Identifying and Prioritizing the Effective Factors in Improving the Performance of Ilam Fire and Safety Services Organization

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Abstract: The aim of present study was to identify and prioritize the effective factors in improving the performance of Ilam Fire and Safety Services Organization. The study was conducted using qualitative-quantitative method. First, 10 firefighters were interviewed and their opinions were coded and categorized. Then, 12 categories of the factors affecting improvement of the Fire and Safety Services Organization performance in Ilam city were extracted. These factors were extracted through a questionnaire that was distributed among the second statistical population of the study consisting of 83 operational staff and some retirees of the Ilam Fire and Safety Services Organization to confirm or reject accuracy of the factors. One-sample t-test was used to confirm the factors and Friedman test was used to rank them. After comparing the means of each of the proposed factors with the mean "3", results showed that there was a significant difference between the means and according to Friedman test, the highest mean rank (9.34) was related to wages and welfare facilities and the lowest mean rank (4.55) was related to commanding and operation management.

Keywords: Identification, Prioritization, Effective factors, Performance improvement, Fire department, Ilam city

1. Introduction

Fire and Safety Services Organizations have a special importance due to paying increasing attention to safety issues in cities and taking measures to prevent the fires and accidents (Kordi, Mohammadi and Mohammadian, 2016). The job of firefighter is one of the most difficult and stressful jobs, since firefighters are always on the alert and ready and everything is out of control during the accident. A large number of firefighters lose their lives every year. In developed countries, fire department and its officers are considered as key elements of the safety system. High risk and sensitivity, uncertain and complex working conditions, stressful conditions, direct exposure to all kinds of accidents and harmful factors work, and the need for personnel readiness in each hour of the day have made this job to be one of the difficult and harmful jobs (Darvish et al., 2015). Organizations such as fire department can improve the efficiency and effectiveness through performance assessment system and human resources to improve the performance and fulfill the missions and strategies. Performance assessment of the business units has been one of the major concerns for the managers and officials of these units throughout history. The importance of performance assessment has been clarified for organizations. It plays a major role in both the private and public sectors of the government, since it helps to make organizations more transparent by calculating performance. Performance assessment is one of the best methods to obtain information needed to make decisions in organizations. The success of organizations and work environments depends on the efficient use of human resources based on the behavioral sciences. It is essential to gain more and comprehensive knowledge about the concepts and structures related to human resources and its special tools to face the challenge of efficient use of this resource. It is also necessary to use the skill of these structures and tools (Hershey and Blanchard, 1996). The organizational effectiveness and efficiency can be enhanced by identifying variables that are positively related to job performance. Fire departments are among the important and vital service centers in the cities that play a major role in ensuring the safety and comfort of citizens and economic development of cities (Molaei Ghelichi, Javadzad Aghdam, Najafpour and Asadi, 2012). Continuous improvement of organizational performance creates a great synergistic force that can support the program of growth and development and provide opportunities for the organizational excellence. Governments, organizations and institutions are always seeking to achieve this goal. Increasing the efficiency and productivity of any organization requires optimal use of all the factors affecting the production or provision of services (Zare Heshmat, 2001). