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A multi-attribute framework for the selection of high-performance work systems: the hybrid DEMATEL-MABAC model

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ABSTRACT

Research in strategic human resource management indicates that high performance work systems (HPWS) have a positive impact on the overall performance of an organization as a result of better human resource (HR) outcomes. Regarding the multi-dimensional and complex nature of these factors, common statistical models are not useful for examining the performance of HPWS. Using the capabilities of multi-attribute decision-making (MADM) methods to deal with various criteria that may be contradictory, this study proposes a MADM-based framework that provides the opportunity to prioritize HR practices. Based on this framework, high-performance HR practices and their related HR outcomes were identified after studying the theoretical literature and ascertaining the views of decision-makers and HR experts. Then, after looking at the interactions among HR outcomes, the weights of the criteria were calculated using the method of the decision making trial and evaluation laboratory (DEMATEL). Then, the alternatives were ranked using the multi-attributive border approximation area comparison (MABAC) method. Finally, the designed framework was implemented in an organization active in the banking industry. This framework can be used to improve employees' performance and, consequently, the performance of the organization. Accordingly, taking into account the resource constraints organizations face, the priorities presented can be helpful in budgeting human-resource-management (HRM) improvement projects and making an appropriate resource allocation for this.

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1. Introduction

Over the past two decades, high-performance work systems (HPWS) have attracted a great deal of attention both from academic researchers and practitioners who have been looking to gain a sustained competitive advantage by investing in human capital (Chen et al., 2018). Organizations that focus on their employees believe that employee attitudes and behaviors play a key role in satisfying their customers and subsequently play a key role when one is looking to improve the performance of an organization (Cheah et al., 2019; Jha et al., 2017). This is even more important in the service industries such as banking. In this sector, the quality of communication between frontline employees and customers is one of the most important determinants of customer satisfaction and thus organizational performance (Paes de Faria et al., 2020; Ranjan et al., 2015). The philosophy derived from the strategic human resource management (SHRM) approach in which interests are based on the design of a set of high-performance work systems is called HPWS. HPWS is a set of human resource (HR) practices that leverage organizational human and social capital to gain a competitive advantage for a firm (Guthrie et al., 2009; Huselid, 1995).

Much of the academic SHRM research has emphasized how HPWS is a bundle of HR practices that ought bring about positive organizational outcomes, including customer satisfaction (Ogbonnaya & Valizade, 2018), return on investment (ROI) (Katou, 2011), organizational coordination (Fu et al., 2019), market share, organizational innovation (Bin Saeed et al., 2019; Fu et al., 2015), and workforce productivity (Datta et al., 2005; Guthrie, 2001; Guthrie et al., 2009; Huselid, 1995; MacDuffie, 1995).

Research findings indicate that HPWS has a positive impact on the overall performance of an organization through an improvement of HR outcomes such as employee job satisfaction, organizational commitment, organizational citizenship behavior, and employee empowerment (Messersmith et al., 2011). A survey conducted by Takeuchi et al. (2007) of both managers and employees shows that the average performance of managers and employees can increase significantly after the implementation of HPWS.

Despite the importance of this issue, few studies have examined the effects of implementing HPWS in the banking industry (Cooke et al., 2019; Kloutsiniotis & Mihail, 2018; Liao et al., 2009). In this context, the research conducted by Cooke et al. (2019) confirms the link in the Chinese banking industry between the implementation of HPWS and an improvement in employee resilience and engagement. According to the results of this study, when employee resilience, which is a set of individual skills and characteristics, is improved, this can have benefits both at the individual and organizational levels due the effective application of HPWS. In another study that looked at the banking industry, Mahmood et al. (2019) confirmed that HPWS has a positive effect on organizational commitment of employees by enhancing their levels of job satisfaction.

There is general agreement among human resource management (HRM) researchers and scholars that a systematic approach to HR practices is better than a one-dimensional approach. Nevertheless, there is still no consensus as to what exactly is to be included in the combination of practices that constitute HPWS (Boxall & Macky, 2007; Cooke et al., 2019; Van De Voorde & Beijer, 2015). Therefore, it is important to choose the right practices for HPWS that help an organization be better aligned with its goals and strategies in order to achieve its desired HR outcomes and ultimately improve its organizational performance.

However, despite the important role HPWS can have on HR outcomes and thus the performance of an organization, there are still no precise indicators and criteria for measuring the impact of high-performance HR practices, and there is no approach yet that takes into account their impact on how to best select for the most effective practices. Some researchers argue that common statistical models do not have the capability of examining the performance of HPWS due to their simplicity and superficiality. Nor, these same researchers argue, can these models account for the complex and multi-dimensional nature of decision-making on the choice of high-performance HR practices that would optimally impact HR outcomes (Zhang et al., 2014).

In order to compensate for this limitation, multi-attribute decision-making (MADM) methods are used in this study. Due to the high capability of MADM methods for choosing the best alternative based on a number of criteria, some of which may be in contradiction with each other, these methods have become one of the most popular topics in the decision theory literature (Amiri et al., 2020; Barak & Dahooei, 2018; Stanujkic et al., 2015; Yazdani et al., 2019). These methods have also been used in the field of HRM on certain issues such as performance management, staff selection, and recruitment (Abdullah & Zulkifli, 2015; Balezentis et al., 2012; Beskese et al., 2018; Chou et al., 2012; Dursun & Karsak, 2010; Ensslin et al., 2013; Heidary Dahooie et al., 2018; Horváthová et al., 2019; Kelemenis & Askounis, 2010; Mammadova & Jabrayilova, 2018; Polychroniou & Giannikos, 2009; Rahmanniyay & Yu, 2019; Sang et al., 2015; Tuana, 2018; Zhang & Liu, 2011).

The main objective of this study is to use MADM develop a framework for decision-making regarding the selection of high-performance HR practices that best maximize their impact on the desired HR outcomes, all in order to gain a deeper understanding of the performance of HPWS and to avoid the limitations inherent to current analytical methods. This framework can provide HR decision-makers with a systematic approach for making more effective decisions while enabling them to analyze and consider all of the relevant criteria. Given the interrelations among the various HR outcomes and the fact that a few MADM methods take into account the interrelations among the criteria, a combination of decision-making trial, evaluation laboratory (DEMATEL), and multi-attributive border approximation area comparison (MABAC) methods is used in this study.

The rest of this article is structured as follows. Section 2 deals with the theoretical foundations of the study. The executive steps of the research are presented in section 3. Section 4 outlines the methods used in this study. Section 5 is devoted to presenting the findings from the implementation of the proposed framework in a real case. Finally, an analysis of the research findings and conclusions are presented in Sections 6 and 7, respectively.

2. Literature review

2.1. High-performance work systems

HPWS is a bundle of HR practices derived from HRM best practices that are said to lead to a superior level of performance in organizations (Takeuchi et al., 2007). These set of HR practices are internally coordinated and reinforce each other in order to achieve inclusive goals (Lepak et al., 2006). In addition, the HR practices that simultaneously reinforce one other, according to the systematic approach, create synergistic effects that deliver the effects of the sum of practices beyond the sum from the practices individually. This set of HR practices is well known in the current literature on strategic HRM as high-performance work systems (HPWS) or high-performance work practices (HPWP). However, other studies give it titles such as high-involvement work practices (HIWP) (Guthrie et al., 2009), high-performance management practices (Zacharatos et al., 2005), human-capital-enhancing HR systems (Youndt et al., 1996), and high commitment work practices (HCWP) (McClean & Collins, 2011).

