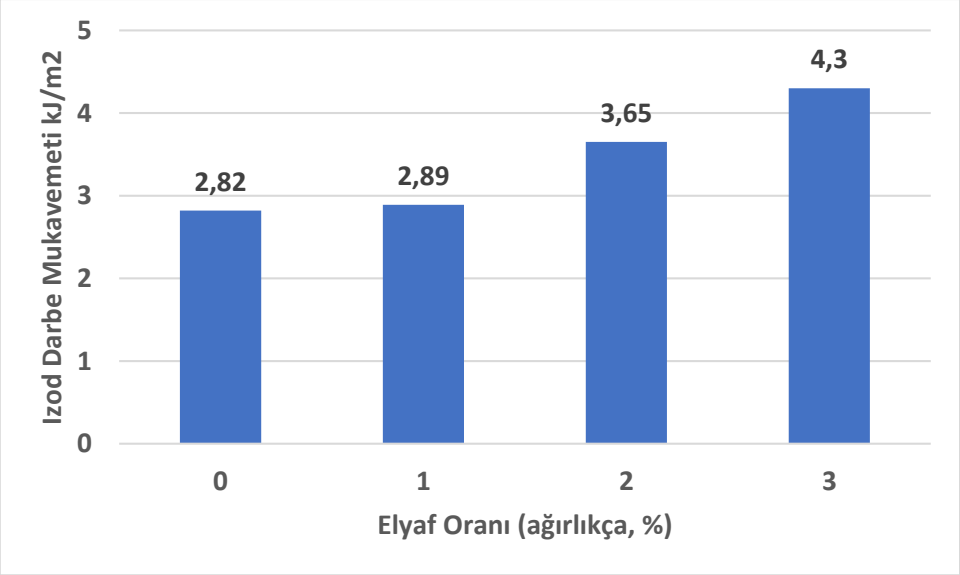
Tablo 2. Numunelerin çekme testi sonuçları

Elyaf Oranı (ağırlıkça, %)	Çekme Mukavemeti (MPa)	Elastisite Modülü (MPa)	Uzama (%)
0	38.2	5450	0.54
1	42.1	6650	0.28
2	44.5	6850	0.41
3	44.7	6820	0.38

Şekil 3'de jüt elyaf oranına bağlı olarak numunelerin Izod darbe mukavemeti özellikleri verilmiştir. Kompozit numunelerin darbe mukavemeti elyaf malzemesinin özellikleri, dağılım, matris malzemesi ile etkileşimi, kompozit üretim tekniği gibi birçok duruma bağlı olarak değişebilir. Uzun lifler veya büyük

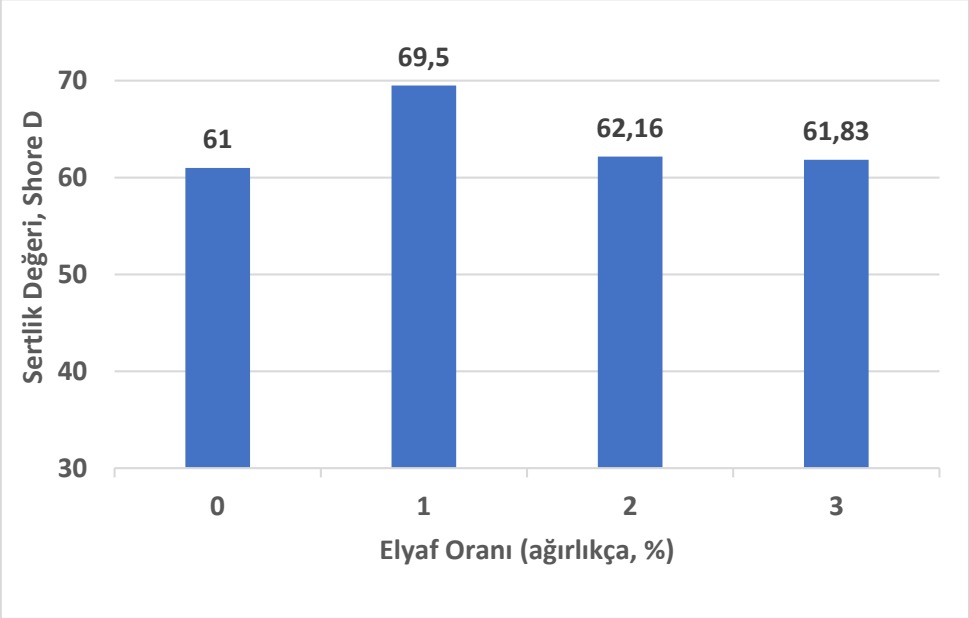
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partiküller genellikle daha iyi bir darbe mukavemeti sağlar çünkü enerjiyi dağıtmaya ve emmeye daha fazla fırsat verirler (Kartal & Selimoğlu 2023). Bu çalışmada jüt elyaf oranı artması ile kompozitin darbe direncinde bir miktar artış gözlemlenmiştir. Jüt elyaf 2 mm uzunluğunda olmasına rağmen %3 oranında ilave ile kompozitin darbe mukavemeti %52 oranında artış göstermiştir.



Şekil 3. Numunelerin Izod darbe mukavemeti

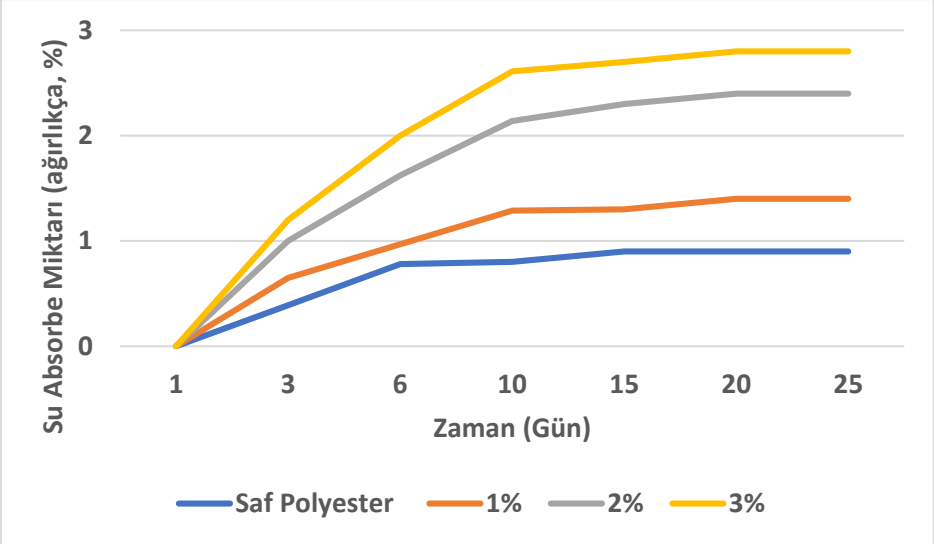
Şekil 4'de jüt elyaf dolgu oranına bağlı olarak numunelerin sertlik özellikleri verilmiştir. Kompozit malzemelerde fiber elyaf boyutu ve yapıya sağlayacağı sertlik özellikleri arasında karmaşık bir ilişki vardır. Genel olarak, büyük boyutlara sahip ve yüksek yoğunluklu elyaflar daha yüksek bir sertlik elde edilmesine sebep olabilir. Ancak malzeme tipine, dağılımına ve diğer faktörlere bağlı olarak değişiklik gösterebilir. En yüksek sertlik değeri %1 elyaflı numunede elde edilmiş, sonrasında sertlik değerleri azalmıştır. %1 jüt elyafı ile %14 oranında sertlik değerinde artış tespit edilmiştir. En düşük sertlik değeri saf polyesterde elde edilmiştir.



Şekil 4. Numunelerin Shore D sertlik testi değerleri

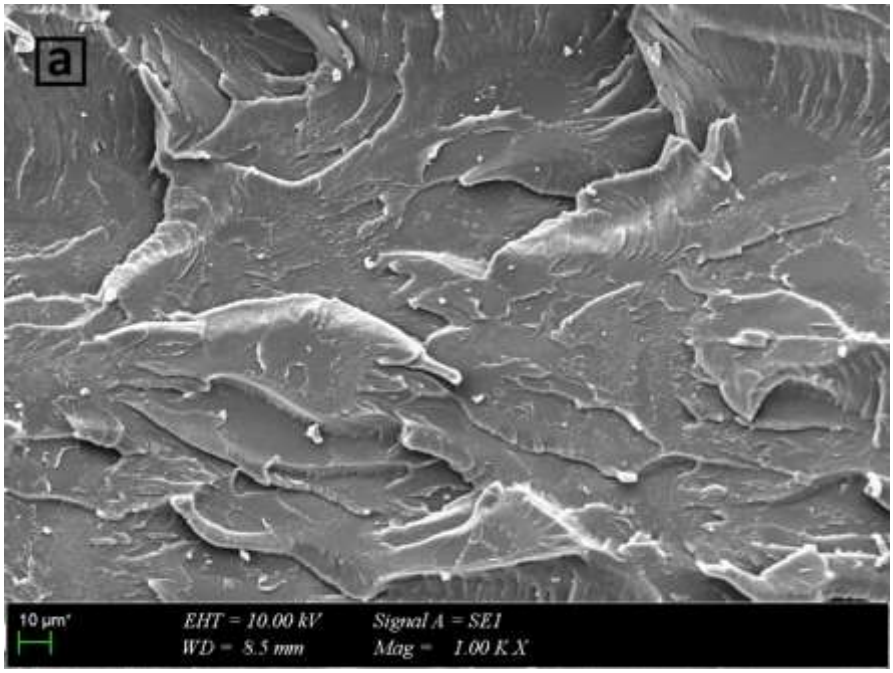
Numunelerin su emme özellikleri şekil 5'te verilmiştir. Saf polyester numunesinin su emme miktarı en az seviyededir. Jüt elyaf miktarı arttıkça su absorpsiyon oranı da artmıştır. Jüt elyaf doyum oranı olan %3'lük numunede yaklaşık ağırlıkça %2,8 su emme gözlemlenmiştir. Selüloz esaslı yapılarda, hidrofilik olan yapıların varlığı hızlı su emme oranını açıklamaktadır (Mohammed, 2015).

