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A hybrid MCDM model for personnel selection based on a novel Gray AHP, Gray MOORA and Gray MAUT methods in terms of business management: An application in the tourism sector

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Abstract

Personnel selection and high performance of personnel are crucial in businesses operating in the tourism sector. In response to this important issue, an application was conducted in a local hotel operating in Bartın, Turkey. The study analyzed the performance of service personnel working in the restaurant section of the hotel. The Gray AHP, Gray MOORA, and Gray MAUT methods were used in the analyses. The weights of the evaluation criteria used to measure the performance of service employees were determined using the Gray AHP method. The study evaluated three main criteria and eleven sub-criteria. As a result of the analysis, it was concluded that the most effective criteria in evaluating the service personnel working in the hotel restaurant were "Diction - effective and eloquent speaking ability" and "Effective Communication - the ability to effectively use verbal and non-verbal communication skills" under the main criterion of "Personal Characteristics," and "Experience - knowledge and experience gained by working in a business operating in the tourism sector" under the main criterion of "Professional Characteristics." The performance of five personnel working in the hotel restaurant was ranked separately using Gray MOORA and Gray MAUT, with identical rankings obtained in both methods. The study is considered beneficial both for the hotel management where the application was conducted and for businesses engaged in local hotel management. This application also introduced a hybrid model to the literature, utilizing Gray AHP-based Gray MOORA and Gray MAUT methods together.

Keywords: Tourism Sector, Personnel Performance Evaluation, Human Resources Management, Gray AHP, Gray MOORA, Gray MAUT, Multi Criteria Decision Making (MCDM).

1. Introduction

Personnel selection is of critical importance to the success of businesses. Especially in the tourism sector, which is a labor-intensive industry, a high level of human potential is required to carry out economic activity. Therefore, personnel selection in the tourism sector is an important issue that needs to be emphasized. In the perception of service quality by tourists who temporarily stay in the facility, the quality of human resources at every level of the business is significant. Due to the fact that tourism activities are carried out on-site and through direct contact between the service provider and the consumer, i.e., tourists (Anderson et al., 2003), the importance of personnel working in the tourism sector increases even more (Urosevic et al., 2017). The employment of a large number of employees who are not suitable for job qualifications in the sector leads to the failure of businesses in achieving their organizational goals. Unfortunately, selecting personnel who can meet the business requirements and job qualifications is a complex process involving numerous criteria, alternatives, and objectives. Decision-makers have to make choices in a multi-criteria decision-making environment surrounded by inconsistency and uncertainty to recruit the most suitable applicant for the business requirements. Since many businesses lack the resources to finance personnel selection, they choose their candidates through traditional and quick methods (Vadivel and Sundar, 2021).

In today's challenging competitive conditions, businesses need to improve their personnel selection processes to survive. Conducting personnel selection processes is a separate field of expertise and should be carried out by experts in the field within the human resources unit (Çavdar and Çavdar, 2010). Important functions of "Human Resources Management" (HRM) in a business include planning jobs and defining human resources for these jobs, recruitment, training and development of employees, performance management, motivation, compliance with legal regulations, and dismissal (Safari et al., 2014). The critical stage of HRM is the recruitment activity, which primarily involves the planning/selection of human resources, which will determine the quality of personnel input. Placing the right person in the right job requires considerable effort. Errors that may occur in this process can create obstacles to achieving the company's objectives. If the hired person is incompatible with the assigned task, work disruptions may occur, workplace accidents may increase, and consequently, the turnover rate may rise (Erdem and Gezen, 2014). Human resources are considered the true wealth of any organization (Abdel-Basset et al., 2021). Particularly in tourism as a service sector, human resources management plays a crucial role in enhancing competitive advantage due to its heavy reliance on human resources serving tourists (Gaffar and Setiyorini, 2010). However, a large number of businesses in the tourism and hospitality sectors are small and medium-sized enterprises (SMEs) (Buhalis, 1998; Tang et al., 2020), and in these businesses, a human resources unit is not established; typically, the owner or manager of the business carries out HR-related processes. In their study, Aslan and Dinçer (2017) revealed that hotel businesses operating at the SME level in Istanbul lack a human resources unit. In an organization without an HR unit, issues such as the recruitment of unsuitable individuals, an increase in employee turnover rate, and low productivity and performance among employees are more likely to occur (Pelit, 2015). Therefore, it is essential for the owners and/or managers of SMEs in the tourism sector to accurately assess whether individuals meet the qualifications required for the job during recruitment processes (June and Mahmood, 2011). In this context, the competencies of business owners and/or managers in personnel selection, an essential and indispensable phase for the growth and expansion of the business, are gaining importance (Karabasevic et al., 2018). Based on this importance, this research was conducted for a hotel business operating at the SME level in Bartın, Turkey.

Human resources are of great importance in tourism businesses, where labor-intensive activities are carried out and guest satisfaction depends on the continuous provision of product and service quality (Bilici, 2009). The expectations and needs of tourists are to enjoy this short leisure time called a vacation and have a good time. In this way, tourism services differ from other services. From the first encounter with the employees of the tourism

business, the customer expects pleasant impressions and extends these expectations to all the people they interact with (Greer, 2002). Studies Urosevic et al. (2017), Gaffar and Setiyorini (2010), Yıldırım et al. (2019), and Jessica Hwang and Lockwood (2006) emphasize the importance of the competencies of tourism business employees in ensuring customer satisfaction. In 21st-century hotel businesses, highly skilled personnel who can professionally, quickly, and effectively solve tasks are valued more than ever (Seveke and Kozhayev, 2015). For this reason, it is crucial to select the right human resources in hotel businesses so that employees can satisfy customers and provide quality and efficient service (Bilgiçli, 2010). To make the right selection, it is first necessary to identify the qualifications that meet the job requirements, that is, to conduct job analyses. People differ in terms of age, gender, physical attributes, work speed, intelligence, judgment, and patience. Directing each person to the right department according to their own qualities, abilities, character, and enthusiasm is important for increasing the efficiency of the business (Yıldırım et al., 2019). Although the topic of personnel management has many reflections in scientific studies (Bunakov et al., 2018), a competent personnel management system has still not been established in most hotel businesses, especially those classified as SMEs.

Personnel selection involves the process of hiring an employee for an open position from among other candidates with the necessary qualifications according to the requirements of the job (Yıldırım et al., 2019). The personnel selection process aims to select employees with the highest potential for filling open positions based on predefined criteria (Kabak et al., 2012; Zhang and Liu, 2011; Baležentis et al., 2012). Due to its complexity, analytical multi-criteria decision-making (MCDM) methods play a significant role in solving personnel selection problems (Štilić, 2019). There are many decision-making methods available for businesses to select the ideal personnel (Sang et al., 2015; Wen et al., 2018).

