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SALES MANAGER SELECTION WITH MULTI CRITERIA DECISION MAKING METHODS

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Çok Kriterli Karar Verme Yöntemleri ile Satış Müdürü Seçimi

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ABSTRACT

Business success requires leaders who can create strategic plans in consistent forward-looking interactions. Companies must pay attention to the selection of managers who can create interactive, realistic strategic plans for the long term and enable their employees to act in line with these plans. Because selection of these employees affects the performance of the companies and the trust of the shareholders. The sales manager is one of the critical personnel to be selected carefully. The literature uses multi-criteria decision-making (MCDM) methodologies to solve the management selection problem. This research aims to identify the criterias for a sales manager and to use MCDM methodologies for applying them. The criteria importance through an inter-criteria correlation based on a single-valued neutrosophic set (SVNS-CRITIC) method used for weighting eight criteria and ratio analysis based on the single-valued neutrosophic sets (SVNS-MULTIMOORA) method was used for ranking the alternatives. The case study was carried out in an automobile spare part company operating in Turkey. Findings of this reserach revealed that communication skills were the most crucial factor, and the first applicant was regarded as the best candidate. Based on the results of the research, recommendations have been made for automobile spare part firms, sales manager candidates, and researchers.

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ÖZ

İşletmenin başarısı, tutarlı ileriye dönük etkileşimlerde stratejik planlar oluşturabilen liderler gerektirmektedir. Şirketler uzun vadeli, interaktif, gerçekçi stratejik planlar oluşturabilen ve çalışanlarının bu planlar doğrultusunda hareket etmelerini sağlayan yöneticilerin seçimine özen göstermelidir. Çünkü bu çalışanların seçimi şirketlerin performansını ve hissedarların güvenini etkilemektedir. Satış müdürü özenle seçilmesi gereken kritik personellerden biridir. Literatürde, yönetim seçimi problemini çözmek için çok kriterli karar verme (MCDM) metodolojilerini kullanılmaktadır. Bu araştırma, bir satış yöneticisi için kriterleri belirlemeyi ve bunları uygulamak için ÇÖKV metodolojilerini kullanmayı amaçlamaktadır. Kriterlerin önemi, sekiz kriteri ağırlıklandırmak için kullanılan tek değerli bir nötrozofik küme (SVNS-CRITIC) yöntemine dayalı bir kriterler arası korelasyon yoluyla önem kazanmaktadır. Alternatiflerin sıralanmasında ise tek değerli nötrozofik kümeler (SVNS-MULTIMOORA) yöntemine dayalı oran analizi kullanılmıştır. Çalışmadaki örnek olay, Türkiye'de faaliyet gösteren bir

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otomobil yedek parça firmasında gerçekleştirilmiştir. Bu araştırmanın bulguları, iletişim becerilerinin en önemli faktör olduğunu ve ilk başvuranın en iyi aday olarak görüldüğünü ortaya koymuştur. Araştırma sonuçlarına dayalı olarak otomobil yedek parça firmaları, satış yöneticisi adayları ve araştırmacılara önerilerde bulunulmuştur.

1. Introduction

While today's competitive conditions not only motivate companies to produce qualified products, they also trigger efforts to successfully market and sell qualified products. Businesses should develop accomplished sales strategies to sell their products to both other businesses and their customers. Planning and implementation of these strategies is the duty of the sales manager. These managers are also expected to have the skills to understand the needs of the market and customers and to direct companies in this way. To add these, they should have the skills to be good models for sales personnel and be able to motivate those (Rich, 1997). In addition, sales managers should be able to make successful sales like sales personnel. And they must manage their sales personnel successfully so that the sales personnel can convey the right information with the right method to customers (Rapp et al., 2020).

The selection of sales managers is a topic covered in both qualitative and quantitative research in the literature. These studies show that problems with sales manager selection include the use of multicriteria decision-making (MCDM) techniques (Boran et al., 2011; Wan et al., 2013; Urosevic et al., 2017; Ji et al., 2018; Mumcu & Gok, 2021). In addition, there is various manager selection research in the literature (Kara, 2022; Kara et al., 2022; Kara et al., 2023a; Kara et al., 2023b). This research aims to explain the sales manager selection problem through a case study.

This research is divided into five sections. The second section presents a literature review of the CRITIC and MULTIMOORA methodologies for sales manager selection criteria. In the third part, SVNS-CRITIC and SVNS-MULTIMOORA methods are explained. In the fourth part, the sales manager selection process is explained with the case study. In the fifth part, the results and suggestions are presented.

2. Literature Review and Criteria Selection

Result of aggressive mergers and acquisitions, competition among companies, high-speed e-communication, fast technology developments, demographic and societal shifts, and globalization occurring today force businesses to change and develop. Companies that are unable to keep up with change and competition are threatened by financial failure and bankruptcy. The success of a company depends on having competent personnel, especially managers (Kelemenis & Askounis, 2010). Without the help of qualified managers, it is difficult for companies to compete with their rivals (Lipiec, 2001; Kaygin et al., 2016). And decisions made by the managers are the biggest determinant of a company's success. A manager must have the skills and expertise to handle any issue in the business sector (Kelemenis et al., 2011). Therefore, companies need to select the best manager. This paper focuses on the sales manager selection problem.

Sales managers are responsible for various tasks necessary for a firm to operate without problems (Boichuk et al., 2019). A sales manager is a person who manages overseas sales representatives and manages day-to-day sales activities. They set sales targets, manage sales strategy, and track sales results. Also, sales management often encompasses discovering talent, developing agents, coaching, creating a sales plan and

strategies, and monitoring sales operations (Kelwig, 2021). These managers regularly inform top management of sales volumes and even play a role in determining the direction of the company at the strategic level. Every managerial step taken by sales managers is directed toward achieving sales targets and achieving profits for their businesses (Patel, 2021). Researchers are looking at a variety of decision-making techniques aided by computers, such as fuzzy logic, etc. In the literature, researchers have focused on improving decision-making processes by utilizing these methods. As with other selection problems, the sales manager selection problem can be handled by MCDM methods. (Bonissone et al., 2009).

To find out supply chain risk management for the long term, Abdel-Basset Mohamed (2020) applied the CRITIC technique based on neutrosophic sets (NS-CRITIC). Merkepçi et al. (2021) used the CRITIC technique based on neutrosophic sets to solve the drone selection issue. Sbastian, Ridwan & Novitasari (2021) applied the CRITIC method based on fuzzy neutrosophic sets (FNS-CRITIC) for the warehouse location selection. Rani et al. (2021) weighted the criteria in the method selection issue using SVSN-CRITIC for food waste treatment method selection problem. In the evaluation of logistics providers, Mishra et al. (2021) favored the CRITIC technique based on neutrosophic sets for sustainable third party reverse logistic provider selection problem. Yazdani et al. (2021) used the CRITIC method based on neutrosophic sets for sustainable supplier selection problem. Simic et al. (2022) used the CRITIC method based on neutrosophic sets in the public transportation pricing system selection problem. In the selection of the most appropriate technology forecasting approach, Adalı et al. (2022) used the CRITIC method based on neutrosophic sets. In the evaluation of project-driven intensive instruction, Peng et al. (2022) preferred the CRITIC method based on neutrosophic sets. A literature review of the CRITIC method based on neutrosophic sets is presented in Table 1.