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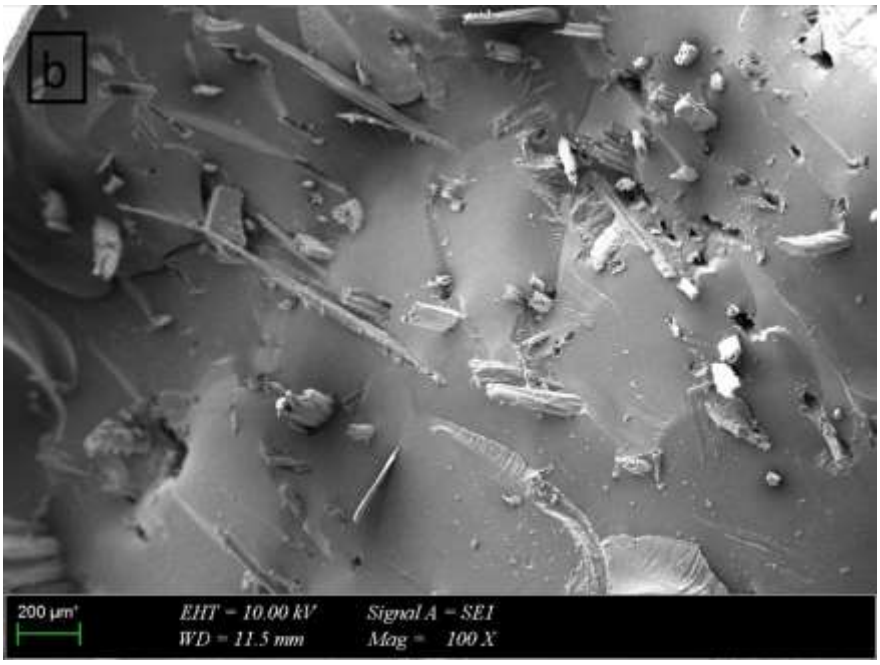


Şekil 5. Elyaf oranına bağlı olarak numunelerin su emme özellikleri

Numunelerin kırılma yüzeylerinin SEM görüntüleri Şekil 5a ve 5b'de verilmiştir. Saf polyesterin kırık yüzey görüntüsünden gevrek bir kırılma ile kırıldığı anlaşılmaktadır. %2 elyaf katkılı numenin kırık yüzey görüntüsünde (5b) jüt elyaflar görülmektedir. Resimden de anlaşılacağı gibi iyi bir yapışma olduğu görülmektedir. Görüntüdeki elyafların görünen boyutu 600 mikrona kadar çıkabildiği, görünmeyen kısmın da polyester içinde kaldığı anlaşılmaktadır. Bu çalışmadaki benzer gözlemler farklı çalışmalarda da rapor edilmiştir (Kartal & Özcan, 2023).



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Şekil 6. Numunelerin kırık yüzey SEM görüntüleri a) Saf polyester b) %2 jüt elyaflı numune

SONUÇLAR

Yeşil kompozitlerde doğal elyafların kullanımı ile olumlu çevre etkisi, yenilenebilir kaynakların kullanımı, biyobozunurluk, enerji tasarrufu gibi birçok avantaj sunmaktadır. Ancak kompozitlerde kullanılan elyafların bir üst limiti vardır. Bu çalışmada yaklaşık 2 mm boyutlarındaki jüt elyafın doymamış polyester reçine içindeki üst kullanım limiti ağırlıkça % 3 olarak tespit edilmiştir.

Bu çalışmada elyaf miktarı % 3 olarak kullanılmasıyla bile saf polyestere göre çekme mukavemeti %17 oranında, Izod darbe mukavemeti %52 oranında, sertlik değeri ise kısmen artmıştır. Bu artış elyafla reçine arasında iyi bir ara yüzey bağı gerçekleştiğini söylenebilir.

Atık doğal elyaflar sentetik elyafların yerine kullanılması ile hem ülkeye hem de çevreye daha büyük fayda sağlayacağı bir gerçektir. Bu nedenle geleneksel sentetik elyaflar yerine doğal elyafların kullanımı daha çok teşvik edilmelidir.

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INVESTIGATION OF MECHANICAL PROPERTIES OF HAZELNUT SHELL FILLED POLYESTER BASED COMPOSITES

FINDIK KABUĞU DOLGULU POLYESTER ESASLI KOMPOZİTLERİN MEKANİK ÖZELLİKLERİNİN İNCELENMESİ

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ABSTRACT

The global demand for sustainable and biodegradable materials has driven the development of natural fiber/filler-containing polymer composites. Fillers are frequently used in green composites to improve mechanical properties and reduce cost. Organic fillers used in such composites are materials such as wood sawdust and walnut shell, which are generally obtained from natural resources and minimize environmental impacts. While fillers play an important role in improving the performance and properties of green composites, they also contribute to reducing the overall production cost by reducing the amount of polymer.

In this study, hazelnut shell was used as organic filler material. First, hazelnut shells were ground in a mechanical grinder and sieved in the size range of 1-400 microns. Polyester was added to the matrix at certain rates, starting from 5%. The saturation rate for filler addition was determined as 20%. Mechanical properties of the samples such as tensile test, Izod impact test, hardness test were examined, and SEM images were taken from the broken surfaces. Additionally, since the filling structure is cellulose-based, a water absorption test was also performed. With the addition of hazelnut shells to polyester, tensile strength decreased and hardness and impact resistance partially increased. At the end of the study, it was evaluated that hazelnut shells can be used as a filler in polyester matrix composites.

Key words: Polyester, hazelnut filler, mechanical properties, composite

ÖZET

Sürdürülebilir ve biyolojik olarak parçalanabilen malzemelere yönelik küresel talep, doğal elyaf/dolgu içerikli polimer kompozitlerin geliştirilmesine yön vermiştir. Mekanik özellikleri geliştirmek ve maliyeti azaltmak için yeşil kompozitlerde dolgu maddeleri sıklıkla kullanılmaktadır. Bu tür kompozitlerde kullanılan organik dolgular, genellikle doğal kaynaklardan elde edilen ve çevresel etkileri minimize eden ağaç talaşı, ceviz kabuğu gibi malzemelerdir. Dolgu maddeleri, yeşil kompozitlerin performansını ve özelliklerini iyileştirmede önemli bir rol oynarken aynı zamanda polimer miktarını azaltarak genel üretim maliyetinin azaltılmasına da katkıda bulunurlar.

Bu çalışmada organik dolgu malzemesi olarak fındıkkabuğu kullanılmıştır. Önce fındıkkabuğu mekanik öğütücüde öğütülmüş ve 1-400 mikron boyut aralığında elenmiştir. %5 oranından başlayarak belli oranlarda polyester matrise ilave edilmiştir. Dolgu ilavesi için %20 doyum oranı olarak tespit edilmiştir. Numunelere çekme testi, Izod darbe testi, sertlik testi gibi mekanik özellikleri incelenmiş, kırık yüzeylerden SEM görüntüsü alınmıştır. Ayrıca dolgu yapısı selüloz esaslı olduğu için su emme testi de yapılmıştır. Fındıkkabuğunun polyestere ilavesiyle çekme mukavemeti azalmış, sertlik ve darbe direnci kısmen artırmıştır. Çalışma sonunda fındıkkabuğunun polyester matrisli kompozitlerde dolgu olarak kullanılabileceği değerlendirilmiştir.

Anahtar kelimeler: Polyester, fındıkkabuğu dolgusu, mekanik özellikler, kompozit

FULL TEXTS BOOK

GİRİŞ

Fındık dünyada sert kabuklu meyveler içinde gerek üretim gerekse tüketim bakımından bademden sonra ikinci sırada yer almaktadır. Fındık özellikle çikolata, şekerleme gibi sektörlerde gıda sanayinin temel hammaddelerindendir. İnsan sağlığı ve beslenmesinde çok önemli bir yere sahip olduğu için yoğun olarak tüketilmektedir (Demircan, 2009; Cengiz ve ark., 2021; Arun ve ark., 2020).

Uluslararası ölçekte fındık üreten ülkeler Türkiye, İtalya, ABD ve Azerbaycan'dır. Ülkemiz fındık üretiminde dünya lideri olup Dünya Gıda ve Tarım Örgütü verilerine göre toplam üretimin %60'ından fazlasını karşılamaktadır. Dünyada fındık üretimi son yıllarda ortalama 1,2 milyon ton olarak gerçekleşmektedir. Ülkemiz fındık rekoltesi yıllara göre önemli dalgalanmalar olsa da yaklaşık 700 bin civarındadır (Tarım Bakanlığı, 2024; Barczewski ve ark., 2019).

Fındık cinsine göre değişse de dış kabuk ağırlığı toplam ağırlığın yaklaşık %50-55'i kadardır. Yani fındığın yarısı sert kabuktan oluşmaktadır. Dünyada her yıl binlerce ton sert fındık kabuk atığı oluşmaktadır. Ülkemizde yaklaşık olarak 350 bin ton fındıkkabuğu ortaya çıkmaktadır. Fındıkkabuğu ülkemizde yüksek kalorili bir yakacak olarak kullanılmaktadır. Yakıt ve yakacak sektörü haricinde fındıkkabuğu birçok farklı kullanım alanı da vardır. Fındıkkabuklarının kaba dokusu, ince bir toz haline getirildiğinde onları doğal eksfoliant olarak ölü cilt hücrelerini çıkarmaya ve cildin görünümünü iyileştirmeye yardımcı olmak için yüz maskelerinde kullanılabilirler. Fındıkkabukları, renk üretebilen doğal pigmentler olan tanenler içerdiğinden kumaşlar ve diğer malzemeler için doğal boyalar oluşturmak için kullanılabilir (Ceraulo ve ark., 2022; Çağlar ve ark., 2022; Arun ve ark., 2020).

Dünyadaki doğal kaynakların hızla azalması, çevresel kaygılar gibi birçok sebeple sürdürülebilir ve geri dönüştürülebilir ürünlerin üretilmesi, günümüz endüstrisinin üzerinde çokça durduğu bir husustur. Son yıllarda, düşük çevresel etki, geri dönüştürülebilir özellik içermesi ve işleme kolaylığı gibi nedenlerle polimerik kompozitlerin üretiminde tarım endüstrisi atıklarından elde edilen doğal maddelerin kullanılmasıyla ilgili çok sayıda çalışma yapılmaktadır. Kompozit sektöründe yeşil kompozitler olarak isimlendirilen bu çevreci çalışmalar, daha çok sürdürülebilir kaynaklardan gelen polimer ve takviye malzemelerinin kullanımı üzerine yoğunlaşmıştır. Yeşil kompozitler, ahşap, kenaf, kenevir, keten, jüt, ceviz kabuğu, ananas yaprağı, buğday sapı, mısır püskülü, fıstık-badem kabukları gibi doğal elyaf ve/veya dolgu içerir (Sayın ve arkadaşları, 2016; Kartal ve Şengör, 2023; Demirer ve arkadaşları, 2018).

Karadeniz bölgesinde yaygın olarak bulunan fındıkkabuğu genellikle yakacak malzemesi olarak kullanılır ve katma değeri olan bir çıktıya dönüştürülmez. Fındıkkabuğu karakteristik rengiyle nispeten sert selülozik yapıya sahiptir. Dolayısı ile polimer içinde dolgu olarak kullanılması uygun olan tarımsal atıklardan biridir. Doğal dolgular, düşük maliyetleri, düşük yoğunlukları ve bulunabilirlikleri nedeniyle giderek daha fazla araştırılmaktadır. Ekolojik farkındalığın artması, sentetik elyaflara olan talebin artması nedeniyle, doğal dolgu/elyaf içeren kompozitler potansiyel bir alternatiftir (Çelik ve arkadaşları, 2021; Barbu ve arkadaşları, 2020; Cherkashina ve arkadaşları, 2023).

Bu çalışmada fındıkkabuğu polyester reçinesi içerisinde dolgu olarak kullanılmıştır. Mekanik öğütücü yardımıyla belirli boyutlara getirilen fındıkkabuğu partikülleri belli oranlarda polyester reçinesine ilave edilerek çekme, darbe, sertlik gibi mekanik özellikleri incelenmiştir. Kırık yüzeylerden SEM görüntüleri alınmış ve organik dolgu içermesi sebebiyle su emme testi de yapılmıştır.