Regardless of its title, HPWS comprises a set of HR practices that are integrated and aligned both vertically and horizontally. This set of high performance HR practices collectively transform an organization's employees into information-driven, motivated, and action-oriented individuals. Although there is still no clear consensus on the ideal configuration for HPWS (Cooke et al., 2019), previous studies suggest that the most important practices include training, selective recruitment, performance-based pay, employee career path, performance management, teamwork, job design, and employee participation programs. These studies have specifically emphasized the adoption of these practices for service-oriented industries (Aryee et al., 2012; Cooke et al., 2019; Figueiredo et al., 2016; Gibbs & Ashill, 2013; Liao et al., 2009; Ning et al., 2018; Wang & Xu, 2017).

Although there is agreement among HRM experts and scholars that the systematic approach to HR practices is more appropriate than the one-dimensional approach, there is still no consensus concerning the best composition of the practices that form the HPWS in an organization (Boxall & Macky, 2007; Cooke et al., 2019; Van De Voorde & Beijer, 2015). Therefore, researches in the field emphasize the need for providing a framework for selecting the optimal combination of these practices at the organizational level.

2.2. HPWS–Performance relationship

Most researchers believe that HPWS is one of the most important sources of attaining a competitive advantage (Guthrie et al., 2009; Huselid, 1995). For this reason, many of the analyses of HPWS comes from SHRM researchers who have examined the impact of HR practices on organizational outcomes (Jiang et al., 2012). An important point emphasized in the literature is how HPWS has strong and positive effects on employees and organization performance (Combs et al., 2006). Although many steps have been taken in recent years to understand how to obtain the best level of performance for HRM, there are still many uncertainties regarding the relationship between HPWS and organizational performance (Boxall et al., 2011; Chuang & Liao, 2010; Messersmith et al., 2011; Sun et al., 2007).

What is clear is that HPWSs can positively influence individual and organizational performance. According to Boxall (2012), HPWS positively affects employee outcomes and behaviors at the individual level before affecting an organization's performance. Based on a common framework, ability motivation opportunity theory (AMO),

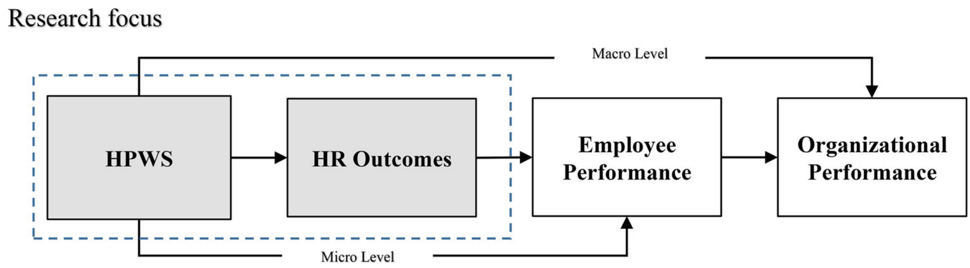

Figure 1. Conceptual model of research. Source: compiled by authors.

HPWS is said to positively influence employee performance by affecting the abilities, motivation, and their opportunity to participate (Jiang et al., 2012).

Experimental and theoretical studies in the field of SHRM suggest that there are various mechanisms involved in shaping the individual and collective characteristics of employees in a way that positively influences organizational performance (Lepak et al., 2006). Accordingly, one can adopt a macro-level approach, in which the impact of HR practices on organizational performance is examined (Combs et al., 2006), or adopt a micro-level approach, in which the main focus is on the impact of HR practices on employee performance when examining the impact of HPWS (Haar & White, 2013).

As shown in Figure 1, HPWS directly or indirectly affects the performance of an organization. Accordingly, HPWS shapes employee performance by means of HR outcomes, and their performance ultimately influences the organization's performance.

The HR outcomes that are considered central to mediating between HPWS and employee performance (Cooke et al., 2019) include job satisfaction, the rate of absenteeism, organizational commitment, occupational safety, employee resilience, and employee motivation.

By looking at Figure 1, one can see the relationship between HPWS and organizational performance with regard to the HR outcomes that can improve performance and have effects as a mediating mechanism. In this study, when considering these relationships, more of an emphasis is placed on analyzing the first part, namely the relationships among employee performance, HR outcomes, and HPWS in terms of the micro-level approach. This is the focus of the research. An important point in exploring the interrelations among the outcomes that can positively influence the performance of employees. Therefore, while analyzing these relationships, in addition to considering the direct impact of each outcome on performance, it is essential to consider the impact of the outcomes on each other and ultimately on organizational performance. This demonstrates once again the need to apply an appropriate methodology for analyzing these interrelations.

In this study, after reviewing the theoretical literature, a list of HR outcomes by which HPWS can influence the performance of employees was prepared. The list was presented to the experts for final selection. The identified HR outcomes are listed in Table 1.

3. Research steps

The purpose of this study is to provide a framework for selecting the best high-performance HR practices for organizations. As explained above, the basis for this selection is how each of the identified HPWS impacts provide significant HR outcomes

Table 1. Human resource outcomes list based on literature review.

No.	HR outcomes	References
1	Job satisfaction and employee engagement	Cooke et al., 2019; Ogbonnaya & Valizade, 2018; Mahmood et al., 2019; Xian et al., 2019; Bal et al., 2013; Gibbs & Ashill, 2013; Takeuchi et al., 2007
2	Absenteeism rate	Ogbonnaya & Valizade, 2018; Guthrie et al., 2009; Cafferkey & Dundon, 2015
3	Organizational commitment	Cafferkey & Dundon, 2015; Gibbs & Ashill, 2013; Messersmith et al., 2011; Katou, 2011; Boxall et al., 2011
4	Employee turnover	Zungbey et al., 2019; Selden & Sowa, 2015; Guthrie, 2001; Shaw et al., 2005; Guthrie et al., 2009; Huselid, 1995
5	Employee resilience	Úbeda-García et al., 2018; Chang et al., 2014
6	Occupational safety	Zacharatos et al., 2005
7	Career adaptability	Safavi & Karatepe, 2018
8	Employee trust	Searle & Skinner, 2011; Xian et al., 2019
9	Psychological empowerment	Messersmith et al., 2011; Boxall et al., 2011
10	Customer-oriented behaviors	Boxall et al., 2011
11	Job burnout	Kroon et al., 2009
12	Psychological well-being	Fan et al., 2014
13	Employee creativity	Chang et al., 2014
14	Organizational citizenship behaviors	Sun et al., 2007; Kehoe & Wright, 2013; Zhang et al., 2019
15	Employee motivation	Cafferkey & Dundon, 2015; Katou, 2011, Bailey et al., 2001; Jiang et al., 2012; Appelbaum et al., 2000
16	Employee opportunity to participation	Appelbaum et al., 2000; Katou, 2011, Bailey et al., 2001; Jiang et al., 2012
17	Employee skills	Appelbaum et al., 2000; Katou, 2011, Bailey et al., 2001; Jiang et al., 2012

Source: compiled by authors.

that ultimately lead to improvements in organizational performance. The research process is presented in Figure 2.