Table 1: Review of The CRITIC Method based on Neutrosophic Sets Literature

Authors	Method	Selection Problem
Abdel-Basset & Mohamed (2020)	NS-CRITIC	Sustainable supply chain risk management
Sbastian et al. (2021)	FNS-CRITIC	Products warehouse location selection
Merkepçi et al. (2021)	NS-CRITIC	Drone selection problem
Mishra et al. (2021)	SVNS-CRITIC	Sustainable third party reverse logistic provider selection problem
Yazdani et al. (2021)	IVNS-CRITIC	Sustainable supplier selection problem
Rani et al. (2021)	SVNS-CRITIC	Food waste treatment method selection problem
Peng et al. (2022)	NS-CRITIC	Evaluation problem of project-driven intensive teaching
Adalı et al. (2022)	NS-CRITIC	The most appropriate technology forecasting method selection problem
Simic et al. (2022)	T2NS-CRITIC	Public transportation pricing system selection problem

Zavadskas et al. (2017) used the MULTIMOORA technique based on neutrosophic sets to solve the residential home element and material selection problem. Aydin & Yörükoğlu (2018) employed this technique to solve the ground handling services business evaluation problem. Zavadskas et al. (2019) used this technique to solve the internal combustion engine analysis issue. Siksnelyte et al. (2019) chose this technique to determine European Union's energy policy applications. Yörükoğlu & Aydin (2019) evaluated the space debris mitigation problem using this technique.

Zavadskas, et al. (2020) employed the MULTIMOORA approach based on neutrosophic sets (NS-MULTIMOORA) to compare e-commerce websites. Karamaşa et al. (2021) employed SVNS-MULTIMOORA technique for the optimal transporting aircraft evaluation problem. Table 2 presents a literature review of this technique.

Table 2: Literature Review of The NS-MULTIMOORA

Authors	Method	Selection Problem
Zavadskas et al. (2017)	NS-MULTIMOORA	Residential house element and material selection problem
Aydin & Yörükoğlu (2018)	NS-MULTIMOORA	Ground handling services firm evaluation problem
Siksnelyte et al. (2019)	NS-MULTIMOORA	Determination of European Union energy policy applications
Zavadskas et al. (2019)	NS-MULTIMOORA	Internal combustion engine analysis problem
Yörükoğlu & Aydin (2019)	NS-MULTIMOORA	Evaluation of space debris mitigation problem
Zavadskas et al. (2020)	IVNS-MULTIMOORA	E-commerce websites comparison problem
Karamaşa et al. (2021)	SVNS-MULTIMOORA	The optimal transporting aircraft evaluation problem

Butkiewicz (2002) used fuzzy logic to tackle the seller consultant selection problem. To solve the difficulty of selecting managers at the top level, Wu and Lee (2007) used the fuzzy decision-making trial and evaluation laboratory (DEMATEL) method. Using the fuzzy preference ranking organization technique for enrichment evaluation (PROMETHEE) method, Chen et al. (2009) selected an international marketing manager. The sales manager selection issue was resolved by Boran et al. (2011) by utilizing the technique for order preference by similarity to the ideal solution (TOPSIS) method. Zolfani et al. (2012) used the grey-based collaboration platform for research and standards (COPRAS-G) and AHP methodologies to solve the quality control managers' selection problem. Balezentis & Zeng (2013) applied the Type 2 fuzzy MULTIMOORA approach to the problem of selecting a research and development manager. Wan et al. (2013) selected managers using the fuzzy viekriterijumsko kompromisno rangiranje (VIKOR) technique. On the problem of non-governmental organization management selection, Ozbek (2014) used the fuzzy analytic hierarchy process (F-AHP). When choosing sales managers, Urosevic et al. (2017) favored the weighted aggregated sum product assessment (WASPAS) and the stepwise weight assessment ratio analysis (SWARA). Cetin & Icigen (2017) employed SWARA and multiple-objective optimization based on ratio analysis (MOORA) approaches to choose the best front office manager. Ji et al. (2018) used the fuzzy interactive multi-criteria decision-making (TODIM) technique to solve the sales supervisor selection problem. Akça et al. (2018) used the analytics network process (ANP) technique to solve the finance manager selection problem. Thakre et al. (2018) used the AHP technique to solve the problem of branch manager selection. Mumcu & Gok (2021) solved the manager selection problem using the AHP and TOPSIS approaches. Table 3 presents a review of the literature on the sales manager selection problem.

Table 3: Literature Review for Selecting Manager

Authors	Selection Problem	Methods	Criteria
Butkiewicz (2002)	Seller consultant	Fuzzy logic	"Cognitive, affective, psychomotor, psychological characteristics"
Wu & Lee (2007)	Top manager	F-DEMATEL	"Cognitive IQ, emotional IQ, political IQ, cultural/social IQ, organizational IQ, network IQ, innovative IQ and intuitive IQ"
Chen et al. (2009)	International marketing manager	Fuzzy PROMETHEE	"English ability, work experience, market ability and communication ability"
Boran et al. (2011)	Sales manager	IF-TOPSIS	"Oral communication skills, experience, general aptitude, willingness, self-confidence and first impression"
Zolfani et al. (2012)	Quality control manager	COPRAS-G, AHP	"Knowledge of product and raw material, experience and educational background, administrative orientation, behavioral flexibility, risk evaluation ability, payment, teamwork"
Wan et al. (2013)	Manager selection	F-VIKOR	"Moral character, work attitude, leadership, cultural level, oral communication, and experience"
Balezentis & Zeng (2013)	Research and development manager	T2F-MULTIMOORA	"Proficiency in identifying research areas, proficiency in administration, personality, past experience, self-confidence"
Özbek (2014)	Non-governmental organization manager selection	F-AHP	"Honesty and reliability, education, general culture, volunteering, sense of mission, initiative and decision making, responsibility, social and human relations, verbal and written expression ability, team awareness, objectivity and well adjusted"
Urosevic et al. (2017)	Sales manager	SWARA-WASPAS	"Communication skills, leadership skills, flexibility, decision making, negotiating skills, analytical skills, and consistency"
Cetin & Icigen (2017)	Finest front office manager	SWARA-MOORA	"Work experience, foreign language knowledge, education, computer skills and personal characteristics"
Ji et al. (2018)	Sales supervisor	FNS-TODIM	"Oral communication skills, working experience and general aptitude"
Akça et al. (2018)	Finance manager	ANP	"Personal equipment, up to date, technical feature information"
Thakre et al. (2018)	Branch manager	AHP	"Management knowledge/skills, technical knowledge/skills, banking knowledge/skills and marketing knowledge/skills"
Mumcu & Gok (2021)	Manager	AHP-TOPSIS	"Management skills, professional competence, work experience, and trust"

Eight criteria for the sales manager selection problem were selected as a consequence of the literature study. Table 4 lists the criteria's definitions.