MALZEME VE METOT

Malzemeler

Bu çalışmada kompozit reçine olarak genel amaçlı polyester reçinesi kullanılmıştır. Polyester Reçine, genel amaçlı kompozit uygulamaları için kullanılan orta reaktiviteli polyester reçinesidir. Uygun vizkozitesi sayesinde elyafları ve dolguları kolay ve iyi ıslatır. Hacimsel çekmesi düşüktür. Yüksek mekanik değerlere sahiptir (Kartal ve Güneş 2024; Kartal ve Uzunyol, 2024). Ayrıca içerisinde %6 kobalt naftalat hızlandırıcı bulunmaktadır. Polyester reçinesi için sertleştirici olarak Metil Etil Keton Peroksit, (MEK-Peroksit) kullanılmıştır.

Numunelerin Hazırlanması

Kompozit numuneler, fındıkkabuğu ve polyester reçinesinin bir kombinasyonu olup fındıkkabuğu mekanik öğütücüde öğütülerek farklı oranlarda polyestere ilave edilmiş ve kompozit numuneler elde

FULL TEXTS BOOK

edilmiştir. Öğütülen fındıkkabuğu 1-400 mikron aralığındadır. Daha büyük ve kaba olan partiküller kullanılmamıştır. Fındıkkabuğu içindeki yumuşak bölgeler de dolgu içinde kalmış, kabuk bütün olarak öğütülmüştür. Kompozit numuneler Teflon kalıpta açık döküm yöntemi ile polyester reçinesine ağırlıkça % 5-10-15-20 oranlarında kompozit numuneler hazırlanmıştır. % 20 oranı dolgu doyum noktası olduğu tespit edilince daha yüksek oranda dolgu kullanılmamıştır.

Fındıkkabuğu Oranı, (ağırlıkça, %)	Reçine Oranı	Sertleştirici Oranı
0	100	1,5
5	100	1,5
10	100	1,5
15	100	1,5
20	100	1,5

Tablo 1. Kompozit numune karışım oranları

Çekme testi, Zwick marka Z010 üniversal tip çekme test cihazında ISO 527 standardına göre 5mm/dk hızda, Izod darbe deneyi numuneleri çentiksiz olup Zwick marka B5113.30 darbe test cihazında 5.4 J çekiç ile, sertlik testi ölçümleri Shore D test cihazında icra edilmiştir. SEM analizi Marmara Üniversitesi Nanoteknoloji ve Biyomalzemeler Uygulama ve Araştırma Merkezi Laboratuvarında bulunan Polaron SC marka cihaz ile gerçekleştirilmiştir.

BULGULAR VE TARTIŞMA

Bu çalışmada, fındıkkabuğu dolgulu termoset esaslı kompozit üretimi yapılmış ve mekanik özellikleri incelenmiştir. Çalışmada doğal dolgu olarak ülkemizde bol miktarda bulunan fındıkkabuğu kullanılmış ve çevreye duyarlı bir kompozit üretimi hedeflenmiştir. Matris malzemesi olarak kompozit endüstrisinde çok yaygın olarak kullanılan genel amaçlı doymamış polyester reçinesi kullanılmıştır. Şekil 1'de çekme testi için hazırlanan numunelerin fiziksel görüntüleri verilmiştir.

Numunelerin çekme mukavemeti, E modülü ve % uzama değerleri Tablo 2'de verilmiştir. Partikül dolgulu kompozitlerin çekme mukavemeti, matrise ilave edilen partikül yapısına, boyutuna ve oranına bağlı olarak değişkenlik göstermektedir. Ayrıca parçacık ve matris arasındaki ara yüzey özellikleri de önemlidir. Kompozitlerde dolgu kullanımı çok yaygın olup dolgu kullanım ana amacı maliyeti düşürmektir. Ancak kullanılan bazı dolgu maddeleri oran ve boyutlarına bağlı olarak polimerin mekanik özelliklerini zayıflatabilmekte, sertliğini ise artırabilmektedir. Bununla beraber kompozitlerde kullanılan organik veya inorganik dolgu oranının bir üst sınır değeri vardır.



Şekil 1. Çekme testi numuneleri

FULL TEXTS BOOK

Bu çalışmada dolgu maddesi miktarının artmasıyla numunelerin çekme mukavemeti saf polyestere göre azalmıştır. Bunun nedeni fındıkkabuğu dolgu boyutu dağılımının geniş bir aralıkta olması olabilir. Bir başka olası neden ise fındıkkabuğu içindeki yumuşak bölgelerin varlığıdır. Yine kompoziti sıkı bir şekilde bağlayan polyester reçine yüzdesinin azalmasıyla beraber polimer matris ile dolgu içeriği arasındaki zayıf ara yüzey bağının kompozitin çekme mukavemetini azaltmıştır. Matristeki organik dolgu miktarı arttıkça topaklanma eğiliminin çekme mukavemetinin azalmasına neden olduğu yapılan birçok çalışmada belirtilmektedir (Khan ve arkadaşları, 2021; Lette ve arkadaşları, 2018; Huda ve arkadaşları, 2006).

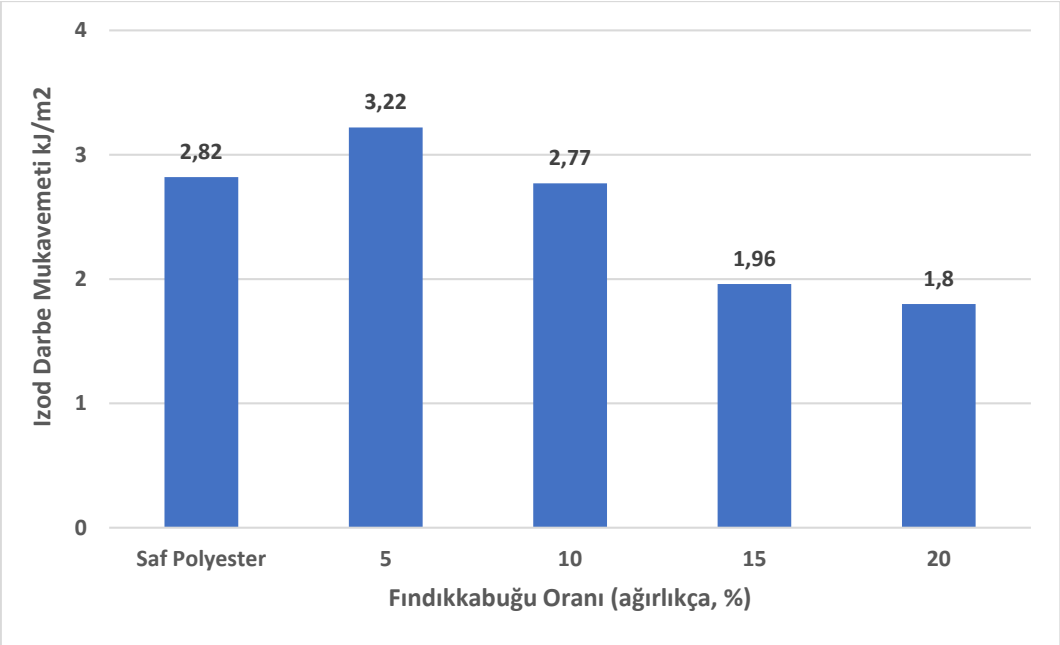
Tablo 2. Fındıkkabuğu dolgu oranına bağlı olarak numunelerin çekme testi sonuçları

Dolgu oranı, Ağırlıkça %	**Çekme Mukavemeti (MPa)**	**Elastisite Modülü (MPa)**	**% Uzama**
Saf Polyester	38,2	5450	0,54
5	29,5	5610	0,46
10	28,5	5450	0,42
15	28,1	5830	0,37
20	27,2	6150	0,35

Şekil 2'de fındıkkabuğu dolgu oranına bağlı olarak numunelerin Izod darbe mukavemeti özellikleri verilmiştir. Kompozit numunelerin darbe mukavemeti dolgu malzemesinin özellikleri, dolguların dağılım ve yoğunluğunu, matris malzemesi ile etkileşimi, kompozit üretim tekniği, dolgu maddesinin etkilendiği çevresel faktörler gibi birçok duruma bağlı olarak değişebilir. Organik dolgu malzemeleri, genellikle lif veya partikül halinde olabilir. Uzun lifler veya büyük partiküller genellikle daha iyi bir darbe mukavemeti sağlar çünkü enerjiyi dağıtmaya ve emmeye daha fazla fırsat verirler. Ancak, bu ilişki her zaman doğru değildir ve bazı durumlarda büyük dolgu boyutları istenmeyen sonuçlara neden olabilir. Yine dolgu malzemesinin yapıda homojen bir şekilde dağıtılması ve uygun bir yoğunlukta olması darbe mukavemetini yine olumlu etkiler.

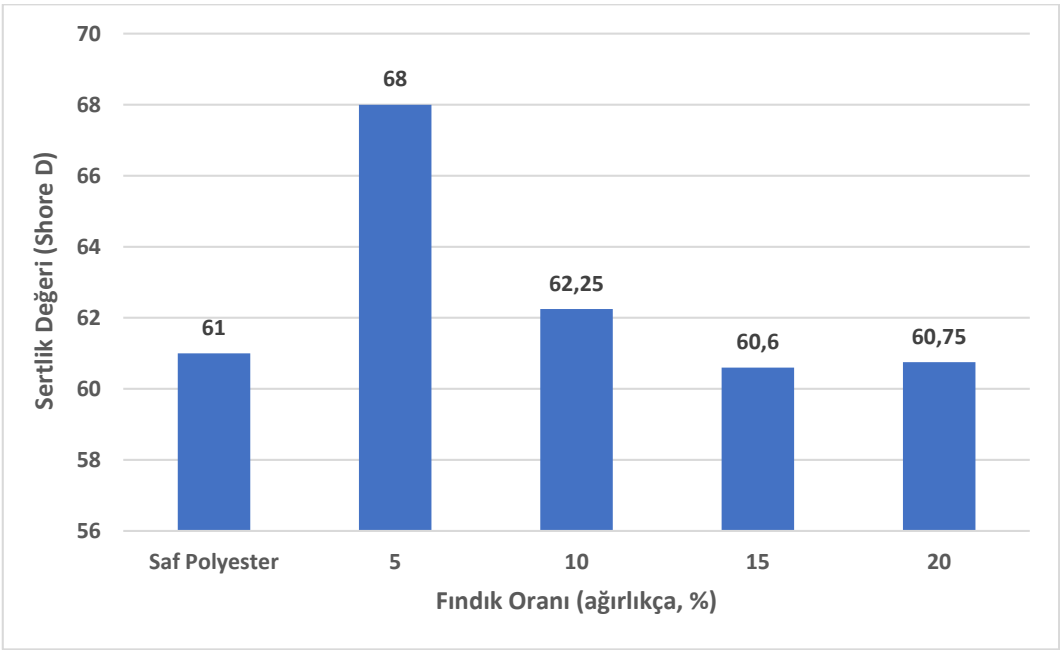
Bu çalışmada fındıkkabuğu oranı artması ile kompozitin darbe direncinde bir miktar artış gözlemlenmiştir. % 10 dolgu oranı ve sonrası ise darbe mukavemeti saf polyesterin darbe mukavemeti değerinin altına düşmüştür. Doyum oranına ulaştığı %20 dolgulu numunede ise en düşük değer tespit edilmiştir. Numunelerde dolgu boyutunun 1-400 mikron boyut aralığında olması darbe mukavemetine olumlu tesir ettiği, ancak % 10 ve sonrası polimer matris ile dolgu içeriği arasındaki zayıf ara yüzey bağı oluşması ve dolgu miktarı arttıkça topaklanma eğilimi darbe mukavemetini düşürdüğü düşünülmektedir.

