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HYBRID PERFORMANCE ANALYSIS WITH MULTI-CRITERIA DECISION-MAKING METHODS: EXAMPLE OF STORE MANAGERS

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Abstract
Effectively evaluating and enhancing managers' performance is crucial for achieving organizational success and maintaining competitive advantage in a dynamic business environment. This paper presents a new approach for store manager performance evaluation using a comprehensive framework that combines two important decision-making techniques: Global Fuzzy Step-by-Step Step Weight Rating Ratio Analysis (SF-SWARA) and Global Fuzzy Combined Consensus Solution (SF-CoCoSo). The presented SF-SWARA-CoCoSo method aims to address the inherent complexities and subjectivities involved in evaluating managers' performance by incorporating multiple perspectives and objective criteria into the evaluation process. The aim of this study is to apply multi-criteria decision making (MCDM) methods in a hybrid way to evaluate the performance of store managers in a simple and understandable way. SF-SWARA SF-CoCoSo hybrid MCDM method were used in the study. The findings of the study reveal that the "Knowledge and Training Level" criterion is the most important criterion for the store manager and the criterion with the lowest importance is the "Salary" criterion. As a result of the study, it is concluded that the criterion "Knowledge and Education Level", which is determined to be the most important criterion, has emerged due to the fact that today is the information age.

Keywords: Store Manager, Multi-Criteria Decision Making, Performance Evaluation, SF-SWARA, SF-CoCoSo

HİBRİT PERFORMANS ANALİZİ VE ÇOK KRİTERLİ KARAR VERME YÖNTEMLERİ: MAĞAZA MÜDÜRLERİ ÖRNEĞİ

Öz
Yöneticilerin performansının etkili bir şekilde değerlendirilmesi ve arttırılması, organizasyonel başarıya ulaşmak ve dinamik iş ortamında rekabet avantajını sürdürmek için çok önemlidir. Bu çalışma, iki önemli karar verme tekniğini birleştiren kapsamlı bir çerçeve kullanarak mağaza yöneticisi performans değerlendirmesi için yeni bir yaklaşım sunmaktadır: Küresel Bulanık Adım Adım Ağırlık Değerlendirme Oran Analizi (SF-SWARA) ve Küresel Bulanık Birleşik Uzlaşma Çözümü (SF-CoCoSo). Sunulan SF-SWARA-CoCoSo yöntemi, değerlendirme sürecine birden fazla bakış açısı ve nesnel kriter dahil ederek yöneticilerin performansını değerlendirmede yer alan doğal karmaşıklıkları ve öznellikleri ele almayı amaçlamaktadır. Bu çalışmanın amacı çok kriterli karar verme (ÇKKV) yöntemlerini hibrit bir şekilde uygulayarak mağaza yöneticilerinin performansını basit ve anlaşılır bir şekilde değerlendirilmesini sağlamaktır. SF-SWARA ve SF-CoCoSo hibrit ÇKKV yöntemi kullanılmıştır. Çalışmanın bulguları "Bilgi ve Eğitim Düzeyi" kriterinin mağaza yöneticisi için en önemli kriter olduğu ve en düşük öneme sahip kriterin ise "Ücret" kriteri olduğunu ortaya koymaktadır. Çalışmanın sonucunda en önemli kriter olduğu tespit edilen "Bilgi ve Eğitim Düzeyi" kriterinin günümüzün bilgi çağı olması nedeni ile ortaya çıktığı sonucuna varılmıştır.
Anahtar Kelimeler: Mağaza Müdürü, Çok Kriterli Karar Verme, Performans Değerlendirme, SF-SWARA, SF-CoCoSo

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Introduction

The performance of store managers plays a crucial role in determining the success and sustainable growth of retail businesses (Genç, 2020). With the ever-changing market dynamics and increasing customer expectations, the need to effectively evaluate and enhance store managers' performance has become paramount (Daft, 2008). Traditional performance appraisal methods often fall short in capturing the diverse range of skills and contributions required of store managers. To address this challenge, this study introduces a novel approach that combines Combined Compromised Solution (CoCoSo) method and the Stepwise Weight Assessment Ratio Analysis (SWARA) for criteria prioritization, to create a comprehensive and objective store manager performance appraisal framework.

The SWARA and CoCoSo framework based on spherical fuzzy (SF) sets is designed to overcome the limitations of conventional appraisal methods by integrating multiple decision-making techniques that incorporate both qualitative and quantitative factors. By considering various perspectives, this approach enables a well-rounded assessment of store managers' capabilities, leadership qualities, operational efficiency, and their ability to drive customer satisfaction. With increasing globalization, it is imperative to develop a model for performance appraisal system that aligns with the specific goals and values of retail organizations. The SF-SWARA and SF-CoCoSo approach offers a flexible and customizable evaluation process, accommodating the unique requirements of different retail formats and sizes. This tailored approach fosters fairness, consistency, and transparency in assessing store manager performance, providing valuable insights for managerial development and organizational decision-making.

The significance of an effective store manager performance appraisal system cannot be overstated. Retail businesses rely on such systems not only to identify and reward high-performing managers but also to facilitate targeted training and development for those seeking improvement. Moreover, a well-structured performance appraisal system can enhance employee motivation, leading to increased productivity and customer satisfaction (Genç, 2020). Throughout this paper, we will delve into the details of the SF-SWARA and SF-CoCoSomethodology, discussing its theoretical underpinnings, the step-by-step implementation process, and its potential benefits.

In today's society, the prevalence of chain supermarkets has become a ubiquitous aspect of our daily lives, shaping our approach to shopping and influencing consumer behavior. The landscape is changing dynamically as the number of these chain supermarkets, which present themselves under innovative and different names, continues to grow. The proliferation of these organizations and their increasing importance as they represent a broader shift in consumer preferences makes the issue of performance appraisal of managers in these stores even more important. In order to shed light on this phenomenon and understand its importance, a case study of chain supermarkets was conducted. As chain supermarkets become increasingly woven into the fabric of our societies, their impact on local economies, consumer preferences and the competitive landscape of the retail sector is becoming increasingly evident. In this context, chain supermarkets were used in the case study due to their growing importance and number. In the literature, there are studies that have addressed performance of employees and managers from various perspectives and emphasized different evaluation methods. However, so far, there has not been a study on executive performance selection using a hybrid approach that combines SF-SWARA and SF-CoCoSo methods. In this context, this study fills a gap in the literature and provides both academicians and business professionals with a new model and perspective on executive performance selection. The integration of SF-SWARA and SF-CoCoSo methods contributes to the more effective evaluation of managerial performance and helps organizations to form their managerial staff more effectively. Businesses will be able to make a more effective manager performance evaluation by applying this proposed model in their businesses. This study has the potential to shed light on further studies in the field of manager performance selection by forming the basis for future similar studies.

This study consists of five chapters. The second section presents the literature review on SF-SWARA and SF-CoCoSo methods for store manager and store managers' performance evaluation criteria. In the third section, SF-SWARA-CoCoSo methods are explained. In the fourth section, the performance evaluation process of store managers is explained with a case study. In the fifth section, conclusions based on the findings of the case study and the manager performance evaluation model is presented.

Literature Review

Multi-criteria decision-making (MCDM) strategies have been used in recent research on the evaluation of manager performance to take into account various criteria. In the area of people management where manager performance is evaluated, there is a wealth of study. Over the past few years, numerous quantitative and subjective methodologies have developed. However, the research (Kilduff et al., 2000; Higgs et al., 2005) provides ample evidence of the significance of staff performance evaluation and its connection to the performance of the company. Performance may be measured using several performance assessment approaches (Ahmed et al., 2013, Ozkan et al., 2014; Esen et al., 2016; Milani et al., 2018; Nobari et al., 2019; Saidin, 2022).

Numerous organizations lack a systematic approach to evaluating their managers' performance, leading to vague and inefficient evaluation methods. Therefore, the development of a structured and regular performance evaluation process becomes imperative during the planning stage. The complexity arises as organizations employ multiple criteria to assess managers, each with varying rules and priorities, making the aggregation of results into a comprehensive performance index cumbersome. An effective solution lies in adopting fuzzy rule-based decision-making, wherein fuzzy logic considers various criteria and simplifies the calculation process based on predefined rules, circumventing the complexities of traditional methods (Ahmed et al., 2013). Fuzzy logic may be used to calculate a manager's overall performance index by creating a model that grades managers' actions on predetermined criteria using judgment scales. Fuzzy logic makes it easier to evaluate managers' performance by utilizing firm performance statistics and judgment-based assessments. The key tasks in this model involve establishing judgment scales and formulating rules within the fuzzy logic framework to facilitate the calculations (Nobari et al., 2019). The fuzzy environment has witnessed numerous studies across diverse areas and applications, including evaluating managers' performance using MCDM methods.