Table 4: Selected Criteria for Sales Manager Selection Problem

Criteria	Definition	References
General Aptitude (C1)	It points to the general sales abilities of the sales manager.	Boran et al. (2011);Ji et al. (2018)
Experience (C2)	It points to the sales manager's experience in sales management.	Boran et al. (2011);Wan et al. (2013); Ji et al. (2018); Mumcu &Gok (2021)
Trustable (C3)	It refers to the level of trustworthiness of the sales manager.	Mumcu & Gok (2021)
Leadership (C4)	It points to the sales manager's leadership skills.	Wan et al. (2013); Urosevic et al. (2017);
Decision making (C5)	It points to the sales manager's decision-making skills.	Urosevic et al. (2017)
Analytical thinking skills (C6)	It points to the sales manager's analytical thinking skills.	Urosevic et al. (2017)
Work attitude (C7)	It points to the sales manager's attitudes and behaviors towards the job.	Wan et al. (2013)
Communication skills (C8)	It points to the sales manager's communication skills.	Boran et al. (2011); Wan et al. (2013); Urosevic et al. (2017); Ji et al. (2018)

3. Methods

3.1. SVNS-CRITIC Method

The SVNS method is among the methods that help decision makers in decision-making processes under uncertainty.

It is defined as $\widetilde{N} = \{(T_{\widetilde{N}}(u), I_{\widetilde{N}}(u), F_{\widetilde{N}}(u)) : u \in U\}$, $t_N(u), i_N(u), f_N(u) : U \rightarrow [0,1]$ and $0 \leq t_N(u) + i_N(u) + f_N(u) \leq 3$with $u \in U$ in the SVNSs recommended for decision making processes in an environment of uncertainty. $T_{\widetilde{N}}(u)$ denotes truth-membership function. $I_{\widetilde{N}}(u)$ denotes indeterminacy-membership function. $F_{\widetilde{N}}(u)$ denotes falsity-membership function (Wang, Smarandache, Zhang & Sunderraman, 2010).

For SVNS-CRITIC, which will be used to calculate criterion weights, alternatives are defined as $F = \{F_1, F_2, \dots, F_m\}$, criteria as $P = \{P_1, P_2, \dots, P_n\}$and decision makers as $E = \{E_1, E_2, \dots, E_l\}$.

The evaluation of the i^{th} alternative according to thej^{th} criterion by the k^{th} decision maker is defined as $\xi_{ij}^{(k)}$. SVNS-CRITIC occurs in eight steps. These steps are as follows (Baidya et al., 2021, Rani et al., 2021):

Step 1-1: The weights of the decision makers ($\bar{\omega}_k$) are calculated with Eq. (1). Decision makers are evaluated according to table 5, which expresses their decision maker characteristics (Haq et al., 2022).

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

Table 5: Linguistic Variables for Decision Makers

Linguistic Variables	SVNSs
Expert	(0.90; 0.10; 0.10)
Proficient	(0.80; 0.25; 0.20)
Competent	(0.60; 0.35; 0.40)
Advanced Beginner	(0.40; 0.55; 0.55)
Novice	(0.20; 0.75; 0.80)

Step 1-2: Table 6 contains the linguistic statements that each alternative can take, which will be evaluated by the decision makers according to the criteria. In addition, SVNSs corresponding to linguistic expressions are also included in this table. The decision matrices obtained as a result of the evaluations made by the decision makers are combined with Eq. (2) (Ye, 2014).

$$\xi_{ij} = \left(t_{ij}, i_{ij}, f_{ij}\right) = SVNWA_{\bar{\omega}}\left(\xi_{ij}^{(1)}, \xi_{ij}^{(2)}, \dots, \xi_{ij}^{(l)}\right) = \left(1 - \prod_{k=1}^{l}\left(1 - t_{ij}^{(k)}\right)^{\bar{\omega}_k}, \prod_{k=1}^{l}\left(i_{ij}^{(k)}\right)^{\bar{\omega}_k}, \prod_{k=1}^{l}\left(f_{ij}^{(k)}\right)^{\bar{\omega}_k}\right) \quad (2)$$

Table 6 Single Valued Neutrosophic Sets Numbers

Linguistic Variables	SVNNs	Linguistic Variables	SVNNs
Extremely high (EH)	(1.00; 0.00; 0.00)	Moderately low (ML)	(0.40; 0.65; 0.60)
Very very high (VVH)	(0.90; 0.10; 0.10)	Low (L)	(0.30; 0.75; 0.70)
Very high (VH)	(0.80; 0.15; 0.20)	Very low (VL)	(0.20; 0.85; 0.80)
High (H)	(0.70; 0.25; 0.30)	Very very low (VVL)	(0.10; 0.90; 0.90)
Moderately high (MH)	(0.60; 0.35; 0.40)	Extremely low (EL)	(0.00; 1.00; 1.00)
Fair (F)	(0.50; 0.50; 0.50)		

Step 1-3: The score matrix ($\mathbb{S}(\xi_{ij})$) is created with Eq. (3).

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

Step 1-4: Benefit criteria (P_b) and cost criteria (P_n) are standardized with Eq. (4). For Eq. (4), $\xi_j^+ = \max_i \xi_{ij}$ and $\xi_j^- = \min_i \xi_{ij}$.

$$\tilde{\xi}_{ij} = \begin{cases} \frac{\xi_{ij} - \xi_j^-}{\xi_j^+ - \xi_j^-}, & j \in P_b \\ \frac{\xi_j^- - \xi_{ij}}{\xi_j^+ - \xi_j^-}, & j \in P_n \end{cases} \quad (4)$$

Step 1-5: The standard deviation values (σ_j) of the criteria are calculated with Eq. (5).

$$\sigma_j = \sqrt{\frac{\sum_{i=1}^{m}\left(\tilde{\xi}_{ij} - \bar{\xi}_j\right)^2}{m}}, \bar{\xi}_j = \sum_{i=1}^{m} \frac{\tilde{\xi}_{ij}}{m} \quad (5)$$

Step 1-6: The correlation coefficient values (r_{jt}) of the criteria are calculated with Eq. (6).

$$r_{jt} = \frac{\sum_{i=1}^{m}\left(\tilde{\xi}_{ij} - \bar{\xi}_j\right)\left(\tilde{\xi}_{ij} - \bar{\xi}_t\right)}{\sqrt{\sum_{i=1}^{m}\left(\tilde{\xi}_{ij} - \bar{\xi}_j\right)^2\left(\tilde{\xi}_{ij} - \bar{\xi}_t\right)^2}}, t = 1,2, \dots, n \quad (6)$$

Step 1-7: The c_j values of the criteria are calculated with Eq. (7).

$$c_j = \sigma \sum_{t=1}^{n}\left(1 - r_{jt}\right) \quad (7)$$

Step 1-8: The weights of the criteria (w_j) are calculated with Eq. (8).

$$w_j = \frac{c_j}{\sum_{j=1}^{n} c_j} \quad (8)$$

3.2. SVNS-MULTIMOORA Method

The MULTIMOORA model includes full multiplicative form (FMF), reference point (RP), and ratio system (RS) models (Brauers &Zavadskas, 2010). SVNS-MULTIMOORA method has ten steps. These steps are as follows (Rani et al., 2021):

Step 2-1: For the RS model, the SVNWAO values of the benefit criteria (Y_i^+) and cost criteria (Y_i^-) are calculated with Eq. (9) and Eq. (10), respectively.