FULL TEXTS BOOK



Şekil 2. Dolgu oranına bağlı olarak numunelerin Izod darbe mukavemeti özellikleri

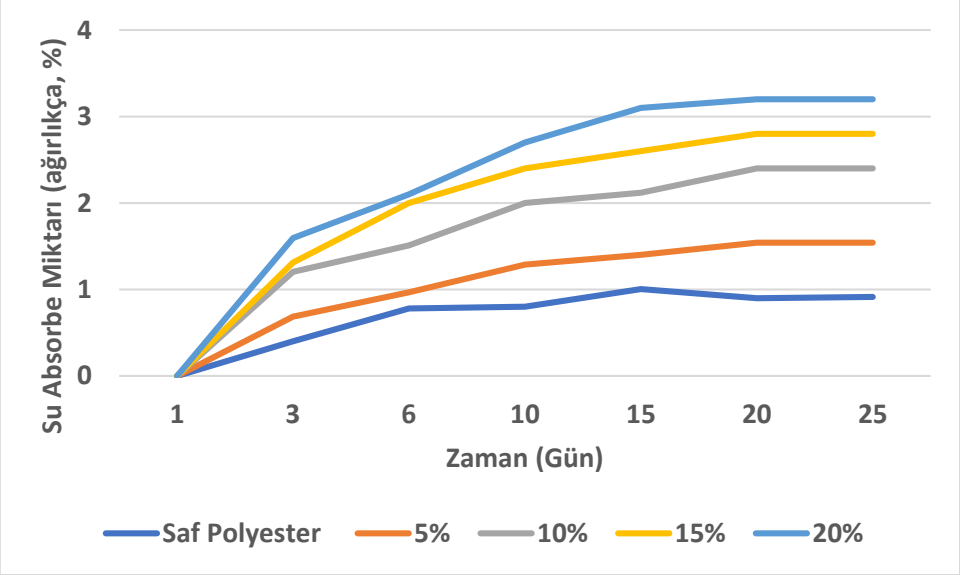
Şekil 3'te fındıkkabuğu dolgu oranına bağlı olarak numunelerin sertlik özellikleri verilmiştir. Kompozit malzemelerde organik esaslı dolgunun boyutu ve yapıya sağlayacağı sertlik özellikleri arasında karmaşık bir ilişki ortaya çıkar. Genel olarak, büyük boyutlara sahip dolgu malzemeleri ve yüksek yoğunluklu dolgular daha yüksek bir sertlik düzeyine katkıda bulunabilir, ancak malzeme tipine, dağılımına ve diğer faktörlere bağlı olarak değişiklik gösterebilir. Organik dolgu malzemelerinin kompozit malzemeyle birleştirilme süreci, sertlik özelliklerini etkileyebilir. Kompozit numune hazırlama aşamasında kullanılan presleme işlemleri, kompozit malzemenin homojenliğini ve dolayısıyla sertliğini etkileyebilir. Yâda açık döküm yapıldığında yoğunluk farkı sebebiyle dolgular dibe çökebilir. Yine organik dolgu malzemeleri nem, sıcaklık veya kimyasal etkileşimler dolgu malzemesinin özelliklerini ve dolayısıyla sertlik özelliklerini etkileyebilir. En yüksek sertlik değeri %5 dolgulu numunede elde edilmiş, sonrasında sertlik değerleri azalmıştır.



Şekil 3. Dolgu oranına bağlı olarak numunelerin sertlik özellikleri

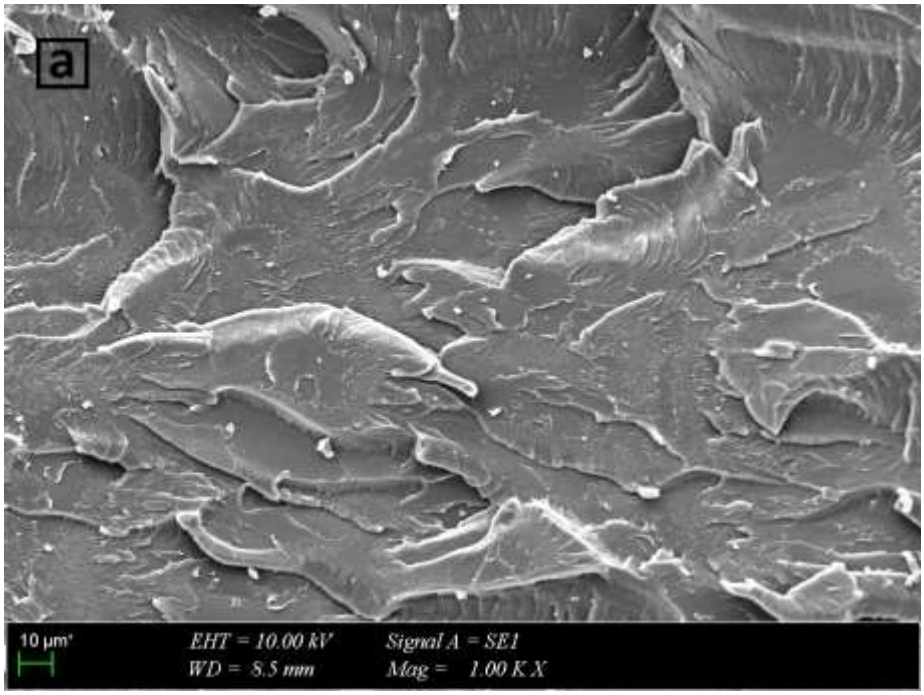
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Numunelerin su emme özellikleri şekil 4'te verilmiştir. Saf polyesterin su emme miktarı minimum seviyede tespit edilmiştir. Fındıkkabuğu dolgu miktarı arttıkça su emme oranı artmıştır. Fındıkkabuğu dolgu doyum oranı olan %20'de yaklaşık %3,2 su emme gözlemlenmiştir. Selüloz esaslı yapılarda, doğası gereği hidrofilik olan doğal dolguların varlığı, yüksek nem içeriğini ve hızlı su emme oranını açıklamaktadır (Mohammed, 2015).

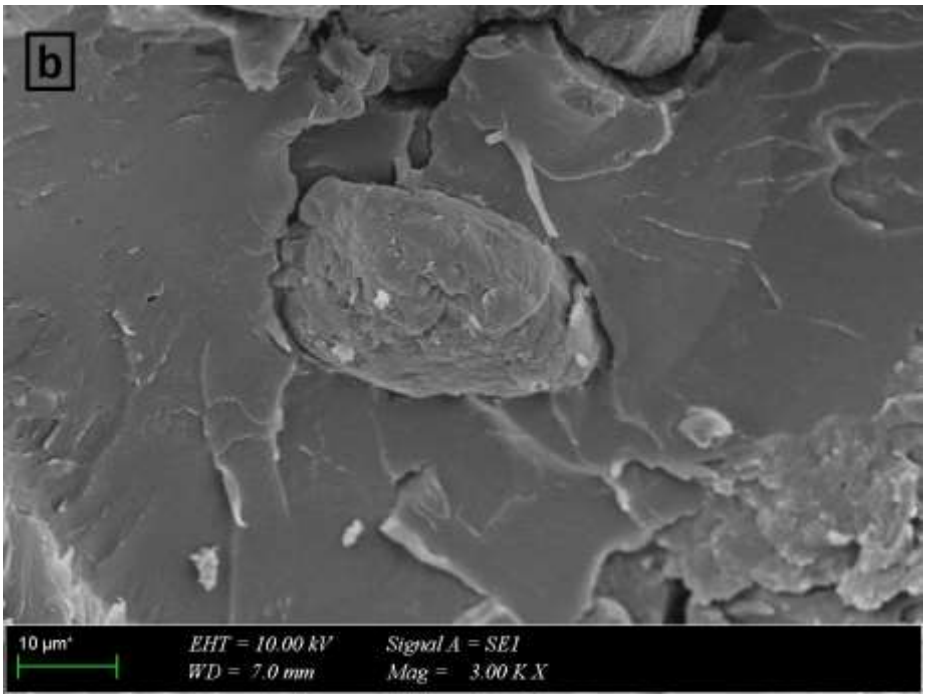


Şekil 4. Dolgu oranına bağlı olarak numunelerin su emme özellikleri

Numunelerin kırılma yüzeylerinin SEM görüntüleri Şekil 5a ve 5b'de verilmiştir. Saf polyesterin kırık yüzey görüntüsünden de (5a) anlaşıldığı üzere gevrek bir kırılma gözlemlenmiştir. %10 fındıkkabuğu dolgulu numenin kırık yüzey görüntüsünde (5b) fındıkkabuğu parçacığı görülmektedir. Resimden de anlaşılacağı gibi iyi bir yapışma olduğu söylenebilir. Görüntüdeki partikülün görünen boyutu 35-40 mikron civarında olduğu, görünmeyen kısmın da polyester içinde kaldığı anlaşılmaktadır. Bu çalışmadaki benzer gözlemler farklı çalışmalarda da rapor edilmiştir (Kartal, Naycı ve Demirer, 2019).



FULL TEXTS BOOK



Şekil 5. Kırık yüzeylerden SEM görüntüleri a) Saf polyester b) %10 fındıkkabuğu dolgulu numune

Numunelerin fiziki görüntüleri şekil 1'de görüldüğü gibi fındıkkabuğu ilavesi ile kabuğun kendi doğal rengi kompozite de geçmiştir. Saf polyester reçinesi renksiz ve şeffaftır. % 5 dolgu oranında hafif bir renk tonu varken dolgu oranı arttıkça renk tonu da koyulaşmıştır. Buradan da anlaşılacağı üzere fındıkkabuğu dolgusu kompozitlerde renklendirici olarak da kullanılabilir olduğu görülmüştür.

SONUÇLAR

Doğal dolgu maddelerinin yeşil kompozitlerde yaygın olarak kullanılmakta olup çevreye olumlu etki sunması, yenilenebilir kaynakların kullanımı, geri dönüşüm olanaklarının artırılması, biyobozunurluk, enerji tasarrufu gibi birçok avantaj sağlamaktadır. Ayrıca doğal dolgu maddeleri kompozit içinde polimer miktarını azaltarak kompozit malzemenin maliyetini önemli ölçüde düşürmektedir. Ancak polimerde kullanılan dolguların bir üst limiti söz konusudur. Bu çalışmada 1-400 mikron boyut aralığındaki fındıkkabuğunun polyesterde üst kullanım limiti ağırlıkça %20 olarak tespit edilmiştir.

Kompozit numunelerin en yüksek değerleri çekme mukavemetinde dolgusuz saf polyesterde, Elastisite modülünde %20 dolgu içerikli numunede, Izod darbe testinde %5 dolgulu numunede, sertlik testinde ise %5 dolgulu numunede tespit edilmiştir. Fındıkkabuğunun kendi doğal rengi kompozit matrise de geçtiği için renklendirici olarak ta kullanılabileceği değerlendirilmiştir.