The tourism sector has its own unique characteristics in personnel selection (Urosevic et al., 2017). The sector is comprehensive and has varying characteristics. The qualifications of human resources vary according to the businesses within the tourism sector and the department considered within the business. In this respect, the personnel selection problem in the tourism sector is suitable for solving with MCDM techniques. However, when a literature review was conducted, very few studies were found on the use of MCDM techniques in the tourism sector, and especially a limited number of studies focused on accommodation businesses, which are among the most important businesses in the tourism sector (Akyurt, 2019). As stated in the study by Tesone and Ricci (2012), many people believe that the accommodation and tourism industry consists of hotels and restaurants. Approximately 35% of the hotel business workforce works as service personnel (Olalı and Korzay, 1993). For these reasons, the scope of the study has been determined as hotel businesses and service personnel. In this respect, the study is expected to contribute to the literature and provide benefits both to managers who influence recruitment processes in the tourism sector and to individuals working or aiming to work in the tourism sector.

In the study, initially, the necessary qualifications for personnel in the service department of a hotel business in Bartın were determined based on business managers, a literature review, and expert opinions. Subsequently, performance evaluations of the business's current employees were conducted based on the identified criteria. The analyses were carried out by combining the AHP, MOORA, and MAUT methods, which are multi-criteria decision-making methods, with Gray System Theory. The weights of the criteria identified for evaluating the performance of service personnel were determined using Gray AHP, and the performances of the service personnel in the restaurant section of the hotel were ranked using Gray MOORA and Gray MAUT.

After presenting the literature review, the principles of Gray AHP, Gray MOORA, and Gray MAUT methods are explained with formulas in the study. In the following stage, the application part includes the performance evaluation of service personnel working in the restaurant section of a hotel business operating in Bartın, Turkey, using the Gray AHP, Gray MOORA, and Gray MAUT methods. The final part includes results and recommendations.

2. Literature review

In this study, examples of studies in which personnel selection is applied in the tourism sector are presented. Akyurt (2021) interviewed hotel managers to determine which personnel selection criteria are more important from the perspective of managers of four- and five-star hotels in Ordu. The study revealed that experience is the most important criterion for personnel selection, followed by foreign language proficiency, organizational commitment, discipline, responsibility, education, and physical appearance, respectively. The AHP method was used in the study. In their study on personnel selection in the tourism sector, Valiyev et al. (2021) evaluated three selected candidates using Fuzzy AHP within a total of 20 sub-criteria under the main criteria of External Criteria, Internal Criteria, Professional Competence, and Responsibility. The evaluation determined that professionalism is the most important main criterion, and the significant sub-criterion for candidates is experience and knowledge to work in hotel management. Štilić (2019), in a literature review-based study examining the criteria in multi-criteria analyses in the tourism sector, identified the prominent criteria in studies as follows: efficiency, decision-making, interpersonal communication, conflict management, flexibility, decisiveness, negotiation skills, analytical skills, self-awareness, self-control, and teamwork.

Tesone and Ricci (2012), in their survey-based study conducted with senior managers responsible for recruitment in various sectors of the accommodation and tourism industry in Orlando, Florida, identified teamwork, communication (listening skills, verbal and writing skills, and empathy), professional image (attire, attitude, appearance), effective communication with customers, and realistic job/career expectations as important criteria for personnel recruitment. Özdemir et al. (2015) analyzed 524 job advertisements posted by accommodation businesses operating in Bodrum on the website "www.turizmgazetisi.com" using content analysis to examine the qualifications of employees in the job postings. These postings were categorized into three groups: type of business, employee qualifications, and characteristics sought in candidate employees (foreign language level, work experience, gender, and education level). The study concluded that hotel businesses do not attach sufficient importance to foreign language proficiency, professional experience, and level of professional education, and instead tend to employ low-skilled, inexpensive labor.

In her study, Başkaya Dazlak (2019) interviewed ten experts responsible for recruitment processes in the HR departments of hotel businesses with over 250 employees to identify the criteria effective in the selection of personnel to work as front desk staff in tourism businesses. She analyzed the data obtained from the interviews using the AHP method. In the study, the criteria were determined as four main categories with twelve sub-criteria: experience, education, professional requirements, and individual characteristics. The study concluded that experience is a highly significant criterion in personnel selection, while education is relatively insignificant when compared to other criteria. Urosevic et al. (2017) proposed a hybrid model using SWARA and WASPAS methods and conducted an application for the selection of a sales manager in the tourism sector. The personnel qualities they identified (communication, leadership, flexibility, decision-making, negotiation, analytical skills, and consistency) were evaluated by three HR experts, and four sample candidates were selected by tourism experts according to these criteria. Among the evaluated criteria, communication skills were considered the most important attribute.

In their interview-based study conducted with 15 hotel managers of SMEs operating in Istanbul, Aslan and Dinçer (2017) found that managers prioritize experience over education in personnel selection. Akyurt (2019), in his study of hotel businesses in Giresun, determined that "foreign language" is the most important criterion in personnel selection. Other important criteria in hotel personnel selection identified in the study were "experience, physical characteristics, responsibility, organizational commitment, education, and physical characteristics." The study used the AHP method.

Şimşek et al. (2014), using the Fuzzy AHP method, conducted a study in a hotel business in the Fethiye district of Muğla, determining the qualifications of personnel based on the views of six different department managers. They identified External Criteria (military service, gender, driver's license, marital status, and travel condition), Internal Criteria (persuasion ability, communication skills, problem-solving ability, stress management, and effective time management), Professional Competence (experience, education level, general programming knowledge, program knowledge, and foreign language), and Responsibility (leadership quality, customer orientation, result orientation, responsibility, and team compatibility). The study concluded that the most important criterion is having experience, followed by persuasion ability, communication skills, and problem-solving ability. Tercan İçigen and Çetin (2017), in their study on the recruitment of a front office manager for a chain hotel business operating in Antalya, identified six main criteria and a total of fifteen sub-criteria. The study found that the most important criterion is foreign language proficiency, and the second most important main criterion is personal characteristics. The study used AHP and TOPSIS methods. Tanrıverdi et al. (2018), in a survey conducted with managers of 80 five-star hotels in Istanbul, found that managers attach great importance to variables such as foreign language proficiency, diction, general personal appearance, human relations skills, personality traits, and desire to obtain the job in personnel selection criteria. Additionally, they noted that managers consider variables like career expectations, motivation for the job, job demand, alignment with organizational culture, and reasons for leaving the previous workplace. In their study, Yıldırım et al. (2019) selected the most suitable personnel for a tourism business using the ARAS method. Chang (2015), in his study, applied the Fuzzy Delphi Method, ANP, and TOPSIS methods for the selection of public relations personnel in a business operating in Taiwan's tourism sector.

In the literature, there are applications in which Gray Relational Analysis and MAUT Methods are used in the same study (Kenger, 2017; Vargün et al., 2020; Zolghadr-Asli et al., 2020; Özari and Kurtulmus, 2017). In these studies, it is seen that Gray Relational Analysis and MAUT methods are used and the results are compared. For example, Özari and Kurtulmus (2017) analyzed personnel selection with Gray Relational Analysis and MAUT Methods separately and concluded that Gray Relational analysis actually increases the probability of selecting the right employee.

MAUT method has been used in many studies in the literature. For example: Demir (2021), Gergin (2023), Anafi et al. (2023), Sarıgül et al. (2023), Ulutaş (2020), Alhamad and Al-Mandil (2024), and Satria et al. (2024).

GRA method has been used in many studies in the literature. For example: Arslan et al. (2023), Chakraborty et al. (2024), Zhu et al. (2022), Setiawansyah et al. (2024), Demir et al. (2020).

However, there is no study in the literature in which Gray theory based MAUT (Gray MAUT) method is used. Therefore, Gray MAUT method will be used for the first time in this study and will contribute to the literature.

Table 1 gives examples of studies in which gray AHP Method and gray MOORA Method, the other two MCDM methods used in this study, were applied.

Table 1. Literature Review

Authors	Problem	Methods
	Gray AHP Method	
Zhian et al., (2024)	Determining a sustainable and suitable wastewater treatment system for Tehran	Monte Carlo Simulation and Gray AHP
Tao et al., (2024)	Evaluation of aircraft engine gas path fault diagnosis methods	Gray AHP
Li et al., (2024)	Evaluation of oily sludge treatment technologies	Gray AHP
Wang et al., (2023)	Analysis of Integrated energy systems that will facilitate the energy transition and promote green and low-carbon development of the energy industry	Gray AHP

Ghosh et al., (2021)	Comparing mobile phones belonging to two different mobile phone segments within a certain price range and selecting the optimal mobile phone	Gray AHP and TOPSIS
Gray MOORA Method		
Latifian et al., (2022)	Selecting technology transfer methods in the automobile battery manufacturing industry	BWM and Gray MOORA
Zarbakhshnia et al., (2020)	Evaluation of third-party reverse logistics providers (3PRLPs) for an auto parts manufacturing company	Fuzzy AHP and Gray MOORA
Mohapatra et al., (2019)	Comparison of wire electrodes in a wire Electric Discharge Machining gear cutting process	Gray MOORA and ANOVA
Forouhar et al., (2018)	Analyzing the reasons for the delay of projects of local electric power companies in Fars province	Gray MULTIMOORA
Kumar et al., (2014)	An application for measuring supply chain performance and its impact on the competitiveness of manufacturing industries	Gray MOORA

3. Methodology

The mathematical working algorithms of the methods used in this study are as follows.

3.1 Gray Analytical Hierarchy Process (G-AHP)

G-AHP is used for calculating gray weights of criteria by using gray scale (Ulutaş & Bayrakçıl, 2017). G-AHP process is in Table 2 (Ulutaş & Bayrakçıl, 2017).

Table 2. G-AHP Procedure

Step	Equation	Equation number
Filling the diagonal cells (lower value)	$i = j \implies \underline{c_{ij}} = 1$	(1)
Filling the diagonal cells (upper value)	$i = j \implies \overline{c_{ij}} = 1$	(2)
Filling the lower triangular cells (lower value)	$\underline{c_{ji}} = \frac{1}{\overline{c_{ij}}}$	(3)
Filling the lower triangular (upper value)	$\overline{c_{ji}} = \frac{1}{\underline{c_{ij}}}$	(4)
Calculating crisp values for consistency control	$c_{ij} = \frac{\underline{c_{ij}} + \overline{c_{ij}}}{2}$	(5)
Crisp pairwise comparison matrix	$\begin{bmatrix} c_{11} & c_{12} & \dots & c_{1n} \\ c_{21} & c_{22} & \dots & c_{2n} \\ \dots & \dots & \dots & \dots \\ c_{n1} & c_{n2} & \dots & c_{nn} \end{bmatrix}$	(6)
Crisp weight for consistency control	$w_i = \frac{\sum_{j=1}^{n} \frac{c_{ij}}{\sum_{i=1}^{n} c_{ij}}}{n};\ for\ \forall i$	(7)

Calculating vector value	$\begin{bmatrix}\lambda_1\\ \lambda_2\\ \dots\\ \lambda_n\end{bmatrix} = \begin{bmatrix}c_{11} & c_{12} & \dots & c_{1n}\\ c_{21} & c_{22} & \dots & c_{2n}\\ \dots & \dots & \dots & \dots\\ c_{n1} & c_{n2} & \dots & c_{nn}\end{bmatrix}\begin{bmatrix}w_1\\ w_2\\ \dots\\ w_n\end{bmatrix}$	(8)
Calculating lambda value	$\lambda_{max} = \frac{\sum_{i=1}^{n}\lambda_i}{n}$	(9)
Consistency index	$CI = \frac{\lambda_{max} - n}{n-1}$	(10)
Consistency ratio	$CR = \frac{CI}{RI}$	(11)
Checking the consistency	$\begin{cases} CR > 0{,}1 \Rightarrow not\ consistent \\ CR \leq 0{,}1 \Rightarrow consistent \end{cases}$	(12)
Gray row total lower value	$\underline{RS_i} = \sum_{j=1}^{n} \underline{c_{ij}}$	(13)
Gray row total upper value	$\overline{RS_i} = \sum_{j=1}^{n} \overline{c_{ij}}$	(14)
Gray weight lower value	$\underline{w_i} = \frac{2\underline{RS_i}}{\sum_{i=1}^{n}\underline{RS_i} + \sum_{i=1}^{n}\overline{RS_i}}$	(15)
Gray weight upper value	$\overline{w_i} = \frac{2\overline{RS_i}}{\sum_{i=1}^{n}\underline{RS_i} + \sum_{i=1}^{n}\overline{RS_i}}$	(16)

Where:

- $i: row\ criterion; i = 1,2,3, \dots, n;$
- $j: column\ criterion; j = 1,2,3, \dots, n;$
- $\underline{c_{ij}}: gray\ evaluation\ lower\ value;$
- $\overline{c_{ij}}: gray\ evaluation\ upper\ value;$
- $\lambda_i: criterion\ i\ vector\ value;$
- $\lambda_{max}: lambda\ value\ for\ consistency;$
- $CI: consistencyv\ index;$
- $CR: consistency\ ratio;$
- $RI: random\ index;$
- $\underline{RS_i}: gray\ row\ total\ lower\ value;$
- $\overline{RS_i}: gray\ row\ total\ upper\ value;$
- $\underline{w_i}: gray\ weight\ lower\ value\ for\ criterion\ i;$
- $\overline{w_i}: gray\ weight\ upper\ value\ for\ criterion\ i.$

3.2 Gray MOORA (Gray Multi-Objective Optimization by Ratio Analysis)

The method is the integration of gray theory (Garg, 2021) and MOORA (Ghoushchi et al., 2019). Gray scale is used for evaluating alternatives (Ulutaş & Bayrakçıl, 2017). MOORA-G process is in Table 3.

Table 3. MOORA-G procedure

Step	Equation	Equation number
Integrating expert opinions (lower value)	$\underline{x_{ij}} = \frac{\sum_{k=1}^{K} \underline{x_{ijk}}}{K}$	(17)
Integrating expert opinions (upper value)	$\overline{x_{ij}} = \frac{\sum_{k=1}^{K} \overline{x_{ijk}}}{K}$	(18)
Normalization (lower value)	$\underline{n_{ij}} = \frac{\underline{x_{ij}}}{\sqrt{\sum_{i=1}^{m} \left[\underline{x_{ij}^2} + \overline{x_{ij}^2}\right]}}$	(19)
Normalization (upper value)	$\overline{n_{ij}} = \frac{\overline{x_{ij}}}{\sqrt{\sum_{i=1}^{m} \left[\underline{x_{ij}^2} + \overline{x_{ij}^2}\right]}}$	(20)
Lower weighted normalized value	$\underline{y_{ij}} = \underline{w_j} * \underline{n_{ij}};\ for\ \forall i, j$	(21)
Upper weighted normalized value	$\overline{y_{ij}} = \overline{w_j} * \overline{n_{ij}};\ for\ \forall i, j$	(22)
Total lower weighted normalized value for benefit criteria	$\underline{b_i} = \sum_{j=1}^{g} \underline{y_{ij}}\ ; for\ \forall i$	(23)
Total upper weighted normalized value for benefit criteria	$\overline{b_i} = \sum_{j=1}^{g} \overline{y_{ij}}\ ; for\ \forall i$	(24)
Total lower weighted normalized value for cost criteria	$\underline{c_i} = \sum_{j=g+1}^{n} \underline{y_{ij}}\ ; for\ \forall i$	(25)
Total upper weighted normalized value for cost criteria	$\overline{c_i} = \sum_{j=g+1}^{n} \overline{y_{ij}}\ ; for\ \forall i$	(26)
Total crisp value for benefit criteria	$b_i = \frac{\underline{b_i} + \overline{b_i}}{2}; for\ \forall i$	(27)
Total crisp value for cost criteria	$c_i = \frac{\underline{c_i} + \overline{c_i}}{2}; for\ \forall i$	(28)
Total crisp value of alternatives	$t_i = b_i - c_i; for\ \forall i$	(29)

Where:

- $i: alternative; i = 1,2,3, \dots, m;$
- $k: decision\ maker; k = 1,2,3, \dots, K;$
- $\underline{x_{ijk}}: gray\ evaluation\ lower\ value\ (expert\ k);$
- $\overline{x_{ijk}}: gray\ evaluation\ upper\ value\ (expert\ k);$
- $\underline{x_{ij}}: gray\ evaluation\ lower\ value;$
- $\overline{x_{ij}}: gray\ evaluation\ upper\ value;$
- $\underline{n_{ij}}: lower\ normalized\ value;$
- $\overline{n_{ij}}: upper\ normalized\ value;$
- $\underline{y_{ij}}: lower\ weighted\ normalized\ value;$
- $\overline{y_{ij}}: upper\ weighted\ normalized\ value;$
- $\underline{b_i}: total\ lower\ weighted\ normalized\ value\ for\ benefit\ criteria;$
- $\overline{b_i}: total\ upper\ weighted\ normalized\ value\ for\ benefit\ criteria;$
- $j: benefit\ criterion; j = 1,2,3, \dots, g;$

- $\underline{c_i}$: $total\ lower\ weighted\ normalized\ value\ for\ cost\ criteria$;
- $\overline{c_i}$: $total\ upper\ weighted\ normalized\ value\ for\ cost\ criteria$;
- j: $cost\ criterion; j = g+1, g+2, g+3, \dots, n$;
- b_i: $total\ crisp\ value\ for\ benefit\ criteria;$
- c_i: $total\ crisp\ value\ for\ cost\ criteria;$
- t_i: $total\ crisp\ value\ for\ alternative\ i$.

3.3 Gray MAUT (Gray Multi Attribute Utility Theory)

The method is the integration of gray theory (Garg, 2021) and MAUT (Zhu et al., 2017). MAUT-G process is in Table 4.

Table 4. MAUT-G procedure

Step	Equation	Equation number
Integrating expert opinions (lower value)	$\underline{x_{ij}} = \frac{\sum_{k=1}^{K} \underline{x_{ijk}}}{K}$	(30)
Integrating expert opinions (upper value)	$\overline{x_{ij}} = \frac{\sum_{k=1}^{K} \overline{x_{ijk}}}{K}$	(31)
Lower normalized value for benefit criterion	$\underline{o_{ij}} = \frac{\underline{x_{ij}} - \min_j \left\{\underline{x_{ij}}; \overline{x_{ij}}\right\}}{\max_j \left\{\underline{x_{ij}}; \overline{x_{ij}}\right\} - \min_j \left\{\underline{x_{ij}}; \overline{x_{ij}}\right\}}$	(32)
Upper normalized value for benefit criterion	$\overline{o_{ij}} = \frac{\overline{x_{ij}} - \min_j \left\{\underline{x_{ij}}; \overline{x_{ij}}\right\}}{\max_j \left\{\underline{x_{ij}}; \overline{x_{ij}}\right\} - \min_j \left\{\underline{x_{ij}}; \overline{x_{ij}}\right\}}$	(33)
Lower normalized value for cost criterion	$\underline{o_{ij}} = \frac{\max_j \left\{\underline{x_{ij}}; \overline{x_{ij}}\right\} - \overline{x_{ij}}}{\max_j \left\{\underline{x_{ij}}; \overline{x_{ij}}\right\} - \min_j \left\{\underline{x_{ij}}; \overline{x_{ij}}\right\}}$	(34)
Upper normalized value for cost criterion	$\overline{o_{ij}} = \frac{\max_j \left\{\underline{x_{ij}}; \overline{x_{ij}}\right\} - \underline{x_{ij}}}{\max_j \left\{\underline{x_{ij}}; \overline{x_{ij}}\right\} - \min_j \left\{\underline{x_{ij}}; \overline{x_{ij}}\right\}}$	(35)
Lower weighted normalized value	$\underline{v_{ij}} = \underline{w_j} * \underline{o_{ij}};\ for\ \forall i,j$	(36)
Upper weighted normalized value	$\overline{v_{ij}} = \overline{w_j} * \overline{o_{ij}};\ for\ \forall i,j$	(37)
Total lower weighted normalized value	$\underline{s_i} = \sum_{j=1}^{n} \underline{y_{ij}}\ ; for\ \forall i$	(38)
Total upper weighted normalized value	$\overline{s_i} = \sum_{j=1}^{n} \overline{y_{ij}}\ ; for\ \forall i$	(39)
Total crisp value for alternatives	$s_i = \frac{\underline{s_i} + \overline{s_i}}{2}; for\ \forall i$	(40)

Where:

- $\underline{o_{ij}}$: $lower\ normalized\ value$;
- $\overline{o_{ij}}$: $upper\ normalized\ value$;
- $\underline{v_{ij}}$: $lower\ weighted\ normalized\ value$;
- $\overline{v_{ij}}$: $upper\ weighted\ normalized\ value$;

- $\underline{s_i}$: $total\ lower\ weighted\ normalized\ value$;
- $\overline{s_i}$: $total\ upper\ weighted\ normalized\ value$;
- s_i: $total\ crisp\ value\ for\ alternative\ i$.

4. Application

The aim of the study is to determine the personnel selection criteria in the tourism sector based on MCDM methods. The application area of the study is designated as hotel businesses, due to their significance in the tourism sector. There are differences among businesses in determining the personnel to be hired in hotel businesses. Each hotel business sets its own personnel selection process and criteria. Therefore, there is no standard defined for hotel businesses. Factors such as whether the structure of the hotel business is international or national, its bed capacity, the size of the business, its location, physical conditions, and the products and services it offers are fundamental elements that create differences in personnel selection (Olalı and Korzay, 1993). Additionally, many other criteria, such as the hotel's location, size, and the department in which the personnel will work, may further differentiate the personnel selection criteria. Although hotels may have their own criteria and systems, given that hotel managers make the final decision, it is important to identify and understand the criteria that hotel managers consider in personnel selection (Akyurt, 2019). Therefore, it is necessary to evaluate personnel selection in hotel businesses on a business and department basis.

The study was conducted to determine the qualifications of service personnel and to evaluate the current personnel using MCDM methods based on these criteria in a hotel business operating in Bartın. Bartın Province, located in Turkey's Black Sea Region, has significant appeal with its exceptional historical, cultural, and folkloric values carried from its 3000-year history, and with its naturally beautiful tourism resources (Bartın Governorship, 2024). In the central district of Bartın, there are a total of 22 hotel businesses, 10 of which have tourism business (ministry) licenses and 11 have municipal licenses (Bartın Culture, 2024). The hotel business in which the study was conducted is licensed by the ministry. The business has two restaurants, one indoor and one outdoor, and one service bar, with 6 service personnel. It is managed by the owner/manager, who also oversees the recruitment processes. The personnel qualifications in the business vary depending on both the characteristics of the business and the tourist profile of the region. Therefore, the personnel qualifications in this study were determined based on the views of the business manager and a tourism expert who has been working as an educator in the region for approximately 20 years and is familiar with the tourism industry in the region, along with a literature review. Interviews were conducted face-to-face.

In the study, initially, three main criteria and eleven sub-criteria were determined for evaluating the performance of service personnel based on the information obtained from interviews with the business manager, the tourism expert, and the literature review. The relevant criteria and information regarding these criteria are presented in Table 5. Subsequently, the criteria were scored by the business manager, the responsible employee of the service department, and the tourism expert. Finally, the performance of five candidates working in the service department was scored by the business manager and the service department supervisor based on these criteria.

Table 5. Descriptions of criteria

Main Criteria	Sub-Criteria	Code	Definition	References
1-Professional Characteristics	Education	1a	All documented knowledge and skills obtained through education in institutions affiliated with the Ministry of National Education or at the university level in the field of tourism, or through participation in courses organized by private educational institutions	Başkaya Dazlak, 2019; Özdemir et al., 2015; Chang, 2015
	Experience	1b	Knowledge gained through working in a business operating in the tourism field	Valiyev et al., 2021; Özdemir et al., 2015; Başkaya Dazlak, 2019; Aslan and Dinçer, 2017; Şimşek et al., 2014
	Foreign Language	1c	The ability to speak and understand English at a good level	Özdemir et al., 2015; Şimşek et al., 2014; Tercan İçigen and Çetin, 2017
2-Personal Characteristics	Diction	2a	The ability to speak effectively and eloquently	Akbaba and Günlü, 2011; Tanrıverdi et al., 2018
	Effective Communication	2b	The ability to effectively use verbal and non-verbal communication skills	Urosevic et al., 2017; Tesone and Ricci, 2012; Tercan İçigen and Çetin, 2017
	Persuasion Ability	2c	The ability to make others accept one's own desires and thoughts	Şimşek et al., 2014
	Stress Management	2d	The ability to maintain control by making responses to adverse situations more systematic and conscious	Štilić, 2019; Tesone and Ricci, 2012; Şimşek et al., 2014; Chang, 2015
	Physical Appearance	2e	Visible characteristics such as paying attention to appearance, hygiene compliance, and care for hands and hair	Başkaya Tazlak, 2019; Tesone and Ricci, 2012; Akyurt, 2019; Tanrıverdi et al., 2018
	Responsibility	2f	The ability to adapt, fulfill duties, respect others' rights, and take responsibility for one's own actions	Şimşek et al., 2014; Valiyev et al., 2021; Akyurt, 2019; Akyurt, 2021
3-Organization-Oriented	Organizational Commitment	3a	The employee's loyalty towards the organization and the interest shown in ensuring the organization's success	Akyurt, 2019; Tanrıverdi et al., 2018; Akyurt, 2021
	Teamwork	3b	The ability to work harmoniously by combining talents and knowledge with other employees	Štilić, 2019; Tesone and Ricci, 2012; Tercan İçigen and Çetin, 2017

The weights of the main and sub-criteria identified to evaluate the performance of service personnel were determined using Gray AHP. The criteria with calculated weights were included in the analysis within the Gray MOORA and Gray MAUT methods, which were used to evaluate the performance of the service personnel. The performance ranking of service personnel was analyzed using both Gray MOORA and Gray MAUT.