As noted in Figure 2, the initial list of HR practices and HR outcomes are first identified through a review of the literature. This list is then made available to an HR committee, which in turn selects a number of HR outcomes that are aligned with banking industry strategies. The committee does so by modeling HRM key performance indicators (KPIs) and considering them in terms of decision criteria. As mentioned in Section 2, the HR outcomes are not independent and are interrelated. Because of this important point, methods such as stepwise weight assessment ratio analysis (SWARA), analytic hierarchy process (AHP), and the best-worst method (BWM) are not suitable for determining the relative importance of HR outcomes and their impact on HPWS selection. In this research, the DEMATEL method was used to calculate the criteria weights among the methods that can take into account the relationships among the criteria. To this end, the committee members used their knowledge to determine the relationships among the criteria using linguistic variables. Then the criteria were weighted based on the DEMATEL method (the steps are described in Section 4). The committee then finalized the list of high performance HR practices. Specifically, HRM strategies and the views of decision-makers, particularly board members, were crucial in determining the list. The committee was then asked to express in linguistic variables the degree of impact that the HR practices have on the realization of various HR outcomes based on their specialized knowledge of HRM. In the following, the steps of the MABAC method are applied to calculate the scores of alternatives and to rank the HR practices. Finally, the designed framework is implemented in the banking industry. Specifically, the designed framework

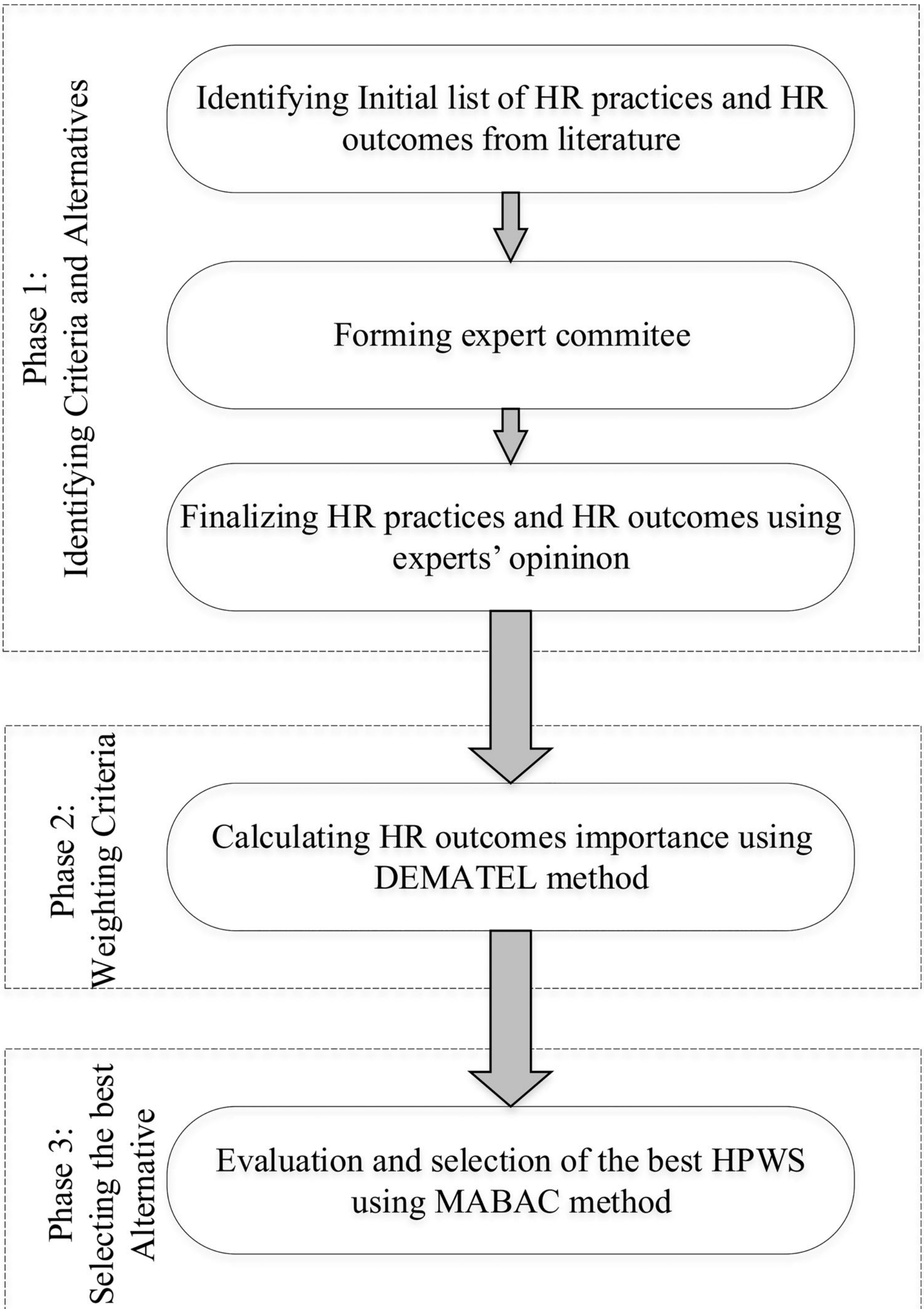

Figure 2. Steps of the proposed framework. Source: compiled by authors.

acts as a decision support tool, and the results are available to industry decision-makers with a view to how the policies and constraints they have when choosing the final list of high-performance HR practices and budget allocations.

4. Methodology

MADM methods have been developed for the purpose of ranking or evaluating a limited number of alternatives in light of criteria that may be contradictory to one other (Barak & Dahooei, 2018). Given the increasing importance of decision-making in daily life, numerous methods have been developed by researchers and applied in different fields (Kaklauskas et al., 2018; Mohagheghi et al., 2019; Zavadskas et al., 2014). One of the main reasons for the development of new approaches is that traditional MADM approaches do not consider the conditions of real-world decision-making problems. Examples of development in approaches are the extensions needed to overcome the challenge of uncertainty and hesitation during the decision-making process (e.g., fuzzy, intuitive fuzzy, hesitant sets, etc.) (Xu & Yager, 2008).

Many MADM approaches assume that the decision criteria are independent of one other. However, in many real-world cases, this assumption is unrealistic and there are various types of interactions among the criteria that affect the traditional decision-making process (Baykasoğlu et al., 2013). Despite the importance of this issue, the interactions among the criteria have received little attention in the literature (Gölcük & Baykasoğlu, 2016).

Gölcük and Baykasoğlu (2016) classified the criteria interactions into two categories, criterion dependency and criteria interactivity, and they identified the methods presented so far in each category. The Battelle Memorial Institute conducted a project using the DEMATEL method through its Geneva Research Centre (Gabus & Fontela, 1972, 1973). In recent years, the DEMATEL method has been widely used due to its great ability to model cause-and-effect relationships, and various MADM methods have been used in combination with it (Gölcük & Baykasoğlu, 2016). The MABAC method was first proposed by Pamučar and Ćirović (2015). They presented a powerful new MADM combination using both DEMATEL and previous MABAC methods simultaneously. Their sensitivity analysis on this combination showed that the MABAC method has higher levels of stability and consistency than other methods such as simple additive weighting (SAW), complex proportional assessment of alternatives (COPRAS), technique of order preference similarity to the ideal solution (TOPSIS), multi-objective optimization on the basis of ratio analysis (MOORA), and vlsekriterijumska optimizcija i kaompromisno resenje (VIKOR) (Pamučar & Ćirović, 2015). Therefore, this new method is considered to be a useful and reliable tool for decision-making. Accordingly, due to the fact that the criteria in this study are not independent of one other and because there are causal relationships among the HR outcomes, we use the modified fuzzy DEMATEL method (Dalalah et al., 2011) to weight the criteria, and we used the developed MABAC method (Pamučar & Ćirović, 2015) to prioritize HPWSs. The steps of this hybrid method are described in the following.

Suppose there are m alternatives (A_i; $i = 1,2,\ldots,m$) that are evaluated according to n different criteria (X_j; $j = 1,2,\ldots,n$). The evaluation value of i^{th} alternative according to the j^{th} criterion is represented by x_{ij}.