Sentetik elyaflarla kıyaslandığında doğal dolgular oldukça ucuzdur. Bu nedenle, geleneksel sentetik dolgularla maliyetleri düşürmek yerine, gelecekte sentetik elyafın değiştirilmesini teşvik etmek için bu gibi çevre dostu dolguların kullanılması hem ülkeye hem de çevreye fayda sağlayabilir.

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FULL TEXTS BOOK

EVALUATION OF MALWARE DETECTION METHODS AND EMERGING THREATS IN CYBERSECURITY

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ABSTRACT

Malicious software, also known as malware, consists of codes or programs that disrupt or impede the operation of endpoint devices. The primary objectives of those who create these software are usually to encrypt files for ransom or to make a profit by selling the acquired data. Malware can manifest in various forms, such as phishing emails, infected files, software or system vulnerabilities, or contaminated USB drives. Due to the complex nature of malware, its detection presents certain challenges. For instance, rootkits can remain hidden in systems for extended periods, causing damage without detection, while others utilize polymorphic and metamorphic techniques to alter their codes with each infection, thereby evading detection systems. Despite various proposed methods to combat these threats, there is an ongoing increase in malware attacks. The continual evolution and growing complexity of malware threats have become a prominent reality. Recent research in 2023 has revealed a significant global increase in the number of malware attacks, with ransomware attacks showing a 20% increase compared to previous years. Moreover, cybersecurity firms detect an average of 350,000 new malware samples daily, clearly indicating the rapid development and spread of malware. This study presents a comparative analysis of malicious software and their detection methods. It also examines the challenges in detecting malware and the newly suggested diverse methods for protection. This research aims to highlight the new trends in malware and to create awareness for protection against them.

Keywords: Malware, Malware Detection, Ransomware, Rootkit, Cybersecurity Trends, AI and Cybersecurity, Ransomware Attacks

INTRODUCTION

In today's world, malicious software is defined as codes that disrupt or impair the functioning of endpoint devices. The detection of malicious software, which involves identifying and preventing these harmful programs, is a crucial aspect of computer security. This malevolent software, infiltrated into computer networks and individual devices by attackers, often activate without the users' knowledge, interfering with or disrupting the normal operations of the devices. The importance of malware detection in cybersecurity cannot be overlooked as it serves to protect computer systems from potential data loss, vulnerabilities, and unauthorized access by identifying and mitigating threats (Vasani et al., 2023). The diversity of malware significantly increases the complexity of the cybersecurity landscape today.

Ransomware encrypts critical data and demands ransom, often targeting critical infrastructures such as government agencies and the health sector. Trojans sneak into computers without users' awareness and engage in harmful activities. Viruses spread by infecting files, damaging systems in the process. Worms can self-propagate, causing widespread damage across networks. Spyware covertly collects users' personal data, leading to privacy breaches. Adware displays unwanted or harmful advertisements to users, while botnets orchestrate coordinated attacks using many infected devices. Rootkits deeply embedded in the system become hard to detect. This variety necessitates the continuous re-evaluation and enhancement of cybersecurity strategies.

The primary reason behind the effectiveness and danger of malicious software lies in its complex nature. This complexity makes it increasingly challenging for traditional security systems to effectively detect such software. Modern malicious software employs various methods to hide itself, prevent detection,

FULL TEXTS BOOK

and bypass defense mechanisms. For example, some use polymorphic and metamorphic techniques to change their code with each infection, thereby evading signature-based detection systems. Others use encrypted or stealth communication channels to deceive security tools that analyze network traffic. Additionally, malicious software can detect sandbox environments and behave harmlessly within them, thereby nullifying analysis and detection efforts. Advanced malware like rootkits, for instance, can remain hidden in a system for extended periods, posing a significant threat. Rootkits work by intercepting or altering system calls, making them hard to detect by regular security scans and antivirus programs. This necessitates continual updates to security systems, though it may not always be possible to detect and prevent such software with current technologies.

The complexity of malicious software forces cybersecurity experts to continually adapt to new threats and update existing defense strategies. New types of malwares, frequently changing tactics, and advanced concealment methods require security researchers and solution providers to constantly innovate and develop proactive approaches. The management of security systems and the detection of threats require extensive technical knowledge and continuously updated skills. However, the lack of adequate training and experience in this field can make it difficult to correctly identify vulnerabilities and implement effective measures. The development of artificial intelligence (AI) and machine learning (ML) techniques has a dual effect in the field of cybersecurity. While these technologies offer new opportunities for attack detection and prevention, they also complicate the methods of attack developed by malicious individuals. AI-powered attacks can bypass traditional security systems, rendering them ineffective. Malware has become one of the favorite tools of cybercriminals, and the increasing skill and intelligence of attackers make these threats more dangerous and unpredictable. The rapid change and development of technology continuously create new challenges in cybersecurity. New technologies and applications also bring new security vulnerabilities.

In recent years, there has been a particular focus in cybersecurity on the rise of ransomware threats and the damages they cause in critical areas such as industrial systems, healthcare organizations, and government networks. For example, reports indicate that in the United Kingdom, losses from online banking fraud reached 174.4 million British Pounds in 2015, a 23% increase compared to 2013 (Saeed et al., 2023). According to Verizon's 2023 Data Breach Investigations Report, 24% of all breaches were caused by ransomware attacks (Verizon, 2023). According to the 2023 report by VirusTotal, over 3 billion samples were analyzed between January 2021 and May 2023. The report highlights the presence of various software embedded in legitimate installation packages, such as ISO files, and points out the distribution of malicious software like CryptoNotepad across platforms including Windows, Telegram, and AnyDesk. The report also notes that these files are sometimes distributed as highly compressed email attachments, underscoring the diverse methods employed for their dissemination (VirusTotal, 2023). Coalition's 2023 report states that 19% of cyber insurance claims were related to ransomware, with an average loss amount exceeding $365,000 (Coalition, 2023). Unit 42's report indicates that the average ransomware demand is $650,000, but actual payments fall 46% below this amount (Unit 42, 2023). Research by ReversingLabs shows that the number of malicious packages discovered in open-source package managers has increased by 1300% in recent years (ReversingLabs, 2023). These statistics demonstrate that cyber threats continue to rise despite AI-based countermeasures and that challenges in this field are increasingly growing.

To date, scientists in this field have conducted various literature reviews and surveys to thoroughly examine cybersecurity studies. These studies have typically focused on specific aspects of cybersecurity. For instance, some have explored the Internet of Things (IoT) (George et al., 2017), while others have delved into the detailed detection of malicious software (Bensaoud, et al., 2024; Ling et al., 2023; Amira et al., 2023). Additionally, there is a significant number of review articles related to artificial intelligence studies (Gaber et al., 2024; Houy, N. 2014; Cen et al., 2024; Maniriho et al., 2024; Gopinath & Sethuraman, 2023; Begovic et al., 2023). Alongside this, there are research and surveys on mobile-based malware (Maniriho et al., 2024; Deldar & Abadi 2023). Despite these detailed studies, a feature-based comparative presentation of malicious software and detection methods has not been provided in any study. To eliminate this gap, we offer an evaluation of malicious software and detection methods based on features.

FULL TEXTS BOOK

This research provides an in-depth analysis of malware detection methods and elucidates their similarities and differences through a comparative approach. It also highlights the new trends and strategies in cyber-attacks. Despite effective measures, it emphasizes that cyber-attacks continue to increase. It has been discovered that malicious software continuously changes and improves its methods of hiding, monitoring, and transforming. In addition, malware has been compared based on various characteristics such as concealment methods, types and speeds of propagation, recent trends in spread, detection difficulties, and detection methods. Comparative data are presented in a table for easy comparison of malicious software.

The research also extensively examines signature-based, behavior-based, machine learning-based, and hybrid detection methods, evaluating their advantages and limitations. The comparative assessment of these methods demonstrates that there is no one-size-fits-all solution for malware detection. These findings are significant for cybersecurity practices and underscore the importance of keeping up with the latest malware detection techniques to protect computer systems.

In addition to these evaluations and comparisons, the study has thoroughly investigated the challenges in detecting malware, advanced concealment methods, and detection deficiencies. It also highlights attacks conducted using AI and ML, increasing security challenges faced by IoT devices, cybersecurity threats in cloud technologies, phishing and social engineering techniques, security vulnerabilities related to advanced cryptography, and concerns about data breaches and personal privacy as new cybersecurity threats.

Another key focus of the research is to raise awareness in the field of cybersecurity and educate users about these threats. In this context, current security measures and defense strategies are discussed with the aim of enhancing cybersecurity awareness.

In Chapter 2 of the study, a literature review introduces malicious software and its types, including detection methods for each. This chapter also compares malware and detection methods. Chapter 3 discusses new trends and future strategies. In the conclusion, the research findings are summarized, and recommendations for future studies are provided.

BACKGROUND AND RELATED WORKS

Malicious Software Types

Malicious software, or malware, consists of various harmful programs designed to infiltrate computers or networks without the user's permission, causing damage (Figure 1). Computer viruses are malicious programs that replicate themselves without the user's knowledge and spread by attaching themselves to other programs or operating system files. They corrupt files, delete data, or consume system resources, reducing the computer's performance. Detection of computer viruses typically involves signature-based scans and heuristic analyses. Signature-based scans detect malware by using the digital "signatures" of known viruses. This method is effective against common and recognized viruses but has limited effectiveness against new or modified viruses. Heuristic analyses are used to detect unknown viruses by analyzing software behavior and code structure to identify potentially harmful activities that deviate from the norm.

Worms are malicious software that independently spread over networks. They propagate themselves through email, messaging programs, or exploiting network vulnerabilities. Worms slow down systems by congesting network traffic, steal important information, or download other malware. Worm detection typically involves network traffic analysis and behavioral analysis techniques, which is created by worms on the network. Behavioral analysis observes unusual behaviors of worms in computer systems. For example, behaviors like file copying, accessing network ports, or constant network connectivity of a worm are identified through this analysis method.

FULL TEXTS BOOK

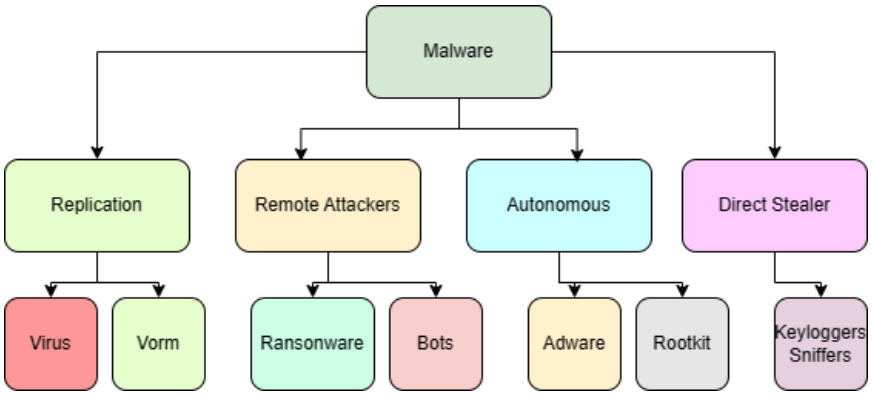


Figure 1. Classification main malware types

Detection of viruses and worms involves traditional methods like signature-based scans and network traffic analyses, as well as machine learning and AI-based algorithms (Souri & Hosseini, 2018).