Gray AHP was used for determining the weights of these criteria. Gray pairwise comparison matrix for main criteria is in Table 6.

Table 6. Gray pairwise comparison matrix for main criteria

	Main criterion 1 lower value	Main criterion 1 upper value	Main criterion 2 lower value	Main criterion 2 upper value	Main criterion 3 lower value	Main criterion 3 upper value
Main criterion 1	1.0000	1.0000	0.2000	0.3333	3.0000	5.0000
Main criterion 2	3.0000	5.0000	1.0000	1.0000	7.0000	9.0000
Main criterion 3	0.2000	0.3333	0.1111	0.1429	1.0000	1.0000

Equations 1-4 were used for filling the diagonal and lower triangular cells of gray comparison matrix. Equation 5 results construct crisp pairwise comparison matrix. The results are in Table 7.

Table 7. Crisp pairwise comparison matrix for consistency control

	Main criterion 1	Main criterion 2	Main criterion 3
Main criterion 1	1.0000	0.2667	4.0000
Main criterion 2	4.0000	1.0000	8.0000
Main criterion 3	0.2667	0.1270	1.0000

The results of Equation 7-11 are in Table 8.

Table 8. The results of equation 7-11

	w_i	λ_i, λ_{max}		
Main criterion 1	0.2296	3.0796	CI	0.0480
Main criterion 2	0.6975	3.1530	RI	0.5800
Main criterion 3	0.0729	3.0552	CR	0.0827
		3.0959		

According to the consistency ratio, the evaluations of expert group are consistent. The results of Equations 13-16 are in Table 9.

Table 9. $\underline{RS_i}, \overline{RS_i}, \underline{w_i}, \overline{w_i}$ Values

	$\underline{RS_i}$	$\overline{RS_i}$	$\underline{w_i}$	$\overline{w_i}$
Main criterion 1	4.2000	6.3333	0.2136	0.3221
Main criterion 2	11.0000	15.0000	0.5595	0.7630
Main criterion 3	1.3111	1.4762	0.0667	0.0751

These steps were repeated for sub criteria of these main criteria. The local and global gray weights are in Table 10.

Table 10. Local and global gray weights.

Criterion code	Local	Local	Global	Global
	$\underline{w_i}$	$\overline{w_i}$	$\underline{w_i}$	$\overline{w_i}$
1	0.2136	0.3221		
2	0.5595	0.7630		
3	0.0667	0.0751		
1a	0.3627	0.4664	0.0775	0.1502
1b	0.4664	0.5700	0.0996	0.1836
1c	0.0650	0.0696	0.0139	0.0224

2a	0.2407	0.3477	0.1347	0.2653
2b	0.2407	0.3477	0.1347	0.2653
2c	0.0767	0.1427	0.0429	0.1088
2d	0.0236	0.0288	0.0132	0.0220
2e	0.1427	0.2407	0.0798	0.1837
2f	0.0645	0.1034	0.0361	0.0789
3a	0.2857	0.4286	0.0191	0.0322
3b	0.4286	0.8571	0.0286	0.0644

Table 10 highlights which criteria should be prioritized when evaluating personnel performance, particularly underscoring the importance of effective communication, experience, and diction in the hotel sector. This emphasizes the importance of effective communication with customers in the tourism sector and demonstrates that experienced personnel play a significant role in contributing to customer satisfaction.

After determining the weights of the criteria, experts evaluated alternatives. MOORA-G were applied. Expert opinions were integrated by using Equation 17 and 18. The results are in Table 11.

Table 11. Intregration for MOORA-G

		Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Lower	1a	6.0	8.0	3.0	8.0	8.0
Upper	1a	8.0	9.5	5.0	9.5	9.5
Lower	1b	8.0	8.0	4.0	9.0	9.0
Upper	1b	9.5	9.5	6.0	10.0	10.0
Lower	1c	2.0	2.0	1.0	6.0	1.0
Upper	1c	4.0	4.0	3.0	8.0	3.0
Lower	2a	6.0	7.0	3.0	6.0	6.0
Upper	2a	8.0	9.0	5.0	7.5	8.0
Lower	2b	5.0	6.0	4.0	7.0	7.0
Upper	2b	7.0	8.0	6.0	8.5	9.0
Lower	2c	4.0	6.0	4.0	8.0	9.0
Upper	2c	6.0	7.5	6.0	9.5	10.0
Lower	2d	4.0	7.0	3.0	5.0	7.0
Upper	2d	6.0	9.0	5.0	6.5	9.0
Lower	2e	5.0	6.0	6.0	9.0	7.0
Upper	2e	7.0	8.0	8.0	10.0	8.5
Lower	2f	5.0	9.0	2.0	9.0	7.0
Upper	2f	7.0	10.0	4.0	10.0	8.5
Lower	3a	6.0	7.0	3.0	9.0	8.0
Upper	3a	8.0	9.0	5.0	10.0	9.5
Lower	3b	4.0	5.0	2.0	5.0	8.0
Upper	3b	6.0	6.5	4.0	6.5	9.5

Gray normalized values were found by using Equations 19 and 20. The results are in Table 12.

Table 12. Normalized values for MOORA-G

		Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Lower	1a	0.2456	0.3275	0.1228	0.3275	0.3275
Upper	1a	0.3275	0.3889	0.2047	0.3889	0.3889
Lower	1b	0.2976	0.2976	0.1488	0.3348	0.3348
Upper	1b	0.3534	0.3534	0.2232	0.3720	0.3720
Lower	1c	0.1581	0.1581	0.0791	0.4743	0.0791
Upper	1c	0.3162	0.3162	0.2372	0.6325	0.2372
Lower	2a	0.2809	0.3277	0.1404	0.2809	0.2809
Upper	2a	0.3745	0.4213	0.2341	0.3511	0.3745
Lower	2b	0.2289	0.2746	0.1831	0.3204	0.3204
Upper	2b	0.3204	0.3662	0.2746	0.3891	0.4120
Lower	2c	0.1735	0.2603	0.1735	0.3470	0.3904
Upper	2c	0.2603	0.3253	0.2603	0.4121	0.4338
Lower	2d	0.1968	0.3443	0.1476	0.2460	0.3443
Upper	2d	0.2952	0.4427	0.2460	0.3197	0.4427
Lower	2e	0.2083	0.2499	0.2499	0.3749	0.2916
Upper	2e	0.2916	0.3333	0.3333	0.4166	0.3541
Lower	2f	0.2081	0.3746	0.0832	0.3746	0.2914
Upper	2f	0.2914	0.4162	0.1665	0.4162	0.3538
Lower	3a	0.2451	0.2860	0.1226	0.3677	0.3268
Upper	3a	0.3268	0.3677	0.2043	0.4085	0.3881
Lower	3b	0.2106	0.2632	0.1053	0.2632	0.4212
Upper	3b	0.3159	0.3422	0.2106	0.3422	0.5002

Weighted normalized values are calculated by using Equations 21 and 22. In this step, AHP-G results are integrated with MOORA-G. the results are in Table 13.

Table 13. Weighted normalized values for MOORA-G

		Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Lower	1a	0.0190	0.0254	0.0095	0.0254	0.0254
Upper	1a	0.0492	0.0584	0.0307	0.0584	0.0584
Lower	1b	0.0297	0.0297	0.0148	0.0334	0.0334
Upper	1b	0.0649	0.0649	0.0410	0.0683	0.0683
Lower	1c	0.0022	0.0022	0.0011	0.0066	0.0011
Upper	1c	0.0071	0.0071	0.0053	0.0142	0.0053
Lower	2a	0.0378	0.0441	0.0189	0.0378	0.0378
Upper	2a	0.0994	0.1118	0.0621	0.0932	0.0994
Lower	2b	0.0308	0.0370	0.0247	0.0432	0.0432
Upper	2b	0.0850	0.0972	0.0729	0.1032	0.1093
Lower	2c	0.0074	0.0112	0.0074	0.0149	0.0167
Upper	2c	0.0283	0.0354	0.0283	0.0449	0.0472
Lower	2d	0.0026	0.0045	0.0019	0.0032	0.0045
Upper	2d	0.0065	0.0097	0.0054	0.0070	0.0097
Lower	2e	0.0166	0.0200	0.0200	0.0299	0.0233
Upper	2e	0.0536	0.0612	0.0612	0.0765	0.0650
Lower	2f	0.0075	0.0135	0.0030	0.0135	0.0105
Upper	2f	0.0230	0.0328	0.0131	0.0328	0.0279
Lower	3a	0.0047	0.0054	0.0023	0.0070	0.0062

Upper	3a	0.0105	0.0118	0.0066	0.0131	0.0125
Lower	3b	0.0060	0.0075	0.0030	0.0075	0.0120
Upper	3b	0.0203	0.0220	0.0136	0.0220	0.0322

MOORA-G results and ranks are in Table 14 after using Equations 23-29.

Table 14. MOORA-G Results and Ranks

	t_i	Rank
Alternative 1	0.3061	4
Alternative 2	0.3565	3
Alternative 3	0.2235	5
Alternative 4	0.3781	1
Alternative 5	0.3747	2

As seen in Table 14, the scores are close to each other. In the performance ranking conducted with the Gray MOORA method, "Alternative 4" was the best-performing employee, while "Alternative 3" had the lowest performance.

MAUT-G were applied. Expert opinions were integrated by using Equation 30 and 31. The results are in Table 15.

Table 15. Integrated expert opinions

		Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
lower	1a	6.0	8.0	3.0	8.0	8.0
upper	1a	8.0	9.5	5.0	9.5	9.5
lower	1b	8.0	8.0	4.0	9.0	9.0
upper	1b	9.5	9.5	6.0	10.0	10.0
lower	1c	2.0	2.0	1.0	6.0	1.0
upper	1c	4.0	4.0	3.0	8.0	3.0
lower	2a	6.0	7.0	3.0	6.0	6.0
upper	2a	8.0	9.0	5.0	7.5	8.0
lower	2b	5.0	6.0	4.0	7.0	7.0
upper	2b	7.0	8.0	6.0	8.5	9.0
lower	2c	4.0	6.0	4.0	8.0	9.0
upper	2c	6.0	7.5	6.0	9.5	10.0
lower	2d	4.0	7.0	3.0	5.0	7.0
upper	2d	6.0	9.0	5.0	6.5	9.0
lower	2e	5.0	6.0	6.0	9.0	7.0
upper	2e	7.0	8.0	8.0	10.0	8.5
lower	2f	5.0	9.0	2.0	9.0	7.0
upper	2f	7.0	10.0	4.0	10.0	8.5
lower	3a	6.0	7.0	3.0	9.0	8.0
upper	3a	8.0	9.0	5.0	10.0	9.5
lower	3b	4.0	5.0	2.0	5.0	8.0
upper	3b	6.0	6.5	4.0	6.5	9.5

Normalized values are calculated by using Equations 32 and 33. The results are in Table 16.

Table 16. Normalized values for MAUT-G

		Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
lower	1a	0.4615	0.7692	0.0000	0.7692	0.7692
upper	1a	0.7692	1.0000	0.3077	1.0000	1.0000
lower	1b	0.6667	0.6667	0.0000	0.8333	0.8333
upper	1b	0.9167	0.9167	0.3333	1.0000	1.0000
lower	1c	0.1429	0.1429	0.0000	0.7143	0.0000
upper	1c	0.4286	0.4286	0.2857	1.0000	0.2857
lower	2a	0.5000	0.6667	0.0000	0.5000	0.5000
upper	2a	0.8333	1.0000	0.3333	0.7500	0.8333
lower	2b	0.2000	0.4000	0.0000	0.6000	0.6000
upper	2b	0.6000	0.8000	0.4000	0.9000	1.0000
lower	2c	0.0000	0.3333	0.0000	0.6667	0.8333
upper	2c	0.3333	0.5833	0.3333	0.9167	1.0000
lower	2d	0.1667	0.6667	0.0000	0.3333	0.6667
upper	2d	0.5000	1.0000	0.3333	0.5833	1.0000
lower	2e	0.0000	0.2000	0.2000	0.8000	0.4000
upper	2e	0.4000	0.6000	0.6000	1.0000	0.7000
lower	2f	0.3750	0.8750	0.0000	0.8750	0.6250
upper	2f	0.6250	1.0000	0.2500	1.0000	0.8125
lower	3a	0.4286	0.5714	0.0000	0.8571	0.7143
upper	3a	0.7143	0.8571	0.2857	1.0000	0.9286
lower	3b	0.2667	0.4000	0.0000	0.4000	0.8000
upper	3b	0.5333	0.6000	0.2667	0.6000	1.0000

Weighted normalized values are calculated by using Equations 36 and 37. In this step G-AHP results are integrated with MAUT-G. The results are in Table 17.

Table 17. Weighted Normalized values for MAUT-G

		Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
lower	1a	0.0358	0.0596	0.0000	0.0596	0.0596
upper	1a	0.1156	0.1502	0.0462	0.1502	0.1502
lower	1b	0.0664	0.0664	0.0000	0.0830	0.0830
upper	1b	0.1683	0.1683	0.0612	0.1836	0.1836
lower	1c	0.0020	0.0020	0.0000	0.0099	0.0000
upper	1c	0.0096	0.0096	0.0064	0.0224	0.0064
lower	2a	0.0673	0.0898	0.0000	0.0673	0.0673
upper	2a	0.2211	0.2653	0.0884	0.1990	0.2211
lower	2b	0.0269	0.0539	0.0000	0.0808	0.0808
upper	2b	0.1592	0.2122	0.1061	0.2388	0.2653
lower	2c	0.0000	0.0143	0.0000	0.0286	0.0358
upper	2c	0.0363	0.0635	0.0363	0.0998	0.1088
lower	2d	0.0022	0.0088	0.0000	0.0044	0.0088
upper	2d	0.0110	0.0220	0.0073	0.0128	0.0220
lower	2e	0.0000	0.0160	0.0160	0.0639	0.0319
upper	2e	0.0735	0.1102	0.1102	0.1837	0.1286
lower	2f	0.0135	0.0316	0.0000	0.0316	0.0225

upper	2f	0.0493	0.0789	0.0197	0.0789	0.0641
lower	3a	0.0082	0.0109	0.0000	0.0163	0.0136
upper	3a	0.0230	0.0276	0.0092	0.0322	0.0299
lower	3b	0.0076	0.0114	0.0000	0.0114	0.0229
upper	3b	0.0343	0.0386	0.0172	0.0386	0.0644

Total lower weighted normalized values, total upper weighted normalized values and total crisp values of alternatives are calculated by using Equations 38-40. MAUT-G results and ranks are in Table 18.

Table 18. MAUT-G results and ranks

	$\underline{s_i}$	$\overline{s_i}$	s_i	Rank
Alternative 1	0.2300	0.9011	0.5655	4
Alternative 2	0.3646	1.1465	0.7556	3
Alternative 3	0.0160	0.5083	0.2621	5
Alternative 4	0.4569	1.2400	0.8484	1
Alternative 5	0.4263	1.2444	0.8353	2

The personnel ranking was exactly the same in both methods. "Alternative 4" was the best-performing employee, while "Alternative 3" had the lowest performance.

5. Managerial implication and conclusions

The tourism sector, being labor-intensive and one of the world's leading economic sectors, is an important source of employment. Therefore, employees—especially qualified ones—are among the most important strategic resources for businesses in the tourism sector. In today's business conditions, personnel with the highest level of competencies have become the most crucial factor for businesses to succeed and compete in the market. Due to the importance of personnel selection and recruitment processes, an application was conducted in a local hotel business operating in Bartın, Turkey, for personnel evaluation and selection in the tourism sector. This application introduced a hybrid model to the literature, using Gray AHP-based Gray MOORA and Gray MAUT methods together. The study aimed to measure the performance of service staff working in the restaurant section of the hotel and to determine the criteria to be used in performance measurement, as well as to find the weights of these criteria. The weights of the evaluation criteria used to measure the performance of service staff were determined using the Gray AHP method, and the performance ranking of service staff was carried out separately using Gray MOORA and Gray MAUT.

For the performance evaluation of service personnel, three main criteria and eleven sub-criteria were determined, and their weights were calculated. As a result of the analysis, it was concluded that in the evaluation of service personnel working in the hotel restaurant, the most effective criteria were "Diction - effective and eloquent speaking ability" and "Effective Communication - the ability to effectively use verbal and non-verbal communication skills" under the main criterion of "Personal Characteristics," and "Experience - knowledge and experience gained by working in a business operating in the tourism sector" under the main criterion of "Professional Characteristics." In the tourism sector, service quality largely depends on employees' ability to interact directly with customers and their level of experience. This industry is one where customer satisfaction is paramount, and interpersonal communication occurs continuously and intensively. In this context, personal attributes such as "Diction" and "Effective Communication" are critically important because they ensure that every interaction with customers leaves a positive and professional impression. Customers visiting these establishments for quality service expect employees to communicate in a friendly, clear, and trustworthy manner. On the other hand, the "Experience" criterion enables employees to handle various situations they may encounter in the sector, allowing them to provide more reliable and professional service. Experienced staff can respond quickly and

effectively, thereby increasing customer satisfaction and strengthening the business's reputation. Therefore, these criteria, which directly influence the customer experience, stand out as priorities in the tourism sector for both business success and sustainable competitive advantage.

Considering the importance of the "Diction" and "Effective Communication" criteria highlighted in the study, implementing regular training programs to develop these skills in hotel businesses would be beneficial. Strengthening employees' effective speaking and communication abilities can enhance customer satisfaction and service quality. The analysis also identified that the experience criterion holds significant importance. Therefore, hotel businesses should prioritize candidates with experience in the tourism sector during recruitment processes. This approach will ensure that employees exhibit professional behavior in customer interactions and have a solid understanding of their roles. Mentorship programs can be established where experienced employees share their knowledge and expertise with less experienced staff. This practice would help new hires adapt more quickly and prevent potential issues arising from a lack of experience. The business should conduct regular performance evaluations to identify employees' strengths and areas for development. These evaluations are crucial for boosting employee motivation and ensuring their continuous improvement.

The performance of five service personnel working in the hotel restaurant was ranked separately using Gray MOORA and Gray MAUT, considering all criteria together. The rankings obtained from both methods were exactly the same. The service personnel coded as Alternative 4 and Alternative 5 shared the top two ranks. The fact that the service personnel coded as "Alternative 4" and "Alternative 5" share the top two ranks in both methods is due to their outstanding performance in the identified critical criteria. These employees excel in essential skills such as "Diction" and "Effective Communication" under personal characteristics, as well as "Experience" under professional characteristics, all of which directly impact customer satisfaction. These criteria are crucial for delivering high-quality service in a hotel restaurant, indicating that the high-scoring personnel are skilled in establishing effective communication with customers, presenting a professional demeanor, and using their experience to provide quick and accurate solutions. This alignment led both methods to reach the same conclusion, highlighting these two employees as standout performers compared to others.

The study is considered beneficial both for the hotel management where the application was conducted and for businesses engaged in local hotel management. Additionally, this study has introduced an application to the literature in which Gray AHP-based Gray MOORA and Gray MAUT methods are used together for personnel selection and performance measurement in the tourism sector. In this respect, it is also considered significant. This study was conducted for the service personnel in the restaurant section of the hotel. In future studies, applications can be conducted for personnel in other units of the hotel, in different sectors, or by using various MCDM methods.

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