International
SMART Journal
International SOCIAL MENTALITY AND RESEARCHER THINKERS Journal
e-ISSN: 2630-631X

RESEARCH ARTICLE
HUMAN RESOURCES MANAGEMENT

Manager Performance Evaluation with Hybrid Multimoora Method: An Application In Logistics Industry

Hibrit Multimoora Yöntemi ile Yönetici Performans Değerlendirmesi: Lojistik Sektöründe Bir Uygulama

Sercan Edinsel [1]
Erol Işıkçı [2]

ABSTRACT

Cargo businesses carry out processes based on intense physical and mental labor through branches in the geography they operate. The increase in e-commerce in recent years has gradually increased the importance of these businesses and intensified the competition between businesses in the sector. At this point, branch performances of cargo companies become critical in proportion to the performance of each branch manager. From this point of view, the aim of this study is to determine the branch manager performance levels of a cargo company and to compare them with each other. In the study, the performances of managers working in four branches of a cargo company operating in Turkey within the borders of Ankara city center were evaluated with fuzzy logic and multi-criteria decision-making methods. As a result of the literature review, seven branch manager performance criteria, whose importance levels were determined by the Fuzzy DEMATEL method, were obtained. The performance rankings of the managers were determined by the MULTIMOORA method based on single-valued neutrophic numbers. Performance evaluation was completed according to the evaluations made by three decision makers in the study. As a result of the research, it was concluded that the most important criterion for branch manager performance evaluation is experience, and the least important criterion is education level. In addition, it was determined that the best performance among the four branch managers was the second branch manager.

Keywords: Performance Evaluation, Multi-Criteria Decision Making, Fuzzy Logic, Single Value Neutrophic Sets, MULTIMOORA

ÖZET

Kargo işletmeleri, faaliyet gösterdikleri coğrafyada şubeler aracılığıyla yoğun fiziksel ve zihinsel emeğe dayalı süreçleri yürütmektedirler.Son yıllarda e- ticaretin giderek artması, bu işletmelerin önemini giderek artırmakta ve sektördeki işletmeler arasındaki rekabeti de yoğunlaştırmaktadır. Bu noktada kargo işletmelerinin her bir şube yöneticisinin performansıyla orantılı olarak şube performansları da kritik hale gelmektedir. Çalışmada bu noktadan hareketle bir kargo işletmesinin şube yönetici performans düzeylerinin belirlenmesi ve birbirleriyle karşılaştırılması amaçlamaktadır. Çalışma, Türkiye'de faaliyet gösteren bir kargo işletmesinin Ankara il merkezi sınırlarındaki dört şubede görev yapan yöneticilerin performansları bulanık mantık ve çok kriterli karar verme yöntemleriyle değerlendirilmiştir. Yapılan literature incelemesi neticesinde önem düzeyleri Bulanık DEMATEL yöntemiyle belirlenen yedi tane şube yöneticisi performans kriteri elde edilmiştir. Yöneticilerin performans sıralamaları ise tek değerli nötrosofik sayılar adayalı MULTIMOORA yöntemiyle belirlenmiştir. Araştırmada üç karar verici tarafından yapılan değerlendirmelere gore performans değerlendirmesi tamamlanmıştır. Araştırma sonucunda şube yönetici performans değerlendirmesi için en önemli kriterin deneyim, en düşük öneme sahip kriterin ise eğitim düzeyi olduğu sonucuna varılmıştır. Ayrıca dört şube yöneticisinden en iyi performansın ikinci şube yöneticisinde olduğu tespit edilmiştir.

Anahtar Kelimeler: Performans Değerlendirme, Çok Kriterli Karar Verme, Bulanık Mantık, Tek Değerli Nötrosofik Kümeler, MULTIMOORA

How to Cite This Article
Edinsel, S. & Işıkçı, E. (2023). "Manager Performance Evaluation with Hybrid Multimoora Method: An Application In Logistics Industry", International Social Mentality and Researcher Thinkers Journal, (Issn:2630-631X) 9(75): 4381-4393. DOI: http://dx.doi.org/10.29228/smryj.72105

Arrival: 27 May 2023
Published: 30 September 2023

INTRODUCTION

In today's world where environmental turbulence is intense, the survival of organizations of all sizes and in every sector and creating sustainable competitive advantage depends on the uniqueness of the human resource and the effective management of this valuable resource. Human resources, which refer to people who directly or indirectly perform organizational processes, including managers, can also be described as the key to the success or failure of an organization (Lado & Wilson, 1994). At this point, the role of the human resources department in the organization comes to the fore. This unit ensures that the strategic activities necessary for

[1] Dr., Ostim Technical University Guest Lecturer, Faculty of Economics and Administrative Sciences, Department of Business Administration, Ankara, Türkiye
[2] Dr., Ostim Technical University, Faculty of Economics and Administrative Sciences, Department of International Trade and Finance, Ankara, Türkiye

the success of the organization are carried out from the highest level to the lowest unit and the performance of the employees is maximized.

Increasing employee performances primarily depends on the evaluation of current performances. Performance appraisal is a process carried out to identify feedback from the activities of organizations and employees (Rivai et al., 2014). An efficient employee performance appraisal process is considered important as it encourages the organizational development of the organization and the personal development of the employees (Foerster-Metz and Golowko, 2018). An employee is evaluated based on some predetermined criteria that are associated with the goals and objectives of his organization (Akinyokun and Uzoka, 2007).

Because the performance of employees in many positions cannot be measured objectively, evaluators are cognitively limited, and there is no consensus on what "good performance" criteria are, researchers have begun to focus on the fairness of the performance appraisal process (Folger, Konovsky and Cropanzano, 1992). However, performance evaluation usually takes into account a wide variety of quantitative and qualitative factors, temporal and resource constraints, changing tactics and strategies, domain-specific information and information asymmetry, and involves decision-making under uncertainty. In addition, in order to make an effective performance evaluation in human resources management, it is often necessary to consider more than one parameter at the same time. Therefore, the state of turbidity, which is generally present in most of human perception and thought (Manoharan Muralidharan, and Deshmukh, 2011), is also present in performance appraisal processes. In most cases, the impossibility of full objectivity causes evaluators to be completely subjective, which undermines employees' trust in their authority (Gürbüz and Albayrak, 2014). However, the performance evaluation process should be as objective as possible in order to avoid mental confusion and meet the expectations of the employees.

Fuzzy logic can provide solutions to uncertainties by clustering with more than one parameter with various fuzzy models and helps to make objective decisions(Yager, 2002). Fuzzy models are becoming increasingly prevalent in various scientific fields, particularly in tasks involving decision-making and analysis of systems. There has been a notable effort to integrate fuzzy-based decision-making scenarios into the realms of business and management. The utilization of fuzzy decision-making models has been extensively studied across diverse domains including the development of performance assessment frameworks (Shaout and Al-Shammari, 1998), the evaluation of military officer performance (Chang, Cheng, and Chen, 2007), and the selection and assessment of employees based on competencies (Golec and Kahya, 2007).