In a series of studies, various researchers have explored diverse methodologies for evaluating employee performance. Falsafi et al. (2011) utilized the Delphi and fuzzy technique for order of preference by similarity to the ideal solution (F-TOPSIS) method to assess employee performance. They used eight criteria as this study. Their criteria are communication, decision making, information, interpersonal relationships, self-motivation, behavioral, management, and customer orientation. They found that sense of responsibility is the most important criterion for evaluating the employees. And also, it is important to note that they used fuzzy method for selecting. Ahmed et al. (2013) used fuzzy logic in their study with twenty different criteria. Their criteria are employees' job knowledge, quality of work, quantity of work, problem solving and decision making, teamwork and cooperation, leadership, absenteeism rate, late arrival, communication skills, time management, adaptability and flexibility, appearance and personal care, professional attitude, initiative and innovation, reliability, self-confidence, stability under pressure, ethics and integrity, planningability, versatility. Appearance and outlook selected as most important criterion. They also used fuzzy methods for evaluating employees. Ozkan et al. (2014) tackled the employees' performance appraisal challenge by applying the fuzzy C-Means method. They used seventeen criteria which are written and unwritten communication skills, non-verbal communication, administrative orientation, tolerance for stress, leadership, negotiation, ability to work as part of a team, reliability and punctuality, appearance, self-confidence, technical/ professional proficiency, ability to analyze a situation or problem logically, planning and organizing, delegation and control, work experience, foreign language, decision making. Afshari and Letic (2016) used fuzzy number bases to evaluate employees. Ten different criteria were used in the study. Also, this study used fuzzy approaches. Lidinska and Jablonsky (2018) decided to evaluate employee performance using the analytic hierarchy process (AHP) technique. Four criteria were employed in this investigation. Money and awards selected as most important criterion. Nobari et al. (2019) employed the F-TOPSIS technique with four criteria, similar to Lidinska and Jablonsky (2018). Both studies used fuzzy techniques. Similarly, to this, Hermawan and Damiyati (2020) used the TOPSIS and simple additive weighting (SAW) methodologies to evaluate employee performance. They used job performance, honesty, cooperation, obedience, loyalty as criteria. The PROMETHEE (Preference Ranking Organization approach for Enrichment Evaluation) approach was utilized by Nursari and Murtako (2020) to carry out the weighing and selection processes, and seven distinct criteria were employed in the study. Job integrity selected as most important criterion. The AHP (Analytic Hierarchy Process) approach was employed by Sumarno et al. (2021) for both weighting and criterion selection. In this study, there were three core criteria and thirteen supporting factors. Employee intellectual competence selected as most important criterion. Hutahaean et al. (2022) the SAW method was used and six different criteria were examined. The most important criterion is education level. Building on this trend, Saidin (2022) utilized the F-TOPSIS approach for the same purpose. And this study used fuzzy approaches. These studies collectively demonstrate the continuous quest for innovative and effective performance appraisal methods to ensure a comprehensive and insightful evaluation of employees' contributions and capabilities. The criteria used in the mentioned studies are shown in Table 1. The criteria used for the selection of the store manager in this study are shown in Table 2.

Table 1: Literature review for evaluation of manager performance.

Study	Methods	Criteria
Falsafi et al. (2011)	Delphi / F-TOPSIS	"Communication, decision making, information, interpersonal relationships, self-motivation, behavioral, management, customer orientation."
Ahmed et al. (2013)	Fuzzy Logic	"Employees' job knowledge, quality of work, quantity of work, problem solving and decision making, team work and cooperation, leadership, absenteeism rate, late arrival, communication skills, time management, adaptability and flexibility, appearance and personal care, Professional attitude, initiative and innovation, reliability, self-confidence, stability underpressure, ethics and integrity, planning ability, versatility."
Ozkan et al. (2014)	Fuzzy C - Means	"Written and unwritten communication skills, non-verbal communication, administrative orientation, Tolerance for stress, Leadership, Negotiation, Ability to work as part of a team, Reliability and punctuality, Appearance, Self-confidence, Technical/ Professional proficiency, Ability to analyze a situation or problem logically, Planning and organizing, Delegation and control, Work experience, Foreign language, Decision making"
Afshari and Letic (2016)	Fuzzy Logic	"Job knowledge, job quality, initiative and creativity, communication, collaboration, planning and organizational effectiveness, amount of work, and employee absenteeism score."
Lidinska and Jablonsky (2018)	AHP	"Money and awards, Team, Risk for low performance, Potential"
Nobari et al. (2019)	F-TOPSIS	"Communication skills, technical skills, analysis skills, creativity skills."
Hermawan and Damiyati (2020)	SAW / TOPSIS	"Job Performance, Honesty, Cooperation, Obedience, Loyalty"
Nursari and Murtako (2020)	PROMETHEE	"Diligence, teamwork, sincerity, skills, initiative, independence and absenteeism."
Sumarno et al. (2021)	AHP	"Servant Leadership (Love, Caring, Vision, Humility, Confidence), Employee Performance (Amount of Work, Work Quality, Work Efficiency, Collaboration, Discipline), Employee Competence (Mental, Emotional, Social)."
Hutahaean et al. (2022)	SAW	"Level of Education, Experience, Expertise, Collaboration, Quality of Work, Discipline."
Saidin (2022)	F-TOPSIS	"Work Execution, Knowledge and Expertise, Personal Attributes, Contributions other than Office Duties, Quantity of work, Quality of work regarding perfection and neatness, Quality of work regarding efforts and initiatives to attain work perfection, Time management, Work efficacy, Knowledge and expertise in the field of works, Execution of policies, regulation and administrative order, The efficacy of communication, Leadership skills, Ability to organise, Discipline, Proactive and innovative, Connection and collaboration"

Table 2: Selected criteria for evaluation of manager performance.

Criteria	Definition	References
Knowledge and Education Level (C1)	It refers to the level of knowledge and education of manager.	Falsafi (2011), Hutahaean et al. (2022); Saidin(2022)
Fee (C2)	It refers to fee that manager gets.	Lidinska and Jablonsky(2018)
Work Quality and Performance (C3)	It refers to work quality and performance of manager.	Ahmed et al. (2013), Hermawan and Damiyati (2020), Sumarno et al. (2021), Hutahaean et al. (2022)
Interpersonal Skills and Appearance (C4)	It refers to interpersonal skills and appearance of manager.	Falsafi et al. (2011), Ahmed et al. (2013), Özkan et al. (2014), Nobari et al. (2019)
Leadership and Teamwork (C5)	It refers to the level of leadership and teamwork of manager.	Ahmed et al. (2013), Özkan et al. (2014), Nursari and Murtako (2020), Sumarno et al. (2021), Saidin (2022)
Experience (C6)	It refers to the experience of manager in company.	Özkan et al. (2014), Hutahaean et al. (2022)

As a result of the literature review Knowledge and Education Level (C1), Fee (C2), Work Quality and Performance (C3), Interpersonal Skills and Appearance (C4), Leadership and Teamwork (C5), Experience (C6) selected as performance evaluation criteria.

In Hooshang and James's (2008) research communication, Falsafi's (2011) research sense of responsibility, in Ahmed's (2013) research appearance and outlook, in Lidinska and Jablonsky' (2018) research money and awards, in Nobari et al.' (2019) research propagation of coworking culture, inNursari and Murtako's (2020) research job integrity, in Sumarno et al.' (2021) research employee intellectual competence, in Saidin (2022) work execution, in Hutahaean et al.' research (2022) education level is the most important criterion.

