

## Identifying and ranking the human resources management criteria influencing on organizational performance using MADM Fuzzy techniques

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### CHRONICLE

#### Article history:

Received December 2, 2013

Accepted 8 May 2014

Available online

May 28 2014

#### Keywords:

Human Resource Management

(HRM) Criteria

Organizational Performance

Fuzzy MADM

### ABSTRACT

Human resources management plays essential role for the success of organizations. This paper presents an empirical investigation to determine human resource management main criteria and sub-criteria based on a survey on the existing literatures and theoretical principles. The study has been applied in a municipality organization in Iran. The study uses analytical hierarchy process as well as fuzzy technique for order preference by similarity to ideal solution (TOPSIS) for prioritizing decision tree criteria. The results indicate job design and human resource planning criteria are ranked as the highest ones. In addition, employee recruitment and selection, employee health and hygiene, training and development and compensation system criteria are other important criteria.

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## 1. Introduction

Human resource management (HRM) is normally described as identifying, selecting, hiring, training, and developing human resource (HR) to reach organizational objectives. Human resource of an organization means all people who are engaged in different levels of the organization and organization means a small or large establishment built for a certain intention to achieve specified goals. Since the organization is designed and managed by human and people working throughout organization is the main topic of HRM, HR issues cannot be confined to only one area of expertise. As a result, managements' decisions and performance influence on all levels of organization and consequently the overall performance of organization (Saadat, 2007). Given the presence of HR in all parts of the organization, HRM plays essential role in improving organizational performance by developing plans for personnel optimal management and appropriate employment of organization's employees. Considering the relative important role of HRM in achieving organizational goals, senior

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management's increasing attention to this field seems obvious. HRM refers to the policies, practices and systems, which influence employees' behavior, attitudes and performance (De Cieri & Kramar, 2005). Human resource practices include determining human resource needs, recruiting, screening, training, rewarding, appraising and also attending to labor relations, health and safety and fairness concerns (Dessler, 2007, 2009). Human resource practices result in human resource outcomes, which in turn influence firm performance (Boselie et al., 2001; Tzafrir, 2006). Numerous studies have defined the components of HR functions and organizational performance and described the relationship and influence of these factors on the organizational performance. Thus, in recent decades, researchers have emphasized on the impact of HR criteria on organizational performance (Becker & Gerhart, 1996; Delery & Doty, 1996; Huselid, 1995). Although there is a consensus that a wide range of HRMP has a positive impact on organizational performance, many studies have not determined the nature of these practices (Becker & Gerhart, 1996). Therefore, after identifying the key HRM criteria influencing the organizational performance using fuzzy analytical hierarchy process (FAHP) (Chang, 1996) and fuzzy technique for order preference by similarity to ideal solution TOPSIS (Wang & Elhag, 2006) techniques, this study aims to rank these criteria and sub-criteria and at the subsequent stage, the final ranking of these criteria and sub-criteria is determined using mean rank method.