$$Y_i^+ = \left(1 - \prod_{j\in P_b}(1-t_{ij})^{w_j},\ \prod_{j\in P_b}(i_{ij})^{w_j}, \prod_{j\in P_b}(f_{ij})^{w_j}\right) \quad (9)$$

$$Y_i^- = \left(1 - \prod_{j\in P_n}(1-t_{ij})^{w_j},\ \prod_{j\in P_n}(i_{ij})^{w_j}, \prod_{j\in P_n}(f_{ij})^{w_j}\right) \quad (10)$$

Step 2-2: The values y_i^+ and y_i^- are calculated by Eq. (11).

$$y_i^+ = \mathbb{S}(Y_i^+) \text{ and } y_i^- = \mathbb{S}(Y_i^-) \quad (11)$$

Step 2-3: The y_i value is calculated by Eq. (12). These values determine the order of alternatives.

$$y_i = y_i^+ - y_i^- \quad (12)$$

Step 2-4: For the RP model, the $p^* = \{p_1^*, p_2^*, \dots, p_n^*\}$ values are calculated with Eq. (13).

$$p_j^* = \begin{cases} \left(\max\limits_i t_{ij}, \min\limits_i i_{ij}, \min\limits_i f_{ij}\right), for\ beneficial\ criteria\ P_b \\ \left(\min\limits_i t_{ij}, \max\limits_i i_{ij}, \max\limits_i f_{ij}\right), for\ non-beneficial\ criteria\ P_n \end{cases} \quad (13)$$

Step 2-5: For $\delta_1, \delta_2 \in SVNN(U)$, the distance measure ($D_{ij}$) values to be used determining the ranking of the alternatives are calculated by Eq. (14) and Eq. (15).

$$D_h(\delta_1,\delta_2) = \frac{1}{3}\left(\left|t_{\delta_1}(u_i) - t_{\delta_2}(u_i)\right| + \left|i_{\delta_1}(u_i) - i_{\delta_2}(u_i)\right| + \left|f_{\delta_1}(u_i) - f_{\delta_2}(u_i)\right|\right) \quad (14)$$

$$D_{ij} = w_j\left(D_h\left(\xi_{ij}, p_j^*\right)\right) \quad (15)$$

Step 2-6: The d_i value is calculated by Eq. (16). These values determine the order of alternatives.

$$d_i = \max_j D_{ij} \quad (16)$$

Step 2-7: For the FMF model, SVNWGO values are calculated by Eq. (17) and Eq. (18).

$$A_i = \left(\prod_{j\in P_b}(t_{ij})^{w_j},\ \prod_{j\in P_b}(1-i_{ij})^{w_j}, \prod_{j\in P_b}(1-f_{ij})^{w_j}\right) \quad (17)$$

$$B_i = \left(\prod_{j\in P_n}(t_{ij})^{w_j},\ \prod_{j\in P_n}(1-i_{ij})^{w_j}, \prod_{j\in P_n}(1-f_{ij})^{w_j}\right) \quad (18)$$

Step 2-8: The α_i and β_i values are calculated by Eq. (19).

$$\alpha_i = \mathbb{S}(A_i)\ and\ \beta_i = \mathbb{S}(B_i) \quad (19)$$

Step 2-9: The u_i values are calculated by Eq. (20). These values determine the order of alternatives.

$$u_i = \frac{\alpha_i}{\beta_i} \tag{20}$$

Step 2-10: The values for the final alternative ranking are obtained by Eq. (21) (Wu, Liao, Xu, Hafezalkotob and Herrera, 2018). The alternative with the highest degree is determined as the best alternative. (22) is used while performing these operations.

$$I_B(F_i) = y_i^* \frac{m-\rho(y_i^*)+1}{(m(m+1)/2)} - d_i^* \frac{\rho(d_i^*)}{(m(m+1)/2)} + u_i^* \frac{m-\rho(u_i^*)+1}{(m(m+1)/2)} \tag{21}$$

$$y_i^* = \frac{y_i}{\sqrt{\sum_{i=1}^{m}(y_i)^2}}, d_i^* = \frac{d_i}{\sqrt{\sum_{i=1}^{m}(d_i)^2}}, u_i^* = \frac{u_i}{\sqrt{\sum_{i=1}^{m}(u_i)^2}} \tag{22}$$

4. Case Study

The sales manager selection problem was conducted in a automobile spare part company operating in Ankara. The company has been operating for 33 years. It sells automobile spare parts in wholesale and retail. A case study was made for the selection of the sales manager to increase the effectiveness of the sales activities of the spare part company and to manage the sales personnel successfully. Evaluations were made according to the CVs of the candidates. As a result of the evaluations made for the sales manager position of the spare part company, four alternative manager candidates (A1 A2, A3, A4) were determined. To determine the most successful sales manager candidate among these, eight sales manager selection criteria were determined. These criteria are as follows: General Aptitude (C1), Experience (C2), Trustable (C3), Leadership (C4), Decision making (C5), Analytical thinking skills (C6), Work attitude (C7), and Communication skills (C8). The top management assigned three decision makers (DM-1, DM-2, and DM-3) to evaluate the manager candidates based on these criteria. The judgments of these three managers were taken into account when evaluating the *criteria* and ranking the management candidates.

The decision makers and the management candidates conducted interviews and exams, and evaluation matrices were produced for each possibility. The criteria were weighted with the SVNS-CRITIC methodology. The options were ranked utilizing the SVNS-MULTIMOORA technique. Due to this, decision matrices were created using assessment procedures for these methods. The sales manager selection problem's case study phases are discussed in turn.

Step 1-1: Decision makers and SVNS numbers are presented in Table 7. Decision maker weights were calculated by Eq. (1). It is shown in Table 8. It is seen that the second decision maker has the highest weight.

Table 7: Decision Makers and SVNS Numbers

DM-1	**DM-2**	**DM-3**
Proficient (0.80; 0.25; 0.20)	Expert (0.90; 0.10; 0.10)	Proficient (0.80; 0.25; 0.20)

Table 8: Decision Maker Weights

	DM-1	**DM-2**	**DM-3**
$\bar{\omega}_k$	0.3163	0.3673	0.3163

Step 1-2: According to Table 6, the decision makers evaluated alternatives for each criterion. Linguistic expressions are shown in Table 9 and SVNS numbers shown in

Table 10. A single decision matrix was obtained by combining the alternatives evaluated for each criterion by the decision makers with Eq. (2). They are shown in Table 11.