Research Method

Preliminaries

Developed by Kutlu Gündoğdu and Kahraman (2019), Spherical Fuzzy (SF) Sets are used for decision making in many areas. The terms in the method, which are mainly intended to express the hesitations of decision makers, are shown in Eq.(1), Eq. (2), and Eq. (3).

$$0 \leq \mu_{\tilde{A}}^2(u) + \vartheta_{\tilde{A}}^2(u) + \pi_{\tilde{A}}^2(u) \leq 1 \ \forall u \in U \qquad (1)$$

$$\tilde{A}_d = \left\{ \left\langle u, \left(\mu_{\tilde{A}_d}(u), \vartheta_{\tilde{A}_d}(u), \pi_{\tilde{A}_d}(u) \right) | u \in U \right\} \qquad (2)$$

$$\mu_{\tilde{A}_d}: U \to [0,1], \vartheta_{\tilde{A}_d}(u): U \to [0,1], \pi_{\tilde{A}_d}(u): U \to [0,1] \qquad (3)$$

Let $\tilde{A}_d = \left(\mu_{\tilde{A}_d}(x), \vartheta_{\tilde{A}_d}(x), \pi_{\tilde{A}_d}(x) \right)$ and $\tilde{B}_d = \left(\mu_{\tilde{B}_d}(x), \vartheta_{\tilde{B}_d}(x), \pi_{\tilde{B}_d}(x) \right)$ be two IFs, SFs and $\lambda > 0$. Their operations are defined as follows (Kutlu Gündoğdu and Kahraman, 2019):

(i) Addition ($\oplus$) is calculated with Eq. (4).

$$\tilde{A}_d \oplus \tilde{B}_d = \left\{ \left({\mu^2}_{\tilde{A}_d} + {\mu^2}_{\tilde{B}_d} - {\mu^2}_{\tilde{A}_d} * {\mu^2}_{\tilde{B}_d} \right)^{1/2}, \vartheta_{\tilde{A}_d} * \vartheta_{\tilde{B}_d}, \left(\left(1 - {\mu^2}_{\tilde{B}_d}\right) * {\pi^2}_{\tilde{A}_d} + \left(1 - {\mu^2}_{\tilde{A}_d}\right) * {\pi^2}_{\tilde{B}_d} - {\pi^2}_{\tilde{A}_d} * {\pi^2}_{\tilde{B}_d} \right)^{1/2} \right\} \quad (4)$$

(ii) Multiplication ($\otimes$) is calculated with Eq. (5).

$$\tilde{A}_d \otimes \tilde{B}_d = \left\{ \mu_{\tilde{A}_d} * \mu_{\tilde{B}_d}, \left({\vartheta^2}_{\tilde{A}_d} + {\vartheta^2}_{\tilde{B}_d} - {\vartheta^2}_{\tilde{A}_d} * {\vartheta^2}_{\tilde{B}_d} \right)^{1/2}, \left(\left(1 - {\vartheta^2}_{\tilde{B}_d}\right) * {\pi^2}_{\tilde{A}_d} + \left(1 - {\vartheta^2}_{\tilde{A}_d}\right) * {\pi^2}_{\tilde{B}_d} - {\pi^2}_{\tilde{A}_d} * {\pi^2}_{B_d} \right)^{1/2} \right\} \quad (5)$$

(iii) Scalar multiplication ($\lambda \tilde{A}_d$) is calculated with Eq. (6).

$$\lambda \tilde{A}_d = \left\{ \left(1 - \left(1 - {\mu^2}_{\tilde{A}_d}\right)^{\lambda} \right)^{1/2}, {\vartheta^\lambda}_{\tilde{A}_d}, \left(\left(1 - {\mu^2}_{\tilde{A}_d}\right)^{\lambda} - \left(1 - {\mu^2}_{\tilde{A}_d} - {\pi^2}_{\tilde{A}_d}\right)^{\lambda} \right)^{1/2} \right\} \quad (6)$$

(iv) Power ($\widetilde{M}^{\lambda}$) is calculated with Eq. (7).

$$\tilde{A}^{\lambda}{}_d = \left\{ {\mu^\lambda}_{\tilde{A}_d}, \left(1 - \left(1 - {\vartheta^2}_{\tilde{A}_d}\right)^{\lambda} \right)^{1/2}, \left(\left(1 - {\vartheta^2}_{\tilde{A}_d}\right)^{\lambda} - \left(1 - {\vartheta^2}_{\tilde{A}_d} - {\pi^2}_{\tilde{A}_d}\right)^{\lambda} \right)^{1/2} \right\} \quad (7)$$

Hybrid Method

Spherical fuzzy stepwise weight assessment ratio analysis (SF-SWARA)

The SWARA approach was introduced by Kersuliene et al. in 2010. It isn't frequently used in conjunction with SF sets, though. It is a well-known strategy in the Multi-Criteria Decision Making (MCDM) area. It is particularly useful when several criteria need to be considered while making difficult judgments. This approach combines the strengths of SWARA and spherical fuzzy approaches. The "Spherical Fuzzy" method broadens the conventional fuzzy logic theory and seeks to more effectively describe multidimensional and complicated data. This approach allows us to better handle the uncertainty of data and criteria and uncertain information. It offers a more flexible structure to express different sizes and ranges of data. "SWARA" is the abbreviation of "Simple Additive Weighted Rank Assessment" and stands for Step-by-Step Weight Assessment Ratio Analysis. It is employed in this approach to establish the relative importance of several criteria and to rank the outcomes. At this point, the criteria are prioritized, and the examination of the outcomes is completed. The SF-SWARA method, as a combination of Spherical Fuzzy and SWARA, combines the advantages of both approaches. The SF-SWARA method offers a more effective and flexible approach to complex MCDM problems. It aims to provide a more comprehensive decision-making process by bringing together the impact of different criteria, uncertainty, and different priorities (Taş et al., 2021).

This method involves the initial ordering of criteria, as assessed by experts, based on their level of importance, with subsequent steps of the method outlined in the following sequence (Ghoushchi et al., 2022).

Step1-1: The weights of the decision makers (φ_d) are calculated by Eq. (8). Table 3 is used in calculations.

$$\varphi_d = \frac{\left(\mu_d + \pi_d \cdot \left(\frac{\mu_d}{\mu_d + \vartheta_d}\right)\right)}{\sum_{d=1}^{s}\left(\mu_d + \pi_d \cdot \left(\frac{\mu_d}{\mu_d + \vartheta_d}\right)\right)}, d = \{1, 2, ., ., ., s\} \quad (8)$$

Based on the language terms in Table 3, evaluations of the criteria and decision-makers are made. In the table, $\mu(x)$ denotes membership degree, $\vartheta(x)$ denotes non-membership degree, $\pi(x)$and denotes hesitancy level (Boran et al., 2009; Schitea et al., 2019).

Table 3: A scale regarding the assessment of criteria and experts.

Symbol	***Definition***	$\boldsymbol{\mu(x)}$	$\boldsymbol{\vartheta(x)}$	$\boldsymbol{\pi(x)}$
VI	Very important	0.88	0.08	0.04
I	Important	0.75	0.20	0.05
M	Medium	0.50	0.45	0.05
UI	Unimportant	0.35	0.60	0.05
VU	Very unimportant	0.08	0.88	0.04

As shown in Table 3 the definitions are “Very important (VI)”, “Important (I)”, “Medium (M)”, “Unimportant (UI)” and “Very unimportant (VU)” respectively.

Step1-2: Criteria are evaluated by decision makers using Table 4.