## **2. Theoretical Foundations**

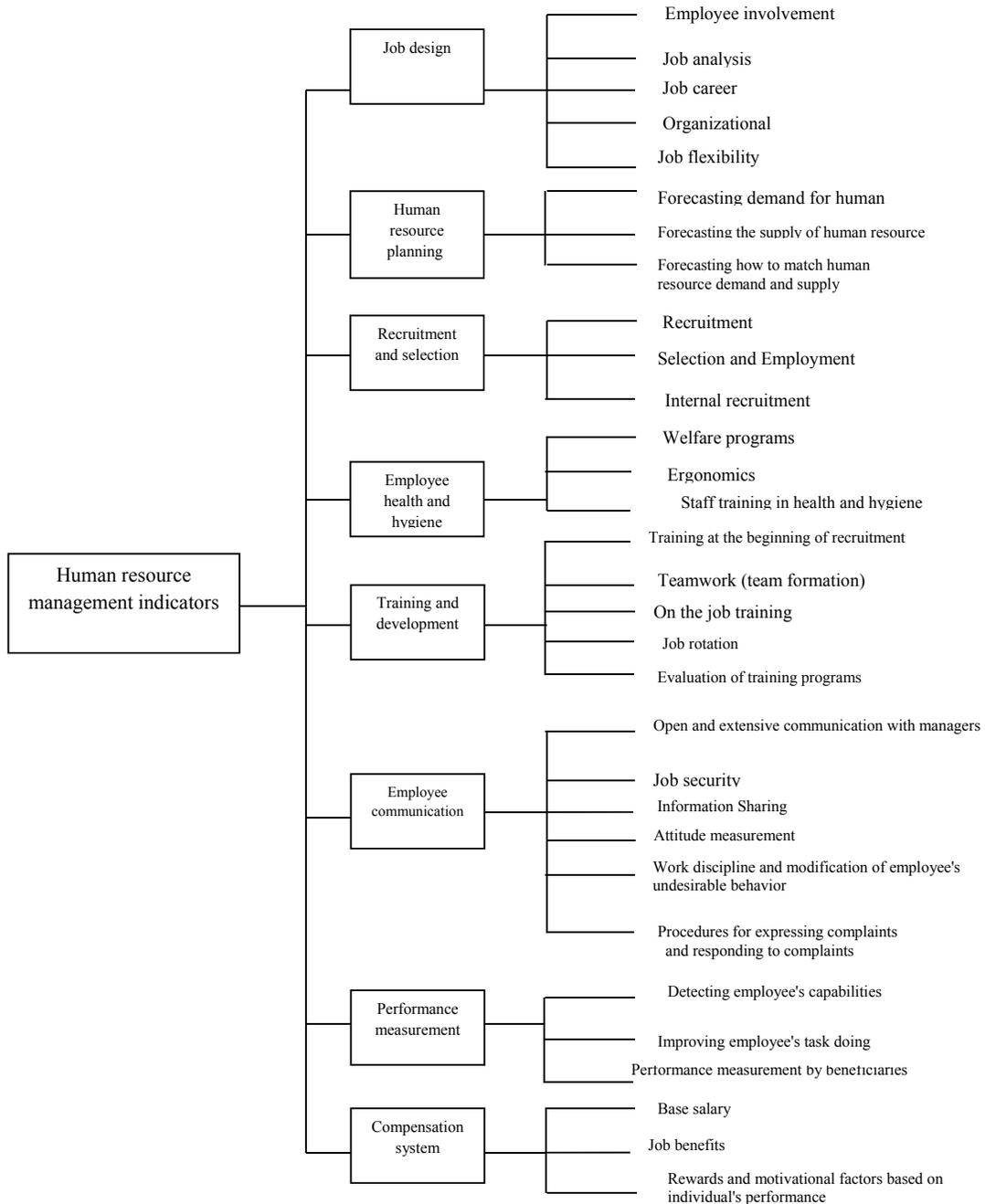
### *2.1 Human Resource Management*

The success of any organization depends on the allocation and deployment of appropriate tools, equipment, money, raw materials, and human resource of the organization in its plans. This will be possible only if the organization is capable of applying its skills, abilities and individual and social characteristics of its employees in line with organizational goals (Seyed Javadin, 2006). Given the importance of HRM in any organization, some explanations on this topic will be discussed.

### *2.2. Human Resource Management definition and its criteria*

There are literally various definitions for human resource management. Here, a definition is referred which is more relevant to the study content. The purpose of HRM is policies and procedures required for the implementation of a part of management task, which depends on those aspects of employee activities especially for recruitment, employees' training, performance evaluation, rewarding, and creating a healthy and fair environment for employees. For example, these policies and procedures will include various criteria such as job analysis (determining the nature of each employee's job), human resource planning, recruitment, selection of qualified applicants, newly recruited employees' justification and training, salary and wages management (how to compensate employees), motivations and benefits, performance evaluation, communicating with employees (interviewing, consulting and disciplinary rules), human resource development and training, employee's commitment to the organization (Dessler, 2007, 2009).

Given the above definitions as well as other definitions of HRM and since a standard definition was not found for HRM criteria based on carried out studies, it can be said that HRM criteria include the distinct but interrelated activities, tasks and processes of human resources management system that are sought to attract, retain and improve the organization's human resources and they are formed simultaneously with the formation of human resource management system and as main components of this system and are used to realize the goals of the organization and human resource. In his study, Karimian and Khosravi (2012) identified eight key criteria of effective HRM on organizational performance. These criteria identified in this area include job design, human resource planning, recruitment and selection, employee's health, training and development, employee's communication, performance measurement, and compensation system. Note that in each of these criteria, several key sub-criteria are identified and the hierarchy of these criteria and sub-criteria is given as Fig. 1.



