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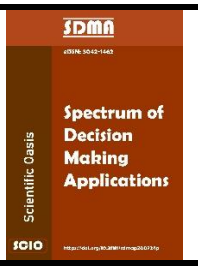

Supplier Selection in the Food Sector: An Integrated Approach Using LODECI and CORASO Methods

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ABSTRACT

As a major component of the world economy, food affects human health, and food safety is an important factor in sustainable development. Variables including population increase, changing consumer preferences, and climate change have made the effective management of the food supply chain ever more important. In this regard, supplier choice presents a multi-criteria decision-making difficulty that directly affects the strategic success of companies. This study identifies the best supplier for a milk and dairy manufacturing company using the LODECI and CORASO approaches. These two approaches, taken simultaneously for the first time, provide a more rigorous and exact assessment tool for decision-makers. Five main categories define the criteria developed in the study: cost, quality, delivery, financial strength, and capacity. These five factors comprise eleven sub-criteria, using which fifteen milk suppliers were evaluated. The findings show that whilst the MSU4-coded milk supplier showed the worst performance, the MSU2-coded milk supplier was determined to be the best milk supplier. Using comparison with other multi-criteria decision-making (MCDM) techniques, the accuracy of the CORASO approach was assessed, and it is shown to be a reliable method with high correlation coefficients.

1. Introduction

Food is a major player in the global economy, which affects human health. Therefore, access to safe food is important for sustainable development as well as other aspects of sustainability. Several elements drive the need to properly manage the food supply chain in the modern day. These are the growing population, shifting consumer expectations, and the uncertainty climate change brings. Food-related suppliers and manufacturers have thus to apply efficient supply chain management techniques if they aim to satisfy customer needs consistently and promptly. Effective supply chain management not only improves operational efficiency but also significantly influences the competitiveness and desirability of suppliers inside the industry. Generally speaking, the supply chain

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is a sequence of events including the ordering and procurement of raw materials, the transportation of these raw materials through the manufacturing process, and the distribution of completed products to consumers [1]. Being a key player in the manufacturing process, suppliers are in charge of promptly, and dependably supplying raw materials, semi-finished items, and final products to manufacturers and end users at a reasonable, affordable cost [2]. Suppliers failing to meet these responsibilities could cause interruptions to the supply chain, therefore affecting the production process and resulting in higher costs and consumer discontent.

A crucial decision-making process with several aspects including quality, cost, technology, and performance, directly affects the strategic success of businesses [2]. Choosing a suitable supplier might improve operational effectiveness and give a competitive edge. Still, the choosing process turns into a difficult decision-making process since one must weigh several criteria. Multi-criteria decision-making (MCDM) techniques are often used to solve this problem since they enable the identification of the most appropriate supplier under several criteria, so offering a methodical framework for decision-making [2]. The current research intends to add to the body of knowledge by tackling the issue of choosing the best supplier for a company running in the food industry. This study uses MCDM techniques to choose the most appropriate candidate considering several factors. It aims to offer companies and decision-makers a structure to enable more logical and successful supply chain management decisions.

In this study, the LODECI (LOgarithmic DEcomposition of Criteria Importance) and the CORASO (COmpromise Ranking from Alternative Solutions) methods were utilized to select a supplier for a company engaged in the production of dairy products. In this paper, LODECI and CORASO methods are used together for the first time. Therefore, this paper is original.

1.1 Literature Review

In the existing literature, methods for multi-criteria decision-making are typically favoured for addressing the supplier selection issue. A selection of these studies is provided in Table 1.

Table 1
References

Authors	Methods
Alshehri *et al.,* [3]	FTOPSIS
Arabsheybani *et al.,* [4]	AHP and MOORA
Fallahpour *et al.,* [5]	FDEMATEL, FBWM, Fuzzy ANP and FIS
Tirkolaee *et al.,* [6]	TOPSIS, MOMILP and RGP
Ada [7]	Fuzzy ANP and VIKOR
Leong *et al.,* [8]	GRA-BWM-TOPSIS
Sarıoğlan *et al.,* [9]	DEMATEL
Puška *et al.,* [10]	FSWARA, FMABAC, MARCOS and CRADIS
Puška *et al.,* [11]	FLMAW and FCRADIS
Thanh *et al.,* [12]	Fuzzy AHP and CoCoSo
Yazdani *et al.,* [13]	LP and TOPSIS
Abdallah *et al.,* [14]	Fuzzy AHP and FMABAC
Aka [15]	Fuzzy-Trapezoidal DEMATEL
Görçün *et al.,* [16]	Bipolar Neutrosophic VIKOR
Keshteli *et al.,* [17]	Pythagorean Fuzzy TOPSIS
Magableh [18]	Fuzzy VIKOR
Mohammeed *et al.,* [19]	FMOMILPM and TOPSIS
Nasseri [20]	Grey FUCOM and Gray PROMTHEE
Wijaya *et al.,* [21]	FAHP
Ardra [22]	FTOPSIS