Table 9: Decision Maker Weights (Linguistics)

		A1	A2	A3	A4
DM-1	**C1**	VH	VH	VH	MH
	C2	H	H	VH	MH
	C3	MH	H	H	ML
	C4	MH	MH	ML	ML
	C5	VH	H	L	ML
	C6	VH	MH	ML	L
	C7	H	VH	MH	MH
	C8	VVH	H	MH	MH
DM-2	**C1**	VH	H	H	MH
	C2	VH	VVH	H	MH
	C3	H	VH	MH	H
	C4	VH	VH	MH	ML
	C5	H	H	H	L
	C6	H	MH	MH	ML
	C7	VH	MH	MH	ML
	C8	VH	MH	H	MH
DM-3	**C1**	VH	H	MH	MH
	C2	MH	VH	MH	H
	C3	H	MH	MH	ML
	C4	MH	H	H	ML
	C5	VH	ML	H	L
	C6	VH	H	MH	ML
	C7	VH	ML	MH	ML
	C8	VH	ML	H	ML

Table 10: Decision Maker Weights (SVNS Numbers)

		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	0.80	0.15	0.20	0.80	0.15	0.20	0.60	0.35	0.40
	C2	0.70	0.25	0.30	0.70	0.25	0.30	0.80	0.15	0.20	0.60	0.35	0.40
	C3	0.60	0.35	0.40	0.70	0.25	0.30	0.70	0.25	0.30	0.40	0.65	0.60
	C4	0.60	0.35	0.40	0.60	0.35	0.40	0.40	0.65	0.60	0.40	0.65	0.60
	C5	0.80	0.15	0.20	0.70	0.25	0.30	0.30	0.75	0.70	0.40	0.65	0.60
	C6	0.80	0.15	0.20	0.60	0.35	0.40	0.40	0.65	0.60	0.30	0.75	0.70
	C7	0.70	0.25	0.30	0.80	0.15	0.20	0.60	0.35	0.40	0.60	0.35	0.40
	C8	0.90	0.10	0.10	0.70	0.25	0.30	0.60	0.35	0.40	0.60	0.35	0.40
DM-2	C1	0.80	0.15	0.20	0.70	0.25	0.30	0.70	0.25	0.30	0.60	0.35	0.40
	C2	0.80	0.15	0.20	0.90	0.10	0.10	0.70	0.25	0.30	0.60	0.35	0.40
	C3	0.70	0.25	0.30	0.80	0.15	0.20	0.60	0.35	0.40	0.70	0.25	0.30
	C4	0.80	0.15	0.20	0.80	0.15	0.20	0.60	0.35	0.40	0.40	0.65	0.60
	C5	0.70	0.25	0.30	0.70	0.25	0.30	0.70	0.25	0.30	0.30	0.75	0.70
	C6	0.70	0.25	0.30	0.60	0.35	0.40	0.60	0.35	0.40	0.40	0.65	0.60
	C7	0.80	0.15	0.20	0.60	0.35	0.40	0.60	0.35	0.40	0.40	0.65	0.60
	C8	0.80	0.15	0.20	0.60	0.35	0.40	0.70	0.25	0.30	0.60	0.35	0.40
DM-3	C1	0.80	0.15	0.20	0.70	0.25	0.30	0.60	0.35	0.40	0.60	0.35	0.40
	C2	0.60	0.35	0.40	0.80	0.15	0.20	0.60	0.35	0.40	0.70	0.25	0.30
	C3	0.70	0.25	0.30	0.60	0.35	0.40	0.60	0.35	0.40	0.40	0.65	0.60
	C4	0.60	0.35	0.40	0.70	0.25	0.30	0.70	0.25	0.30	0.40	0.65	0.60
	C5	0.80	0.15	0.20	0.40	0.65	0.60	0.70	0.25	0.30	0.30	0.75	0.70
	C6	0.80	0.15	0.20	0.70	0.25	0.30	0.60	0.35	0.40	0.40	0.65	0.60
	C7	0.80	0.15	0.20	0.40	0.65	0.60	0.60	0.35	0.40	0.40	0.65	0.60

C8	0.80	0.15	0.20	0.40	0.65	0.60	0.70	0.25	0.30	0.40	0.65	0.60

Table 11: Combined Decision Matrix

	A1			**A2**			**A3**			**A4**		
	t	*i*	*f*	*t*	*i*	*f*	*t*	*i*	*f*	*t*	*i*	*f*
C1	0.800	0.150	0.200	0.736	0.213	0.264	0.711	0.237	0.289	0.600	0.350	0.400
C2	0.717	0.230	0.283	0.824	0.152	0.176	0.711	0.237	0.289	0.635	0.315	0.365
C3	0.671	0.278	0.329	0.717	0.230	0.283	0.635	0.315	0.365	0.535	0.458	0.465
C4	0.690	0.256	0.310	0.717	0.230	0.283	0.585	0.383	0.415	0.400	0.650	0.600
C5	0.768	0.181	0.232	0.626	0.338	0.374	0.608	0.354	0.392	0.333	0.717	0.667
C6	0.768	0.181	0.232	0.635	0.315	0.365	0.545	0.426	0.455	0.370	0.680	0.630
C7	0.773	0.176	0.227	0.635	0.326	0.365	0.600	0.350	0.400	0.472	0.534	0.528
C8	0.839	0.132	0.161	0.585	0.383	0.415	0.671	0.278	0.329	0.545	0.426	0.455

Step 1-3: The score matrix $\mathbb{S}(\xi_{ij})$ was calculated by Eq. (3). It is shown in Table 12. So the fuzzy numbers are converted to crisp numbers.

Table 12: The Score Matrix (S(ξ_ij))

	A1	**A2**	**A3**	**A4**
C1	0.825	0.762	0.737	0.625
C2	0.743	0.836	0.737	0.660
C3	0.697	0.743	0.660	0.539
C4	0.717	0.743	0.601	0.375
C5	0.793	0.644	0.627	0.308
C6	0.793	0.660	0.560	0.345
C7	0.798	0.655	0.625	0.469
C8	0.854	0.601	0.697	0.560

Step 1-4: All criteria are benefit criteria. The criteria are standardized by Eq. (4). It is shown in Table 13.

Table 13: The Standardized SVNS-matrix ($\tilde{\xi}_{ij}$)

	A1	**A2**	**A3**	**A4**
C1	1.000	0.684	0.561	0.000
C2	0.473	1.000	0.439	0.000
C3	0.773	1.000	0.594	0.000
C4	0.928	1.000	0.614	0.000
C5	1.000	0.692	0.657	0.000
C6	1.000	0.703	0.479	0.000
C7	1.000	0.564	0.474	0.000
C8	1.000	0.140	0.466	0.000

Step 1-5: The standard deviation values of the criteria were calculated by Eq. (5). They are shown in Table 14.

Table 14: The Standard deviation values of the criteria (σ_j)

	C1	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**
σ_j	0.361	0.354	0.371	0.395	0.364	0.365	0.355	0.385

Step 1-6: The correlation coefficient values (r_{jt}) values of the criteria were calculated by Eq. (6). It is shown in Table 15.

Table 15: The Correlation Coefficient Values of The Criteria (r_{jt})

	C1	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**
C1	1.0000	0.6436	0.8611	0.9285	0.9938	0.9943	0.9893	0.8201
C2	0.6436	1.0000	0.9418	0.8818	0.6399	0.6625	0.5378	0.0916
C3	0.8611	0.9418	1.0000	0.9875	0.8609	0.8664	0.7832	0.4197

C4	0.9285	0.8818	0.9875	1.0000	0.9228	0.9342	0.8706	0.5498
C5	0.9938	0.6399	0.8609	0.9228	1.0000	0.9768	0.9755	0.8204
C6	0.9943	0.6625	0.8664	0.9342	0.9768	1.0000	0.9868	0.7936
C7	0.9893	0.5378	0.7832	0.8706	0.9755	0.9868	1.0000	0.8816
C8	0.8201	0.0916	0.4197	0.5498	0.8204	0.7936	0.8816	1.0000

Step 1-7: c_j values of the criteria were calculated by Eq. (7). It is shown in Table 16.