**Fig. 1.** Hierarchy of indicators and sub-indicators of HRM

### 2.3. Organizational performance

Organizational performance means the external effectiveness and efficiency indicators of an organization; in this definition, organizational performance criteria are divided into two subjective and objective categories. The objective criteria of organizational performance are criteria that are measured quite truly and based on concrete data. The Subjective criteria of organizational performance include criteria, which are formed based on the judgment of organization's interest groups. Scholars have differentiated between organizational performance and organizational effectiveness. Some believed that organizational performance is more specific than organizational effectiveness concept. In other words, organizational performance involves external dimension of organizational effectiveness, while organizational effectiveness also includes internal factors besides

the external factors (Devinney et al., 2005). Generally, performance is referred to the nature and quality of the work that the organization performs to fulfill its mission for profitability (Sink, 1991). From a quantitative view, performance represents a dimension of a scale i.e. it can be quantified in different ways. For example, performance levels can be expressed as number or percentage so that managers understand its meaning easily. Performance goals are meaningful only when they can be shown quantifiably (Macleod et al, 1997). The importance role which organizational performance has in academic studies and practical areas such as managerial rewards and organizational survival has been caused sufficient understanding of this construct and how to measure it and recognizing factors which can affect it, have had special importance (Fathi, 2007).

#### *2.4. HRM and organizational performance criteria*

It might be said that the superior performance of many organizations is because of the unique competencies and capabilities of the organization's human resources. HRM system and thus the quality of system components and criteria in each organization are associated with improved organizational performance. It demands more attention to this organizational area. Numerous studies have demonstrated the widely accepted theoretical basis of the relationship between human resource practices and organizational performance (Appelbaum, 2000; Cho et al., 2006; Huselid, 1995; Khatri, 2000; Pfeffer, 1994). Empirical studies have identified and utilized the significant relationship between human resource practices and organizational performance (Kaplan & Atkinson, 1998; Paul & Anantharaman, 2003. Huselid (1995) found that human resource practices influence various aspects of organizational performance, including turnover, productivity, and corporate financial performance. Ramsay et al. (2000) demonstrated that the notion of HRMP impacting on organizational performance through a "high road" approach has become a key element in HR literature (Huselid, 1995; Pfeffer, 1994, 1998). This "high road" approach asserts that some HRMP are universalistic, i.e. appropriate and advantageous for all firms. Accordingly, organizations from different sectors, across industries, and through different periods should use these HRMP (Delery & Doty, 1996; Bamberger & Meshoulam, 2000). The universalistic perspective asserts that there was a simple direct relationship between several HRMP and organizational performance (Delery & Doty, 1996). Thus, a universal HRM practice would directly influence organizational performance, independent of other external and internal organizational factors. (Tzafrir, 2006).

### **3. The proposed study**

The main question of the survey is to determine and prioritize HRM criteria influencing organizational performance. To answer this question, we need to find HRM criteria and sub-criteria affecting organizational performance and propose appropriate ranking techniques. In terms of purpose, this study is applied and regarding nature, it is a descriptive-survey research, which is aimed to identify and prioritize HRM criteria and sub-criteria. In this study, the population is composed of HRM scholars who are considered for questionnaires distribution and ranking HRM criteria affecting organizational performance. Therefore, in this study, the population consists of HRM professors of Shahed and Isfahan Universities and HR managers and experts of Isfahan Municipality and affiliated organizations that their views as scholars in this field will consider both theoretically and practically and they are totally 16. Thus, the sample of this study also consists of HRM professors of Shahed and Isfahan Universities and HR managers and experts of Isfahan Municipality and affiliated organizations that are determined through the census.

The main tool used in this study is questionnaire. In this study, two questionnaires are used. The required information is collected through these questionnaires in order to be able to determine the relative weight and ranking of relevant criteria and sub-criteria affecting the organizational performance using Fuzzy AHP and Fuzzy TOPSIS techniques. Therefore, in first questionnaire, based on pairwise comparisons tables, first main HRM criteria and then their relevant sub-criteria are compared and evaluated in order to determine the relative weight and ranking of relevant criteria and

sub-criteria affecting the organizational performance using Fuzzy AHP method. In second questionnaire, based on seven-point scale (from very low to very high), the importance of each sub-criteria affecting organizational performance is determined. Then, according to fuzzy TOPSIS technique, the ranking of criteria and sub-criteria is determined. Finally, based on mean rank technique, the final ranking of HRM criteria and sub-criteria affecting organizational performance is determined. In both questionnaires, since a series of pre-designed standard tables are used, so it can be said that the questionnaires have an acceptable validity. To determine the reliability of first questionnaire, the inconsistency ratio (IR) of each one of questionnaire tables is calculated. Given that if IR is less than 1%, the consistence rate of matrix is acceptable and a serious inconsistency does not exist in matrix. In this measurement tool, regarding the inconsistency ratio of each table, the consistency of most matrices is acceptable. If responses are modifiable, after modifying the responses, matrices with inconsistency higher than acceptable level are used in calculations. Otherwise, they are inevitably excluded from the calculations. In this study, MATLAB software is used for data analysis. The method is that after doing necessary programming in this software, the HRM criteria and sub-criteria are ranked based on fuzzy AHP and fuzzy TOPSIS using this software.

#### 4. Results

After taking the important step of identifying HRM criteria and sub-criteria affecting organizational performance, which is presented in Fig. 1 and after data collection, extraction and classification, fuzzy AHP and fuzzy TOPSIS are used to rank HRM criteria and sub-criteria affecting organizational performance which is referred in the following.

##### 4.1. HRM criteria and sub-criteria ranking using fuzzy AHP technique

Since each one of 16 collected questionnaires was consisted 9 paired comparison matrices, first a combined matrix was obtained for each paired comparison matrices using the geometric mean. After obtaining the combined matrices using fuzzy AHP method formulas that have been programmed in MATLAB software, necessary calculations were performed for weighting and ranking the criteria that its results for each paired comparison matrices are as follows.

##### 4.2. Prioritization of key HRM criteria

Eight key HRM criteria as noted in the previous sections are job design, human resource planning, recruitment and selection, employee health and hygiene, training and development, employee communication, performance measurement and compensation system that were ranked based on the stages of fuzzy analytic hierarchy process. In continued, for example, a summary of these calculations and rankings is noted (Table 2 and Table 3).

**Table 2**  
Ranking of key HRM criteria

Row	Criteria	Weight	Rank
1	Human resource planning	0.5748	1
2	Performance evaluation	0.3461	2
3	Recruitment and selection	0.0557	3
4	Training and development	0.0123	4
5	Job design	0.0046	5
6	Compensation system	0.0035	5
7	Employee communication	0.0018	7
8	Employee health and hygiene	0.0013	8

##### 4.3. Prioritization of job design sub-criteria

According to the hierarchy of HRM criteria presented in Fig. 1, job design has five sub-criteria including job analysis, job career, organizational promotion criteria, job flexibility, and employee involvement which were ranked based on the stages of fuzzy analytic hierarchy process (Table 3).

**Table 3**  
Summary of calculations and prioritization of key criteria

Key criteria	$\sum M_{kl}$							
Job design	7.1663				8.4249			9.7250
Human resource planning	13.1300				15.5000			18.0900
Recruitment and selection	7.5540				8.8050			10.2925
Employee health and hygiene	4.9486				5.5813			6.3614
Training and development	6.3983				7.2846			8.5941
Employee communication	4.8935				5.6537			6.5818
Performance evaluation	10.2219				12.0142			14.2007
Compensation system	7.2692				8.5352			9.7135
$\sum \sum M_{ij}$	61.5817				71.7989			83.5591
$(\sum \sum M_{ij})^{-1}$	0.0120				0.0139			0.0162
$S_1$	0.0858				0.1173			0.1579
$S_2$	0.1571				0.2159			0.2938
$S_3$	0.0904				0.1226			0.1671
$S_4$	0.0592				0.0777			0.1033
$S_5$	0.0766				0.1015			0.1396
$S_6$	0.0586				0.0787			0.1069
$S_7$	0.1223				0.1673			0.2306
$S_8$	0.0870				0.1189			0.1577
$V(S_1 \geq S_2)$					0.0079			
$V(S_1 \geq S_3)$					0.9273			
$V(S_1 \geq S_4)$					1.0000			
.....					.....			
$V(S_8 \geq S_7)$					0.4222			
$V(S_1 \geq S_2, S_3, \dots, S_8)$					0.0079			
$V(S_2 \geq S_1, S_3, \dots, S_8)$					1.0000			
$V(S_3 \geq S_1, S_2, \dots, S_8)$					0.0969			
$V(S_4 \geq S_1, S_2, \dots, S_8)$					0.0023			
$V(S_5 \geq S_1, S_2, \dots, S_8)$					0.0214			
$V(S_6 \geq S_1, S_2, \dots, S_8)$					0.0031			
$V(S_7 \geq S_1, S_2, \dots, S_8)$					0.6021			
$V(S_8 \geq S_1, S_2, \dots, S_7)$					0.0061			
$w'$	0.0079	1.0000	0.0969	0.0023	0.0214	0.0031	0.6021	0.0061
$w$	0.0046	0.5748	0.0557	0.0013	0.0123	0.0018	0.3461	0.0035

**Table 4**  
Ranking of job design sub-criteria

Row	Criteria	Weight	Rank
1	Job analysis	0.5506	1
2	Organizational promotion criteria	0.4200	2
3	Job career	0.0147	3
4	Job flexibility	0.0084	4
5	Employee involvement	0.0063	5

#### 4.4. Prioritization of human resource planning sub-criteria

Given the hierarchy of HRM criteria given in Fig. 1, human resource planning has three sub-criteria including forecasting the demand for human resource, forecasting the supply of human resource, and forecasting how to match HR demand and supply which have been ranked based on the stages of fuzzy analytic hierarchy process and Table 5 shows the results of our survey.