Table 1
Continued

Authors	Methods
Aungkulanon *et al.,* [23]	FAHP, EFA and PROMETHEE II
Baroto *et al.,* [24]	Integrating MCDM-MP and MCDM-AI
Magableh [25]	EWM and MOORA and COPRAS
Nedeljković [26]	Entropy-MABAC
Niroomand [27]	Data Envelopment Analysis
Öner *et al.,* [28]	Fuzzy AHP
Wang *et al.,* [29]	MARCOS
Wang *et al.,* [30]	Pythagorean Fuzzy CRITIC-MARCOS
Miyangaskary *et al.,* [31]	Fuzzy Multi-Objective Model

2. Methodology

This study employed the LODECI and CORASO methodologies collaboratively for the identification of milk suppliers.

2.1 LODECI

The LODECI method was formulated by Pala [32]. The procedures of the LODECI approach are detailed below [32-33].

Step 1: A decision matrix (E) is established, incorporating the criteria and alternatives. The following equation demonstrates this matrix.

$$E = \left[e_{ij}\right]_{m\times n} \tag{1}$$

Step 2: The decision matrix is then subjected to normalization using Eq. (2) and Eq. (3). Eq. (2) is used for beneficial criteria, while Eq. (3) is used for cost criteria.

$$d_{ij} = \frac{e_{ij}}{max\,(e_{ij})} \tag{2}$$

$$d_{ij} = 1 - \frac{e_{ij}}{max\,(e_{ij})} \tag{3}$$

Step 3: The deviation values of the normalized data are computed.

$$SD_{ij} = max\left\{\left|d_{ij} - d_{rj}\right|\right\}\, r \neq i \tag{4}$$

Step 4: The Logarithmic Deviation Value is computed for each criterion using the following equation.

$$LSD_j = ln\left(1 + \frac{\sum_{i=1}^{m} SD_{ij}}{m}\right) \tag{5}$$

Step 5: The weights of the criteria are calculated as follows.

$$w_j = \frac{LSD_j}{\sum_{j=1}^{n} LSD_j} \tag{6}$$

2.2 CORASO

The CORASO approach is an MCDM technique established by Puška [34]. The procedure of this method is defined below [34].

Step 1: The decision matrix is organized. The decision matrix is illustrated in Eq. (1).

Step 2: Eq. (7) normalizes the beneficial criteria, while Eq. (8) normalizes the cost criteria.

$$t_{ij} = \frac{e_{ij}}{e_{jmax}} \tag{7}$$

$$t_{ij} = \frac{e_{jmin}}{e_{ij}} \tag{8}$$

Step 3: The weights of the criteria and the normalized values of the alternatives are multiplied as shown in Eq. (9).

$$v_j = w_j \times t_{ij} \tag{9}$$

Step 4: The values found in Eq. (9) are summed.

$$S_i = \sum_{j=1}^{n} v_j \tag{10}$$

Step 5: Deviations from alternate solutions are calculated as follows.

$$R_i = \frac{S_i}{S_{i\,maxAS}} \tag{11}$$

$$R_i' = \frac{S_{i\,minAS}}{S_i} \tag{12}$$

Step 6: Eq. (13) is used to determine the overall score (Q_i) for each alternative.

$$Q_i = \frac{R_i - R_i'}{R_i + R_i'} \tag{13}$$

The option that receives the highest overall score is the one that is deemed to be the greatest options.

3. Application

This study focuses on the food sector, and the criteria were established within this context by a collaborative decision with the milk purchasing manager of a dairy production firm. The study identified five main criteria and eleven sub-criteria factors. The main criteria and sub-criteria used in the study are presented in Table 2.