In this study, it is aimed to evaluate the performances of branch managers working in four branches of a cargo company operating in Turkey, in Ankara city center, using fuzzy-based Multi-Criteria Decision Making (MCDM) methods. The main reason for this approach is to propose solutions based on more than one criterion in the performance evaluation of managers. In this context, an analysis based on the evaluations of three decision makers involved in the performance evaluation process was made. The fuzzy DEMATEL (Decision-Making Trial and Evaluation Laboratory Method) method was used to prioritize the criteria. The MULTIMOORA (Multi-Objective Optimization by Ratio Method) method based on single-valued neutrophic clusters was applied in the performance evaluation and ranking of the managers. With this research, the application of MCDM approach has been brought to the literature for the manager performance evaluation of cargo branches.

After the introduction, the conceptual framework and literature review are included in the study. The steps regarding the research methods and processes are discussed in the method section, the findings are stated in the relevant section, and the results and recommendations are presented in the last section.

CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

As stated by many researchers, this type of problem can be considered as a MCDM problem, since performance evaluation has multi-level and multi-factor features. In addition, the existence of multiple and contradictory criteria reveals the necessity of the MCDM approach to evaluate the performance of employees (Wang and Chang, 2007; Golec and Kahya, 2007). The literature review conducted within the scope of the research focused on determining the criteria used in the performance evaluation of managers. At the same time, MCDM methods used in employee performance evaluation were determined.

For example, Afshari and Letic (2016) used fuzzy number bases to evaluate employees. Ten different criteria were used in the study. In the study of Nursari and Murtako (2020), weighting and selection processes were carried out with the PROMETHEE (Preference Ranking Organization Method for Enrichment Evaluation) method and seven different criteria were used in the study. In the study of Badaruddin and Lasena (2021), SAW (Simple Additive Weighting) method was used for weighting and ROC (Rank Order Centroind) method was used for criterion selection. Five different criteria were used in this study. Sumarno, Setiawan and Aisjah(2021), on the other hand, used the AHP (Analytic Hierarchy Process) method for both weighting and criterion selection. Three main criteria and thirteen sub-criteria were used in this study. Hutahaean, Suriani, Supriyanto, Amin and Azhar (2022), the SAW method was used and six different criteria were examined. Hermawan and Damiyati (2020) study, on the other hand, made weighting and criterion selection using SAW and TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) methods, respectively. Five different criteria were used in this study. Ahmed, Sultana, Paul and Azeem (2013) fuzzy logic was used in his study and twenty different criteria were evaluated in the study. Amini, Keshavarz, Keshavarz and Bagheri (2016), on the other hand, F-AHP and TOPSIS methods were used for weighting and selection. Nobari, Yousefi, Mehrabanfar, Jahanikia and Khadivi (2019) used the F-TOPSIS method in their study. Falsafi, Zenouz and Mozaffari (2011), Delphi and F-TOPSIS methods were used together. In the study of Chang (2015), AHP and TOPSIS methods were used. In their study, Milani, Rabieea and Shahmansouri (2018) used AHP and VIKOR (Vise KriterijumskaOptimizacijaIKompromisnoResenje) methods to find a solution to the performance evaluation problem of the employees. The criteria used in the mentioned studies are shown in Table 1.

Table1: Literature review

Authors	Method	Criterion
Afshari and Letic (2016)	Fuzzy Logic	Jobknowledge, jobquality, initiativeandcreativity, communication, collaboration, planningandorganizationaleffectiveness, amount of work, andemployeeabsenteeismscore.
BadaruddinandLasena (2021)	SAW / ROC	Quality of work, discipline, cooperation, loyalty, warning.
Sumarno et al. (2021)	AHP	ServantLeadership (Love, Caring, Vision, Humility, Confidence), EmployeePerformance (Amount of Work, WorkQuality, WorkEfficiency, Collaboration, Discipline), EmployeeCompetence (Mental, Emotional, Social).
Hutahaean et al. (2022)	SAW	Level of Education, Experience, Expertise, Collaboration, Quality of Work, Discipline.
NursariandMurtako (2020)	PROMETHEE	Diligence, teamwork, sincerity, skills, initiative, independenceandabsenteeism.
HermawanandDamiyati (2020)	SAW / TOPSIS	Jobperformance, honesty, cooperation, obedienceandloyalty.
Ahmed et al. (2013)	FuzzyLogic	Employees' jobknowledge, quality of work, quantity of work, problem solvinganddecisionmaking, teamworkandcooperation, leadership, absenteeism rate, latearrival, communicationskills, time management, adaptabilityandflexibility, appearanceandpersonalcare, professionalattitude, initiativeandinnovation, reliability, self-confidence, stabilityunderpressure, ethicsandintegrity, planningability, versatility.
Amini et al. (2016)	F-AHP / TOPSIS	Preparation, implementation, evaluation.
Nobari et al. (2019)	F-TOPSIS	Communicationskills, technicalskills, analysisskills, creativityskills.
Falsafi et al. (2011)	Delphi / F-TOPSIS	Communication, decisionmaking, information, interpersonal relationships, self-motivation, behavioral, management, customerorientation.
Chang (2015)	AHP / TOPSIS	Futurepotential, corporatebusinesssuccess, corporatecommitmentandabilitytowork.
Milani et al. (2018)	AHP / VIKOR	Flexibility, compassion, relatingtothemaster reference anddisplayingappropriatebehavior, relatingtopartnersandexhibitingappropriatebehavior, makinguse of existingreferences, creativityandinnovation, updatingknowledgeandskills, obeyingrulesandregulationsanddiscipline, responsibility, amount of work, quality of work.

Source: Produced by Authors.

As shown in Table 1, MCDM methods are frequently applied in the literature in evaluating managerial performance. At the same time, it is found that various criteria are used. In this study, fuzzy DEMATEL and MULTIMOORA methods based on single-valued neutrophic clusters were used as hybrids. These methods are explained in the next section.

RESEARCH METHOD

In this section, Fuzzy DEMATEL and MULTIMOORA Based on Single-Valued Neutrophic Numbers methods will be explained.

Fuzzy DEMATEL Method

In the DEMATEL method, mutual evaluations between the criteria and their effects on each other are evaluated. This method reveals which criteria affect how other criteria (Gabus and Fontela, 1972; Zhou, Huang and Zhang, 2011; Addae, Zhang, Zhou and Wang, 2019). In the Fuzzy DEMATEL method developed by Lin and Wu (2008), the relations between the criteria and their effects on each other are calculated and the weights of the criteria are determined. The steps of the developed method are explained in order below.

Step 1-1: Using Table 2, the effects of the criteria on each other is evaluated by the decision makers (Lin, 2013). With the evaluations made, the comparison matrix (Z matrix) in Equation (1) is obtained.