**Table 5**  
Ranking of human resource planning sub-criteria

Row	Criteria	Weight	Rank
1	Forecasting how to match HR demand and supply	0.9659	1
2	Forecasting the supply of human resource	0.0202	2
3	Forecasting demand for human resource	0.0139	3

#### 4.5 Prioritization of recruitment and selection sub-criteria

Given the hierarchy of HRM criteria, recruitment and selection has three sub-criteria including recruitment, employment and selection, internal recruitment ranked based on the stages of fuzzy analytic hierarchy process (Table 6).

**Table 6**  
Ranking of recruitment and selection

Row	Criteria	Weight	Rank
1	Recruitment	0.4009	1
2	Employment and selection	0.3303	2
3	Internal recruitment	0.2689	3

#### 4.6. Prioritization of employee's health and hygiene sub-criteria

According to the hierarchy of HRM criteria presented in Fig. 1, employee's health and hygiene has three sub-criteria including welfare programs, ergonomics, staff training in health and hygiene which have been ranked based on the stages of fuzzy analytic hierarchy process. Following, after doing required ranking calculations, ranking of these sub-criteria has been referred (Table 7).

**Table 7**  
Ranking of employee health and hygiene sub-criteria

Row	Criteria	Weight	Rank
1	Ergonomics	0.5688	1
2	Staff training in health and hygiene	0.3885	2
3	Welfare programs	0.0427	3

#### 4.7. Prioritization of training and development sub-criteria

Given the hierarchy of HRM criteria presented in Fig. 1, training and development has five sub-criteria including training at the beginning of recruitment, teamwork (team formation), on the job training, job rotation, and evaluation of training programs which have been ranked based on the stages of fuzzy analytic hierarchy process. Following, after doing required ranking calculations, ranking of these sub-criteria has been referred (Table 8).

**Table 8**  
Ranking of training and development sub-criteria

Row	Criteria	Weight	Rank
1	Training at the beginning of recruitment	0.2824	1
2	On the job training	0.2796	2
3	Evaluation of training programs	0.1818	3
4	Job rotation	0.1464	2
5	Teamwork (team formation)	0.1098	3

#### 4.8. Prioritization of employee communication sub-criteria

**Table 9**  
Ranking of employee communication sub-criteria

Row	Criteria	Weight	Rank
1	Job security	0.6205	1
2	Work discipline and modification of employee's undesirable behavior	0.3677	2
3	Procedures for expressing complaints and responding to complaints	0.0048	3
4	Open and extensive communication with managers	0.0033	4
5	Attitude measurement	0.0023	5
6	Information sharing	0.0014	6

According to the hierarchy of HRM criteria presented in Fig. 1, employee communication has six sub-criteria including open and extensive communication with managers, job security, information sharing, attitude measurement, work discipline and modification of employee's undesirable behavior, and procedures for expressing complaints and responding to complaints which have been ranked based on the stages of fuzzy analytic hierarchy process and Table 9 shows the results.

#### 4.9. Prioritization of performance evaluation sub-criteria

According to the hierarchy of HRM criteria given in Fig. 1, performance evaluation has three sub-criteria including detecting employee's capabilities, improving employee's task doing, performance

evaluation by interest groups which have been ranked based on the stages of fuzzy analytic hierarchy process. Table 10 shows details of our survey.

**Table 10**  
Ranking of performance evaluation sub-criteria

Row	Criteria	Weight	Rank
1	Detecting employee's capabilities	0.8990	1
2	Performance evaluation by beneficiaries	0.0832	2
3	Improving employee's task doing	0.0177	3

#### 4.10. Prioritization of compensation system sub-criteria

Given the hierarchy of HRM criteria presented in Fig. 1, compensation system has three sub-criteria including base salary, job benefits, and rewards and motivational factors based on individual's performance ranked based on the stages of fuzzy analytic hierarchy process (See Table 11).