Table 2
Main Criteria and Sub-criteria

Main Criteria	Sub-criteria
Cost	Producer Cost (PC) Transportation Cost (TRC)
Quality	Average Fat Content of Milk (AFCM) Average Protein Content of Milk (APCM) Microbiological Quality of Milk (MQM)
Delivery	Supplier's Distance to Factory (SDF) Delays in Milk Delivery (DMD)
Financial Strength	Payment Postponement Potential (PPP) Early Payment Power for Producers (EPPP)
Capacity	Supplier's Production Capacity (SPC) Capacity Flexibility (Seasonality) (CF)

Four of these sub-criteria were identified as cost criteria, while the remaining criteria were classified as beneficial criteria. The cost criteria are as follows: PC, TRC, SDF and DMD. Three experts, including the company's milk purchasing manager, were asked to evaluate the performance of 15 suppliers from which they bought milk. When evaluating milk suppliers (MSUs), the experts used a scale of 1 (Lowest) to 9 (Highest). The decision matrix in Table 3 was formed by taking the arithmetic mean of the scores assigned by the experts.

Table 3
Decision Matrix

Milk Suppliers	Criteria					
	PC	TRC	AFCM	APCM	MQM	SDF
MSU1	2.289	8.320	3.302	7.319	8.320	8.320
MSU2	1.817	8.320	7.319	8.277	8.320	8.320
MSU3	2.289	8.320	8.32	8.653	8.320	8.320
MSU4	4.642	6.952	5.646	5.313	4.642	6.952
MSU5	1.817	5.593	5.646	4.932	4.642	5.593
MSU6	4.309	6.604	5.000	5.646	5.313	7.319
MSU7	4.309	8.000	6.316	5.313	5.000	8.000
MSU8	4.309	7.652	6.316	5.313	3.915	8.000
MSU9	5.000	8.320	5.313	5.313	5.000	8.000
MSU10	5.000	6.604	6.649	5.313	3.557	7.652
MSU11	6.316	4.642	5.944	4.309	4.642	4.642
MSU12	6.649	4.642	6.649	4.309	4.642	4.642
MSU13	6.649	2.621	2.884	3.000	1.817	3.000
MSU14	7.652	3.302	3.915	3.302	1.817	4.000
MSU15	7.000	2.000	2.884	3.557	2.289	2.000

Milk Suppliers	Criteria				
	DMD	PPP	EPPP	SPC	CF
MSU1	8.653	5.593	5.313	5.646	7.652
MSU2	8.653	7.114	6.804	6.316	7.652
MSU3	8.653	7.000	6.257	5.646	7.652
MSU4	6.649	1.817	3.302	5.646	4.642
MSU5	8.000	1.442	3.78	9.000	4.000
MSU6	7.000	3.634	4.000	6.257	4.309
MSU7	7.000	4.000	3.634	4.579	4.309
MSU8	7.000	4.642	5.000	6.000	3.915
MSU9	7.319	5.000	5.313	5.646	5.000
MSU10	7.000	3.557	2.466	4.579	5.000
MSU11	6.316	1.442	3.557	6.649	5.000
MSU12	7.000	3.302	4.000	6.649	5.000
MSU13	4.642	1.587	9.000	8.320	6.604
MSU14	4.642	7.230	9.000	7.612	7.319
MSU15	3.557	1.817	3.000	4.579	6.257

Eq. (2) and (3) are used to normalize the values in Table 3. The normalized values are shown in Table 4 below.

The deviations of the normalized values are determined using Eq. (4). Logarithmic Deviation Values are computed through Eq. (5), and the weights of the criteria, as per the LODECI method, are derived from Eq. (6). The results of the LODECI method are presented in Table 5.

Table 4
Normalized Matrix

Milk Suppliers	Criteria					
	PC	TRC	AFCM	APCM	MQM	SDF
MSU1	0.7009	0.0000	0.3969	0.8458	1.0000	0.0000
MSU2	0.7625	0.0000	0.8797	0.9565	1.0000	0.0000
MSU3	0.7009	0.0000	1.0000	1.0000	1.0000	0.0000
MSU4	0.3934	0.1644	0.6786	0.6140	0.5579	0.1644
MSU5	0.7625	0.3278	0.6786	0.5700	0.5579	0.3278
MSU6	0.4369	0.2063	0.6010	0.6525	0.6386	0.1203
MSU7	0.4369	0.0385	0.7591	0.6140	0.6010	0.0385
MSU8	0.4369	0.0803	0.7591	0.6140	0.4706	0.0385
MSU9	0.3466	0.0000	0.6386	0.6140	0.6010	0.0385
MSU10	0.3466	0.2063	0.7992	0.6140	0.4275	0.0803
MSU11	0.1746	0.4421	0.7144	0.4980	0.5579	0.4421
MSU12	0.1311	0.4421	0.7992	0.4980	0.5579	0.4421
MSU13	0.1311	0.6850	0.3466	0.3467	0.2184	0.6394
MSU14	0.0000	0.6031	0.4706	0.3816	0.2184	0.5192
MSU15	0.0852	0.7596	0.3466	0.4111	0.2751	0.7596
Milk Suppliers	Criteria					
	DMD	PPP	EPPP	SPC	CF	
MSU1	0.0000	0.7736	0.5903	0.6273	1.0000	
MSU2	0.0000	0.9840	0.7560	0.7018	1.0000	
MSU3	0.0000	0.9682	0.6952	0.6273	1.0000	
MSU4	0.2316	0.2513	0.3669	0.6273	0.6066	
MSU5	0.0755	0.1994	0.4200	1.0000	0.5227	
MSU6	0.1910	0.5026	0.4444	0.6952	0.5631	
MSU7	0.1910	0.5533	0.4038	0.5088	0.5631	
MSU8	0.1910	0.6420	0.5556	0.6667	0.5116	
MSU9	0.1542	0.6916	0.5903	0.6273	0.6534	
MSU10	0.1910	0.4920	0.2740	0.5088	0.6534	
MSU11	0.2701	0.1994	0.3952	0.7388	0.6534	
MSU12	0.1910	0.4567	0.4444	0.7388	0.6534	
MSU13	0.4635	0.2195	1.0000	0.9244	0.8630	
MSU14	0.4635	1.0000	1.0000	0.8458	0.9565	
MSU15	0.5889	0.2513	0.3333	0.5088	0.8177	