Trojan Horses hide within seemingly legitimate software to gain the user's trust. Once activated by the user, they initiate their harmful functions, such as creating backdoors, making unauthorized changes in the system, or stealing sensitive data. Trojans are often distributed through email attachments, fake software updates, or malicious websites. As intrusion methods into computer networks, they exploit security vulnerabilities, weak passwords, or users' susceptibility to social engineering tactics. Detection of this type relies on advanced behavioral analysis and anomaly detection systems, as traditional antivirus software often overlooks the camouflage capabilities of Trojans.

Spyware collects personal and sensitive information by monitoring users' internet activities. This information is used for advertising purposes or sold to more malicious individuals. Spyware often installs itself without the user's knowledge and exhibits privacy-violating behaviors. In their study, Egele et al. (2007) mentioned that spyware covertly monitors users' behaviors, recording their web browsing habits and stealing passwords. Detection of spyware typically involves monitoring the internet activities of users and identifying unusual changes in the system. Additionally, advanced software that analyzes user behavior and identifies abnormal activities uncovers the covert operations of spyware.

Ransomware encrypts users' files or systems, blocking access and demanding a ransom to decrypt. This type of software can cause serious damage in corporate networks and lead to data loss. Ransomware spreads by exploiting security vulnerabilities or through malicious email attachments. The attack infrastructure of ransomware is complex, including social engineering tactics, initial attack vectors via email, weakly secured websites, and malicious software known as 'Exploit Kits.' These kits scan the victim's computer for vulnerabilities and attempt to load ransomware (O'Kane et al., 2018). Detection of ransomware involves systems that monitor suspicious file behaviors and encryption activities. These detection methods help in early identification of ransomware. Additionally, email filtering and web security solutions provide proactive defense by blocking the propagation routes of ransomware.

Botnets are networks created by controlling numerous infected computers. These networks are used for sending spam, conducting DDoS attacks, or engaging in other malicious activities. Botnets often operate in the background without the user's knowledge. Infected devices usually join botnets due to outdated software or weak security measures. Botnet detection involves network traffic analysis and monitoring of abnormal network activities. These detection methods track the communication of botnets with their command-and-control servers and analyze the activities of infected devices on the network. Considering the different configurations of IRC and P2P-based botnets, specialized strategies are developed for these types' more distributed and hard-to-detect structures.

Rootkits are types of malicious software that stealthily infiltrate computer systems and take control of normal operating systems or security measures. These advanced malware infiltrate operating system kernels or other critical system components using methods that make detection difficult. Rootkits are ideal for monitoring, controlling, and stealing data, making them extremely dangerous. It is difficult to detect by using antivirus programs and other security tools. This software uses various techniques to

FULL TEXTS BOOK

hide themselves, including kernel-level hooking, API hooking, and direct kernel object manipulation. These techniques allow rootkits to overshadow normal activities in the system and bypass security mechanisms.

As a result of our detailed literature and report review, we compared the malware and created Table 1. While doing this, we took 14 features into consideration. We determined these features by averaging the results we obtained from different studies. Thanks to these features we chose, we were able to fully compare malware based on their features. These features generally present a comparative view of the fundamental characteristics of malicious software, such as their propagation methods, affected platforms and targets, and details specific detection methods and prevention strategies for each type.

Table 1. Comparison and characteristics of different types of malwares

Feature / Malware Type	**Virus**	**Worm**	**Trojan**	**Spyware**	**Ransomware**	**Botnets**	**Rootkits**
Self-Replicating	Yes	Yes	No	No	Partially	Yes	No
Evasion	Partially	Yes	Yes	Yes	Yes	Yes	Very Strong
Metamorphic Feature	Yes	Yes	No	No	Partially	Partially	Partially
Polymorphic Feature	Yes	Yes	Partially	Partially	Partially	Partially	Partially
Spread Trend in Recent years	High	High	Medium	High	Very High	High	High
Affected Platforms	Various	Various	Various	PC/Mobile	PC/Mobile	Various	PC
Primary Purpose	Damage	Rapid spread	Secret Access	Information Theft	Ransom Demand	Control	Secret Access
Spread Method	File Sharing	Network Vulnerabilities	Deception	Social Engineering	Social Engineering	Network Vulnerabilities	Advanced Techniques
Detection Difficulty	Medium	High	High	Medium	Very High	High	Very High
Prevention Methods	Antivirus	Firewall	Security Training	Antispyware	Backup	Firewall	Special Tools
Detection and Cleaning Tools	Antivirus	Antivirus	Antivirus	Antispyware	Antivirus	Antivirus	Special Tools
Detection Methods	Signature-Based Scanning, Heuristic Analysis	Network Traffic Analysis, Behavioral Analysis	Advanced Behavioral Analysis, Anomaly Detection	User Activity Monitoring, Unusual Changes	Suspicious File Behavior, Encryption Activities	Network Traffic Analysis, Abnormal Network Activities	Advanced Techniques, Bypassing Security Tools
Spread Speed	Fast	Very Fast	Medium	Medium	Fast	Very Fast	Medium
Advanced Threat Detection	Limited	Yes	Yes	Yes	Yes	Yes	Very Strong

Malware Detection Methods

Malware detection is critical for computer security and is performed using various methods. These include behavior-based, signature-based, machine learning-based, and hybrid detection methods.

Signature-Based Detection Method

Signature-based detection protects systems by scanning for specific malware using predefined signatures and is widely used by popular antivirus and malware scanners (Figure.2.). It is one of the most employed detection techniques in cybersecurity (Gaber et al., 2024). This technique identifies known malware by analyzing their unique characteristics or "fingerprints." However, this method has its limitations. According to Souri and Hosseini (2018), signature-based detection is only effective

FULL TEXTS BOOK

against previously identified threats and therefore struggles to detect new or unknown types of malwares (Souri & Hosseini, 2018).

As noted by Akhtar and Feng (2022), susceptibility to the infiltration of polymorphic malware stems from these types of malware's ability to change their appearance and evade signature detection; however, reverse engineering and static analysis methods support signature-based detection by decompiling malware binary files and discovering harmful patterns and signatures within the code. In the study by Abiola and Marhusin (2018), the dependency on maintaining an up-to-date signature database and how this can lead to resource intensity and coverage gaps was mentioned.

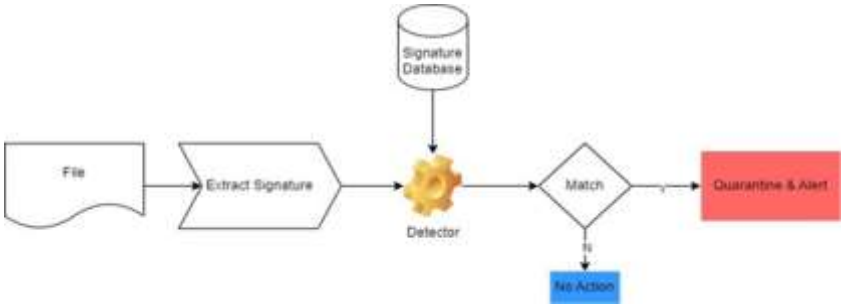


Figure 2. Signature-Based Malware Detection Flow Diagram

In response to these challenges, various implementations of signature-based detection methods have been developed in the field of cybersecurity. Applications in network-based architectures classify the security level for ransomware detection and prevention by analyzing incoming and outgoing traffic. According to the systematic literature review by Maniriho et al. (2024), while this approach can be effective in detecting new or improved malware variants, reducing the dependency on frequent signature updates in the field of Windows malware detection remains a significant research topic.

In their research, Prabath et al. (2023) explore alternative and more sophisticated detection methods to increase the effectiveness of malware identification; these methods can effectively identify known malware and take appropriate action to prevent potential damage.

Behavior-Based Detection Methods

Behavior-Based Detection focuses on analyzing the behavior of software or applications to identify malicious activities, as opposed to relying on signature-based techniques. Behavioral detection methods effectively identify malware actions and interactions even in the face of evasion attempts by signature-based detection and create a strong defense tool when combined with other strategies. It is fundamentally based on monitoring system activities and behaviors during runtime. This method can effectively detect previously unknown or zero-day malware that does not yet have a known signature, offering a significant advantage over the limitations of traditional signature-based detection methods (Souri & Hosseini, 2018). Behavioral detection methods, as demonstrated in the 2024 study by Azeem et al., provide a high accuracy rate of 97.39% in malware detection using wrap-based techniques. According to Vasani et al. (2023), platforms like VirusTotal consolidate multiple antivirus engines and malware analysis tools to provide a comprehensive overview of the behavior of submitted files.

Machine Learning-Based Detection Methods

Machine learning-based detection methods have garnered significant interest in the field of cybersecurity for malware detection. These approaches use modern machine learning algorithms to distinguish between malicious and benign files and often provide a high level of accuracy. The machine learning workflow involves feature extraction, model training, and evaluation steps in malware detection and classification, and various techniques used in this field prove the effectiveness of algorithms with high detection rates. These methods are employed for the identification and mitigation of various types of malwares, including Trojans, ransomware, crypto miners, worms, and botnets. The 2024 literature review by Gaber et al. (2024) highlights the importance of adaptation to cyber threats and detection of zero-day vulnerabilities and unknown threats using AI and machine learning-based detection techniques.

FULL TEXTS BOOK

A classification of malware detection techniques has been developed through a systematic literature review, providing a detailed classification of machine learning methods for malware detection (Mohammed., 2021).

Hybrid Detection Methods

Hybrid detection methods in cybersecurity combine multiple techniques to detect and combat various types of malwares (Figure.3). These methods have become increasingly important, especially due to the rising complexity and sophistication of advanced malware programs, such as Trojans, ransomware, crypto miners, worms, and botnets (Gaber et al., 2024). Hybrid detection systems offer effective solutions against the complex nature of these software types that can encrypt, hijack, and leak data. An example of a hybrid detection system is the combination of API Call Graphs (ACGs) with byte-level image analysis. This approach presents a unique and effective way to detect malware (Rimon et al., 2022). The 2023 study by Yang et al. shows that improved hybrid detection methods combining multiple techniques allow for more accurate identification of malware (Yang et al., 2023).

According to Maseno et al. (2022), hybrid detection systems have increased the ability to identify new and emerging threats due to their capacity to adapt to and learn from various data sources and inputs. However, hybrid systems also face challenges. Damodaran et al. (2022) point out that an increase in false positives can occur if the various detection methods used in hybrid detection systems do not complement each other sufficiently or fail to identify certain malware characteristics. Therefore, a careful balance in the design of these systems is crucial.