**Table 11**  
Ranking of compensation system sub-criteria

Row	Criteria	Weight	Rank
1	Rewards and motivational factors based on individual's performance	0.6023	1
2	Base salary	0.3933	2
3	Job benefits	0.0044	3

#### 4.11. HRM criteria and sub-criteria ranking using extended fuzzy TOPSIS

After collecting questionnaires related to extended fuzzy TOPSIS technique using fuzzy numbers equivalent to seven-point scale (form very low to very high), the arithmetic mean of HRM scholars' responses was obtained for each sub-criteria and finally for main criteria. In the subsequent stage, using extended fuzzy TOPSIS formulas, which were programmed in MATLAB software, the necessary calculations were performed in order to obtain the relative closeness of each alternative and criteria and sub-criteria rankings. The results are as follows:

#### 4.12. Prioritization of main HRM criteria

Eight key HRM criteria, as described in the previous sections, include job design, human resource planning, recruitment and selection, employee's health and hygiene, training and development, employee's communication, performance evaluation, and compensation systems that were ranked based on extended fuzzy TOPSIS technique. In continued, after doing calculations for ranking, the ranking of these criteria is mentioned (Table 12). It is noteworthy that in the following tables, score means the closeness to the ideal solution.

**Table 12**  
The results of ranking the main HRM criteria

Row	Criteria	Positive distance	Negative distance	Score	Rank
1	Job design	3.0378	12.6000	0.8057	1
2	Employee health and hygiene	3.0892	12.6493	0.8037	2
3	Performance evaluation	3.1655	12.4894	0.7978	3
4	Compensation system	3.1792	12.4694	0.7968	4
5	Employee communication	3.5473	12.1122	0.7735	5
6	Training and development	3.8070	11.8423	0.7567	6
7	Recruitment and selection	3.8423	11.8905	0.7558	7
8	Human resource planning	5.2609	10.4026	0.6641	8

#### 4.13. Prioritization of job design sub-criteria

According to the hierarchy of HRM criteria shown in Fig. 1, job design criteria contains five main sub-criteria including employee involvement, job analysis, job career, organizational promotion criteria, and job flexibility which are ranked based on extended fuzzy TOPSIS stages. Table 13 shows the results of our survey.

**Table 13**  
The results of ranking the main Job design sub-criteria

Row	Criteria	Positive distance	Negative distance	Score	Rank
1	Employee involvement	2.3037	13.3333	0.8527	1
2	Job analysis	2.8118	12.9359	0.8214	2
3	Job career	2.8373	12.8999	0.8197	3
4	Organizational promotion criteria	3.2459	12.5586	0.7946	4
5	Job flexibility	3.5552	12.2736	0.7754	5

#### 4.14. Prioritization of human resource planning sub-criteria

According to the hierarchy of HRM criteria shown fig. 1, human resource planning contains three main sub-criteria including forecasting demand for human resource, forecasting human resource supply, and forecasting how to match HR demand and supply which are ranked based on extended fuzzy TOPSIS stages and Table 14 demonstrates the results of our survey.

**Table 14**  
The results of ranking the HRM planning sub-criteria

Row	Criteria	Positive distance	Negative distance	Score	Rank
1	Forecasting demand for human resource	3.7880	12.2699	0.7641	1
2	Forecasting how to match HR demand and supply	4.3202	11.7574	0.7313	2
3	Forecasting the supply of human resource	5.5099	10.4906	0.6556	3

#### 4.15. Prioritization of recruitment and selection sub-criteria

Given the hierarchy of HRM criteria given in Fig. 1, recruitment and selection contains three main sub-criteria including recruitment, employment and selection, and internal recruitment that are ranked based on extended fuzzy TOPSIS stages. Table 15 shows the results of our survey.

**Table 15**  
The results of ranking the recruitment and selection sub-criteria

Row	Criteria	Positive distance	Negative distance	Score	Rank
1	Employment and selection	3.4942	12.3733	0.7798	1
2	Internal recruitment	3.5971	12.2880	0.7736	2
3	Recruitment	3.6911	12.2592	0.7686	3

#### 4.16. Prioritization of employees' health and hygiene sub-criteria

Given the hierarchy of HRM criteria presented in Fig. 1, employees' health and hygiene has three main sub-criteria including welfare programs, ergonomics, and staff training in health and hygiene that are ranked based on extended fuzzy TOPSIS stages. Table 16 shows the results.