Table 4: Linguistic items and SF numbers

Symbol	***Definition***	$\boldsymbol{\mu(x)}$	$\boldsymbol{\vartheta(x)}$	$\boldsymbol{\pi(x)}$
AMI	Absolutely more important	0.90	0.10	0.10
VHI	Very high important	0.80	0.20	0.20
HI	High important	0.70	0.30	0.30
SMI	Slightly more important	0.60	0.40	0.40
EI	Equally important	0.50	0.50	0.50
SLI	Slightly less important	0.40	0.60	0.40
LI	Less important	0.30	0.70	0.30
VLI	Very less important	0.20	0.80	0.20
ALI	Absolutely less important	0.10	0.90	0.10

Step1-3: With Eq. (9), the evaluations of the decision makers are combined with the SWAM operator. The expression “φ_{d_i}” in the equation represents the weight of the i^{th}decision maker.

$$SWAM_w(\tilde{A}_{d1}, \tilde{A}_{d2}, \ldots, \tilde{A}_{dn}) = \varphi_{d_1}\tilde{A}_{d1} + \varphi_{d_2}\tilde{A}_{d2} + \cdots + \varphi_{d_n}\tilde{A}_{dn} = \left\{ \left[1 - \prod_{i=1}^{n}\left(1 - \mu_{\tilde{A}_{di}}^2\right)^{\varphi_{d_i}}\right]^{1/2}, \ \prod_{i=1}^{n} \vartheta_{\tilde{A}_{di}}^{2}{}^{\varphi_{d_i}}, \left[\prod_{i=1}^{n}\left(1 - \mu_{\tilde{A}_{di}}^2\right)^{\varphi_{d_i}} - \prod_{i=1}^{n}\left(1 - \mu_{\tilde{A}_{di}}^2 - \pi_{\tilde{A}_{di}}^2\right)^{\varphi_{d_i}}\right]^{1/2} \right\} \quad (9)$$

Step1-4: Eq. (10) calculates score function values.

$$Score(A_d) = \left(\mu_{\tilde{A}_d} - \pi_{\tilde{A}_d}\right)^2 - \left(\vartheta_{\tilde{A}_d} - \pi_{\tilde{A}_d}\right)^2 \quad (10)$$

Step1-5: The s_j values are calculated with Eq. (11). Before this operation is performed, the criteria are sorted according to the score function values from largest to smallest.

$$s_j = \begin{cases} 0, \ j = 1 \\ Score(\mathrm{A}_{d+1}) - Score(\mathrm{A}_d), \ j > 1 \end{cases} \quad (11)$$

Step1-6: Eq. (12) calculates the coefficient k_j.

$$k_j = \begin{cases} 1, \ j = 1 \\ s_j + 1, \ j > 1 \end{cases} \quad (12)$$

Step1-7: q_j is calculated by Eq. (13).

$$q_j = \begin{cases} 1, \ j = 1 \\ \frac{q_{j-1}}{k_j}, \ j > 1 \end{cases} \quad (13)$$

Step1-8: The weights of the criteria(w_j) are calculated with Eq. (14).

$$w_j = \frac{q_j}{\sum_{j=1}^{n} q_j} \quad (14)$$

Spherical fuzzy combined compromised solution (SF-CoCoSo)

Yazdani et al. (2019) are the authors of the CoCoSo technique. In the area of Multi-Criteria Decision Making (MCDM), the "Spherical Fuzzy Combined Compromised Solution (SF-CoCoSo)" method is a well-known technique. Many decisions nowadays are influenced by several stakeholders, goals, and criteria. The SF-CoCoSoSo technique attempts to handle the ambiguity and relationships between criteria in this complicated framework. The usage of the spherical fuzzy technique in this method draws notice in particular. Spherical fuzzy, an expanded version of conventional fuzzy set theory, tries to more accurately describe multidimensional and complicated data. Traditional fuzzy set theory Compared to set theory, Spherical Fuzzy can manage uncertainty more effectively, providing greater flexibility and accuracy. It supports the incorporation of objective and subjective factors in decision-making processes. The SF-CoCoSo method provides a framework for complex MCDM problems. This approach aims to better address the uncertainties and different preferences of stakeholders by overcoming the limitations of traditional methods. The SF-CoCoSo method can be used in various industries and fields.

It can be especially effective when complex decisions are made and when different goals conflict (Kieu et al., 2021). This method aims to assist decision-makers in complex decision-making processes where more than one criterion is taken into account. The method was developed by combining additive weighting and exponential weighting methods. It is a method that helps in ranking multiple alternatives. The method steps which are based on SF are described below, respectively (Ghoushchi et al., 2021).

Step2-1: Using the data in Table 4, a decision matrix consisting of m alternatives and n criteria is created as in Eq. (15).

$$X = \begin{bmatrix} x_{11} & \cdots & x_{1j} & \cdots & x_{1n} \\ \vdots & \cdots & \vdots & \cdots & \vdots \\ x_{i1} & \cdots & x_{ij} & \dots & x_{in} \\ \vdots & \cdots & \vdots & \cdots & \vdots \\ x_{m1} & \cdots & x_{mj} & \dots & x_{mn} \end{bmatrix} \quad (15)$$

Step 2-2: With the SWAM operator (as in Eq. (9)), the decision matrices created by the decision makers are combined.

Step 2-3: Eq. (10) calculates score function values.

Step 2-4: Benefit and cost criteria are normalized with Eq. (16) and Eq. (17). Then, the normalized decision matrix is obtained as in Eq. (18).

$$r_{ij} = \frac{x_{ij} - \min_i x_{ij}}{\max_i x_{ij} - \min_i x_{ij}}, for\ benefit\ criteria \quad (16)$$

$$r_{ij} = \frac{\max_i x_{ij} - x_{ij}}{\min_i x_{ij} - \max_i x_{ij}}, for\ cost\ criteria \quad (17)$$

$$N = \begin{bmatrix} n_{11} & \cdots & n_{1j} & \cdots & n_{1n} \\ \vdots & \cdots & \vdots & \cdots & \vdots \\ n_{i1} & \cdots & n_{ij} & \dots & n_{in} \\ \vdots & \cdots & \vdots & \cdots & \vdots \\ n_{m1} & \cdots & n_{mj} & \dots & n_{mn} \end{bmatrix} \quad (18)$$

Step 2-5: Eq. (19) calculates the sum of weight comparability sequences and Eq. (20) calculates the power of weight comparability sequences.

$$S_i = \sum_{j=1}^{n} (w_j r_{ij}) (19)$$

$$P_i = \sum_{j=1}^{n} (r_{ij})^{w_j} \quad (20)$$

Step 2-6: For alternative rankings, firstly the values of $k_{ia}, k_{ib}$and $k_{ic}$are calculated by Eq. (21), Eq. (22) and Eq. (23), respectively. Then the value ofk_i for the final alternative ranking is calculated by Eq. (24). The alternative with the highest value is determined as the best alternative.

$$k_{ia} = \frac{S_i + P_i}{\sum_{i=1}^{m} (S_i + P_i)} \quad (21)$$

$$k_{ib} = \frac{S_i}{\min_i S_i} + \frac{P_i}{\min_i P_i} \tag{22}$$

$$k_{ic} = \frac{\lambda S_i + (1-\lambda) P_i}{\lambda \max_i S_i + (1-\lambda) \max_i P_i}; 0 \leq \lambda \leq 1 \tag{23}$$

$$k_i = (k_{ia} k_{ib} k_{ic})^{1/3} + \frac{1}{3}(k_{ia} + k_{ib} + k_{ic}) \tag{24}$$

Case Study for Performance Evaluation of Store Manager Performance

In this study, SF-SWARA and SF-CoCoSo approaches were used as a hybrid. With the use of SF-SWARA (Spherical Fuzzy Simple Additive Weighted Rank Assessment) and SF-CoCoSo (Spherical Fuzzy the Combined Compromised Solution) methods together, it offers a more effective and flexible approach when dealing with complex and multidimensional decision-making problems. In addition, many advantages can be achieved by using these two methods together. SF-SWARA performs weighted sequencing evaluation, while SF-CoCoSo is used to manage complex solutions and balance the preferences of different stakeholders. Both methods aim to comprehensively evaluate different criteria and objectives. By using these two methods together, the criteria can be evaluated more comprehensively. Both SF-SWARA and SF-CoCoSo methods aim to better handle uncertainty using the Spherical Fuzzy approach. Combining the two approaches makes it possible to get more accurate answers when dealing with complicated decision-making issues in the real world. There might be competing goals in the decision-making issue. SF-CoCoSo strikes a balance between diverse goals and preferences of the decision-makers, whereas SF-SWARA takes these conflicts into account when weighing and ranking. These two approaches can be combined to successfully balance competing goals. Management choices are frequently influenced by a combination of objective and subjective elements. These two approaches work together to successfully incorporate quantitative and qualitative data, resulting in a more thorough analysis. The combined use of SF-SWARA and SF-CoCoSo offers decision-makers more information and perspective. Making wiser and more informed judgments is facilitated by this. There are several uses for both approaches. When used in combination, they can be applied to complex decision-making problems in different industries and fields. In addition, when these two methods are used together, they support the evaluation of manager and organizational performance at both strategic and tactical levels (Popović, 2021; Kieu et al., 2021; Taş et al., 2021; Kumar et al., 2022)

In general performance evaluation processes in chain markets, the importance of human resources comes to the fore due to human-oriented activities. The administration of all workers and all processes depends heavily on managerial performance. Therefore, the purpose of this study is to assess how well chain market managers perform. Six criteria were established in this situation as a consequence of the literature study: Knowledge and Education Level (C1), Fee (C2), Work Quality and Performance (C3), Interpersonal Skills and Appearance (C4), Leadership and Teamwork (C5), Experience (C6). These criteria were also found appropriate by the market senior managers.

A case study was created to apply the method we have developed. In this case study, the performance of the managers (A1, A2, A3, A4, A5, A6, A7, A8) in eight different stores of a chain market operating in Ankara was analyzed by four experts (DM-1, DM-2, DM-3, DM-4) (4 mid-level manager) assigned to the performance evaluation of the head office. A 9-point Likert scale was used in this study. The sample was collected through face-to-face interviews using a simple random sampling method.

Ankara is home to a wide variety of shopping destinations, ranging from large shopping malls to niche boutiques. This case study focuses on a company's various stores operating in one district of Ankara province. With a significant population representing different demographics and consumer behaviors, Ankara serves as a microcosm to understand how store managers interact with different customer profiles and meet various consumer expectations. As one of Turkey's thriving economic centers, Ankara's economic dynamism adds another layer of complexity to the study, providing insights into how store managers drive businesses through their performance. Moreover, the cultural richness of the city as a meeting point of different cultures provides an opportunity to examine how store managers cope with cultural diversity and how they communicate effectively within their teams. For these reasons, the authors focus on the branches of a company operating in Ankara.

The ease of establishing standards is facilitated by the consistent application of similar business processes and standards across different branches of the same company. This circumstance simplifies the determination and standardization of criteria used for performance evaluation. Comparability is enhanced as the performance of store managers in different branches can be assessed against common benchmarks. This enables the identification of best practices and the adaptation of successful strategies to other branches. The opportunity for evaluation under equal conditions arises from the fact that store managers in various branches of the same company are subject to similar working conditions. This fosters a more equitable and objective assessment, contributing to the reliability of performance evaluations. Additionally, the implementation of uniform training and development programs for managers across different branches within the same company enhances the objectivity of performance evaluation processes. Within the scope of the case study, there are reasons why the company's branches operating in a certain district of Ankara province were taken into consideration. First of all, it is considered that the shopping preferences of people living in the same district will be similar. The second reason is the proximity in terms of income levels of people living in the same district. The third reason is the proximity of these chains. Many of their branches are within walking distance. For these reasons, the branches operating in the same district are considered. Findings were obtained by applying all the steps described in the methodology section in order.

Stage 1: Determine the criteria weight with SF-SWARA

The steps of the SF-SWARA method were sequentially applied for determining criterion weights.

Step 1-1: Using the values in Table 3, the weights of the decision makers are calculated with Eq. (8). Decision maker linguistic and SF values and their weights are shown in Table 5.

Table 5: The experts' linguistic items and SF sets.

	DM-1	*DM-2*	*DM-3*	*DM-4*
Linguisticitems	I	I	M	VI
IF Numbers	[0.75;0.20;0.05]	[0.75;0.20;0.05]	[0.50;0.45;0.05]	[0.88;0.08;0.04]
$\boldsymbol{\varphi_d}$	0.2612	0.2612	0.1742	0.3033

Table 5 shows that weights ($\boldsymbol{\varphi_d}$) of DM-1-2's is 0.2612, DM-3 is 0.1742 and DM-4's is 0.3033

Step 1-2: The linguistic decision matrix is structured as a table, wherein the rows typically represent alternatives or options under consideration, and the columns denote various criteria or attributes that play a role in the decision process. What sets this matrix apart from traditional numerical matrices is the utilization of linguistic terms or labels instead of numerical values. These linguistic terms are used by the decision makers to describe their opinions, assessments, or preferences regarding the performance of each alternative across the different criteria. The linguistic decision matrix created by the decision makers using Table 4 is shown in Table 6, and the corresponding SF sets are shown in Table 7.

Table 6: The decision matrix (Linguistic items).

	DM-1	*DM-2*	*DM-3*	*DM-4*
C1	SMI	EI	HI	VHI
C2	EI	SMI	VLI	EI
C3	EI	VLI	HI	HI
C4	VLI	HI	EI	HI
C5	HI	SLI	SMI	EI
C6	VLI	HI	HI	VLI

In the complex landscape of decision-making, the integration of linguistic considerations into the evaluation process has led to the development of 'The Decision Matrix (Linguistic Items).' This innovative approach involves a systematic grid or matrix where various alternatives are assessed against predefined linguistic criteria. These linguistic items may encompass factors such as clarity of communication, language proficiency, and the overall effectiveness of verbal expression. By incorporating these linguistic elements into the decision matrix, decision-makers gain a nuanced understanding of how different options perform in the realm of language-related considerations. This proves particularly valuable in scenarios where effective communication is pivotal, ensuring that decisions align not only with quantitative data but also with the subtleties of linguistic excellence.

Table 7: The decision matrix (SF sets).

	DM1			***DM2***			***DM3***			***DM4***		
	$\mu(x)$	$\vartheta(x)$	$\pi(x)$	$\mu(x)$	$\vartheta(x)$	$\pi(x)$	$\mu(x)$	$\vartheta(x)$	$\pi(x)$	$\mu(x)$	$\vartheta(x)$	$\pi(x)$
C1	0.6	0.4	0.4	0.5	0.5	0.5	0.7	0.3	0.3	0.8	0.2	0.2
C2	0.5	0.5	0.5	0.6	0.4	0.4	0.2	0.8	0.2	0.5	0.5	0.5
C3	0.5	0.5	0.5	0.2	0.8	0.2	0.7	0.3	0.3	0.7	0.3	0.3
C4	0.2	0.8	0.2	0.7	0.3	0.3	0.5	0.5	0.5	0.7	0.3	0.3
C5	0.7	0.3	0.3	0.4	0.6	0.4	0.6	0.4	0.4	0.5	0.5	0.5
C6	0.2	0.8	0.2	0.7	0.3	0.3	0.7	0.3	0.3	0.2	0.8	0.2

Step 1-3: In Table 8, the process of determining the weights assigned to individual decision-makers (DMs) and constructing the aggregated decision matrix is illustrated. This process involves the application of the SWAM operator, as defined by Eq. (9), to amalgamate the preferences expressed by each DM. The resulting aggregated decision matrix provides a comprehensive view of the combined evaluations, considering the relative importance attributed to the viewpoints of each DM.

Table 8: The aggregated decision matrix

	$\mu(x)$	$\vartheta(x)$	$\pi(x)$
C1	0.679322	0.326816	0.345519
C2	0.498828	0.511921	0.448382
C3	0.578434	0.442958	0.354835
C4	0.597128	0.423685	0.334755
C5	0.566160	0.441387	0.406737
C6	0.520681	0.521936	0.273841

The term 'The Aggregated Decision Matrix' refers to a comprehensive framework that consolidates decision-making data from various sources or criteria. This unified matrix integrates inputs from different perspectives, possibly derived from individual decision matrices, to provide a holistic assessment of options. By combining diverse criteria and weighting factors, the Aggregated Decision Matrix enhances the depth and reliability of decision-making processes, offering a nuanced and balanced evaluation of alternatives.

Step 1-4: The score function values calculated with Eq. (10) are shown in Table 9.

Table 9: The score function values

	C1	***C2***	***C3***	***C4***	***C5***	***C6***
A_d	0.111075	-0.001492	0.042231	0.060931	0.024215	-0.000621

Step 1-5, 6, 7 and 8: Eq. (11), Eq. (12), Eq. (13) and Eq. (14) calculates s_j, k_j, q_j and w_j values, respectively. These values are shown in Table 10.

Table 10: The s_j, k_j, q_j and w_jValues

	s_j	k_j	q_j	w_j
C1	0	1	1	0.178686
C4	0.050143	1.050143	0.952251	0.170154
C3	0.018700	1.018700	0.934770	0.167030

C5	0.018016	1.018016	0.918228	0.164074
C6	0.024836	1.024836	0.895975	0.160098
C2	0.000871	1.000871	0.895195	0.159959

As seen in Table 10, the most important criterion isthe firstone on the other hand the least important criterion is the second one. So, a store manager'sknowledge and education level areconsidered the first criteria. The fee is less than the other criterion.

Stage 2: Determine the store manager ranking with SF-CoCoSo

The steps of the SF-CoCoSo method were sequentially applied for determining alternatives ranking.

Step 2-1: In the creation of decision matrices, linguistic and Scale Factor (SF) sets play a crucial role. Linguistic sets represent the qualitative expressions that decision-makers use to convey their preferences or evaluations. SF sets, on the other hand, are used to convert these linguistic expressions into a numerical format. Decision matrices are structured tables used to systematically capture decision-makers' preferences regarding alternatives and criteria. These matrices enable decision-makers to express their preferences and subsequently analyze them. Therefore, linguistic and SF sets facilitate the conversion of qualitative preferences into a format suitable for quantitative analysis and the creation of decision matrices. Linguistic and SF sets decision matrices created by the decision makers using the data in Table 4 are shown in Tables 11 and Table 12.

Table 11: The decision matrix for alternatives ranking (Linguistic items).

Alt.	***C1***				***C2***				***C3***			
	DM1	***DM2***	***DM3***	***DM4***	***DM1***	***DM2***	***DM3***	***DM4***	***DM1***	***DM2***	***DM3***	***DM4***
A1	EI	SLI	SMI	EI	EI	VHI	EI	SMI	HI	VHI	HI	HI
A2	VHI	SMI	HI	SLI	SMI	SMI	HI	HI	SMI	EI	EI	VHI
A3	SMI	SLI	HI	SLI	VHI	SLI	HI	SLI	SLI	HI	VHI	VHI
A4	SMI	SMI	VHI	VHI	SLI	VHI	HI	SLI	SMI	SLI	HI	HI
A5	EI	SMI	HI	SLI	SLI	VHI	SMI	SMI	VHI	HI	SMI	SMI
A6	SMI	SLI	VHI	SMI	VHI	SLI	VHI	VHI	HI	EI	EI	HI
A7	VHI	SLI	EI	SMI	VHI	HI	SMI	SLI	SLI	SMI	SMI	SMI
A8	SMI	SMI	VHI	VHI	VHI	HI	VHI	SMI	SLI	EI	SMI	VHI

Alt.	***C4***				***C5***				***C6***			
	DM1	***DM2***	***DM3***	***DM4***	***DM1***	***DM2***	***DM3***	***DM4***	***DM1***	***DM2***	***DM3***	***DM4***
A1	HI	SMI	SMI	VHI	EI	SMI	SLI	SMI	EI	EI	SMI	SMI
A2	SLI	HI	SLI	HI	SLI	VHI	HI	SLI	EI	SMI	VHI	HI
A3	SLI	SLI	VHI	EI	EI	HI	HI	HI	HI	VHI	VHI	SLI
A4	SMI	SLI	SLI	SLI	VHI	HI	HI	HI	SMI	VHI	HI	HI
A5	EI	SLI	VHI	SLI	SMI	EI	VHI	SMI	SLI	VHI	VHI	VHI
A6	VHI	HI	EI	VHI	SMI	EI	SMI	HI	SMI	SMI	SLI	HI
A7	SLI	SLI	SLI	VHI	VHI	HI	SLI	SLI	SMI	HI	SLI	SLI
A8	HI	HI	SMI	SMI	HI	HI	SLI	HI	SMI	HI	SLI	SLI

Table 12: The decision matrix for alternatives ranking (SF sets).

Alt.	C1												C2											
	DM1			DM2			DM3			DM4			DM1			DM2			DM3			DM4		
	$\mu(x)$	$\vartheta(x)$	$\pi(x)$	$\mu(x)$	$\vartheta(x)$	$\pi(x)$	$\mu(x)$	$\vartheta(x)$	$\pi(x)$	$\mu(x)$	$\vartheta(x)$	$\pi(x)$	$\mu(x)$	$\vartheta(x)$	$\pi(x)$	$\mu(x)$	$\vartheta(x)$	$\pi(x)$	$\mu(x)$	$\vartheta(x)$	$\pi(x)$	$\mu(x)$	$\vartheta(x)$	$\pi(x)$
A1	0.5	0.5	0.5	0.4	0.6	0.4	0.6	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.8	0.2	0.2	0.5	0.5	0.5	0.6	0.4	0.4
A2	0.8	0.2	0.2	0.6	0.4	0.4	0.7	0.3	0.3	0.4	0.6	0.4	0.6	0.4	0.4	0.6	0.4	0.4	0.7	0.3	0.3	0.7	0.3	0.3
A3	0.6	0.4	0.4	0.4	0.6	0.4	0.7	0.3	0.3	0.4	0.6	0.4	0.8	0.2	0.2	0.4	0.6	0.4	0.7	0.3	0.3	0.4	0.6	0.4
A4	0.6	0.4	0.4	0.6	0.4	0.4	0.8	0.2	0.2	0.8	0.2	0.2	0.4	0.6	0.4	0.8	0.2	0.2	0.7	0.3	0.3	0.4	0.6	0.4
A5	0.5	0.5	0.5	0.6	0.4	0.4	0.7	0.3	0.3	0.4	0.6	0.4	0.4	0.6	0.4	0.8	0.2	0.2	0.6	0.4	0.4	0.6	0.4	0.4
A6	0.6	0.4	0.4	0.4	0.6	0.4	0.8	0.2	0.2	0.6	0.4	0.4	0.8	0.2	0.2	0.4	0.6	0.4	0.8	0.2	0.2	0.8	0.2	0.2
A7	0.8	0.2	0.2	0.4	0.6	0.4	0.5	0.5	0.5	0.6	0.4	0.4	0.8	0.2	0.2	0.7	0.3	0.3	0.6	0.4	0.4	0.4	0.6	0.4
A8	0.6	0.4	0.4	0.6	0.4	0.4	0.8	0.2	0.2	0.8	0.2	0.2	0.8	0.2	0.2	0.7	0.3	0.3	0.8	0.2	0.2	0.6	0.4	0.4

Alt.	C3												C4											
	DM1			DM2			DM3			DM4			DM1			DM2			DM3			DM4		
	$\mu(x)$	$\vartheta(x)$	$\pi(x)$	$\mu(x)$	$\vartheta(x)$	$\pi(x)$	$\mu(x)$	$\vartheta(x)$	$\pi(x)$	$\mu(x)$	$\vartheta(x)$	$\pi(x)$	$\mu(x)$	$\vartheta(x)$	$\pi(x)$	$\mu(x)$	$\vartheta(x)$	$\pi(x)$	$\mu(x)$	$\vartheta(x)$	$\pi(x)$	$\mu(x)$	$\vartheta(x)$	$\pi(x)$
A1	0.7	0.3	0.3	0.8	0.2	0.2	0.7	0.3	0.3	0.7	0.3	0.3	0.7	0.3	0.3	0.6	0.4	0.4	0.6	0.4	0.4	0.8	0.2	0.2
A2	0.6	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.8	0.2	0.2	0.4	0.6	0.4	0.7	0.3	0.3	0.4	0.6	0.4	0.7	0.3	0.3
A3	0.4	0.6	0.4	0.7	0.3	0.3	0.8	0.2	0.2	0.8	0.2	0.2	0.4	0.6	0.4	0.4	0.6	0.4	0.8	0.2	0.2	0.5	0.5	0.5
A4	0.6	0.4	0.4	0.4	0.6	0.4	0.7	0.3	0.3	0.7	0.3	0.3	0.6	0.4	0.4	0.4	0.6	0.4	0.4	0.6	0.4	0.4	0.6	0.4
A5	0.8	0.2	0.2	0.7	0.3	0.3	0.6	0.4	0.4	0.6	0.4	0.4	0.5	0.5	0.5	0.4	0.6	0.4	0.8	0.2	0.2	0.4	0.6	0.4
A6	0.7	0.3	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.7	0.3	0.3	0.8	0.2	0.2	0.7	0.3	0.3	0.5	0.5	0.5	0.8	0.2	0.2
A7	0.4	0.6	0.4	0.6	0.4	0.4	0.6	0.4	0.4	0.6	0.4	0.4	0.4	0.6	0.4	0.4	0.6	0.4	0.4	0.6	0.4	0.8	0.2	0.2
A8	0.4	0.6	0.4	0.5	0.5	0.5	0.6	0.4	0.4	0.8	0.2	0.2	0.7	0.3	0.3	0.7	0.3	0.3	0.6	0.4	0.4	0.6	0.4	0.4

Alt.	C5												C6											
	DM1			DM2			DM3			DM4			DM1			DM2			DM3			DM4		
	$\mu(x)$	$\vartheta(x)$	$\pi(x)$	$\mu(x)$	$\vartheta(x)$	$\pi(x)$	$\mu(x)$	$\vartheta(x)$	$\pi(x)$	$\mu(x)$	$\vartheta(x)$	$\pi(x)$	$\mu(x)$	$\vartheta(x)$	$\pi(x)$	$\mu(x)$	$\vartheta(x)$	$\pi(x)$	$\mu(x)$	$\vartheta(x)$	$\pi(x)$	$\mu(x)$	$\vartheta(x)$	$\pi(x)$
A1	0.5	0.5	0.5	0.6	0.4	0.4	0.4	0.6	0.4	0.6	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.4	0.4	0.6	0.4	0.4
A2	0.4	0.6	0.4	0.8	0.2	0.2	0.7	0.3	0.3	0.4	0.6	0.4	0.5	0.5	0.5	0.6	0.4	0.4	0.8	0.2	0.2	0.7	0.3	0.3
A3	0.5	0.5	0.5	0.7	0.3	0.3	0.7	0.3	0.3	0.7	0.3	0.3	0.7	0.3	0.3	0.8	0.2	0.2	0.8	0.2	0.2	0.4	0.6	0.4
A4	0.8	0.2	0.2	0.7	0.3	0.3	0.7	0.3	0.3	0.7	0.3	0.3	0.6	0.4	0.4	0.8	0.2	0.2	0.7	0.3	0.3	0.7	0.3	0.3
A5	0.6	0.4	0.4	0.5	0.5	0.5	0.8	0.2	0.2	0.6	0.4	0.4	0.4	0.6	0.4	0.8	0.2	0.2	0.8	0.2	0.2	0.8	0.2	0.2
A6	0.6	0.4	0.4	0.5	0.5	0.5	0.6	0.4	0.4	0.7	0.3	0.3	0.6	0.4	0.4	0.6	0.4	0.4	0.4	0.6	0.4	0.7	0.3	0.3
A7	0.8	0.2	0.2	0.7	0.3	0.3	0.4	0.6	0.4	0.4	0.6	0.4	0.6	0.4	0.4	0.7	0.3	0.3	0.4	0.6	0.4	0.4	0.6	0.4
A8	0.7	0.3	0.3	0.7	0.3	0.3	0.4	0.6	0.4	0.7	0.3	0.3	0.6	0.4	0.4	0.7	0.3	0.3	0.4	0.6	0.4	0.4	0.6	0.4

Step 2-2: The SWAM operator, is a decision-making technique used to determine the relative importance or weighting of criteria in a decision matrix. It's valuable when assigning different levels of significance to criteria based on their importance in the decision-making process. The SWAM process includes steps like normalization, weight assignment, scoring, and aggregation, ultimately resulting in a final score or ranking for

each alternative, with higher scores indicating more favorable choices. The decision matrix combined with the SWAM operator (Eq. (9)) is shown in Table 13.

Table 13: The aggregated decision matrix.

Alt.	C1			C2			C3			C4			C5			C6		
	$\mu(x)$	$\vartheta(x)$	$\pi(x)$	$\mu(x)$	$\vartheta(x)$	$\pi(x)$	$\mu(x)$	$\vartheta(x)$	$\pi(x)$	$\mu(x)$	$\vartheta(x)$	$\pi(x)$	$\mu(x)$	$\vartheta(x)$	$\pi(x)$	$\mu(x)$	$\vartheta(x)$	$\pi(x)$
A1	0.50	0.50	0.46	0.64	0.37	0.39	0.73	0.27	0.27	0.70	0.30	0.31	0.55	0.46	0.43	0.55	0.45	0.45
A2	0.65	0.36	0.33	0.65	0.35	0.35	0.65	0.36	0.38	0.61	0.41	0.34	0.62	0.40	0.32	0.66	0.34	0.36
A3	0.53	0.48	0.38	0.62	0.40	0.32	0.71	0.30	0.27	0.55	0.47	0.40	0.66	0.34	0.35	0.70	0.31	0.28
A4	0.72	0.29	0.30	0.62	0.40	0.32	0.62	0.39	0.35	0.47	0.54	0.40	0.73	0.27	0.27	0.71	0.29	0.30
A5	0.55	0.46	0.41	0.64	0.37	0.34	0.69	0.31	0.32	0.54	0.47	0.39	0.63	0.38	0.39	0.74	0.27	0.24
A6	0.62	0.39	0.36	0.74	0.27	0.24	0.63	0.37	0.39	0.74	0.26	0.28	0.61	0.39	0.40	0.61	0.39	0.37
A7	0.63	0.39	0.36	0.66	0.35	0.32	0.56	0.44	0.40	0.59	0.43	0.33	0.64	0.38	0.31	0.56	0.45	0.37
A8	0.72	0.29	0.30	0.73	0.27	0.28	0.63	0.38	0.36	0.66	0.34	0.35	0.67	0.34	0.32	0.56	0.45	0.37

Step 2-3,4 and 5: A normalized decision matrix is created to evaluate alternatives across multiple criteria systematically. The resulting values are then presented in a table for easy comparison and analysis. This table helps decision-makers understand how each alternative performs across different criteria, facilitating informed decision-making by considering the relative importance of criteria and identifying the top-performing options. This method enhances transparency and effectiveness in complex, multi-criteria decision scenarios.Eq. (10) calculates the score function values. With Eq. (16) and Eq. (17), a normalized decision matrix is created. Obtained values are shown in Table 14.

Table 14: The score function values and the normalized decision matrix.

Alt.	A_d						r_{ij}					
	C1	C2	C3	C4	C5	C6	C1	C2	C3	C4	C5	C6
A1	0.00	0.06	0.21	0.15	0.01	0.01	0.00	0.00	1.00	0.73	0.00	0.00
A2	0.11	0.09	0.07	0.07	0.08	0.09	0.61	0.15	0.27	0.35	0.35	0.34
A3	0.01	0.08	0.19	0.02	0.09	0.18	0.08	0.10	0.92	0.14	0.41	0.70
A4	0.17	0.08	0.07	-0.01	0.21	0.17	1.00	0.10	0.25	0.00	1.00	0.68
A5	0.02	0.09	0.14	0.02	0.06	0.25	0.10	0.13	0.63	0.14	0.22	1.00
A6	0.06	0.25	0.06	0.22	0.05	0.06	0.36	1.00	0.19	1.00	0.17	0.20
A7	0.07	0.12	0.02	0.06	0.10	0.03	0.40	0.29	0.00	0.32	0.45	0.08
A8	0.17	0.20	0.07	0.10	0.12	0.03	1.00	0.72	0.26	0.48	0.55	0.08

Step 2-6: The S_i and $P_i$values calculated by Eq. (19) and Eq. (20) are shown in Table 15.

Table 15: The S_i and P_i values.

	A1	A2	A3	A4	A5	A6	A7	A8
S_i	0.2905	0.3490	0.3867	0.5098	0.3634	0.4879	0.2596	0.5231
p_i	1.9469	4.9739	4.8388	4.4294	4.8051	5.1173	4.0388	5.2052

Step 2-7: The values of k_{ia}, k_{ib}, k_{ic} and k_i calculated with Eq. (21), Eq. (22), Eq. (23) and Eq. (24) are shown in Table 16.