A. *Calculation the weight of each criteria.*

Because each criterion may have a different impact on the choice of the best alternative, the weight of each criterion is determined as w_j; $j = 1,2,\ldots,n$ ($\sum_{j=1}^{n} W_j = 1$). At this stage of the model, the relationship between the criteria is obtained using the modified fuzzy DEMATEL method. The steps to implement this method are as follows:

1. Collect experts' opinions and construct the average matrix $\tilde{Z}$.
   Given k as the number of committee members, an $n \times n$ matrix $\tilde{z}^{(e)}$ is formed for e^{th} expert which indicates the direct-relation between criteria (n represents the number of criteria). Each element of this matrix ($\tilde{z}_{ij}^{(e)}$) represents the degree to which the criterion C_i affects the criterion C_j. Then the fuzzy matrix $\tilde{Z}$, which indicates the aggregated opinions of experts, is obtained by Equation (1).

$$\tilde{z}_{ij} = \frac{\sum_{e=1}^{k} \tilde{z}_{ij}^{(e)}}{k} \tag{1}$$

2. Calculate the normalized initial direct-relation matrix $\tilde{D}$.
   The normalized direct-relation matrix $\tilde{D} = [\tilde{d}_{ij}]$ is shown as follows:

$$\tilde{D} = \begin{bmatrix} \tilde{d}_{11} & \tilde{d}_{12} & \cdots & \tilde{d}_{1n} \\ \tilde{d}_{21} & \tilde{d}_{22} & \cdots & \tilde{d}_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ \tilde{d}_{n1} & \tilde{d}_{n2} & \cdots & \tilde{d}_{nn} \end{bmatrix} \tag{2}$$

   All values of this matrix are in the range [0,1] and are calculated based on Equations (3) and (4).

$$\tilde{d}_{ij} = \frac{\tilde{z}_{ij}}{\tilde{R}} = \left(\frac{z_{ij}^{(l)}}{r^{(l)}}, \frac{z_{ij}^{(m)}}{r^{(m)}}, \frac{z_{ij}^{(r)}}{r^{(r)}} \right) \tag{3}$$

$$\tilde{R} = \max\left(\sum_{j=1}^{n} \tilde{z}_{ij} \right) = \left(r^{(l)}, r^{(m)}, r^{(r)} \right) \tag{4}$$

3. Calculate the total relation matrix $\tilde{T}$.
   The total relation matrix $\tilde{T}$ is obtained by Equation (5).

$$\tilde{T} = \lim_{w \to \infty} \left(\tilde{D} + \tilde{D}^2 + \cdots + \tilde{D}^w \right) = \tilde{D}(I - \tilde{D})^{-1} \tag{5}$$

   Here matrix I is $n \times n$ identity matrix. Accordingly, the total relation matrix is represented as Equation (6).

$$\tilde{T} = \begin{bmatrix} \tilde{t}_{11} & \tilde{t}_{12} & \cdots & \tilde{t}_{1n} \\ \tilde{t}_{21} & \tilde{t}_{22} & \cdots & \tilde{t}_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ \tilde{t}_{n1} & \tilde{t}_{n2} & \cdots & \tilde{t}_{nn} \end{bmatrix} \tag{6}$$

Where $\tilde{t}_{ij} = \left(t_{ij}^{(l)}, t_{ij}^{(m)}, t_{ij}^{(r)}\right)$ represents the indirect effects of factor i on factor j. Then the total relation matrix $\tilde{T}$ was defuzzified using Equation (7). Defuzzification was carried out using Equation (7)

$$t_{ij} = \left(t_{ij}^{(l)} + 4.t_{ij}^{(m)} + t_{ij}^{(r)}\right)/6 \tag{7}$$

4. Calculate the sum of rows and columns of the matrix T.
   In this step, the sum of the rows and columns of the matrix T, which are represented by R_i and D_i, respectively, are computed by the following equations:

$$D_i = \sum_{i=1}^{n} t_{ij} \quad i = 1, 2, \ldots, n \tag{8}$$

$$R_i = \sum_{j=1}^{m} t_{ij} \quad j = 1, 2, \ldots, m \tag{9}$$

   where n and m are the numbers of criteria and alternatives, respectively.
5. Calculate the initial weight coefficients of the criteria.
   The initial weight of each criterion is calculated based on the Equation (10).

$$W_i = \sqrt{(D_i + R_i)^2 + (D_i - R_i)^2} \tag{10}$$

6. Normalization and calculation of the final weight coefficients of the criteria.
   After determining the weight of each criterion, the weights are normalized as follows:

$$W_i = \frac{W_i}{\sum_{i=1}^{n} W_i} \tag{11}$$

A. *Ranking the alternatives*

After determining the weight of each criteria, conditions are provided for using the MABAC method. The basis of the MABAC method is based on calculating the distance of each criterion to the border approximation area. The steps of this method are as follows.

Step 1. Form the initial decision matrix X.

At this stage, each of the m alternatives is evaluated in terms of n criteria. x_{ij} specifies the value of alternative i according to the criterion j ($i = 1,2,.,m$; $j = 1,2, \ldots ,n$).

$$X = \begin{bmatrix} x_{11} & x_{12} & \ldots & x_{1n} \\ x_{21} & x_{22} & \ldots & x_{2n} \\ \ldots & \ldots & \ldots & \ldots \\ x_{m1} & x_{m2} & \ldots & x_{mn} \end{bmatrix} \tag{12}$$

Step 2. Normalize the elements from the matrix X.

The elements of normalized matrix N (Equation (13)) is obtained using Equations (14) and (15).

Where x_i^+ and x_i^- are maximum and minimum values of alternatives according to a given criterion.

$$N = \begin{bmatrix} n_{11} & n_{12} & \ldots & n_{1n} \\ n_{21} & n_{22} & \ldots & n_{2n} \\ \ldots & \ldots & \ldots & \ldots \\ n_{m1} & n_{m2} & \ldots & n_{mn} \end{bmatrix} \tag{13}$$

$$n_{ij} = \frac{x_{ij} - x_i^-}{x_i^+ - x_i^-} \quad \text{for Benefit type criteria} \tag{14}$$

$$n_{ij} = \frac{x_i^+ - x_{ij}}{x_i^+ - x_i^-} \quad \text{for Cost type criteria} \tag{15}$$

Step 3. Calculate the weighted matrix V.

The elements of weighted matrix V are obtained using Equation (16).

$$v_{ij} = w_i.(n_{ij} + 1) \tag{16}$$

Where n_{ij} is the element of normalized matrix N and w_i is the weight of criterion i (Equation (11)). Accordingly, the weighted matrix V is as follows:

$$V = \begin{bmatrix} v_{11} & v_{12} & \ldots & v_{1n} \\ v_{21} & v_{22} & \ldots & v_{2n} \\ \ldots & \ldots & \ldots & \ldots \\ v_{m1} & v_{m2} & \ldots & v_{mn} \end{bmatrix} = \begin{bmatrix} w_1.(n_{11}+1) & w_2.(n_{12}+1) & \ldots & w_n.(n_{1n}+1) \\ w_1.(n_{21}+1) & w_2.(n_{22}+1) & \ldots & w_n.(n_{2n}+1) \\ \ldots & \ldots & \ldots & \ldots \\ w_1.(n_m+1) & w_2.(n_{m2}+1) & \ldots & w_n.(n_{mn}+1) \end{bmatrix} \tag{17}$$

Step 4. Determine the border approximation area matrix G.

At this stage, the border approximation area for each criterion is calculated based on the Equation (18).

$$g_i = \left(\prod_{j=1}^{m} v_{ij} \right)^{\frac{1}{m}} \tag{18}$$

After calculating g_i for each criterion, the border approximation area matrix G with the format $n \times 1$ is formed.

$$G = \begin{bmatrix} g_1 & g_2 & \dots & g_n \end{bmatrix} \tag{19}$$

Step 5. Calculate the distance of alternatives from the border approximation area Q.

The distance of alternatives from the border approximation area is calculated based on the difference between elements of the weighted matrix V and the border approximation area matrix G (Equation (20)).

$$Q = V - G = \begin{bmatrix} v_{11}-g_1 & v_{12}-g_2 & \dots & v_{1n}-g_n \\ v_{21}-g_1 & v_{22}-g_2 & \dots & v_{2n}-g_n \\ \dots & \dots & \dots & \dots \\ v_{m1}-g_1 & v_{m2}-g_2 & \dots & v_{mn}-g_n \end{bmatrix} = \begin{bmatrix} q_{11} & q_{12} & \dots & q_{1n} \\ q_{21} & q_{22} & \dots & q_{2n} \\ \dots & \dots & \dots & \dots \\ q_{m1} & q_{m2} & \dots & q_{mn} \end{bmatrix} \tag{20}$$

Alternative A_i can belong to the border approximation area G, upper approximate area G^+, or lower approximate area G^-, that is, $A_i \in \{G \bigvee G^- \bigvee G^+\}$. The upper approximate area G^+ represents the area where the ideal alternative A^+ is located, while the lower approximate area G^- presents the area where anti-ideal alternative A^- is located. Belonging of the alternative A_i to the approximate area G, G^+, or G^- is obtained by Equation (21).

$$A_i \in \begin{cases} G^+ \ q_{ij} > 0 \\ G \ q_{ij} = 0 \\ G^- \ q_{ij} < 0 \end{cases} \tag{21}$$

For alternative A_i to be the best one in the set of alternatives, it is necessary to have a higher number of criteria above the upper approximate area G^+ than the other alternatives.

Step 6. Ranking alternatives.

The final criterion functions for alternatives are calculated by summing across the rows of the matrix Q (Equation (22)). The alternatives are then ranked based on the values obtained.

$$S_i = \sum_{j=1}^{n} q_{ij}, \; j = 1, 2, \ldots, n \; i = 1, 2, \ldots, m \tag{22}$$

5. Case study

The banking industry is one of the most competitive and service-oriented industries, and it spends significant amounts on HR practices. HR plays a key role in gaining a competitive advantage because in service businesses human capital has a greater impact on organizational performance than in production organizations. In addition, service businesses are more dependent on interactions with customers. In these situations, employees need to have developed the skills and attributes that have a greater impact on their performance (Bailly & Léné, 2013). Despite its importance, there seems to be an insufficient understanding of HR systems in the banking industry (Cooke et al., 2019; Zhao et al., 2012). In light of this and the requirements presented in the previous sections, the framework designed in this study was used to select the best high-performance HR practices after considering HR outcomes in the banking industry in Iran.

In order to go through the decision-making process, a specialized committee was formed. The committee members were chosen based on their levels of expertise and experience in the HR field. Taking into account the need for a better evaluation of HR practices, three working groups were formed under the supervision of the main committee: the HR managers, the members of the board of directors, and the HR consultants, who were prominent university professors in the field of HRM. The latter had an academic background in HR as well as relevant work experience in the banking industry. Their expertise in HR and experience in the banking industry (at least 15 years) allowed researchers to test their proposed framework while using valid data.

According to the steps outlined in Section 3, the initial list of HR outcomes was obtained through a review of the literature, which is the initial list presented in Table 1. The list was then made available to members of each of the working groups using the fuzzy Delphi method. The working groups' members selected a number of HR outcomes that, based on the HRM KPIs, were consistent with the industry's strategies, and then they incorporated them as decision criteria. Finally, HR outcomes, including skills (C_1), collaboration (C_2), motivation (C_3), organizational commitment (C_4), job satisfaction (C_5), turnover (C_6), and presence (C_7), were selected as the decision criteria.

In the next step, the DEMATEL method was used to calculate the relative importance of each identified outcome, that is, the method was used to calculate the impact of each outcome on the selection of high-performance HR practices. Table 2 represents the degree of the direct relationships among the identified criteria from the perspective of each working group.

As illustrated in this table, linguistic variables were used to indicate the extent to which a criterion was influenced by another criterion. The fuzzy Likert scale used in this paper is presented in Table 3 (Li, 2013).

Then, the direct-relation matrices of three working groups were aggregated into the average matrix $\tilde{Z}$ using Equation (1) (Table 4). For example, $\tilde{z}_{13}$ (the degree to which the criterion C_1 affects the criterion C_3) is calculated by:

Table 2. The degree of the direct relation between criteria based on linguistic variables.

Working group 1							
	C_1	C_2	C_3	C_4	C_5	C_6	C_7
C_1	NO	NO	NO	NO	NO	NO	NO
C_2	NO	NO	H	VH	H	VH	NO
C_3	NO	H	NO	VH	VH	VH	VH
C_4	VL	VH	H	NO	VH	VH	VH
C_5	VL	H	VH	VH	NO	VH	VH
C_6	VL	VH	VH	L	VH	NO	VH
C_7	L	L	VH	NO	H	VH	NO
Working group 2							
	C_1	C_2	C_3	C_4	C_5	C_6	C_7
C_1	NO	L	H	VL	H	L	VH
C_2	L	NO	H	H	H	H	H
C_3	L	VH	NO	VH	VH	VH	VH
C_4	NO	VH	VH	NO	VH	VH	VH
C_5	L	VH	VH	VH	NO	VH	VH
C_6	NO	H	VH	VH	VH	NO	VH
C_7	H	VH	H	L	L	L	NO
Working group 3							
	C_1	C_2	C_3	C_4	C_5	C_6	C_7
C_1	NO	H	H	L	H	H	VH
C_2	H	NO	H	H	H	VH	H
C_3	VL	L	NO	H	H	VH	VH
C_4	VL	L	VL	NO	L	VH	VH
C_5	VL	H	H	VH	NO	VH	VH
C_6	VL	H	L	H	H	NO	H
C_7	NO	L	L	L	L	L	NO

Source: compiled by authors.

$$\tilde{z}_{13} = \frac{\sum_{e=1}^{3} \tilde{z}_{ij}^{(e)}}{3} = \left(\frac{0+2.5+2.5}{3}, \frac{0+3.5+3.5}{3}, \frac{1.5+4.5+4.5}{3}\right) = (1.67, 2.33, 3.50)$$

Next, the elements of the normalized initial direct-relation matrix $\tilde{D}$ were determined using Equation (3). In order to obtain the elements of the initial direct-relation matrix, it was necessary to calculate the sum of each row of elements in matrix $\tilde{Z}$, and then choose the maximum element $\tilde{R}$ from the obtained amounts using Equation (4). Table 5 shows the normalized initial direct-relation matrix.

$$\tilde{R} = \max\left(\sum_{j=1}^{n} \tilde{z}_{ij}\right) = (21, 25.33, 28.83)$$

Then the total relation matrix $\tilde{T}$ was calculated using Equation (5). The defuzzified total relation matrix is presented in Table 6. Defuzzification was carried out using Equation (7)

$\tilde{D}_i$ and $\tilde{R}_i$ were obtained by calculating the sum of the rows and columns of the defuzzified total relation matrix using Equations (8) and (9). Finally, the weights of criteria were determined using Equations (10) and (11). Table 7 summarizes these calculations.