Table 5
The Results of the LODECI Method

Milk Suppliers	Criteria					
	PC	TRC	AFCM	APCM	MQM	SDF
LSD_j	0.4597	0.4908	0.3897	0.3981	0.4583	0.4943
w_j	0.0981	0.1047	0.0832	0.085	0.0978	0.1055
Milk Suppliers	Criteria					
	DMD	PPP	EPPP	SPC	CF	
LSD_j	0.3783	0.5003	0.4505	0.3205	0.3453	
w_j	0.0807	0.1068	0.0961	0.0684	0.0737	

The results obtained from the LODECI method indicate that the criteria are ranked based on their respective weights in the following order: PPP, SDF, TRC, PC, MQM, EPPP, APCM, AFCM, DMD, CF and SPC. Thus, the most important criterion is Payment Postponement Potential (PPP), while the least important criterion is Supplier's Production Capacity (SPC). Upon establishing the criteria weights, the CORASO method is employed to assess the milk suppliers. The first step is to normalize the values using Eq. (7) and (8). The results of the equations are shown in Table 6.

Table 6
Normalized Matrix (CORASO Method)

Milk Suppliers	Criteria					
	PC	TRC	AFCM	APCM	MQM	SDF
MSU1	0.7938	0.2404	0.3969	0.8458	1.000	0.2404
MSU2	1.000	0.2404	0.8797	0.9565	1.000	0.2404
MSU3	0.7938	0.2404	1.000	1.000	1.000	0.2404
MSU4	0.3914	0.2877	0.6786	0.614	0.5579	0.2877
MSU5	1.000	0.3576	0.6786	0.5700	0.5579	0.3576
MSU6	0.4217	0.3028	0.601	0.6525	0.6386	0.2733
MSU7	0.4217	0.2500	0.7591	0.614	0.601	0.2500
MSU8	0.4217	0.2614	0.7591	0.614	0.4706	0.2500
MSU9	0.3634	0.2404	0.6386	0.614	0.601	0.2500
MSU10	0.3634	0.3028	0.7992	0.614	0.4275	0.2614
MSU11	0.2877	0.4308	0.7144	0.498	0.5579	0.4308
MSU12	0.2733	0.4308	0.7992	0.498	0.5579	0.4308
MSU13	0.2733	0.7631	0.3466	0.3467	0.2184	0.6667
MSU14	0.2375	0.6057	0.4706	0.3816	0.2184	0.5000
MSU15	0.2596	1.000	0.3466	0.4111	0.2751	1.000

Milk Suppliers	Criteria				
	DMD	PPP	EPPP	SPC	CF
MSU1	0.4111	0.7736	0.5903	0.6273	1.000
MSU2	0.4111	0.984	0.756	0.7018	1.000
MSU3	0.4111	0.9682	0.6952	0.6273	1.000
MSU4	0.535	0.2513	0.3669	0.6273	0.6066
MSU5	0.4446	0.1994	0.4200	1.000	0.5227
MSU6	0.5081	0.5026	0.4444	0.6952	0.5631
MSU7	0.5081	0.5533	0.4038	0.5088	0.5631
MSU8	0.5081	0.642	0.5556	0.6667	0.5116
MSU9	0.4860	0.6916	0.5903	0.6273	0.6534
MSU10	0.5081	0.4920	0.2740	0.5088	0.6534
MSU11	0.5632	0.1994	0.3952	0.7388	0.6534
MSU12	0.5081	0.4567	0.4444	0.7388	0.6534
MSU13	0.7663	0.2195	1.000	0.9244	0.863
MSU14	0.7663	1.000	1.000	0.8458	0.9565
MSU15	1.000	0.2513	0.3333	0.5088	0.8177

Eq. (9) provides the weighted normalized values, as presented in Table 7.