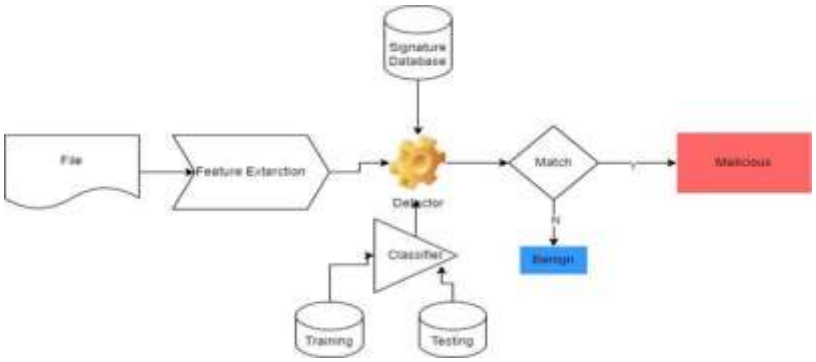


Figure 3. Hybrid Detection Malware Detection Workflow Diagram

The development of hybrid detection tools continues to aid in the fight against the ever-evolving cyber threats. For example, a research study focuses on word2vec-based transfer learning and multi-modal image representation to present innovative approaches for malware detection. These innovative approaches provide valuable insights for the cybersecurity community by offering new ways to characterize and detect malware (Azem et al., 2024). Hybrid detection tools enhance the accuracy and efficacy of cybersecurity defense strategies by leveraging the strengths of various detection techniques.

Challenges in Malware Detection

Malware detection is an ever-evolving and complex battle within the field of cybersecurity, hence the development of many different techniques. These techniques work on experimental scenarios to identify and classify malware. Windows specifically uses methodologies like feature selection from deep learning and log data to detect peculiar behavior patterns associated with malware designed for its operating system (Alraizza et al., 2023). Quickly and accurately detecting threats also brings a set of challenges. One of the main challenges in this area is the behavior of some legitimate software that mimics malware. This can lead to an increase in false-positive results in detection processes. For example, some security software may exhibit behavior similar to malware during normal activities, which can lead to false alarms by security systems (Azem et al., 2024).

Another challenge is the resource consumption of security systems in the face of ever-increasing data volumes and complex cyber threats. The necessity of continuous monitoring of system activities increases resource consumption, especially in large and complex network structures. This poses a serious problem for institutions with limited resources. Fortunately, tools like Google Rapid Response

FULL TEXTS BOOK

(GRR) help overcome these challenges by providing scalable and extensible solutions to analyze the behavior of malware in systems (Vasani et al., 2023).

Today's continuous evolution of malware and the emergence of new threats increase the need for resources. Windows emphasizes the importance of high computational resource requirements, especially for processing large datasets and training complex models in malware detection. Current statistics show that security threats are ever-present, and significant challenges still exist in protecting computer systems (Azem et al., 2024).

Advanced Evasion Techniques and Detection Deficiencies

Malware is increasingly utilizing more sophisticated methods of hiding, monitoring, and transforming. These include polymorphic and metamorphic techniques, rootkit usage, and complex network traffic obfuscation tactics. Polymorphic and metamorphic malware constantly change their code to evade standard signature-based security systems. Polymorphic software alters its structure with each infection, not giving a fixed signature. Metamorphic software rewrites its own code, displaying an entirely different structure with each infection. Rootkits embed deeply into operating systems or applications, allowing them to hide from current antivirus programs or other security applications. Complex network traffic obfuscation tactics deceive network-based detection systems by making malware traffic appear as normal network activity. This advanced evasion, monitoring, and transforming methods create challenges in malware detection, requiring security professionals to continually develop new strategies.

Challenges Brought Using AI and ML

AI and ML have been increasingly used in malware detection and classification in recent years, offering significant advantages in speed, accuracy, and flexibility over traditional methods (Gaber et al., 2024). Among ML-based methods are techniques such as K-Nearest Neighbors, decision trees, and random forests (Azem et al., 2024). ML approaches are effective in large malware datasets and often outperform traditional methods. The use of deep learning and AI requires cybersecurity professionals to better understand complex threats and re-evaluate traditional detection methods. Additionally, the increasing use of generative AI techniques brings new attack vectors, such as fake data injection, while defense strategies against these complex threats involve challenges (Dhoni & Kumar, 2023). Cybersecurity professionals can enhance their abilities to combat an increasing variety of cyber threats by incorporating AI and machine learning technologies into malware detection strategies.

AI and ML hold significant potential in the field of cybersecurity. However, realizing this potential brings its own significant challenges. AI and ML-based systems typically offer high accuracy rates in identifying malware. Still, they require extensive and diversified datasets for effective training. Collecting, processing, and labeling comprehensive datasets require significant time and resource investment, and maintaining the currency and representativeness of these datasets requires ongoing effort. Another challenge for AI and ML models is their susceptibility to manipulation by malicious actors. Attackers can deceive the system with misleading or poisonous data during the model's learning process.

Such attacks lead to false positives or negatives, resulting in security vulnerabilities and dangerous false alarm rates. Continuous testing, updating, and enhancing the security of AI and ML systems are also essential. These technologies must be continuously improved and updated to adapt to the ever-changing nature of malware and new types of threats. This process means a continuous effort in research and development, especially in the field of cybersecurity. Effective use of AI and ML systems requires expert knowledge and skills. The complexity and technical difficulties of these systems present a barrier for institutions without sufficient technical expertise. Additionally, the lack of transparency in how these systems work opens questions about the understanding and reliability of decision-making processes. Lastly, AI and ML-based detection systems can lead to privacy violations and misuse while processing user data, necessitating careful attention to data protection and user privacy issues.

Evaluation of Malware Detection Methods

Creating specific criteria for evaluation is very important to effectively assess malware detection methods. Malware programs have evolved into various complex and sophisticated variants, such as ransomware, Trojans, crypto miners, worms, and botnets, each with different characteristics and

FULL TEXTS BOOK

challenges (Gaber et al., 2024). Therefore, factors such as detection accuracy, false-positive rates, scalability, and adaptability to new threats must be considered in the evaluation process. Comparative evaluation, as presented in Table 2, emphasizes the effectiveness and need for adaptation of malware detection techniques against the constantly evolving cyber threat environment. It also underscores the need for ongoing innovation and development to stay ahead of potential threats. Despite significant advancements in malware detection methods, there are still natural limitations in current techniques that need to be addressed.

Table 2. Comparison of Different Malware Detection Methods

Features	Signature-Based	Behavior-Based	Machine Learning Based	Hybrid
Known Detections	Each malware has its unique signature.	Identifies malware by monitoring software behavior.	Machine learning can detect hidden patterns of malware.	Combines static and dynamic analyses, particularly effective for detecting packed files.
New Detections	**Low** new malware detection can be time-consuming.	**Medium** new malware behaviors might not conform to known harmful patterns.	**High** capable of detecting new malware with continuous learning and evolving ability.	**High** accurately and quickly detects new and packed malware.
Zero-Day Vulnerabilities	**Very Low** new attack vectors may not be detectable with this method.	**Medium** has the potential to detect zero-day vulnerabilities.	**High** trainable models can detect new and unknown threats.	**High** combination of static and dynamic analyses is effective in detecting zero-day threats.
Sensitivity to Polymorphic Malware	**High** can evade detection with signature changes.	**Medium** can detect in some cases with behavioral changes.	**Low** effectively classifies polymorphic malware.	**High** various analysis techniques are used to detect polymorphic threats.
Need for Continuous Updates	**High** signatures need to be constantly updated for new malware.	**Medium** behavioral patterns of new malware may need continuous updates.	**Low** the model can be updated with training datasets.	**Medium** static and dynamic analyses need updates, but automated learning processes are also present.
Effectiveness Against Evolving Threats	**Low** often unable to detect new and unknown malware.	**High** dynamic and adaptable structure makes it effective against new threats.	**Very High** flexible and adaptable structure allows for continuous improvement against new threats.	**Very High** combination of static and dynamic analyses offers effective solutions against evolving threats.
Compatibility with ML/AI	**Low** typically relies on a static and limited database.	**Medium** has potential for integration with machine learning.	**Very High** utilizes the latest technologies in ML and AI techniques.	**Very High** achieves high accuracy rates using various ML algorithms.

As highlighted by Ranveer and Hiray (2015), despite many efforts to enhance the capability of detection methods, the lack of analysis on the current trends of malware threats leads to potential gaps in knowledge and protection. Furthermore, as malware continues to evolve and become more complex, detection techniques must constantly adapt to stay ahead of potential threats (Aboaoja et al., 2022). False positives and negatives can pose significant challenges to the accuracy and reliability of malware detection methods.

NEW TRENDS AND THREATS IN CYBERSECURITY

The rapid development of technology in recent years has led to the emergence of new trends and threats in cybersecurity. The increasing integration of the Internet and the evolution of digital technologies compel cybersecurity professionals to continually develop new strategies.

FULL TEXTS BOOK

The rise of AI and ML, the growing use of IoT devices, advancements in cloud technologies, increases in phishing and social engineering tactics, next-generation cryptography, growing data breaches, and privacy concerns are among the significant developments in this sector. Cybersecurity threats today include attacks conducted using AI and machine learning, increased security challenges faced by IoT devices, cybersecurity dangers in cloud technologies, phishing and social engineering techniques, security vulnerabilities related to advanced cryptography, and data leaks and privacy concerns. These topics are subsequently examined in detail.

AI and Machine Learning-Based Attacks

AI and ML present both opportunities and challenges in the field of cybersecurity. As per the report by The Economist Intelligence Unit (EIU), AI and ML can offer powerful tools to detect, prevent, and respond to cyber-attacks more easily. For example, MasterCard uses AI and ML for Decision Intelligence, a security platform that can identify fraud behaviors more readily than human observers (The Economist Intelligence Unit 2021).

However, AI and ML can also be misused by cybercriminals. The latest report by ENISA emphasizes that AI and ML provide cyber attackers with the ability to conduct faster, more scalable, and more effective attacks than traditional methods. AI and ML enable cybercriminals to use natural language generation (NLG) or deepfake technologies to create fake emails, websites, or social media accounts (European Union Agency for Cybersecurity, 2023).

Cybersecurity applications of AI and ML can vary from sector to sector. Some industries acknowledge that AI and ML can be more critical and sensitive in terms of cybersecurity. For example, industrial control systems (ICS) can use AI and ML to manage vital infrastructures like energy, transportation, or healthcare. These systems can be vulnerable to cyber-attacks, and the consequences of such attacks can be severe in terms of physical, financial, or human life. Therefore, cybersecurity applications for AI and ML must consider sectoral characteristics, standards, and regulations (Cozzupoli AND Salomon, 2024).

IoT Security

The Internet of Things represents a network of uniquely identifiable connected devices capable of processing and communicating data without or with human intervention. A possible future scenario for IoT is predicted as follows: When 50 billion devices are connected to the Internet, and if 1.1% of them (approximately 55 million devices) are hacked and remotely controlled, each device could generate attack traffic equivalent to gigabit Ethernet. This "zombie army," when used for DDoS attacks, could allow attackers to generate 4.47 to 81.8 trillion frames per second or 55 petabits. This could exceed the defense capacity of any single service provider and create a difference of 183333 to 1 when compared to the fastest network interface ever built (300Gbps). This information provides significant insight into the security of IoT devices and the scale of potential cyber threats, highlighting the importance of security measures in this area (George et al., 2017).

Cloud-Based Cyber Threats

Cloud-based cyber threats refer to malicious attacks and security vulnerabilities targeting cloud computing infrastructure. These threats can result in serious risks such as data breaches, identity theft, and service disruptions. According to the "Global Threat Report 2024," cyber-attacks in the cloud environment saw a 75% increase in 2023 compared to 2022. This increase indicates a 110% rise in cloud-aware attack cases and a 60% increase in cloud-agnostic cases. Cloud awareness refers to the ability of threat actors to compromise cloud resources and use those resources' cloud-specific features for their purposes. Particularly, eCrime actors are highly active in targeting cloud environments, with 84% of cloud-aware attacks being conducted by such actors (Crowdstrike Report, 2024).