Based on the results presented in Table 7, among the HR outcomes, turnover (C_6) and job satisfaction (C_5) were deemed the most important criteria from the viewpoint of the committee members. In the next step, committee members were asked to finalize the list of practices that could be implemented in their organization after

Table 3. Fuzzy Likert scale to assess the extent of the impact of the criteria on each other.

No.	Linguistic terms	Triangular fuzzy numbers	Linguistic values
1	Very high influence (VH)	$\tilde{5}$	(4.50, 5.00, 5.00)
2	High influence (H)	$\tilde{3.5}$	(2.50, 3.50, 4.50)
3	Low influence (L)	$\tilde{2.5}$	(1.50, 2.50, 3.50)
4	Very low influence (VL)	$\tilde{1.5}$	(0.00, 1.50, 2.50)
5	No influence (No)	$\tilde{0}$	(0.00, 0.00, 1.50)

Source: Li (2013).

consulting the HR practices extracted from the literature, taking into account the HRM strategies, and taking in the opinions of the committee members while prioritizing the high-performance HR practices. The selected practices included training (A_1), selective hiring (A_2), performance-based pay (A_3), employee career development (A_4), performance management (A_5), teamwork (A_6), job design (A_7), and employee participation programs (A_8).

The members of the committee were then asked to express the extent to which each of the criteria influences the realization of the HR outcomes identified in the previous stage by using linguistic variables and their expertise in HRM. The definitions of the linguistic variables and the corresponding fuzzy numbers are presented in Table 8 (Saremi et al., 2009).

The preferences of each working group are presented in Table 9.

Since linguistic variables were used for evaluation, these values must be converted into crisp variables according to the methodology. For this purpose, the fuzzy evaluations from the working groups were aggregated using Equation (1) and were defuzzified using Equation (7). The results are presented in Table 10.

Now, the normalized matrix N is calculated using Equations (14) and (15). The results are presented in Table 11.

Taking into account the weights in Table 7, the weighted matrix V is calculated using Equation (16) (shown in Table 12).

Then, the border approximation area matrix G was obtained using Equations (18) and (19) which is presented in Table 13.

In the next step, the distance of each HPWS to the border approximation area Q was calculated using Equation (20) (Table 14).

In the final step, the final scores and ranking of HPWS were calculated based on the MABAC method (Table 15).

Using the MABAC method, performance-based pay (A_3) and employee participation programs (A_8) were ranked first and second, respectively, among the high-performance HR practices based on their significant HR outcomes.

6. Discussion and comparison

In order to analyze the results of the method used, we first compared the findings from the current study with previous research in the field. Previous research did not use MADM methods to prioritize HPWSs. Therefore, in order to evaluate the stability of our method, the results were compared with those of other MADM methods.

As presented in Table 7, employee turnover and employee job satisfaction were the most important HR outcomes from the committee's point of view. These results confirm findings from previous studies that emphasized the attitudes of employees as the

Table 4. Average direct-relation matrix (.∼ Z)

	C1	C2	C3	C4	C5	C6	C7
C1	(0.00,0.00,1.50)	(1.33,2.00,3.17)	(1.67,2.33,3.50)	(0.50,1.33,2.50)	(1.67,2.33,3.50)	(1.33,2.00,3.17)	(3.00,3.33,3.83)
C2	(1.33,2.00,3.17)	(0.00,0.00,1.50)	(2.50,3.50,4.50)	(3.17,4.00,4.67)	(2.50,3.50,4.50)	(3.83,4.50,4.83)	(1.67,2.33,3.50)
C3	(0.50,1.33,2.50)	(2.83,3.67,4.33)	(0.00,0.00,1.50)	(3.83,4.50,4.83)	(3.83,4.50,4.83)	(4.50,5.00,5.00)	(4.50,5.00,5.00)
C4	(0.00,1.00,2.17)	(3.50,4.17,4.50)	(2.33,3.33,4.00)	(0.00,0.00,1.50)	(3.50,4.17,4.50)	(4.50,5.00,5.00)	(4.50,5.00,5.00)
C5	(0.50,1.83,2.83)	(3.17,4.00,4.67)	(3.83,4.50,4.83)	(4.50,5.00,5.00)	(0.00,0.00,1.50)	(4.50,5.00,5.00)	(4.50,5.00,5.00)
C6	(0.00,1.00,2.17)	(3.17,4.00,4.67)	(3.50,4.17,4.50)	(2.83,3.67,4.33)	(3.83,4.50,4.83)	(0.00,0.00,1.50)	(3.83,4.50,4.83)
C7	(1.33,2.00,3.17)	(2.50,3.33,4.00)	(2.83,3.67,4.33)	(1.00,1.67,2.83)	(1.83,2.83,3.83)	(2.50,3.33,4.00)	(0.00,0.00,1.50)

Source: authors' own calculations.

Table 5. Normalized initial direct-relation matrix.∼ (D)

	C1	C2	C3	C4	C5	C6	C7
C1	(0.00,0.00,0.07)	(0.05,0.08,0.15)	(0.06,0.09,0.17)	(0.02,0.05,0.12)	(0.06,0.09,0.17)	(0.05,0.08,0.15)	(0.10,0.13,0.18)
C2	(0.05,0.08,0.15)	(0.00,0.00,0.07)	(0.09,0.14,0.21)	(0.11,0.16,0.22)	(0.09,0.14,0.21)	(0.13,0.18,0.23)	(0.06,0.09,0.17)
C3	(0.02,0.05,0.12)	(0.10,0.14,0.21)	(0.00,0.00,0.07)	(0.13,0.18,0.23)	(0.13,0.18,0.23)	(0.16,0.20,0.24)	(0.16,0.20,0.24)
C4	(0.00,0.04,0.10)	(0.12,0.16,0.21)	(0.08,0.13,0.19)	(0.00,0.00,0.07)	(0.12,0.16,0.21)	(0.16,0.20,0.24)	(0.16,0.20,0.24)
C5	(0.02,0.07,0.13)	(0.11,0.16,0.22)	(0.13,0.18,0.23)	(0.16,0.20,0.24)	(0.00,0.00,0.07)	(0.16,0.20,0.24)	(0.16,0.20,0.24)
C6	(0.00,0.04,0.10)	(0.11,0.16,0.22)	(0.12,0.16,0.21)	(0.10,0.14,0.21)	(0.13,0.18,0.23)	(0.00,0.00,0.07)	(0.13,0.18,0.23)
C7	(0.05,0.08,0.15)	(0.09,0.13,0.19)	(0.10,0.14,0.21)	(0.03,0.07,0.13)	(0.06,0.11,0.18)	(0.09,0.13,0.19)	(0.00,0.00,0.07)

Source: authors' own calculations.

Table 6. Defuzzified total relation matrix.

	C1	C2	C3	C4	C5	C6	C7
C1	0.05393	0.23387	0.24827	0.20396	0.24804	0.26940	0.30993
C2	0.15908	0.27801	0.39532	0.39942	0.39996	0.47867	0.41288
C3	0.16631	0.46938	0.35399	0.48119	0.50054	0.57619	0.57218
C4	0.14825	0.46438	0.44275	0.31907	0.47028	0.55301	0.54764
C5	0.18576	0.49660	0.51393	0.51133	0.37510	0.59638	0.59205
C6	0.14233	0.44657	0.45396	0.42671	0.46674	0.38138	0.51885
C7	0.14472	0.33678	0.35098	0.28098	0.32797	0.38439	0.27287

Source: authors' own calculations.

Table 7. Calculating the weights of each criteria.