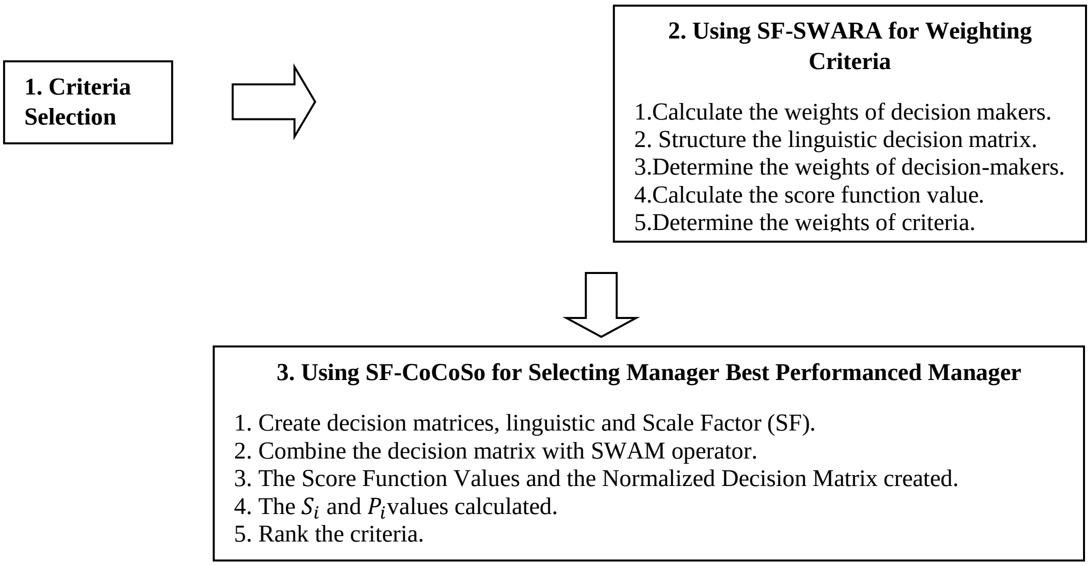
Table 16: The k_{ia}, k_{ib}, k_{ic} and $k_i$values and rankings.

	$\boldsymbol{k_{ia}}$	$\boldsymbol{k_{ib}}$	$\boldsymbol{k_{ic}}$	$\boldsymbol{k_i}$	***Rankings***
A1	0.058	2.119	0.391	1.219	8
A2	0.138	3.899	0.929	2.450	5
A3	0.136	3.975	0.912	2.464	4
A4	0.128	4.239	0.862	2.520	3
A5	0.134	3.868	0.902	2.411	6
A6	0.145	4.508	0.979	2.740	2
A7	0.112	3.075	0.750	1.948	7
A8	0.149	4.689	1.000	2.833	1

Based on the assigned criteria weightings and the evaluations provided by the decision makers, a comprehensive performance evaluation of the store managers has been conducted. The outcome of this evaluation has been summarized in Table 16, which reveals that the eighth manager (referred to as "A8") has achieved the highest level of performance among all the store managers under consideration. The overall ranking of the store managers has been determined, with the performance ranking listed as follows: "A8>A6>A4>A3>A2>A5>A7>A1." This ranking signifies that Manager A8 is at the top of the list, indicating the most outstanding performance, followed by Managers A6, A4, A3, A2, A5, A7, and A1, respectively.

To provide a deeper understanding of the results, $\boldsymbol{k_i}$ values have also been assigned to each manager. These values represent the calculated scores or metrics that quantify their performance. The values assigned to the managers are as follows: 2.833 for Manager A8, 2.740 for Manager A6, 2.520 for Manager A4, 2.464 for Manager A3, 2.450 for Manager A2, 2.411 for Manager A5, 1.948 for Manager A7, and 1.219 for Manager A1. These $\boldsymbol{k_i}$”values serve as a quantitative measure of each manager's performance, reflecting the weighted evaluation based on the established criteria and decision maker assessments. The higher the "$\boldsymbol{k_i}$" value, the better the performance of the respective store manager. These results are crucial for making informed decisions, recognizing top performers, and identifying areas where improvements may be needed in managing the stores effectively. The proposed model for evaluating the performance of store manager is show inFigure1.

Figure 1: Proposed model for selecting store manager



Results and Discussion

The innovative SF-SWARA-CoCoSo approach presented in this study offers a robust framework for evaluating store manager performance. With the use of SF-SWARA (Spherical Fuzzy Simple Additive Weighted Rank Assessment) and SF-CoCoSo (Spherical Fuzzy the Combined Compromised Solution) methods together, it offers a more effective and flexible approach when dealing with complex and multidimensional decision-making problems. In addition, many advantages can be achieved by using these two methods together. SF-SWARA performs weighted sequencing evaluation, while SF-CoCoSo is used to manage complex solutions and balance the preferences of different stakeholders. Both methods aim to comprehensively evaluate different criteria and objectives. By using these two methods together, the criteria can be evaluated more comprehensively. Both SF-SWARA and SF-CoCoSo methods aim to better handle uncertainty using the Spherical Fuzzy approach. The combined use of the two methods helps to obtain more realistic results in real-world complex decision-making problems. The decision-making problem may involve conflicting objectives. SF-CoCoSo balances various objectives and decision-maker's preferences, while SF-SWARA addresses these contradictions when weighing and ranking. The combination of these two methods allows to effectively balancing conflicting objectives. Objective and subjective factors influencing management decisions often have to come together. The combination of these two methods effectively combines both quantitative and qualitative data, providing a more comprehensive assessment. The combined use of SF-SWARA and SF-CoCoSo offers decision-makers more information and perspective. This helps to make better-informed and smarter decisions. Both methods offer a wide range of applications. When used in combination, they can be applied to complex decision-making problems in different industries and fields. In addition, when these two methods are used together, they support the evaluation of manager and organizational performance at both strategic and tactical levels. By amalgamating the power of Spherical Fuzzy Stepwise Weight Assessment Ratio Analysis (SF-SWARA) and Spherical Fuzzy the Combined Compromised Solution (SF-CoCoSo), this method addresses the intricate challenges associated with performance assessment, incorporating diverse perspectives and objective metrics. The structured and iterative nature of the approach facilitates the identification of high-performing managers and emphasizes the significance of factors such as educational level. As this study demonstrates thatthe SF-SWARA-CoCoSo framework can provide organizations with a comprehensive understanding of managers' abilities and potential contributions.

In this study, the performance evaluations of eight store managers of the chain market operating in Ankara were determined by the SF-SWARA and SF-CoCoSo hybrid methods. According to the evaluations of decision-makers, the levels of importance for the criteria are respectively as follows: "Knowledge and Education Level (C1), Interpersonal Skills and Appearance (C4), Work Quality and Performance (C3), Leadership and Teamwork (C5), Experience (C6), Fee (C2). ”The results support the research results of Hutahaean et al. (2018). Hutahaean et al. (2018) concluded that the most important criterion is the level of education. However, Edinsel and Işıkçı (2023) determined the least important criterion as "Education Level". While "Fee" was the most important criterion in Lidinska and Jablonsky's (2018) study, it was found to be the least important criterion in this study. However, the results of Hooshang and James (2008) study support the results of this study. In Hooshang and James (2008) study, "Communication Skills" was found to be a highly important criterion, while in this study, "Interpersonal Skills and Appearance" was also found to be a highly weighted criterion. Based on these results, the following conclusions have been drawn.

(i) In the evaluation of store managers, knowledge and education level, interpersonal skills and appearance, and work quality and performance are the top three most desirable and essential parameters.

(ii) Contrary to Lidinska and Jablonsky (2017) criteria weighting "Fee" has been identified as the parameter with the lowest importance. This finding is attributed to the fact that store manager services are not primarily driven by fee considerations.

(iii) Additionally, it has been observed that leadership and teamwork play a significant role in store manager performance evaluation processes.

According to the store manager performance levels, the eighth store manager performance took the first place. The performance of the sixth store manager ranked second. The performance of the fourth store manager ranked third. The performance of the first store manager was in the last place. According to these results, the recommendations for the market board of directors are as follows:

(i) The performance indicators of the eighth store manager are at a high level. It can be said that this manager exhibits the specified criteria more and more successfully than other managers. It is considered that it would be appropriate for this manager to participate in training programs to maintain his performance level.

(ii) It is recommended that the first store 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.

(iii) Necessary feedback should be given to seven, five, second and third store managers to improve performance. The recommendations made for the fourth store manager should be applied to these managers as well.

As a result of the research, the suggestions and implications to the researchers are as follows:

(i) Managerial performance evaluation problems can be handled with different MCDM methods.

(ii) Managerial performance evaluation problems can be applied to different sectors by using different criteria.

(iii) Expert evaluations 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, store manager performances can be evaluated, and the findings obtained can be compared with other manager performances.

The results of this study show that the proposed method can be used as an effective tool to objectively evaluate and improve managerial performance. It can also be emphasized that future studies need to be done to examine and validate the expanded applications of this method in different sectors and cultural contexts. Such reviews can help businesses maintain a competitive advantage by maximizing their leadership capacity. In addition, this study contributes to the literature as it makes manager selection by using SF-SWARA and SF-CoCoSo methods together.

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