Table 2: LinguisticTermsandTriangleFuzzyNumbers

LinguisticTerms	TriangleFuzzyNumbers
Very High (VH)	(0.75; 1.0; 1.0)
High (H)	(0.5; 0.75; 1.0)
Average (A)	(0.25; 0.5; 0.75)
Low (L)	(0; 0.25; 0.5)
Noneffective (NE)	(0; 0; 0.25)

Source: Produced by Authors.

$$\tilde{Z}^k = \begin{bmatrix} 0 & \tilde{z}_{12}^k & \cdots & \tilde{z}_{1j}^k \\ \tilde{z}_{21}^k & 0 & \dots & \tilde{z}_{2j}^k \\ & \vdots & & \\ \tilde{z}_{ij}^k & \tilde{z}_{i2}^k & \dots & 0 \end{bmatrix} \quad (1)$$

k represents a variable represented by the decision maker (k=1,2,...,p). z ̃_ij=(a_ij,b_ij,c_ij) represents the effect level of "i"th criterion to "j"th criterion (j=1,2,…,n). Here a, b and c represent triangular fuzzy numbers.

Step 1-2: Equation (2) and Equation (3) provide the normalized relationship matrix in Equation (4).

$$\tilde{X}_{ij}^k = \frac{\tilde{z}_{ij}^k}{r^k} = \left(\frac{a_{ij}{}^k}{r^k}, \frac{b_{ij}{}^k}{r^k}, \frac{c_{ij}{}^k}{r^k}\right) \quad (2)$$

$$r^k = \max_{1<i<n}\left(\sum_{j=1}^{n} c_{ij}{}^k\right) \quad (3)$$

$$\tilde{X} = \begin{bmatrix} \tilde{X}_{11} & \tilde{X}_{12} & \cdots & \tilde{X}_{1n} \\ \tilde{X}_{21} & 0 & \dots & \tilde{X}_{2n} \\ & \vdots & & \\ \tilde{X}_{n1} & \tilde{X}_{n2} & \dots & \tilde{X}_{nn} \end{bmatrix} \quad (4)$$

Step 1-3: With Equation (5) and Equation (6), the total relationship matrix is obtained.

$$\tilde{T} = \tilde{X}^1 + \tilde{X}^2 + \tilde{X}^3 + \cdots = \sum_{i=1}^{\infty} \tilde{X}^1 = \tilde{X}^1(\mathrm{I} - \tilde{X}^1)^{-1} \quad (5)$$

$$\tilde{T} = \begin{bmatrix} \tilde{T}_{11} & \tilde{T}_{12} & \cdots & \tilde{T}_{1n} \\ \tilde{T}_{21} & 0 & \dots & \tilde{T}_{2n} \\ & \vdots & & \\ \tilde{T}_{n1} & \tilde{T}_{n2} & \dots & \tilde{T}_{nn} \end{bmatrix} \quad (6)$$

Step 1-4: With Equation (7) and Equation (8), the sums of column and row elements are obtained, respectively.

$$\tilde{C}_i = \sum_{j=1}^{n} \tilde{T}_{ij} \quad (7)$$

$$\tilde{R}_i = \sum_{i=1}^{n} \tilde{T}_{ij} \quad (8)$$

Criteria with a high R-C value are more effective than other criteria. Criteria with a high R+C value are more related to other criteria.

Step 1-5: Equation (9) and Equation (10) and R-C and R+C values are clarified.

$$\tilde{R}_i{}^{Def} + \tilde{C}_i{}^{Def} = \frac{1}{4}(a + 2b + c) \quad (9)$$

$$\tilde{R}_i{}^{Def} - \tilde{C}_i{}^{Def} = \frac{1}{4}(a + 2b + c) \quad (10)$$

Step 1-6: The priorities of the criteria are determined by calculating the weights of the criteria with Equation (11) and Equation (12).

$$\omega_i = \left(\left(\tilde{R}_i{}^{Def} + \tilde{C}_i{}^{Def}\right)^2 + \left(\tilde{R}_i{}^{Def} - \tilde{C}_i{}^{Def}\right)^2\right)^2 \quad (11)$$

$$w_i = \frac{\omega_i}{\sum_{i=1}^{n} \omega_i} \quad (12)$$

MULTIMOORA Method Based on Single-Valued Neutrophic Numbers

In univalent neutrophic sets used in decision making processes under uncertainty, $u \in U$ is expressed as $\widetilde{N} = \{(T_{\widetilde{N}}(u), I_{\widetilde{N}}(u), F_{\widetilde{N}}(u)): u \in U\}$. Here it is expressed as $t_N(u), i_N(u), f_N(u): U \rightarrow [0,1]$ and $0 \leq t_N(u) + i_N(u) + f_N(u) \leq 3$(Wang and Chang, 2007. And also($T_{\widetilde{N}}$) is expressed as the truth membership function, ($I_{\widetilde{N}}$) as the uncertainty membership function and ($F_{\widetilde{N}}$) as the falsity membership function.

The steps for the Ratio System (RS), Reference Point (RP) and Full Multiplier Form (FMF) models for alternative rankings are given below, respectively (Brauers and Zavadskas, 2006; Brauers and Zavadskas, 2010; Rani, Mishra, Krishankumar, Ravichandran and Samarjit, 2021):

Step 2-1: Using the values in Table 3 and Equation (13), the weights of the decision makers are calculated (Haq et al., 2022).

$$\varpi_k = \frac{3+t_k-2i_k-f_k}{\sum_{k=1}^{l}(3+t_k-2i_k-f_k)}, \sum_{k=1}^{l} \varpi_k = 1 \quad (13)$$

Table 3: Importance of Decision Makers

LinguisticTerms	Single-ValuedNeutrophicClusters
ExtremelySkilled (ES)	(0.90; 0.10; 0.10)
VeryVerySkilled (VVS)	(0.75; 0.25; 0.20)
VerySkilled (VS)	(0.60; 0.35; 0.40)
Skilled (S)	(0.50; 0.45; 0.50)
LowSkilled(LS)	(0.25; 0.75; 0.70)
Very Low Skilled (VLS)	(0.10; 0.90; 0.90)

Source: Produced by Authors.

Step 2-2: Using the values in Table 4, decision makers evaluate each alternative for each criterion. These values are combined with Equation (14) (Ye, 2014).

Table4: Single-Valued Neutrophic Clusters

LinguisticTerms	Single-Valued Neutrophic Clusters
Extremely High (EH)	(1.00; 0.00; 0.00)
Very Very High (VVH)	(0.90; 0.10; 0.10)
Very High (VH)	(0.80; 0.15; 0.20)
High (H)	(0.70; 0.25; 0.30)
Medium High (MH)	(0.60; 0.35; 0.40)
Fair Average (F)	(0.50; 0.50; 0.50)
Medium Low (ML)	(0.40; 0.65; 0.60)
Low (L)	(0.30; 0.75; 0.70)
Very Low (VL)	(0.20; 0.85; 0.80)
Very Very Low (VVL)	(0.10; 0.90; 0.90)
Extremely Low (EL)	(0.00; 1.00; 1.00)

Source: Produced by Authors.

$$\xi_{ij} = (t_{ij}, i_{ij}, f_{ij}) = SVNWA_{\varpi}\left(\xi_{ij}^{(1)}, \xi_{ij}^{(2)}, \ldots, \xi_{ij}^{(l)}\right) = \left(1 - \prod_{k=1}^{l}\left(1 - t_{ij}^{(k)}\right)^{\varpi_k}, \prod_{k=1}^{l}\left(i_{ij}^{(k)}\right)^{\varpi_k}, \prod_{k=1}^{l}\left(f_{ij}^{(k)}\right)^{\varpi_k}\right) \quad (14)$$

Step 2-3: In the RS model, Equation (15) and Y_i^+ values are calculated for benefit criteria, Equation (16) and Y_i^- values are calculated for cost criteria.

$$Y_i^+ = \left(1 - \prod_{j\in P_b}\left(1 - t_{ij}\right)^{w_j}, \prod_{j\in P_b}\left(i_{ij}\right)^{w_j}, \prod_{j\in P_b}(f_{ij})^{w_j}\right) \quad (15)$$

$$Y_i^- = \left(1 - \prod_{j\in P_n}\left(1 - t_{ij}\right)^{w_j}, \prod_{j\in P_n}\left(i_{ij}\right)^{w_j}, \prod_{j\in P_n}(f_{ij})^{w_j}\right) \quad (16)$$

Step 2-4: y_i^+,y_i^- and $\mathbb{S}(\xi_{ij})$ are calculated by Equation (17) and Equation (18).

$$y_i^+ = \mathbb{S}(Y_i^+) \text{ and } y_i^- = \mathbb{S}(Y_i^-) \quad (17)$$

$$\mathbb{S}(\xi_{ij}) = \frac{3+t_{ij}-2i_{ij}-f_{ij}}{4} \quad (18)$$

Step 2-5: The y_i values calculated by Equation (19) are used in the order of alternatives. The alternative with the highest value is determined as the best alternative.

$$y_i = y_i^+ - y_i^- \quad (19)$$

Step 2-6: In the RP model, Equation (20) and p_j^* values are calculated for all criteria.

$$p_j^* = \begin{cases} \left(\max_i t_{ij}, \min_i i_{ij}, \min_i f_{ij}\right), for\ benefit\ crterion\ P_b \\ \left(\min_i t_{ij}, \max_i i_{ij}, \max_i f_{ij}\right), for\ cost\ criterion\ P_n \end{cases} \quad (20)$$

Step 2-7: Equation (21) and Equation (22) for $\delta_1, \delta_2 \in SVNN(U)$ calculate the distance measure D_{ij} .

$$D_h(\delta_1, \delta_2) = \frac{1}{3}\left(\left|t_{\delta_1}(u_i) - t_{\delta_2}(u_i)\right| + \left|i_{\delta_1}(u_i) - i_{\delta_2}(u_i)\right| + \left|f_{\delta_1}(u_i) - f_{\delta_2}(u_i)\right|\right) \quad (21)$$

$$D_{ij} = w_j\left(D_h(\xi_{ij}, p_j^*)\right) \quad (22)$$

Step 2-8: The d_i values calculated by Equation (23) are used in the order of alternatives. The alternative with the lowest value is determined as the best alternative.

$$d_i = \max_j D_{ij} \quad (23)$$

Step 2-9: In the FMF model, Equation (24) andA_i d values for benefit criteria and Equation (25) and B_i values for cost criteria are calculated.

$$A_i = \left(\prod_{j \in P_b}(t_{ij})^{w_j}, \prod_{j \in P_b}(1 - i_{ij})^{w_j}, \prod_{j \in P_b}(1 - f_{ij})^{w_j}\right) \quad (24)$$

$$B_i = \left(\prod_{j \in P_n}(t_{ij})^{w_j}, \prod_{j \in P_n}(1 - i_{ij})^{w_j}, \prod_{j \in P_n}(1 - f_{ij})^{w_j}\right) \quad (25)$$

Step 2-10: The α_i and β_i values are calculated by Equation (18) and Equation (26).

$$\alpha_i = \mathbb{S}(A_i)\ and\ \beta_i = \mathbb{S}(B_i) \quad (26)$$

Step 2-11: Theu_i values calculated with the equation (27) are used in ordering the alternatives. The alternative with the highest value is determined as the best alternative.

$$u_i = \frac{\alpha_i}{\beta_i} \quad (27)$$

Step 2-12: Values are obtained by using Equation (28) and Equation (29) for the final alternative ranking (Wu et al., 2018). The alternative with the highest rating is determined as the best alternative.

$$I_B(F_i) = y_i^* \frac{m - \rho(y_i^*) + 1}{(m(m+1)/2)} - d_i^* \frac{\rho(d_i^*)}{(m(m+1)/2)} + u_i^* \frac{m - \rho(u_i^*) + 1}{(m(m+1)/2)} \quad (28)$$

$$y_i^* = \frac{y_i}{\sqrt{\sum_{i=1}^{m}(y_i)^2}}, d_i^* = \frac{d_i}{\sqrt{\sum_{i=1}^{m}(d_i)^2}}, u_i^* = \frac{u_i}{\sqrt{\sum_{i=1}^{m}(u_i)^2}}$$

FINDINGS AND DISCUSSION

In the general performance evaluation processes of cargo companies, the importance of human resources comes to the fore due to human-oriented activities. In particular, managerial performance plays an important role in the management of all personel and all processes. Therefore, in this study, it is aimed to evaluate the performance of cargo branch managers. In this context, seven criteria were determined as a result of the literature review: Experience (C1), Absenteeism (C2), Discipline (C3), Decision-making ability (C4), Teamwork ability (C5), Communication skills (C6), Education level (C7). These criteria were also approved by the top managers of the cargo company.

In this case study, the performance of four different branch managers (A1, A2, A3, A4) of a cargo company operating in Ankara was carried out by three experts(DM-1, DM-2, DM-3) in the general directorate performance evaluation according to the criteria determined above. Findings were obtained by applying all the steps described in the methodology section in order.

Step 1-1: The effects of the criteria on each other were determined by linguistic expressions using Table 2 by the decision makers. These statements are shown in Table 5. Then linguistic expressions were converted into triangular fuzzy numbers. It is shown in Table 6.

Table5: Criteria Comparison Matrix of Decision Makers (LinguisticTerms)

		C1	C2	C3	C4	C5	C6	C7
DM1	**C1**	-	L	L	L	L	A	H
	C2	H	-	A	A	L	L	H
	C3	H	A	-	L	A	L	L
	C4	VH	A	H	-	H	H	L
	C5	H	H	A	L	-	L	H
	C6	A	H	H	L	H	-	A
	C7	L	L	H	H	L	A	-
DM2	**C1**	-	L	L	L	L	A	H
	C2	H	-	L	L	L	H	A
	C3	VH	H	-	A	A	H	L
	C4	VH	H	A	-	L	A	L
	C5	H	VH	A	H	-	H	A
	C6	A	L	L	H	L	-	L
	C7	L	A	H	A	A	H	-
DM3	**C1**	-	L	A	L	L	VH	L
	C2	VH	-	L	A	A	H	L
	C3	H	VH	-	H	H	L	A
	C4	VH	H	L	-	L	H	VH
	C5	VH	H	L	VH	-	A	L
	C6	A	L	H	A	H	-	A
	C7	H	H	A	L	H	A	-

Source: Produced by Authors.

Table6: Criteria Comparison Matrix of Decision Makers (Triangular Fuzzy Numbers)

		C1	C2	C3	C4	C5	C6	C7
DM1	**C1**	(0; 0; 0)	(0; 0.25; 0.5)	(0; 0.25; 0.5)	(0; 0.25; 0.5)	(0; 0.25; 0.5)	(0.25; 0.5; 0.75)	(0.5; 0.75; 1)
	C2	(0.5; 0.75; 1)	(0; 0; 0)	(0.25; 0.5; 0.75)	(0.25; 0.5; 0.75)	(0; 0.25; 0.5)	(0; 0.25; 0.5)	(0.5; 0.75; 1)
	C3	(0.5; 0.75; 1)	(0.25; 0.5; 0.75)	(0; 0; 0)	(0; 0.25; 0.5)	(0.25; 0.5; 0.75)	(0; 0.25; 0.5)	(0; 0.25; 0.5)
	C4	(0.75; 1; 1)	(0.25; 0.5; 0.75)	(0.5; 0.75; 1)	(0; 0; 0)	(0.5; 0.75; 1)	(0.5; 0.75; 1)	(0; 0.25; 0.5)
	C5	(0.5; 0.75; 1)	(0.5; 0.75; 1)	(0.25; 0.5; 0.75)	(0; 0.25; 0.5)	(0; 0; 0)	(0; 0.25; 0.5)	(0.5; 0.75; 1)
	C6	(0.25; 0.5; 0.75)	(0.5; 0.75; 1)	(0.5; 0.75; 1)	(0; 0.25; 0.5)	(0.5; 0.75; 1)	(0; 0; 0)	(0.25; 0.5; 0.75)
	C7	(0; 0.25; 0.5)	(0; 0.25; 0.5)	(0.5; 0.75; 1)	(0.5; 0.75; 1)	(0; 0.25; 0.5)	(0.25; 0.5; 0.75)	(0; 0; 0)
DM2	**C1**	(0; 0; 0)	(0; 0.25; 0.5)	(0; 0.25; 0.5)	(0; 0.25; 0.5)	(0; 0.25; 0.5)	(0.25; 0.5; 0.75)	(0.5; 0.75; 1)
	C2	(0.5; 0.75; 1)	(0; 0; 0)	(0; 0.25; 0.5)	(0; 0.25; 0.5)	(0; 0.25; 0.5)	(0.5; 0.75; 1)	(0.25; 0.5; 0.75)
	C3	(0.75; 1; 1)	(0.5; 0.75; 1)	(0; 0; 0)	(0.25; 0.5; 0.75)	(0.25; 0.5; 0.75)	(0.5; 0.75; 1)	(0; 0.25; 0.5)
	C4	(0.75; 1; 1)	(0.5; 0.75; 1)	(0.25; 0.5; 0.75)	(0; 0; 0)	(0; 0.25; 0.5)	(0.25; 0.5; 0.75)	(0; 0.25; 0.5)
	C5	(0.5; 0.75; 1)	(0.75; 1; 1)	(0.25; 0.5; 0.75)	(0.5; 0.75; 1)	(0; 0; 0)	(0.5; 0.75; 1)	(0.25; 0.5; 0.75)
	C6	(0.25; 0.5; 0.75)	(0; 0.25; 0.5)	(0; 0.25; 0.5)	(0.5; 0.75; 1)	(0; 0.25; 0.5)	(0; 0; 0)	(0; 0.25; 0.5)
	C7	(0; 0.25; 0.5)	(0.25; 0.5; 0.75)	(0.5; 0.75; 1)	(0.25; 0.5; 0.75)	(0.25; 0.5; 0.75)	(0.5; 0.75; 1)	(0; 0; 0)
DM3	**C1**	(0; 0; 0)	(0; 0.25; 0.5)	(0.25; 0.5; 0.75)	(0; 0.25; 0.5)	(0; 0.25; 0.5)	(0.75; 1; 1)	(0; 0.25; 0.5)
	C2	(0.75; 1; 1)	(0; 0; 0)	(0; 0.25; 0.5)	(0.25; 0.5; 0.75)	(0.25; 0.5; 0.75)	(0.5; 0.75; 1)	(0; 0.25; 0.5)
	C3	(0.5; 0.75; 1)	(0.75; 1; 1)	(0; 0; 0)	(0.5; 0.75; 1)	(0.5; 0.75; 1)	(0; 0.25; 0.5)	(0.25; 0.5; 0.75)
	C4	(0.75; 1; 1)	(0.5; 0.75; 1)	(0; 0.25; 0.5)	(0; 0; 0)	(0; 0.25; 0.5)	(0.5; 0.75; 1)	(0.75; 1; 1)
	C5	(0.75; 1; 1)	(0.5; 0.75; 1)	(0; 0.25; 0.5)	(0.75; 1; 1)	(0; 0; 0)	(0.25; 0.5; 0.75)	(0; 0.25; 0.5)
	C6	(0.25; 0.5; 0.75)	(0; 0.25; 0.5)	(0.5; 0.75; 1)	(0.25; 0.5; 0.75)	(0.5; 0.75; 1)	(0; 0; 0)	(0.25; 0.5; 0.75)
	C7	(0.5; 0.75; 1)	(0.5; 0.75; 1)	(0.25; 0.5; 0.75)	(0; 0.25; 0.5)	(0.5; 0.75; 1)	(0.25; 0.5; 0.75)	(0; 0; 0)

Source: Produced by Authors.

Step 1-2: The matrix in Table5 was normalized using Equation (2), Equation (3), Equation (4).

Step 1-3: By using Equation (5) and Equation (6), the total relationship matrix was obtained.

Step 1-4: Column and row elements are summed with Equation (7) and Equation (8).

Step 1-5: Equation (9) and Equation (10) and R-C and RC values were clarified.

Step 1-6: The priorities of the criteria were determined by calculating the weights of the criteria with Equation (11) and Equation (12). It is presented in Table7.