Table 16: The c_j Values of The Criteria

	C1	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**
c_j	0.278	0.922	0.474	0.365	0.295	0.287	0.346	1.009

Step 1-8: The weights of the criteria (w_j) were calculated by Eq. (8). It is shown in Table 17. As a result of the results obtained, it is seen that the eighth criterion has the highest value, while the first criterion has the lowest weight.

Table 17: The Criteria Weights (w_j)

	C1	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**
w_j	0.0699	0.2319	0.1193	0.0918	0.0742	0.0721	0.0871	0.2537
Ranking	8	2	3	4	6	7	5	1

Step 2-1: Since all the criteria for the RS procedures are benefits. only the Y_i^+ values of the criteria calculated by Eq. (9) are shown in Table 18.

Table 18: The Y_i^+ Values

	Y_i^+		
	t	***i***	***f***
A1	0.766	0.189	0.234
A2	0.704	0.257	0.296
A3	0.655	0.296	0.345
A4	0.530	0.450	0.470

Step 2-2: The y_i^+ and y_i^- values are calculated by Eq. (11). It is shown in Table 19. Since there is no non-beneficial criteria $t_{ij}.i_{ij}\ and\ f_{ij}$values were taken as 0 in the calculation of β_i values.

Table 19: The y_i^+ and y_i^- Values

	A1	**A2**	**A3**	**A4**
y_i^+	0.788	0.724	0.679	0.540
y_i^-	0.750	0.750	0.750	0.750

Step 2-3: The y_i values are calculated by Eq. (12). It is shown in Table 20. While the fourth alternative was determined as the best alternative, the second alternative was determined as the worst alternative.

Table 20: The Values and Alternative Rankings

	A1	**A2**	**A3**	**A4**
y_i	0.0384	0.0262	0.0708	0.2101
Ranking	3	4	2	1

Step 2-4: The p^* values for the RP model were calculated by Eq. (13). It is shown in Table 21.

Table 21: The p^* Values

	p^*		
	t	***i***	***f***
C1	0.800	0.150	0.200

C2	0.824	0.152	0.176
C3	0.717	0.230	0.283
C4	0.717	0.230	0.283
C5	0.768	0.181	0.232
C6	0.768	0.181	0.232
C7	0.773	0.176	0.227
C8	0.839	0.132	0.161

Step 2-5: TheD_{ij} values were calculated by Eq. (15). It is shown in Table 22.

Table 22: The D_{ij}Values

	A1	**A2**	**A3**	**A4**
C1	0.0000	0.0635	0.0882	0.2000
C2	0.0974	0.0000	0.1034	0.1802
C3	0.0462	0.0000	0.0828	0.1970
C4	0.0266	0.0000	0.1388	0.3511
C5	0.0000	0.1467	0.1644	0.4683
C6	0.0000	0.1333	0.2300	0.4316
C7	0.0000	0.1417	0.1730	0.3196
C8	0.0000	0.2533	0.1607	0.2940

Step 2-6: The d_i values were calculated by Eq. (16). It is shown in Table 23. While the first alternative was determined as the best alternative, the fourth alternative was determined as the worst alternative.

Table 23: The D_{ij}Values and Ranking the Alternatives

	A1	**A2**	**A3**	**A4**
$\boldsymbol{d_i}$	0.0226	0.0643	0.0408	0.0746
Ranking	1	3	2	4

Step 2-7: The $A_i$values for the FMF model were calculated by only Eq. (17) because all criteria are benefit criteria. It is shown in Table 24.

Table 24: The A_i Values

	$\boldsymbol{A_i}$		
	t	***i***	***f***
A1	0.756	0.198	0.244
A2	0.684	0.277	0.316
A3	0.649	0.305	0.351
A4	0.511	0.488	0.489

Step 2-8: The α_i and β_i values were calculated by Eq. (19). It is shown in Table 25. Since there are no non-beneficial criteria $t_{ij}. i_{ij}$ and f_{ij}values were taken as 0 in the calculation of β_i values.

Table 25: The α_i and β_i Values

	A1	**A2**	**A3**	**A4**
$\boldsymbol{\alpha_i}$	0.779	0.703	0.672	0.511
$\boldsymbol{\beta_i}$	0.750	0.750	0.750	0.750

Step 2-9: The u_i values calculated by Eq. (20) and the alternative ordering is shown in Table 26. While the first alternative was determined as the best alternative, the fourth alternative was determined as the worst alternative.

Table 26: The u_i Values and Ranking Alternatives

	A1	**A2**	**A3**	**A4**
$\boldsymbol{u_i}$	1.039	0.938	0.896	0.681
Ranking	1	2	3	4

Step 2-10: The $I_B(F_i)$ values were calculated by Eq. (21). The final alternative ranking is shown in Table 27. While the first alternative was the best alternative, the second alternative was determined as the worst alternative.

Table 27: The $I_B(F_i)$ Values and Ranking Alternatives

	A1	**A2**	**A3**	**A4**
$\boldsymbol{I_B(F_i)}$	0.2445	0.0319	0.0688	0.6070
Ranking	1	4	2	3

5. Results and Conclusion

Sales are the most vital function for businesses. In a company, there is a need for a manager who performs many critical activities such as preparing sales plans and strategies, managing and directing the salespeople, and managing sales operations. And these issues are the responsibility of the sales manager. Since the sales manager is a critical role for a company to sell its products, they must have the greatest sales manager to thrive in today's competitive climate.

The subject of sales manager selection is examined in this study. As a consequence of the literature analysis, eight criteria for selecting sales managers were developed. A case study was created for sales manager selection based on these criteria. In this research the SVNS-CRITIC technique was used to weight the criteria, while the SVNS-MULTIMOORA approach was utilized to rank the sales manager candidates. According to the findings of the SVNS-CRITIC method, the order of the criteria was determined as follows: Communication skills ($w_8 = 0.2537$), Experience ($w_2 = 0.2319$), Trustable ($w_3 = 0.1193$), Leadership ($w_4 = 0.0918$), Work attitude ($w_7 = 0.0871$), Decision making ($w_5 = 0.0742$), Analytical thinking skills ($w_6 = 0.0721$), General Aptitude ($w_1 = 0.0699$). The findings of case study indicate that the communication skills of the manager candidate are the most important criteria to be considered in the selection of a sales manager. The general aptitude of sales manager candidates is the least important criteria compared to others. According to the SVNS-MULTIMOORA results, the first sales manager candidate was considered to be the best fit for the sales manager role.

Finally, the implications for the selection of a sales manager are as follows: (i) In the selection of a sales manager, candidates should be evaluated according to their general aptitude, experience, trustable, leadership, decision-making, analytical thinking skills, work attitude, and communication skills. (ii) MCDM methods can be used in the selection of sales managers. (iii) SVNS-CRITIC method can be applied to weigh the criteria. (iv) SVNS-MULTIMOORA method can be applied in the ranking of the sales manager candidates.

Suggestions for companies who select candidates for sales manager positions are as follows: (i) The sales manager selection problem should be viewed as a decision-making problem, and it should be solved by using MCDM methodologies. (ii) In the selection of sales manager, spare part companies should give more importance to the communication skills of the candidates compared to other criteria. (iii) Fuzzy-based MCDM methods should be preferred in manager selection. (iv) Manager candidate pool and selection criteria should be specified correctly. (v) Expert opinions should be used in the selection of managers.