Table 7
The Weighted Normalized Values

Milk Suppliers	Criteria					
	PC	TRC	AFCM	APCM	MQM	SDF
MSU1	0.0779	0.0252	0.033	0.0719	0.0978	0.0254
MSU2	0.0981	0.0252	0.0732	0.0813	0.0978	0.0254
MSU3	0.0779	0.0252	0.0832	0.085	0.0978	0.0254
MSU4	0.0384	0.0301	0.0565	0.0522	0.0546	0.0304
MSU5	0.0981	0.0374	0.0565	0.0485	0.0546	0.0377
MSU6	0.0414	0.0317	0.0500	0.0555	0.0625	0.0288
MSU7	0.0414	0.0262	0.0632	0.0522	0.0588	0.0264
MSU8	0.0414	0.0274	0.0632	0.0522	0.0460	0.0264
MSU9	0.0356	0.0252	0.0531	0.0522	0.0588	0.0264
MSU10	0.0356	0.0317	0.0665	0.0522	0.0418	0.0276
MSU11	0.0282	0.0451	0.0594	0.0423	0.0546	0.0454
MSU12	0.0268	0.0451	0.0665	0.0423	0.0546	0.0454
MSU13	0.0268	0.0799	0.0288	0.0295	0.0214	0.0703
MSU14	0.0233	0.0634	0.0392	0.0324	0.0214	0.0528
MSU15	0.0255	0.1047	0.0288	0.0349	0.0269	0.1055
$MinAS$	0.0233	0.0252	0.0288	0.0295	0.0214	0.0254
$MaxAS$	0.0981	0.1047	0.0832	0.085	0.0978	0.1055

Milk Suppliers	Criteria				
	DMD	PPP	EPPP	SPC	CF
MSU1	0.0332	0.0826	0.0567	0.0429	0.0737
MSU2	0.0332	0.1051	0.0727	0.0480	0.0737
MSU3	0.0332	0.1034	0.0668	0.0429	0.0737
MSU4	0.0432	0.0268	0.0353	0.0429	0.0447
MSU5	0.0359	0.0213	0.0404	0.0684	0.0385
MSU6	0.0410	0.0537	0.0427	0.0476	0.0415
MSU7	0.0410	0.0591	0.0388	0.0348	0.0415
MSU8	0.0410	0.0686	0.0534	0.0456	0.0377
MSU9	0.0392	0.0739	0.0567	0.0429	0.0482
MSU10	0.0410	0.0525	0.0263	0.0348	0.0482
MSU11	0.0455	0.0213	0.0380	0.0505	0.0482
MSU12	0.0410	0.0488	0.0427	0.0505	0.0482
MSU13	0.0618	0.0234	0.0961	0.0632	0.0636
MSU14	0.0618	0.1068	0.0961	0.0579	0.0705
MSU15	0.08070	0.0268	0.0320	0.0348	0.0603
$MinAS$	0.0332	0.0213	0.0263	0.0348	0.0377
$MaxAS$	0.0807	0.1068	0.0961	0.0684	0.0737

In conclusion, the findings of the CORASO approach and the ranking of milk suppliers are ultimately acquired by the utilization of Eqs. (10) -(13). Table 8 displays the outcomes of the CORASO approach.

Table 8
The Results of CORASO Method

Milk Suppliers	Results				
	S_i	R_i	R_i'	Q_i	Rankings
MSU1	0.6203	0.6203	0.4948	0.1125	4
MSU2	0.7337	0.7337	0.4183	0.2738	1
MSU3	0.7145	0.7145	0.4295	0.2491	2
MSU4	0.4551	0.4551	0.6744	-0.1942	15
MSU5	0.5373	0.5373	0.5712	-0.0306	7
MSU6	0.4964	0.4964	0.6183	-0.1094	11
MSU7	0.4834	0.4834	0.6349	-0.1355	12
MSU8	0.5029	0.5029	0.6103	-0.0965	10
MSU9	0.5122	0.5122	0.5992	-0.0783	8
MSU10	0.4582	0.4582	0.6698	-0.1876	14
MSU11	0.4785	0.4785	0.6414	-0.1455	13
MSU12	0.5119	0.5119	0.5995	-0.0788	9
MSU13	0.5648	0.5648	0.5434	0.0193	5
MSU14	0.6256	0.6256	0.4906	0.1209	3
MSU15	0.5609	0.5609	0.5472	0.0124	6