Table7: Criterion Weights

	C1	C2	C3	C4	C5	C6	C7
$\tilde{R}_i^{Def} + \tilde{C}_i^{Def}$	4.049	3.927	3.909	3.985	3.962	4.052	3.863
$\tilde{R}_i^{Def} - \tilde{C}_i^{Def}$	0.911	0.172	-0.223	-0.392	-0.472	0.175	-0.172
w_i	0.1487	0.1408	0.1403	0.1435	0.1430	0.1453	0.1385
Ranking	1	5	6	3	4	2	7

Source: Produced by Authors.

Step 2-1: Using Table 3 and Equation (13), the expertise levels of the decision makers were determined and the decision maker weights were calculated. Table 8 shows the level of expertise of the decision makers. Table 9 shows the weights of the decision makers.

Table8: Expertise Levels of Decision Makers

DM-1	**DM-2**	**DM-3**
Very Skilled (0.60; 0.35; 0.40)	Extremely Skilled (0.90; 0.10; 0.10)	Very Very Skilled (0.75; 0.25; 0.20)

Source: Produced by Authors.

Table9: Importance Level of Decision Makers

	DM-1	**DM-2**	**DM-3**
ϖ_k	0.2732	0.3934	0.3333

Source: Produced by Authors.

Step 2-2: Using the values in Table 4, decision makers evaluated each alternative for each criterion. Linguistic expressions are presented in Table 10 and Single Value Neutrophic numbers are presented in Table 11. These values are combined with Equation (14).

Table10: DecisionMakers' Evaluation of Alternatives According to Criteria (Linguistic Terms)

		A1	A2	A3	A4
DM-1	C1	VH	H	VH	MH
	C2	VVH	VH	MH	MH
	C3	VH	VH	MH	MH
	C4	H	H	F	H
	C5	H	VH	ML	F
	C6	MH	H	ML	ML
	C7	ML	F	F	L
DM-2	C1	VVH	H	VH	VH
	C2	VH	H	VH	VH
	C3	VH	VH	H	MH
	C4	VH	VH	H	H
	C5	H	H	F	ML
	C6	F	MH	ML	ML
	C7	ML	MH	ML	F
DM-3	C1	VH	MH	H	VVH
	C2	VH	MH	H	VH
	C3	VVH	H	MH	VH
	C4	VH	VH	F	H
	C5	VH	H	ML	ML
	C6	MH	H	ML	L
	C7	F	ML	L	L

Source: Produced by Authors.

Table 11: Decision Makers' Evaluation of Alternatives According to the Criteria (Single Value Neutrophic)

		A1			A2			A3			A4		
		t	*i*	*f*	*t*	*i*	*f*	*t*	*i*	*f*	*t*	*i*	*f*
DM-1	C1	0.80	0.15	0.20	0.70	0.25	0.30	0.80	0.15	0.20	0.60	0.35	0.40
	C2	0.90	0.10	0.10	0.80	0.15	0.20	0.60	0.35	0.40	0.60	0.35	0.40
	C3	0.80	0.15	0.20	0.80	0.15	0.20	0.60	0.35	0.40	0.60	0.35	0.40
	C4	0.70	0.25	0.30	0.70	0.25	0.30	0.50	0.50	0.50	0.70	0.25	0.30
	C5	0.70	0.25	0.30	0.80	0.15	0.20	0.40	0.65	0.60	0.50	0.50	0.50
	C6	0.60	0.35	0.40	0.70	0.25	0.30	0.40	0.65	0.60	0.40	0.65	0.60
	C7	0.40	0.65	0.60	0.50	0.50	0.50	0.50	0.50	0.50	0.30	0.75	0.70
DM-2	C1	0.90	0.10	0.10	0.70	0.25	0.30	0.80	0.15	0.20	0.80	0.15	0.20
	C2	0.80	0.15	0.20	0.70	0.25	0.30	0.80	0.15	0.20	0.80	0.15	0.20
	C3	0.80	0.15	0.20	0.80	0.15	0.20	0.70	0.25	0.30	0.60	0.35	0.40
	C4	0.80	0.15	0.20	0.80	0.15	0.20	0.70	0.25	0.30	0.70	0.25	0.30
	C5	0.70	0.25	0.30	0.70	0.25	0.30	0.50	0.50	0.50	0.40	0.65	0.60
	C6	0.50	0.50	0.50	0.60	0.35	0.40	0.40	0.65	0.60	0.40	0.65	0.60
	C7	0.40	0.65	0.60	0.60	0.35	0.40	0.40	0.65	0.60	0.50	0.50	0.50
DM-3	C1	0.80	0.15	0.20	0.60	0.35	0.40	0.70	0.25	0.30	0.90	0.10	0.10
	C2	0.80	0.15	0.20	0.60	0.35	0.40	0.70	0.25	0.30	0.80	0.15	0.20
	C3	0.90	0.10	0.10	0.70	0.25	0.30	0.60	0.35	0.40	0.80	0.15	0.20
	C4	0.80	0.15	0.20	0.80	0.15	0.20	0.50	0.50	0.50	0.70	0.25	0.30
	C5	0.80	0.15	0.20	0.70	0.25	0.30	0.40	0.65	0.60	0.40	0.65	0.60
	C6	0.60	0.35	0.40	0.70	0.25	0.30	0.40	0.65	0.60	0.30	0.75	0.70
	C7	0.50	0.50	0.50	0.40	0.65	0.60	0.30	0.75	0.70	0.30	0.75	0.70

Source: Produced by Authors.

Step 2-3: In the RS model, Equation (15) and Y_i^+ values were calculated for benefit criteria, Equation (16) and Y_i^- values were calculated for cost criteria.

Step 2-4: The values y_i^+ , $y_i^-$and $\mathbb{S}(\xi_{ij})$arecalculatedbyEquation (17) andEquation (18).

Step 2-5: The y_i values calculated by Equation (19) were used in the order of alternatives. Alternative ranking is obtained for the RS model.

Step 2-6: Equation (20) and p_j^* values were calculated for all criteria in the RP model.

Step 2-7: For $\delta_1, \delta_2 \in SVNN(U)$ Equation (21) and Equation (22) and distance measure D_{ij} values were calculated.

Step 2-8: The d_i values calculated by Equation (23) are ranked alternatively. The alternative with the lowest value was determined as the best alternative.

Step 2-9: In the FMF model, Equation (24) andA_i values for benefit criteria and Equation (25) B_i values for cost criteria were calculated.

Step 2-10: The α_i and $\beta_i$values were calculated by Equation (18) and Equation (26).

Step 2-11: The u_i values calculated by Equation (27) were used to rank the alternatives.

Step 2-12: Values were obtained using Equation (28) and Equation (29) for the final alternative ranking. The final alternative ranking is shown in Table 12.

Table 12: Final Alternative Ranking

	A1	A2	A3	A4
$\boldsymbol{I_B(F_i)}$	0.3049	0.3935	0.1043	0.0890
Ranking	2	1	3	4

Source: Produced by Authors.