**Table 16**  
The results of employees' health and hygiene sub-criteria ranking

Row	Criteria	Positive distance	Negative distance	Score	Rank
1	Staff training in health and hygiene	2.8000	12.9708	0.8225	1
2	Ergonomics	3.0155	12.8509	0.8099	2
3	Welfare programs	3.3024	12.4715	0.7906	3

#### 4.17. Prioritization of training and development sub-criteria

**Table 17**  
The results of training and development sub-criteria ranking

Row	Criteria	Positive distance	Negative distance	Score	Rank
1	On the job training	2.9454	12.8633	0.8137	1
2	Training at the beginning of recruitment	3.4080	12.3125	0.7832	2
3	Teamwork (team formation)	3.4819	12.2923	0.7793	3
4	Evaluation of training programs	4.1179	11.6722	0.7392	4
5	Job rotation	5.3312	10.3980	0.6611	5

Given the hierarchy of HRM criteria presented in Fig. 1, training and development has five main sub-criteria including training at the beginning of recruitment, teamwork (team formation), on the job training, job rotation, and evaluation of training programs that are ranked based on extended fuzzy TOPSIS stages and the results are summarized in Table 17.

#### 4.18. Prioritization of employees' communication sub-criteria

Given the hierarchy of HRM criteria presented in Fig. 1, employees' communication contains six main sub-criteria including open and extensive communication with managers, job security, information sharing, attitude measurement, work discipline and modification of employee's undesirable behavior, and procedures for expressing complaints and responding to complaints that are ranked based on extended fuzzy TOPSIS stages and the results are given in Table 18 as follows,

**Table 18**

The results of Employees' communication sub-criteria ranking

Row	Criteria	Positive distance	Negative distance	Score	Rank
1	Work discipline and modification of employee's undesirable behavior	2.4324	13.2814	0.8452	1
2	Job security	2.8354	12.8312	0.8190	2
3	Information sharing	3.5704	12.1848	0.7734	3
4	Procedures for expressing complaints and responding to complaints	3.8429	11.9274	0.7562	4
5	Open and extensive communication with managers	4.1639	11.6138	0.7361	5
6	Attitude measurement	4.9327	10.9155	0.6888	6

#### 4.19. Prioritization of performance evaluation sub-criteria

Given the hierarchy of HRM criteria given in Fig. 1, performance evaluation contains three main sub-criteria including detecting employee's capabilities, improving employee's task doing, and performance evaluation by interest groups that are ranked based on extended fuzzy TOPSIS stages and Table 19 shows the results.

**Table 19**

The results of Performance evaluation sub-criteria ranking

Row	Criteria	Positive distance	Negative distance	Score	Rank
1	Detecting employee's capabilities	2.7435	12.9410	0.8251	1
2	Improving employee's task doing	3.0099	12.7420	0.8089	2
3	Performance evaluation by interest groups	3.6546	12.1005	0.7680	3

#### 4.20. Prioritization of compensation system sub-criteria

Given the hierarchy of HRM criteria presented in Fig. 1, compensation system contains three main sub-criteria including base salary, job benefits, and rewards and motivational factors based on individual's performance that are ranked based on extended fuzzy TOPSIS stages and the results are given in Table 20 as follows,

**Table 20**

The results of compensation system sub-criteria ranking

Row	Criteria	Positive distance	Negative distance	Score	Rank
1	Rewards and motivational factors based on individual's performance	2.0628	13.5374	0.8678	1
2	Job benefits	3.3317	12.4276	0.7886	2
3	Base salary	4.2269	11.5023	0.7313	3

#### 4.21. Final ranking of HRM criteria and sub-criteria

After HRM criteria and sub-criteria ranking using fuzzy AHP and fuzzy TOPSIS methods, mean rank method was used for final ranking of these criteria and sub-criteria, which is pointed out below.

#### 4.22. Final ranking of main HRM criteria

As mentioned previously, eight main HRM criteria included job design, human resource planning, recruitment and selection, employees' health and hygiene, training and development, employee's communication, performance evaluation, and compensation system. After ranking of these criteria with fuzzy AHP and fuzzy TOPSIS techniques, mean rank method was used for the final ranking of these criteria. Following the final ranking of these criteria is shown, after doing calculations required for ranking (Table 21).

**Table 21**

The results of final ranking of main HRM criteria

Row	Criteria	Ranking in fuzzy AHP	Ranking in fuzzy TOPSIS	Mean rank	Final ranking
1	Performance evaluation	2	3	2.5	1
2	Job design	5	1	3	2
3	Human resource planning	1	8	4.5	3
4	Recruitment and selection	3	7	5	4
5	Employee health and hygiene	8	2	5	4
6	Training and development	4	6	5	4
7	Compensation system	6	4	5	4
8	Employee communication	7	5	6	5

Following given the hierarchy of HRM criteria, which is presented in figure 1, after ranking with fuzzy AHP and fuzzy TOPSIS techniques, mean rank method was used for the final ranking of these sub-criteria, which the final ranking of each one of main HRM criteria is shown in tables 22-29.