Suggestions for manager candidates are as follows: (i) Skills should be developed according to the eight criteria required for the automobile spare part company sales manager. (ii) Because of the high level of importance of the communication skills criterion, experience should be acquired. (iii) Communication skills, experience, being trustable and leadership should be developed. (iv) The analytical thinking skills of the manager candidate, which is also used in other manager selection problems, also comes to the fore for the sales manager selection problem.

Suggestions for researchers are as follows: (i) The criteria used in this research can be applied with different MCDM methods. (ii) For the sales manager selection problem, a selection problem based on different criteria can be made. (iii) Sector-specific criteria can be determined by considering the sales manager selection problem in different sectors. (iv) This research can be reconsidered by expanding the number of decision-makers.

The limitations of this research are as follows: (i) The research was addressed with eight criteria, three decision-makers, and four candidates. Different results can be obtained by using different numbers of decision-makers, criteria, and candidates. (ii) MCDM techniques were applied in the research. The case study of different MCDM techniques can create differences in results. (iii) In this research, managers were selected for automobile spare part companies. Manager selection problems can be handled in different sectors. (iv) This research was conducted on an automobile spare part company operating in Turkey. Case study results may differ in different countries. (v) Finally, with this research, the criteria that can be preferred in the selection of sales managers to spare part companies are presented and the case study steps of the selection problem based on MCDM techniques are explained.

References

Abdel-Basset, M., & Mohamed, R. (2020). A novel plithogenic TOPSIS-CRITIC model for sustainable supply chain risk management. *Journal of Cleaner Production*, 247, 119586.https://doi.org/10.1016/j.jclepro.2019.119586

Adalı, E. A., Öztaş, T., Özçil, A., Öztaş, G. Z., & Tuş, A. (2022). A New Multi-Criteria Decision-Making Method Under Neutrosophic Environment: ARAS Method with Single-Valued Neutrosophic Numbers. *International Journal of Information Technology & Decision Making*, 1-31.https://doi.org/10.1142/S0219622022500456

Akça, N., Sönmez, S., Gür, Ş., Yilmaz, A., & Eren, T. (2018). Kamu Hastanelerinde Analitik Ağ Süreci Yöntemi ile Finans Yöneticisi Seçimi. *Optimum: Journal of Economics & Management Sciences/Ekonomi ve Yönetim BilimleriDergisi*, 5(2), 133-146. https://doi.org/10.17541/optimum.390536

Aydin, S., & Yörükoğlu, M. (2018). Ground handling services firm evaluation based on neutrosophic MULTIMOORA method. In *Data Science and Knowledge Engineering for Sensing Decision Support: Proceedings of the 13th International FLINS Conference*, 1050-1057. https://doi.org/10.1142/9789813273238_0133

Baidya, J., Garg, H., Saha, A., Mishra, A. R., Rani, P., & Dutta, D. (2021). Selection of third party reverses logistic providers: An approach of BCF-CRITIC-MULTIMOORA using Archimedean power aggregation operators. *Complex &*

Intelligent Systems, 7(5), 2503-2530. https://doi.org/10.1007/s40747-021-00413-x

Baležentis, T., & Zeng, S. (2013). Group multi-criteria decision making based upon interval-valued fuzzy numbers: an extension of the MULTIMOORA method. *Expert Systems with Applications*, 40(2), 543-550. https://doi.org/10.1016/j.eswa.2012.07.066

Boichuk, J. P., Bommaraju, R., Ahearne, M., Kraus, F., &Steenburgh, T. J. (2019). Managing laggards: The importance of a deep sales bench. *Journal of Marketing Research*, 56(4), 652-665. https://doi.org/10.1177/0022243718824561

Bonissone, P. P., Subbu, R., & Lizzi, J. (2009). Multicriteria decision making (MCDM): a framework for research and applications. *IEEE Computational Intelligence Magazine*, 4(3), 48-61.https://doi.org/10.1109/MCI.2009.933093

Boran, F. E., Genç, S., & Akay, D. (2011). Personnel selection based on intuitionistic fuzzy sets. *Human Factors and Ergonomics in Manufacturing & Service Industries*, 21(5), 493-503. https://doi.org/10.1002/hfm.20252

Brauers, W. K. M., & Zavadskas, E. K. (2010). Project management by MULTIMOORA as an instrument for transition economies. *Technological and economic development of economy*, 16(1), 5-24.

Butkiewicz, B. S. (2002). Selection of staff for enterprise using fuzzy logic. In *IEEE International Conference on Systems, Man and Cybernetics* (Vol. 4, 3). IEEE.https://doi.org/10.1109/ICSMC.2002.1173304

Cetin, E. I., & Icigen, E. T. (2017). Personnel selection based on step-wise weight assessment ratio analysis and multi-objective optimization on the basis of ratio analysis methods. *International Journal of Economics and Management Engineering*, 11(11), 2718-2722.https://doi.org/10.5281/zenodo.1314471

Chen, C. T., Hwang, Y. C., & Hung, W. Z. (2009). Applying multiple linguistic PROMETHEE method for personnel evaluation and selection. In *2009 IEEE International Conference on Industrial Engineering and Engineering Management*,1312-1316. IEEE. https://doi.org/10.1109/IEEM.2009.5373021

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

Ji, P., Zhang, H. Y., & Wang, J. Q. (2018). A projection-based TODIM method under multi-valued neutrosophic environments and its application in personnel selection. *Neural Computing and Applications*, 29(1), 221-234. https://doi.org/10.1007/s00521-016-2436-z

Kara, K. (2022). Logistics operations manager selection with F-DEMATEL and F-RAFSI methods. In E. Burak and A.T. Küçükyiğit (Eds.) *Management Studies in Social Sciences*, 53-81.

Kara, K., Edinsel, S., & Yalçın, G. C. (2022). Human resources manager selection based on fuzzy and intuitionistic fuzzy numbers for logistics companies. *Mersin*

Üniversitesi Denizcilik ve Lojistik Araştırmaları Dergisi, 4(2), 254-286. https://doi.org/10.54410/denlojad.1211835

Kara, K., Yalçın, G. C., & Edinsel, S. (2023a) Warehouse Manager Selection by CRITIC-MULTIMOORA Hybrid Method based on Single-Valued Neutrosophic Sets. *Journal of Maritime Transport and Logistics*, 4(1), 48-64. http://dx.doi.org/10.52602/mtl.1126012

Kara, K., Edinsel, S., & Yalçın, G. C. (2023b). Hybrid Approach to Supply Chain Project Manager Selection Problem. *Avrupa Bilim ve Teknoloji Dergisi*, 46, 98-108. https://doi.org/10.31590/ejosat.1206786

Karamaşa, Ç., Karabasevic, D., Stanujkic, D., Kookhdan, A., Mishra, A., & Erturk, M. (2021). An extended single-valued neutrosophic AHP and MULTIMOORA method to evaluate the optimal training aircraft for flight training organizations. *Facta Universitatis-Series Mechanical Engineering*, 19(3), 555-578. https://doi.org/10.22190/fume210521059k

Kaygin, C. Y., Tazegül, A., & Yazarkan, H. (2016). İşletmelerin Finansal Başarılı ve Başarısız Olma Durumlarının Veri Madenciliği ve Lojistik Regresyon Analizi İle Tahmin Edilebilirliği. *Ege Academic Review*, 16(1), 147-159.