As shown in Table 12, the second branch manager of the cargo company was identified as the manager with the highest performance. The lowest performance was determined as the fourth branch manager.

CONCLUSION AND IMPLICATIONS

Different approaches are applied in managerial performance evaluation processes. In this study, manager performance evaluation process was evaluated by MCDM method. The results obtained with in the scope of the research are discussed in two sub-headings, on the basis of criteria and on the basis of managers.

According to the evaluations of the decision makers, the importance levels of the criteria are respectively as “Experience, Communication skills, Decision-making ability, Teamwork ability, Absenteeism, Discipline, Education Level”. According to these results, the following inferences were obtained:

✓ In the evaluation of cargo branch managers, the three basic parameters that are most desired are that the managers have experience, have high communication skills and have advanced decision-making skills.

✓ Contrary to expectations, education level was determined as the least important parameter. This situation is seen as the fact that cargo services are based on experience rather than education.

✓ It has been understood that absenteeism and discipline parameters also play an important role in cargo manager performance evaluation processes.

According to the performance levels of the cargo branch managers, the performance of the second branch manager took the first place. The performance of the first branch manager took the second place. The performance of the third branch manager ranked third. The performance of the fourth branch manager was in the last place. According to these results, the recommendations for the cargo company are as follows:

✓ The performance indicators of the second branch manager are at a high level. It can be said that this manager exhibits the determined criteria more and more successfully than other managers. In order to maintain the performance level of this manager, it is recommended to make financial and non-material rewards that will increase his/her motivation.

✓ It is recommended that the fourth branch manager be in the last place in the performance evaluation, this manager should gain different experiences with applications such as rotation, problem solving with simulations, decision making, and should be supported with trainings and motivating factors that improve skills such as communication and teamwork skills.

✓ Necessary feedback should be given to second and third branch managers to improve performance. The recommendations made for the fourth branchmanager should be applied to these managers as well.

As a result of the research, the suggestions to there searchers are as follows:

✓ Managerial performance evaluation problems can be handled with different MCDM methods. Managerial performance evaluation problems can be applied in different sectors by using different criteria.

✓ Expert evaluators can be increased and more sensitive assessments can be applied according to the interviews with the senior managers of the companies. In addition, with these and similar methods, branch manager performances can be evaluated and the findings obtained can be compared with branch performances.

✓ Ultimately, this research provides benefits in calculating managerial performance by quantifying general evaluations as well as metric measurements.

REFERENCES

Addae, B. A., Zhang, L., Zhou, P. & Wang, F. (2019). Analyzing barriers of smart energy city in Accra with two-step Fuzzy Dematel.*Cities*, 89, 218-227.

Afshari, A. &Letić, D. (2016). Linguistic evaluating the employee’s performance.VI International Symposium Engineering Management and Competitiveness 2016 (EMC 2016)17-18th June 2016, Kotor, Montenegro. Doi:10.13140/RG.2.1.4003.2882.

Ahmed, I., Sultana, I, Paul, S. K., & Azeem, A., (2013). Employee performance evaluation: A fuzzy approach. *International Journal of Productivity and Performance Management*, Vol. 62 Issue: 7, 718-734, https://doi.org/10.1108/IJPPM-01-2013-0013

Akinyokun, O. C., &Uzoka, F. M. E. (2007). Factor analysis of the effects of academic staff profile on the investment portfolio of a university. *International Journal of the Computer, the Internet and Management*, *15*(1), 51-62.

Amini, M.T., Keshavarz, E., Keshavarz, A., & Bagheri, S.M., (2016). Prioritisation and performance evaluation of employees at strategic human resource management process using fuzzy AHP and fuzzy TOPSIS methods. *International Journal of Productivity and Quality Management*, Inderscience Enterprises Ltd, vol. 17(1), pages 61-81.

Badaruddin, M. &Lasena, M. (2021) The decision support system in the performance appraisal of employees by applying the method of Simple Additive Weighting (SAW). *European Journal of Research Development and Sustainability* (EJRDS). 2(12):37-42.

Brauers, W. K. M., &Zavadskas, E. K. (2006). The MOORA method and its application to privatization in a transition economy.*Control and Cybernetics*, 35(2), 445-469.

Brauers, W. K. M., &Zavadskas, E. K. (2010). Robustness in the MULTIMOORA model: The example of Tanzania, *Transformations in Business & Economics*, 9-3(21), 67-83

Chang, J. R., Cheng, C. H., & Chen, L. S. (2007). A fuzzy-based military officer performance appraisal system. *Applied Soft Computing*, *7*(3), 936-945.

Chang, Y. (2015). Employee performance appraisal in a logistics company. *Open Journal of Social Sciences*. 03. 47-50. 10.4236/jss.2015.37008.

Falsafi, N., Zenouz, R.Y. & Mozaffari, M.M. (2011). Employees' performance appraisal with TOPSIS under fuzzy environment.*Int. J. Society Systems Science*, Vol. 3, No. 3, pp.272–290.

Foerster-Metz, U. S. F. P., &Golowko, N. (2018). The need for digital and soft skills in the Romanian business service industry. *Management &Marketing.Challenges for the knowledge society*, *13*(1), 831-847.https://doi.org/10.2478/mmcks-2018-0008

Folger, R., Konovsky, M. A., & Cropanzano, R. (1992). A due process metaphor for performance appraisal. *Research in Organizational Behavior*, *14*, 129-129.https://doi.org/10.1016/j.asoc.2006.03.003

Gabus, A. & Fontela, E. (1972) World problems an invitation to further thought within the framework of DEMATEL. Battelle Geneva Research Centre, Geneva.

Golec, A., & Kahya, E. (2007).A fuzzy model for competency-based employee evaluation and selection. *Computers & Industrial Engineering*, *52*(1), 143-161. https://doi.org/10.1016/j.cie.2006.11.004

Gürbüz, T., & Albayrak, Y. E. (2014). An engineering approach to human resources performance evaluation: Hybrid MCDM application with interactions. *Applied Soft Computing*, *21*, 365-375.https://doi.org/10.1016/j.asoc.2014.03.025

Haq, R. S. U., Saeed, M., Mateen, N., Siddiqui, F., Naqvi, M., Yi, J. B., & Ahmed, S. (2022). Sustainable material selection with crisp and ambiguous data using single-valued neutrosophic-MEREC-MARCOS framework.*Applied Soft Computing*, 128, 109546. https://doi.org/10.1016/j.asoc.2022.109546

Hermawan, A. &Damiyati, A. (2020). Decision support system for employee performance assessment with SAW and TOPSIS Methods.*eCo-Buss*. 2. 50-70. 10.32877/eb.v2i3.139.

Hutahaean, J., Suriani, S., Supriyanto, H., Amin, M. & Azhar, Z. (2021). Implementation of simple additive weighting method in evaluating employee performance for job promotion recommendations.*Webology*. 19. 123-132. Doi: 10.14704/WEB/V19I1/WEB19009.