	D_i	R_i	$D_i + R_i$	$D_i - R_i$	W_i	W
C1	1.567399757	1.000387527	2.567787283	0.56701223	2.6296453	0.071145844
C2	2.523339297	2.725584981	5.248924279	−0.202245684	5.252819186	0.142116602
C3	3.119786983	2.759187733	5.878974716	0.360599251	5.89002339	0.159356354
C4	2.945369458	2.622654965	5.568024423	0.322714493	5.577368611	0.150897385
C5	3.271148363	2.788644192	6.059792555	0.482504171	6.078971631	0.164468405
C6	2.836538967	3.239423005	6.075961972	−0.402884038	6.089304511	0.164747964
C7	2.098701742	3.226402165	5.325103907	−1.127700423	5.443201252	0.147267446

Source: compiled by authors.

central variable in the relationship between HPWS and employee performance (Bonias et al., 2010; Cooke et al., 2019; Jensen et al., 2013; Kloutsiniotis & Mihail, 2017). From Yang's (2010) perspective, in particular in service-oriented industries, employee attitudes and behavior in the workplace can have a positive impact on meeting customer expectations (Yang, 2010).

The results of a recent study conducted by Zungbey et al. (2019) emphasized the negative relationship between the HPWS and employee turnover. This means that the effective implementation of HRM practices in the industry can reduce employee turnover at the individual level (Guthrie et al., 2009; Selden & Sowa, 2015; Zungbey et al., 2019). The results of various studies show that this impact can be the direct or indirect result of variables such as job satisfaction, organizational commitment, job engagement and psychological attachment, unions, organizational citizenship

Table 8. Linguistic variables for the ratings.

No.	Linguistic terms	Linguistic values
1	Very poor/very low	(0.00, 0.00, 1.00)
2	Poor/low	(0.00, 1.00, 3.00)
3	Medium poor/medium low	(1.00, 3.00, 5.00)
4	Fair/medium	(3.00, 5.00, 7.00)
5	Medium good/medium high	(5.00, 7.00, 9.00)
6	Good/high	(7.00, 9.00, 10.00)
7	Very good/very high	(9.00, 10.00, 10.00)

Source: Saremi et al. (2009).

behavior, motivation, and trust (Chen et al., 2018; Heffernan & Dundon, 2016; Kloutsiniotis & Mihail, 2017; Kundu & Gahlawat, 2016; Zungbey et al., 2019).

In line with our study's findings, the impact of HPWS on employee job satisfaction (Heffernan & Dundon, 2016; Kloutsiniotis & Mihail, 2017; Mahmood et al., 2019) as well as the impact of job satisfaction on organizational performance (Budie et al., 2019; Delaney & Huselid, 1996; Schyns & Croon, 2006) has been confirmed in several studies.

These studies indicate the necessity of paying attention to the interrelations among the criteria, which has been the main focus of this research.

On the other hand, the results from using the MABAC method (Table 15) show that performance-based pay and employee participation programs are among the most important high-performance HR practices and should, therefore, be taken into account in organizational planning. A review of the research in this field also shows that among high-performance HR practices, a significant proportion of previous studies focused on the role of performance-based pay (Gerhart et al., 2009; Gooderham et al., 2018; Nyberg et al., 2016). Performance-based pay affects current and future employee performance by influencing employee attitudes (Fulmer et al., 2003), enhancing employees' psychological sense of empowerment in the organization (Messersmith et al., 2011; Spreitzer, 1995), and gaining emotional achievements (Nyberg et al., 2016; Perry et al., 2017), which ultimately can enhance organizational performance (Gardner et al., 2011). The findings of Sturman et al. (2012) also confirm that performance-based pay is one of the organizational tools that is best for retaining high-performance employees.

According to the literature, having an employee participation program is categorized as an opportunistic practice of HPWS (Lepak et al., 2006). In most organizations, the top management usually makes the final decisions on key issues. However, employee perceptions about how managers pay attention to their ideas are one of the most important factors to shape employee perceptions of the effectiveness of collaborative systems. If employees perceive that managers do pay attention to their ideas, this can lead to more positive attitudes such as job satisfaction and organizational commitment (Appelbaum et al., 2000). McMahon and Lawler (1995) showed that organizations using employee engagement systems achieve a higher level of performance than other organizations. As Combs et al. (2006) indicate, HPWS can positively influence the performance of an organization while enhancing employee skills, knowledge, and abilities by improving the organization's internal social structures to better facilitate employee communication and cooperation (Combs et al., 2006). In other words, the key feature of HPWS is the reorganization of work processes so that

Table 9. Evaluation of alternatives by each working group.

Working group 1							
	Criterion						
Alternatives	C_1	C_2	C_3	C_4	C_5	C_6	C_7
A_1	G	P	P	P	P	P	P
A_2	G	G	P	VG	VG	VG	G
A_3	P	F	VG	VG	VG	MG	F
A_4	G	P	F	F	VG	VG	VG
A_5	P	P	VG	VG	F	MG	MG
A_6	G	VG	P	VG	F	MG	MG
A_7	P	G	P	VG	VG	VG	VG
A_8	P	VG	F	VG	G	VG	VG
Working group 2							
Alternatives	Criterion						
	C_1	C_2	C_3	C_4	C_5	C_6	C_7
A_1	VG	VG	VG	G	VG	MG	F
A_2	VG	VG	VG	F	MG	F	MG
A_3	VG	VG	VG	VG	VG	VG	VG
A_4	VG	VG	VG	VG	VG	VG	VG
A_5	VG	VG	VG	VG	VG	VG	G
A_6	VG	VG	VG	G	VG	G	MG
A_7	VG	VG	VG	G	VG	MG	G
A_8	VG	VG	VG	VG	VG	VG	VG
Working group 3							
Alternatives	Criterion						
	C_1	C_2	C_3	C_4	C_5	C_6	C_7
A_1	VG	G	G	F	G	F	G
A_2	VG	G	G	VG	G	G	G
A_3	G	VG	VG	G	VG	G	VG
A_4	G	MG	VG	G	VG	G	G
A_5	VG	VG	VG	G	VG	G	VG
A_6	G	VG	VG	G	VG	MG	F
A_7	G	F	VG	G	VG	G	VG
A_8	G	VG	VG	G	G	VG	VG

Source: compiled by authors.

Table 10. Defuzzified aggregate working group's criteria evaluation.

	Criterion						
Alternatives	C_1	C_2	C_3	C_4	C_5	C_6	C_7
A_1	9.500	6.611	6.611	5.000	6.611	4.389	5.000
A_2	9.500	9.167	6.611	8.222	8.556	7.889	8.222
A_3	6.611	8.222	9.833	9.500	9.833	8.556	8.222
A_4	9.167	6.000	8.222	7.889	9.833	9.500	9.500
A_5	6.944	6.944	9.833	9.500	8.222	8.556	8.556
A_6	9.167	9.833	6.944	9.167	8.222	7.611	6.333
A_7	6.611	7.889	6.944	9.167	9.833	8.556	9.500
A_8	6.611	9.833	8.222	9.500	9.167	9.833	9.833

Source: authors' own calculations.

Table 11. Normalized matrix *N*.

	Criterion						
Alternatives	C_1	C_2	C_3	C_4	C_5	C_6	C_7
A_1	1	0.15942	0	0	0	1	0
A_2	1	0.82609	0	0.71605	0.60345	0.35714	0.66667
A_3	0	0.57971	1	1	1	0.23469	0.66667
A_4	0.88462	0	0.5	0.64198	1	0.06122	0.93103
A_5	0.11538	0.24638	1	1	0.5	0.23469	0.73563
A_6	0.88462	1	0.10345	0.92593	0.5	0.40816	0.27586
A_7	0	0.49275	0.10345	0.92593	1	0.23469	0.93103
A_8	0	1	0.5	1	0.7931	0	1

Source: authors' own calculations.