According to the results of the CORASO method, milk suppliers are ranked as follows: MSU2, MSU3, MSU14, MSU1, MSU13, MSU15, MSU5, MSU9, MSU12, MSU8, MSU6, MSU7, MSU11, MSU10 and MSU4. Consequently, the best milk supplier is recognized as MSU2, whilst the milk supplier with the least performance is designated as MSU4. To evaluate the accuracy of the rankings of milk suppliers obtained by the CORASO approach, it is compared with other MCDM methods (MOOSRA, MOORA-RATIO, COPRAS, OCRA, ARAS and EDAS). Table 9 shows the results of this comparison.

Table 9
The Comparison of MCDM Methods

Milk Suppliers	Methods						
	CORASO	MOOSRA	MOORA-RATIO	COPRAS	OCRA	ARAS	EDAS
MSU1	4	5	5	4	4	5	4
MSU2	1	1	2	1	1	1	1
MSU3	2	2	1	2	2	2	2
MSU4	15	14	13	15	15	15	14
MSU5	7	6	6	6	7	7	6
MSU6	11	9	9	11	9	11	8
MSU7	12	13	14	13	13	13	12
MSU8	10	11	11	10	11	10	10
MSU9	8	12	12	9	10	9	9
MSU10	14	15	15	14	14	14	15
MSU11	13	10	8	12	12	12	11
MSU12	9	8	7	8	6	8	7
MSU13	5	4	4	5	5	6	5
MSU14	3	3	3	3	3	3	3
MSU15	6	7	10	7	8	4	13

Pearson Correlation Coefficients between CORASO method and other MCDM methods are as follows: CORASO-MOOSRA (0.9321), CORASO-MOORA-RATIO (0.8571), CORASO-COPRAS (0.9893), CORASO-OCRA (0.9571), CORASO-ARAS (0.9821), and CORASO-EDAS (0.8750). The correlation coefficients are significantly elevated. The CORASO approach yields precise findings.

4. Conclusions

This study uses the LODECI and CORASO methodologies in conjunction to identify the optimal milk supplier for a dairy-producing firm. The findings indicate that the MSU2 supplier exhibits superior performance and is the optimal selection for the organization. However, the MSU4 supplier presented the poorest performance. The CORASO approach's results were compared with several MCDM methods (MOOSRA, MOORA-RATIO, COPRAS, OCRA, ARAS, EDAS), and its correctness was evaluated through high correlation coefficients. The results indicate that enterprises ought to implement systematic and dependable decision-making strategies in the selection of suppliers.

Supply chain management in the food sector is a critical procedure that directly influences product quality and operational efficiency. The LODECI and CORASO methodologies employed in the study offer a systematic and objective assessment framework for enterprises in the multi-criteria decision-making process. The study's primary contribution is in the integration of the two methodologies and the evaluation of the results' reliability against alternative decision-making approaches. The results indicate that the Payment Postponement Potential (PPP) criterion is the most significant criterion, whilst the Supplier's Production Capacity (SPC) is the least significant. It is established that cost, quality, delivery, and financial strength must be assessed in a balanced manner when evaluating supplier performance. The study's findings may enhance the supplier selection processes for organizations across many sectors, particularly in the food industry.

This study's findings indicate that enterprises ought to base their supplier selection decisions on methodical and scientific methodologies. In the food sector, it is crucial to evaluate aspects such as cost, quality, delivery time, and financial stability when choosing suppliers. The CORASO technique demonstrates reliability in supplier evaluation and offers a more rigorous analytical framework for decision-makers. Future studies may evaluate the applicability of the LODECI and CORASO methodologies across various sectors and enhance these methods by incorporating more criteria into the supplier evaluation process. Moreover, incorporating sophisticated analytical methods like artificial intelligence and machine learning into these procedures could enhance the efficacy of decision support systems.

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Conflicts of Interest

The authors declare no conflicts of interest.

References

[1] https://www.lojistikdunyasi.net/dis-ticaret-ve-lojistik-kutuphanesi/lojistik-sevkiyat-depoyonetimi.pdf

[2] Dağdeviren, M., & Erarslan, E. (2008). PROMETHEE siralama yöntemi ile tedarikçi seçimi. Gazi Üniversitesi Mühendislik Mimarlık Fakültesi Dergisi, 23(1).