Lado, A. A., & Wilson, M. C. (1994). Human resource systems and sustained competitive advantage: A competency-based perspective. *Academy of management review*, *19*(4), 699-727.https://doi.org/10.5465/amr.1994.9412190216

Lin, C .J. & Wu, W. W. (2008).A causal analytical method for group decision-making under fuzzy environment.*Expert Systems with Applications*, 34(1): 205-213.

Lin R-J. (2013). Using fuzzy DEMATEL to evaluate the green supply chain management practices, *Journal of Cleaner Production*, Volume 40, 32-39, https://doi.org/10.1016/j.jclepro.2011.06.010.

Manoharan, T. R., Muralidharan, C., & Deshmukh, S. G. (2011). An integrated fuzzy multi-attribute decision-making model for employees' performance appraisal. *The International Journal of Human Resource Management*, *22*(03), 722-745.

Milani N., Rabieea M., &Shahmansouri A., (2018). Evaluate the efficiency of the company's employees by using VIKOR and AHP approach in Persian corporate insurance. *International Journal of Business Economicsand Management Studies*Vol. 6, No. 2, 2018, pp. 71-79.ISSN 2348-3016

Nobari S.M., Yousefi V., Mehrabanfar E., Jahanikia A.H. &Khadivi A.M. (2019) Development of a complementary fuzzy decision support system for employees' performance evaluation, *Economic Research*, 32:1, 492-509, DOI: 10.1080/1331677X.2018.1556106

Nursari S.R.C. &Murtako A. (2020). Decision support system for employee performance evaluation with promethemethod.case study: Faculty of Engineering, Pancasila University. *Distance Learning* Vol. 3 No. 1.

Rani P., Mishra A. R., Krishankumar R., Ravichandran K. S., & Samarjit K. (2021). Multi-criteria food waste treatment method selection using Single-Valued Neutrosophic-CRITIC-MULTIMOORA framework, *Applied Soft Computing*, Volume 111, 2021, 107657, ISSN 1568-4946, https://doi.org/10.1016/j.asoc.2021.107657.

Rivai, V., Kamal, H., & Muhammad, N. (2014). *The Economic of Education*, Mengelola Pendidikan SecaraProfesionalUntukMeraihMutudenganPendekatanBisnis (1st ed.). Gramedia Pustaka Utama.

Shaout, A., & Al-Shammari, M. (1998). Fuzzy logic modeling for performance appraisal systems: a framework for empirical evaluation. *Expert systems with Applications*, *14*(3), 323-328.https://doi.org/10.1016/S0957-4174(97)00085-7

Sumarno, A., Setiawan, M. &Aisjah, S. (2021). Employees Performance ealuation in Defense Ministry of the Republic of Indonesia based on multicriteria decision making (MCDM) and system dynamic (SD). *International Journal of Operations and Quantitative Management*. 27. 245. 10.46970/2021.27.3.4.

Wang, T. C., & Chang, T. H. (2007). Application of TOPSIS in evaluating initial training aircraft under a fuzzy environment. *Expert systems with applications*, *33*(4), 870-880.https://doi.org/10.1016/j.eswa.2006.07.003

Wu, X., Liao, H., Xu, Z., Hafezalkotob, A., & Herrera, F. (2018). Probabilistic linguistic MULTIMOORA: A multicriteria decision making method based on the probabilistic linguistic expectation function and the improved Borda rule. *IEEE transactions on Fuzzy Systems*, 26(6), 3688-3702. https://doi.org/10.1109/TFUZZ.2018.2843330

Yager, R. R. (2002). Heavy OWA operators. *Fuzzy optimization and decision making*, *1*, 379-397.https://doi.org/10.1023/A:1020959313432

Ye, J. (2014). Clustering methods using distance-based similarity measures of single-valued neutrosophicsets.*Journal of Intelligent Systems*, 23(4), 379-389. https://doi.org/10.1515/jisys-2013-0091

Zhou Q., Huang W., & Zhang Y. (2011) Identifying critical success factors in emergency management using a fuzzy DEMATEL method, *Safety Science*, Volume 49, Issue 2, 2011, Pages 243-252, ISSN 0925-7535, https://doi.org/10.1016/j.ssci.2010.08.005.

EXTENDED ABSTRACT

Cargo businesses play a vital role in the modern economy by facilitating the movement of goods across various geographical locations. The processes involved in this industry require a delicate balance of both physical and mental labor. The operational success of cargo companies hinges not only on their ability to efficiently transport packages but also on the strategic decisions made by branch managers who oversee specific geographic areas. With the surge in e-commerce activities in recent years, the significance of cargo businesses has soared, leading to heightened competition within the sector. In this dynamic landscape, the performance of individual branches has emerged as a critical factor that directly correlates with the success of cargo companies. The responsibilities shouldered by branch managers have become increasingly vital, as they influence various facets of the business, such as customer satisfaction, operational efficiency, and revenue generation. Thus, the evaluation of branch manager performance takes center stage in the pursuit of organizational excellence. Focusing on this aspect, the purpose of the undertaken study was to meticulously assess the performance levels of branch managers within a specific cargo company. The chosen organization operates in Turkey, with its branches situated in the bustling urban expanse of Ankara city center. To achieve a comprehensive evaluation, a combination of fuzzy logic and multi-criteria decision-making methodologies was employed. The study began by carefully identifying and defining seven essential criteria for evaluating branchmanager performance. The Fuzzy DEMATEL method was then applied to determine the relative importance of each criterion, forming a structured basis for subsequent assessments. Utilizing the MULTIMOORA method, which utilizes single-valued neutrosophic numbers, the study ranked branch manager performance across the company's four branches. This comprehensive approach considered the complex interrelationships among various criteria, resulting in a detailed and informed evaluation of each branch manager's effectiveness. Crucially, the evaluation process encompassed input from three distinct decision-makers, ensuring a well-rounded perspective that mitigated potential biases. By consolidating the view points of multiple stakeholders, the study aimed to arrive at an objective and comprehensive judgment. After analyzing the research outcomes, notable insights emerged. Experience was identified as the most important criterion in assessing branch manager performance, highlighting the indispensable role of practical

knowledge and seasoned decision-making. Conversely, educational levels were deemed less influential, highlighting the precedence of practical aptitude over theoretical expertise in this dynamic industry. The study's pinnacle was the recognition of the second branch manager as the highest performer among the four evaluated. This not only offer sactionable insights for company management but also affirms the effectiveness of the fuzzy logic and multi-criteria decision-making methods employed to evaluate and enhance branch manager performance. In short, as competition intensifies, cargo businesses and their managers have gained prominence. The study's amalgamation of fuzzy logic and multi-criteria approaches emphasizes the importance of a comprehensive evaluation of branch manager performance, guiding cargo companies towards sustained success in this evolving landscape.