Phishing and Social Engineering

Phishing is a common cybercrime method where attackers impersonate trustworthy organizations like banks or online service providers to deceive individuals into disclosing sensitive information such as passwords or credit card numbers. This deception is often carried out through fake emails or websites that closely resemble the real ones. Attackers can use the stolen information for malicious purposes like identity theft or financial fraud. Phishing attacks pose a significant threat to individuals and

FULL TEXTS BOOK

organizations, hence the importance of recognizing phishing indicators such as suspicious email requests or unusual website URLs. Social engineering involves tactics to extract sensitive information by deceiving or manipulating people. This can be done through phishing emails, fake websites, phone scams, and false identities. Social engineering attacks bypass technical security measures by exploiting human factors (Dave et al., 2023).

Supply Chain Attack

An attack on an organization's IT systems via third-party suppliers or service providers. These attacks often occur through software updates or other IT services and can cause widespread damage. ENISA's report delves into the increasing frequency and complexity of supply chain attacks. The report notes that 8 supply chain attacks were reported in 2020 (33%) and 16 attacks from the beginning of 2021 to July (66%) (ENISA REPORT 2021). Gartner's 2023 Supply Chain Risk Management Survey Report states that 63% of participants experienced a supply chain attack in the past year, highlighting the importance of measures businesses need to take. These measures include implementing a software supply chain security program, selecting trusted vendors, updating software, educating employees, using software composition analysis tools, and developing plans to respond to attacks (Gartner Report, 2023).

Next-Generation Cryptography Threats

Next-generation cryptography threats involve more sophisticated and effective attacks compared to traditional encryption methods; they focus particularly on algorithms that could be decrypted by quantum computers. These dangers could profoundly affect existing cryptographic infrastructures and herald a new era in information security. Considering the importance of cryptography in cybersecurity, it's foreseeable that innovations in this field could create new security vulnerabilities and threats. The State of Security 2023 report draws attention to the increase in data breaches and privacy concerns with the rising use of cloud-based systems. While cloud technologies facilitate data storage and processing, they also have the potential to create new risks and security vulnerabilities (Tripwire Report, 2023).

These topics present complex challenges that require continuous updates to cybersecurity strategies. In the coming years, more innovations and developments are anticipated in these areas. It is vital for cybersecurity professionals to adapt to these new threats and counter them effectively.

Ransomware and Advanced Attack Tactics

Ransomware is a type of malware that encrypts victims' files to block access, particularly damaging critical infrastructures such as government institutions, the healthcare sector, and industrial systems. Rehman et al. (2024) have conducted comprehensive literature reviews on detection methods and tools to mitigate potential attacks against this increasing threat. In recent years, these types of cyberattacks have become more common and complex, leading to numerous high-profile incidents worldwide. According to Cybersecurity Ventures' 2021 report, there was an estimated ransomware attack every 11 seconds in 2021, a significant increase from every 14 seconds in 2019. Wardle's 2023 blog post provides an analysis of new malware families identified last year, noting an increase of over 50% compared to 2022 (Wardle ,2023). These reviews offer critical findings on the use of artificial intelligence (AI) in malware detection and the challenges in this area (Gaber et al., 2024). In addition to ransomware, various types of cyber threats that require detection and mitigation are present.

Polymorphic and Metamorphic Malware

Polymorphic and metamorphic malware possess advanced evasion capabilities by constantly changing themselves. The ongoing evolution of cyber threats has made these types of malware a significant challenge for hackers and malicious actors, complicating the battle with classic security measures.

Metamorphic malware resists traditional signature-based detection techniques and continually renews itself to circumvent these techniques. This type of malware complicates detection by subjecting each of its copies to a unique encryption or transformation process, appearing in different forms each time (Skoudis & Zeltser, 2003). Polymorphic malware undergoes a transformation process that ensures each copy is unique, making it difficult to be detected with a fixed signature (Zhang et al., 2007). These ever-changing structures aim to overcome traditional security measures and push cybersecurity experts to develop new detection and defense strategies (Christodorescu et al., 2007).

FULL TEXTS BOOK

In the future, the rapid evolution and development of metamorphic and polymorphic malware will continually challenge cybersecurity professionals to be prepared for new threats. Potential future threats of this type of malware include becoming smarter and more adaptive using advanced technologies like AI and ML (Alrzini & Pennington, 2020). The proliferation of IoT devices increases the potential for these types of malwares to infiltrate and harm extensive network (Faisal et al., 2022). Consequently, future threats from this type of malware increase the necessity for continuous development of innovative and effective defense strategies in cybersecurity.

Future Cybersecurity Strategies and Countermeasures

Future cybersecurity strategies will focus on dynamically adapting to increasing cyber threats. These strategies will include the integration of advanced technologies like AI and ML, thereby contributing to the development of adaptive, learning-capable security systems. Additionally, the importance of the human factor in cybersecurity will increase, with more emphasis on security training, raising employee awareness, and constantly updated security protocols. With the rising use of internet-connected devices, IoT security will play a central role in future cybersecurity strategies.

Security strategies will also encompass increasing international collaboration in the formulation and implementation of cybersecurity policies. These approaches will provide a more effective fight against the international nature of cyber threats and contribute significantly to the development of global cybersecurity standards.

Directions for future malware detection research include developing and improving machine learning techniques to enhance the effectiveness of detecting and mitigating cyber threats (Gaber et al., 2024). The accuracy and reliability of the data used for training and evaluating machine learning algorithms are critical for the success of these algorithms, hence data quality will be a significant focus for security challenges like malware detection (Saeed et al., 2023). Recent literature reviews indicate that with the increasing complexity of digital transformation processes, there is a growing necessity for cybersecurity experts to adopt machine learning methods to identify malicious software (Alasmary et al., 2019).

Future cybersecurity strategies will face various challenges. AI-assisted attacks will pose a significant threat with faster and more sophisticated methods (Miller & Brown, 2018). Weak security measures in IoT devices may offer a broad target for attackers, increasing the risk of cyberattacks (Wardle ,2024). Cryptocurrencies and blockchain technology can encourage cybercrimes by providing anonymity and untraceability (Guembe et al., 2022). Industrial Control Systems and Smart Grids have become significant targets that could lead to serious consequences due to security vulnerabilities (Cozzupoli, and Salomon 2024).. This diversity demonstrates the need for continuous development and adaptation of cybersecurity strategies.

As a recently popular technology, AI and ML algorithms can effectively process large volumes of data, aiding network defenders in cybersecurity by identifying real threats. Reinforcement learning also enables AI to learn from positive and negative feedback in a manner like how humans learn from experience, thus optimizing future decisions. This technique reduces alert fatigue for security analysts and enables proactive defense by effectively managing cyber threats. Reinforcement learning, characterized by reward and punishment mechanisms, continually improves systems and plays a crucial role in proactively preventing complex threats such as phishing and botnet attacks. As interest in quantum computing and advanced cryptography grows, these technologies strengthen security infrastructure and lead the development of new defense strategies.

CONCLUSION AND RECOMMENDATIONS

This literature review emphasizes the vital role of malware detection in protecting computer systems from malicious attacks and as a fundamental component of cybersecurity. Methods of malware detection have been thoroughly examined and compared to highlight similarities and differences. In addition, trends in cyberattacks and future strategies have been specified. Research and assessment have shown that despite effective measures being taken, cyber-attacks continue to increase. It has also been revealed that malware increasingly uses more specific methods of hiding, monitoring, and transforming. Additionally, malware has been compared based on characteristics such as methods of concealment,

FULL TEXTS BOOK

types and speeds of propagation, recent spreading trends, detection challenges, and detection methods. Comparative data have been presented in a table format to facilitate easy comparison of malware.

The research also provides a comprehensive overview of malware detection methods, including signature-based, behavior-based, machine learning-based, and hybrid detection approaches. The advantages and disadvantages of each method have been discussed in detail, highlighting that the effectiveness of these methods varies depending on the type of malware being detected. The comparative assessment of these methods shows that there is no one-size-fits-all solution for malware detection. These findings present important implications for cybersecurity practices and emphasize the significant importance of following the most up-to-date malware detection techniques in protecting computer systems.

In addition to this assessment and comparison, new cybersecurity threats have been identified, including attacks using AI and ML, increased security challenges faced by IoT devices, cybersecurity dangers in cloud technologies, phishing and social engineering techniques, security vulnerabilities related to advanced cryptography, and concerns over data breaches and personal privacy.

Future research should focus on developing more advanced and effective malware detection methods to adapt to the constantly changing nature of cyber threats. The integration of AI and ML technologies can significantly enhance detection capabilities and contribute to more dynamic and flexible security solutions. Furthermore, the importance of the human factor and training in cybersecurity should not be overlooked. Educating employees and raising their awareness can create a proactive line of defense against cyber threats.

This study serves as a guide for developing more effective and innovative solutions to the challenges in cybersecurity and provides a foundation that will contribute to the development of effective strategies to combat current and future challenges in the field of cybersecurity.

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10. INTERNATIONAL EUROPEAN CONGRESS ON ADVANCED STUDIES IN BASIC SCIENCES

26-28 July 2024

Amsterdam, Netherlands

İlgili makama;

10. ULUSLARARASI AVRUPA TEMEL BİLİMLERDE İLERİ ARAŞTIRMALAR KONGESİ 26-28 Temmuz 2024 tarihleri arasında Amsterdam, Hollanda'da 32 farklı ülkenin akademisyen/araştırmacılarının katılımıyla gerçekleşmiştir. Kongre kapsamında sunumu yapılan 324 bildirinin 150 adeti Türkiye'den katılımcılar tarafından; 174 bildiri ise 32 ülkeden katılımcılar tarafından sunulmuştur. Kongre 16 Ocak 2020 Akademik Teşvik Ödeneği Yönetmeliğine getirilen "*Tebliğlerin sunulduğu yurt içinde veya yurt dışındaki etkinliğin uluslararası olarak nitelendirilebilmesi için Türkiye dışında en az beş farklı ülkeden sözlü tebliğ sunan konuşmacının katılım sağlaması ve tebliğlerin yarıdan fazlasının Türkiye dışından katılımcılar tarafından sunulması esastır.*" değişikliğine uygun düzenlenmiştir.

Bilgilerinize arz edilir,

Saygılarımla,

Dr. Mariam S. OLSSON
Organizing Committee Member

T.C.
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Teknik Bilimler Meslek Yüksekokulu Müdürlüğü

Sayı : E-33880316-100-2400153589 13.05.2024
Konu : Kongre (Doç.Dr. Tamer TURGUT)

DAĞITIM YERLERİNE

İlgi : 07.05.2024 tarihli ve E-33880316-100-2400149443 sayılı belge.

Birimimiz öğretim üyelerinden Doç. Dr. Tamer TURGUT'un 26-28 Temmuz 2024 tarihlerinde Amsterdam Hollanda da düzenlenecek olan "10. Uluslararası Avrupa Temel Bilimlerde İleri Araştırma Kongresi" başlıklı kongrede düzenleme kurullarında görev alabilmsi Müdürlüğümüzce uygun görülmüştür.

Bilgilerinize rica ederim.

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Yüksekokul Müdürü

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