Table 12. Weighted normalized decision matrix *V*.

	Criterion						
Alternatives	C_1	C_2	C_3	C_4	C_5	C_6	C_7
A_1	0.1423	0.1648	0.1594	0.1509	0.1645	0.3295	0.1473
A_2	0.1423	0.2595	0.1594	0.2589	0.2637	0.2236	0.2454
A_3	0.0711	0.2245	0.3187	0.3018	0.3289	0.2034	0.2454
A_4	0.1341	0.1421	0.239	0.2478	0.3289	0.1748	0.2844
A_5	0.0794	0.1771	0.3187	0.3018	0.2467	0.2034	0.2556
A_6	0.1341	0.2842	0.1758	0.2906	0.2467	0.232	0.1879
A_7	0.0711	0.2121	0.1758	0.2906	0.3289	0.2034	0.2844
A_8	0.0711	0.2842	0.239	0.3018	0.2949	0.1647	0.2945

Source: authors' own calculations.

Table 13. Border approximation area matrix (G).

	Criterion						
BAA	C_1	C_2	C_3	C_4	C_5	C_6	C_7
g_i	0.100494	0.212398	0.21495	0.262401	0.269354	0.212407	0.237576

Source: authors' own calculations.

Table 14. The distance of the alternatives to the border approximation area (Q).

	Criterion						
Alternative	C_1	C_2	C_3	C_4	C_5	C_6	C_7
A_1	0.041798	−0.04762	−0.05559	−0.1115	−0.10489	0.117089	−0.09031
A_2	0.041798	0.04712	−0.05559	−0.00345	−0.00564	0.011179	0.00787
A_3	−0.02935	0.012106	0.103763	0.039394	0.059582	−0.00899	0.00787
A_4	0.033588	−0.07028	0.024084	−0.01463	0.059582	−0.03757	0.046802
A_5	−0.02114	−0.03527	0.103763	0.039394	−0.02265	−0.00899	0.018026
A_6	0.033588	0.071836	−0.03911	0.028217	−0.02265	0.019585	−0.04968
A_7	−0.02935	−0.00025	−0.03911	0.028217	0.059582	−0.00899	0.046802
A_8	−0.02935	0.071836	0.024084	0.039394	0.025554	−0.04766	0.056959

Source: authors' own calculations.

Table 15. Prioritization of HPWS based on the MABAC method.

Alternative	*S*	Rank
A_1	−0.251030174	8
A_2	0.043281274	5
A_3	0.184371964	1
A_4	0.041573114	7
A_5	0.073131072	3
A_6	0.041781771	6
A_7	0.056897973	4
A_8	0.140819817	2

Source: authors' own calculations.

employees have the opportunity to coordinate their efforts in the organization (Choi, 2008). Organizations that introduce their own HPWS have relatively flat structures that emphasize the decentralization of employee information processing to allow employees to use information in decision-making and problem-solving processes. In addition, the collaborative organizational climate created by HPWS promotes a sense of psychological empowerment among employees (Messersmith et al., 2011; Spreitzer, 1995).

In order to analyze the stability of the method used, the results of the MABAC method were compared with the results of simple additive weighting (SAW) (Hwang & Yoon, 1981), technique for order of preference by similarity to ideal solution (TOPSIS) (Hwang & Yoon, 1981), additive ratio assessment (ARAS) (Zavadskas &

Turskis, 2010) and weighted aggregated sum product assessment (WASPAS) (Zavadskas et al., 2012). These methods are commonly used MCDM methods for ranking alternatives.

Based on the criteria weights obtained using the DEMATEL method, the ranking results for the solutions are derived through these four methods. The final rankings of the solutions are presented in Table 16.

As seen in the table, the results for the decision-making methods used in this case rarely changed. Therefore, the results of the applied model have an acceptable level of stability.

7. Conclusion

HPWS is a set of practices that seeks to transform employees so that they can be a source of sustainable competitive advantage for the organization by enhancing their skills levels, competency, and productivity (Datta et al., 2005). Specifically, researchers look at those HPWSs that are more likely to influence employee attitudes and, consequently, individual and organizational performance to select and implement more appropriate improvement strategies (Zopiatis et al., 2014). Despite the importance of this issue, there are still major challenges in the theoretical field. Although researchers in the field of HRM agree that a systematic approach to HR practices is more appropriate than a one-dimensional approach, there is no consensus concerning the configuration and importance of the practices that constitute HPWS (Boxall & Macky, 2007; Cooke et al., 2019; Van De Voorde & Beijer, 2015). That is why choosing the right HPWS to aligns an organization with its goals and strategies is crucial for achieving the desired HR outcomes and ultimately enhance organizational performance. On the other hand, despite acknowledging the importance of the role of HPWS, the way HPWS affect HR outcomes and consequently organizational performance remains unclear (Chuang & Liao, 2010).

An important point in determining the priorities for human resource managers' decision-making processes in an organization so that they can achieve the best HR outcomes through HPWS is that the factors that can influence these decisions are multi-dimensional and complex. This is the reason why the common statistical models are not useful for examining the relationships between HPWS and performance (Zhang et al., 2014). Consequently, there is no specific model or process for prioritizing high-performance HR practices at the organizational level. Given the capability of MADM methods to deal with various criteria that may be contradictory, this study aimed to propose a MADM-based framework that provides the means for prioritizing HR practices by taking into account their impact on various HR outcomes. The important point is that there is a need to pay attention to the interactions among the various HR outcomes that few of the MADM methods have addressed.

Based on this framework, high-performance HR practices and HR outcomes were identified based on the review of theoretical literature and the views of decision-makers and HR experts. Then, due to the interactions among HR outcomes, a DEMATEL-MABAC method was used to prioritize identified actions. Based on this method, the weights of the criteria were calculated using DEMATEL method, and

Table 16. The ranking results derived from the selected MCDM methods.

Alternative	*SAW*	TOPSIS	ARAS	WASPAS	MABAC
A_1	8	8	8	8	8
A_2	5	5	5	5	5
A_3	1	1	1	1	1
A_4	6	7	7	7	7
A_5	4	3	3	3	3
A_6	7	6	6	6	6
A_7	3	4	4	4	4
A_8	2	2	2	2	2

Source: authors' own calculations.

then the alternatives were ranked using the MABAC method. Finally, the designed framework was implemented in an organization active in the banking industry. According to the results, employee turnover and employee job satisfaction were the most important HR outcomes. In addition, performance-based pay and employee participation programs were ranked first and second, respectively, among the HR practices. Managers and decision-makers of organizations can use these results to improve employee performance and, consequently, the performance of the organization. Accordingly, while taking into account the resource constraints in organizations, the priorities presented can be helpful in budgeting HRM improvement projects and the necessary resource allocation for them.

This research is the first attempt to use MADM methods for selecting HPWSs and applying this framework in the banking industry. Future research can utilize this framework for other industries. On the other hand, the proposed framework ultimately provides only a ranking of the HPWSs, though future research in this field may focus on selecting HRM improvement projects or an HPWS combination while considering resource constraints. In addition, given the complexity of the issue and the need for strong theoretical and empirical knowledge to make the expected comparisons and evaluations, utilizing decision-making methods that can better reflect the ambiguity of experts (e.g., intuitive fuzzy numbers with interval values) or incorporating the experts' uncertainty into the designed framework (e.g., hesitant fuzzy numbers) may be useful.

Disclosure statement

No potential conflict of interest was reported by the authors.

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