Kelemenis, A., & Askounis, D. (2010). A new TOPSIS-based multi-criteria approach to personnel selection. *Expert systems with applications*, 37(7), 4999-5008.https://doi.org/10.1016/j.eswa.2009.12.013

Kelemenis, A., Ergazakis, K., & Askounis, D. (2011). Support managers' selection using an extension of fuzzy TOPSIS. *Expert Systems with Applications*, 38(3), 2774-2782.https://doi.org/10.1016/j.eswa.2010.08.068

Kelwig D. (2021). *What does a sales manager do? The ultimate career guides*. https://www.zendesk.com/blog/sales-manager/)

Lipiec, J. (2001). Human resources management perspective at the turn of the century. *Public Personnel Management*, 30(2), 137-146.https://doi.org/10.1177/009102600103000201

Merkepçi, H., Merkepçi, M., & Baransel, C. (2021). A multi–criteria decision–making framework based on neutrosophicevamix with critic approach for drone selection problem. *Biology and Life Sciences*, 2(2), 234-239.

Mishra, A. R., Rani, P., & Bharti, S. (2021). Assessment of agriculture crop selection using Pythagorean fuzzy CRITIC–VIKOR decision-making framework. In *Pythagorean fuzzy sets* (pp. 167-191). Springer, Singapore. https://doi.org/10.1007/978-981-16-1989-2_7

Mumcu, A., & Gök, M. (2021). Application of fuzzy ahp and topsis methods for manager selection. *SosyalBilimlerAraştırmalarıDergisi*, 16(2), 270-280. https://doi.org/10.48145/gopsbad.906183

Özbek, A. (2014). Yöneticilerin çok kriterli karar verme yöntemi ile belirlenmesi. *Journal of Management and Economics Research*, 12(24), 209-225.

Patel S. (2021). *Sales Manager: Main Responsibilities, Skills and Challenges*. https://mailshake.com/blog/sales-manager/

Peng, X., Dai, J., & Smarandache, F. (2022). Research on the assessment of project-driven immersion teaching in extreme programming with neutrosophic linguistic information. *International Journal of Machine Learning and Cybernetics*, 14,873-888. https://doi.org/10.1007/s13042-022-01669-6

Rani, P., Mishra, A. R., Krishankumar, R., Ravichandran, K. S., & Kar, S. (2021). Multi-criteria food waste treatment method selection using single-valued neutrosophic-CRITIC-MULTIMOORA framework. *Applied Soft Computing*, 111, 107657. https://doi.org/10.1016/j.asoc.2021.107657

Rapp, A. A., Petersen, J. A., Hughes, D. E., & Ogilvie, J. L. (2020). When time is sales: the impact of sales manager time allocation decisions on sales team performance. *Journal of Personal Selling & Sales Management*, 40(2), 132-148. https://doi.org/10.1080/08853134.2020.1717961

Rich, G. A. (1997). The sales manager as a role model: Effects on trust, job satisfaction, and performance of salespeople. *Journal of the Academy of marketing science*, 25(4), 319-328. https://doi.org/10.1177/0092070397254004

Sbastian, F., Ridwan, A. Y., & Novitasari, N. (2021, November). Implementation of Multi Criteria Decision Making (MCDM) Fuzzy Neutrosophic TOPSIS-CRITIC in Determining Sustainability Aspects of the Location of IoT Based Products Warehouse. In *2021 International Conference on Computer Science and Engineering (IC2SE)* (Vol. 1, 1-8). IEEE. https://doi.org/10.1109/IC2SE52832.2021.9792127

Siksnelyte, I., Zavadskas, E. K., Bausys, R., & Streimikiene, D. (2019). Implementation of EU energy policy priorities in the Baltic Sea Region countries: Sustainability assessment based on neutrosophic MULTIMOORA method. *Energy Policy*, 125, 90-102. https://doi.org/10.1016/j.enpol.2018.10.013

Simic, V., Gokasar, I., Deveci, M., & Karakurt, A. (2022). An integrated CRITIC and MABAC based type-2 neutrosophic model for public transportation pricing system selection. *Socio-Economic Planning Sciences*, 80, 101157 https://doi.org/10.1016/j.seps.2021.101157

Thakre, T. A., Chaudhari, O. K., & Dhawade, N. R. (2017). Recruitment of personnel in a bank using AHP-FLP model. *Advances in Modelling and Analysis A*, *54*(3), 407-423. https://doi.org/10.18280/ama_a.540302

Urosevic, S., Karabasevic, D., Stanujkic, D., & Maksimovic, M. (2017). An Approach to Personnel Selection in the Tourism Industry Based on the SWARA and the WASPAS Methods. *Economic Computation and Economic Cybernetics Studies And Research*, 51(1), 75-88.

Wan, S. P., Wang, Q. Y., & Dong, J. Y. (2013). The extended VIKOR method for multi-attribute group decision making with triangular intuitionistic fuzzy numbers. *Knowledge-Based Systems*, 52, 65-77. https://doi.org/10.1016/j.knosys.2013.06.019

Wang, H., Smarandache, F., Zhang, Y., & Sunderraman, R. (2010). *Single valued neutrosophic sets*. Infinite study.

Wu, W. W., & Lee, Y. T. (2007). Developing global managers' competencies using the fuzzy DEMATEL method. *Expert systems with applications*, 32(2), 499-507.https://doi.org/10.1016/j.eswa.2005.12.005

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

Yazdani, M., Torkayesh, A. E., Stević, Ž., Chatterjee, P., Ahari, S. A., & Hernandez, V. D. (2021). An interval valued neutrosophic decision-making structure for sustainable supplier selection. *Expert Systems with Applications*, 183, 115354.https://doi.org/10.1016/j.eswa.2021.115354

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

Yörükoğlu, M., & Aydin, S. (2019). Evaluation of space debris mitigation measures by neutrosophic MULTIMOORA method. In *2019 9th International Conference on Recent Advances in Space Technologies (RAST)* (681-687). IEEE. https://doi.org/10.1109/RAST.2019.8767853

Zavadskas, E. K., Bausys, R., Juodagalviene, B., & Garnyte-Sapranaviciene, I. (2017). Model for residential house element and material selection by neutrosophic MULTIMOORA method. *Engineering Applications of Artificial Intelligence*, 64, 315-324. https://doi.org/10.1016/j.engappai.2017.06.020

Zavadskas, E. K., Čereška, A., Matijošius, J., Rimkus, A., & Bausys, R. (2019). Internal combustion engine analysis of energy ecological parameters by neutrosophic MULTIMOORA and SWARA methods. *Energies*, 12(8), 1415. https://doi.org/10.3390/en12081415

Zavadskas, E. K., Bausys, R., Lescauskiene, I., & Usovaite, A. (2020). MULTIMOORA under interval-valued neutrosophic sets as the basis for the quantitative heuristic evaluation methodology HEBIN. *Mathematics*, 9(1), 66. https://doi.org/10.3390/math9010066

Zolfani, S. H., Rezaeiniya, N., Aghdaie, M. H., & Zavadskas, E. K. (2012). Quality control manager selection based on AHP-COPRAS-G methods: a case in Iran. *Economic research-Ekonomskaistraživanja*, 25(1), 72-86. https://doi.org/10.1080/1331677X.2012.11517495