**Table 23**

The results of final ranking of main HRM sub-criteria

Row	Criteria	Ranking in fuzzy AHP	Ranking in fuzzy TOPSIS	Mean rank	Final ranking
1	Forecasting how to match HR demand and supply	1	2	1.5	1
2	Forecasting demand for human resource	3	1	2	2
3	Forecasting the supply of human resource	2	3	2.5	3
4	Forecasting how to match HR demand and supply	1	2	1.5	1
5	Forecasting demand for human resource	3	1	2	2

**Table 24**

The results of final ranking of recruitment and selection sub-criteria

Row	Criteria	Ranking in fuzzy AHP	Ranking in fuzzy TOPSIS	Mean rank	Final ranking
1	Employment and selection	2	1	1.5	1
2	Recruitment	1	3	2	2
3	Internal recruitment	3	2	2.5	3

**Table 25**

The results of final ranking of employees' health and hygiene sub-criteria

Row	Criteria	Ranking in fuzzy AHP	Ranking in fuzzy TOPSIS	Mean rank	Final ranking
1	Ergonomics	1	2	1.5	1
2	staff training in health and hygiene	2	1	1.5	1
3	Welfare programs	3	3	3	2

**Table 26**

The results of final ranking of main HRM sub-criteria

Row	Criteria	Ranking in fuzzy AHP	Ranking in fuzzy TOPSIS	Mean rank	Final ranking
1	Training at the beginning of recruitment	1	2	1.5	1
2	On the job training	2	1	1.5	1
3	Evaluation of training programs	3	4	3.5	2
4	Teamwork (team formation)	5	3	4	3
5	Job rotation	4	5	4.5	4

**Table 27**

The results of final ranking of performance evaluation sub-criteria

Row	Criteria	Ranking in fuzzy AHP	Ranking in fuzzy TOPSIS	Mean rank	Final ranking
1	Detecting employee's capabilities	1	1	1	1
2	Improving employee's task doing	3	2	2.5	2
3	Performance evaluation by beneficiaries	2	3	2.5	2

**Table 28**

The results of final ranking of employee's communication sub-criteria

Row	Criteria	Ranking in fuzzy AHP	Ranking in fuzzy TOPSIS	Mean rank	Final ranking
1	Job security	1	2	1.5	1
2	Work discipline and modification of employee's undesirable behavior	2	1	1.5	1
3	Procedures for expressing complaints and responding to complaints	3	4	3.5	2
4	Open and extensive communication with managers	4	5	4.5	3
5	Information sharing	6	3	4.5	3
6	Attitude measurement	5	6	5.5	4

**Table 29**

The results of final ranking of compensation system sub-criteria

Row	Criteria	Ranking in fuzzy AHP	Ranking in fuzzy TOPSIS	Mean rank	Final ranking
1	Rewards and motivational factors based on individual's performance	1	1	1	1
2	Base salary	2	3	2.5	2
3	Job benefits	3	2	2.5	2

## 5. Discussion and Conclusion

After ranking of HRM criteria and sub-criteria affecting organizational performance using fuzzy MADM (fuzzy AHP and fuzzy TOPSIS) and calculating mean rank, the final ranking of these criteria was determined. Based on this ranking, criteria “performance evaluation”, “job design”, and “human resource planning” maintained the highest priorities; “recruitment and selection”, “employee's health and hygiene”, “training and development”, and “compensation system” were at the fourth priority and “employees' communication” was also at the final ranking. This indicated that Isfahan Municipality and affiliated organizations could more focus on criteria such as performance evaluation, job design, and human resource planning which were recognized as the most significant HRM criteria affecting organizational performance. On the other hand, in criteria “performance evaluation” which was identified as the main HRM criteria affecting organizational performance, sub-criteria “detecting employee's capabilities” received the highest ranking and “improving employee's task doing” and “performance evaluation by interest groups” were at the subsequent priorities. Hence, based on the discussions in the previous sections, it could be concluded that to have a better organizational performance, Isfahan Municipality and its affiliated organizations could be more focused on the study criteria and sub-criteria which were identified through the literature review and theoretical framework and they were ranked according to the scholars' views and it could also attempt to improve and strengthen these cases particularly criteria with higher priority.

## Acknowledgement

The authors would like to thank the anonymous referees for constructive comments on earlier version of this paper.

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