[3] Alshehri, K. A., & Albukhari, A. A. (2021). Critical factors of supplier selection in the food and beverage industry of Saudi Arabia: A FUZZY-TOPSIS approach. In Proceedings of the International Conference on Industrial Engineering and Operations Management (pp. 211–219).

[4] Arabsheybani, A., & Arshadi Khasmeh, A. (2021). Robust and resilient supply chain network design considering risks in food industry: Flavour industry in Iran. International Journal of Management Science and Engineering Management, 16(3), 197–208. https://doi.org/10.1080/17509653.2021.1907811

[5] Fallahpour, A., Nayeri, S., Sheikhalishahi, M., Wong, K. Y., Tian, G., & Fathollahi-Fard, A. M. (2021). A hyper-hybrid fuzzy decision-making framework for the sustainable-resilient supplier selection problem: A case study of Malaysian Palm oil industry. Environmental Science and Pollution Research, 28(1), 1–21. https://doi.org/10.1007/s11356-021-12491-y

[6] Tirkolaee, E. B., Dashtian, Z., Weber, G. W., Tomaskova, H., Soltani, M., & Mousavi, N. S. (2021). An integrated decision-making approach for green supplier selection in an agri-food supply chain: Threshold of robustness worthiness. Mathematics, 9(11), 1304. https://doi.org/10.3390/math9111304
[7] Ada, N. (2022). Sustainable supplier selection in agri-food supply chain management. International Journal of Mathematical, Engineering and Management Sciences, 7(1), 115. https://doi.org/10.33889/IJMEMS.2022.7.1.008
[8] Leong, W. Y., Wong, K. Y., & Wong, W. P. (2022). A new integrated multi-criteria decision-making model for resilient supplier selection. Applied System Innovation, 5(1), 8. https://doi.org/10.3390/asi5010008
[9] Sarıoğlan, M., & Avcıkurt, C. (2022). A research related to the applicability of dematel method for supplier selection as an optimization model in food & beverage enterprises. Turizm Akademik Dergisi, 9(1), 311–321. https://doi.org/10.55065/intraders.1365612
[10] Puška, A., & Stojanović, I. (2022). Fuzzy multi-criteria analyses on green supplier selection in an agri-food company. Journal of Intelligent Management and Decision, 1(1), 2–16. https://doi.org/10.56578/jimd010102
[11] Puška, A., Božanić, D., Nedeljković, M., & Janošević, M. (2022). Green supplier selection in an uncertain environment in agriculture using a hybrid MCDM model: Z-Numbers–Fuzzy LMAW–Fuzzy CRADIS model. Axioms, 11(9), 427. https://doi.org/10.3390/axioms11090427
[12] Thanh, N. V., & Lan, N. T. K. (2022). A new hybrid triple bottom line metrics and fuzzy MCDM model: Sustainable supplier selection in the food-processing industry. Axioms, 11(2), 57. https://doi.org/10.3390/axioms11020057
[13] Yazdani, M., Pamucar, D., Chatterjee, P., & Torkayesh, A. E. (2022). A multi-tier sustainable food supplier selection model under uncertainty. Operations Management Research, 15(1), 116–145. https://doi.org/10.1007/s12063-021-00186-z
[14] Ben Abdallah, C., El-Amraoui, A., Delmotte, F., & Frikha, A. (2024). A hybrid approach for sustainable and resilient farmer selection in food industry: Tunisian case study. Sustainability, 16(5), 1889. https://doi.org/10.3390/su16051889
[15] Aka, D. Ç. (2023). Fuzzy Trapezoidal DEMATEL Method for Criteria Weights in Supplier Selection: A Case Study of Ice Cream Producer. InTraders International Trade Academic Journal, 6(2), 97–118. https://doi.org/10.55065/intraders.1365612
[16] Görçün, Ö. F., Aytekin, A., & Korucuk, S. (2023). Fresh food supplier selection for global retail chains via bipolar neutrosophic methodology. Journal of Cleaner Production, 419, 138156. https://doi.org/10.1016/j.jclepro.2023.138156
[17] Hajiaghaei-Keshteli, M., Cenk, Z., Erdebilli, B., Özdemir, Y. S., & Gholian-Jouybari, F. (2023). Pythagorean fuzzy TOPSIS method for green supplier selection in the food industry. Expert Systems with Applications, 224, 120036. https://doi.org/10.1016/j.eswa.2023.120036
[18] Magableh, G. M. (2023). Evaluating wheat suppliers using fuzzy MCDM technique. Sustainability, 15(13), 10519. https://doi.org/10.3390/su151310519
[19] Mohammed, A., Bai, C., Channouf, N., Ahmed, T. A., & Mohamed, S. M. (2023). G-resilient multi-tier supplier selection and order allocation in food industry: A hybrid methodology. International Journal of Systems Science: Operations & Logistics, 10(1), 2195055. https://doi.org/10.1080/23302674.2023.2195055
[20] Nasseri, H., Chen, H. K., Huo, K. Z., & Lo, Y. F. (2023). A hybrid grey decision methodology in social sustainable supplier selection. Sustainability, 15(15), 11777. https://doi.org/10.3390/su151511777
[21] Wijaya, D. S., & Widodo, D. S. (2022). Evaluation supplier involve on food safety and Halal criteria using fuzzy AHP: A case study in Indonesia. Jurnal Teknik Industri, 23(1), 67–78. http://dx.doi.org/10.22219/JTIUMM.Vol23.No1.67-78
[22] Ardra, S., & Barua, M. K. (2024). Sustainable supplier selection among supermarket's fresh fruits and vegetable supply chains based on circular practices in India. Environment, Development and Sustainability. https://doi.org/10.1007/s10668-024-05347-1
[23] Aungkulanon, P., Atthirawong, W., Luangpaiboon, P., & Chanpuypetch, W. (2024). Navigating Supply Chain Resilience: A Hybrid Approach to Agri-Food Supplier Selection. Mathematics, 12(10), 1598. https://doi.org/10.3390/math12101598
[24] Baroto, T., Utama, D. M., & Ibrahim, M. F. (2024, March). Green supplier selection for agri-food industry: A review on the methodology and context. In AIP Conference Proceedings (Vol. 2927, No. 1). AIP Publishing. https://doi.org/10.1063/5.0192214
[25] Magableh, G. M. (2024). An integrated model for rice supplier selection strategies and a comparative analysis of fuzzy multicriteria decision-making approaches based on the fuzzy entropy weight method for evaluating rice suppliers. PLOS ONE, 19(4), e0301930. https://doi.org/10.1371/journal.pone.0301930
[26] Nedeljković, M., Puška, A., & Ćirković, A. (2024). Selection of suppliers in an alternative food network. International Review, 1-2, 163–170. http://dx.doi.org/10.5937/intrev2401163N

[27] Niroomand, S. (2025). A DEA-based decision framework for performance evaluation and ranking of workers in a real case from food industries. International Journal of Applied Decision Sciences, 18(1), 24–39. https://doi.org/10.1504/IJADS.2025.143075

[28] Öner, S. C., & Bayrak, A. T. (2024, May). Green Supplier Selection Problem for Fast Food Industry. In 2024 International Congress on Human-Computer Interaction, Optimization and Robotic Applications (HORA) (pp. 1–6). IEEE. https://doi.org/10.1109/HORA61326.2024.10550838

[29] Wang, Y., Yang, H., & Han, X. (2024a). Study on the method of selecting sustainable food suppliers considering interactive factors. Journal of Operations Intelligence, 2(1), 202–218. https://doi.org/10.31181/jopi21202420

[30] Wang, Y., Wang, W., Wang, Z., Deveci, M., Roy, S. K., & Kadry, S. (2024b). Selection of sustainable food suppliers using the Pythagorean fuzzy CRITIC-MARCOS method. Information Sciences, 664, 120326. https://doi.org/10.1016/j.ins.2024.120326

[31] Miyangaskary, M. K., Keivanpour, S., & Safari, H. (2025). A multi-objective optimization model of a closed-loop supply chain for supplier selection and order allocation under uncertainty: A case study of retail stores for protein products. Transportation Research Procedia, 82, 323–341. https://doi.org/10.1016/j.trpro.2024.12.046

[32] Pala, O., Atçeken, Ö., Omurtak, H., & Şimşir, B. (2024). BİST Çimento Sektöründe LODECI ve CRADIS ile Finansal Performans Analizi. Alanya Akademik Bakış, 8(3), 956–970. https://doi.org/10.29023/alanyaakademik.1452960

[33] Pala, O. (2024). Assessment of the social progress on European Union by logarithmic decomposition of criteria importance. Expert Systems with Applications, 238, 121846. https://doi.org/10.1016/j.eswa.2023.121846

[34] Puška, A. (2025). Selection of CRM systems using objective criteria for the needs of small companies. International Journal of Knowledge and Innovation Studies, 3(1), 1–11. https://doi.org/10.56578/ijkis030101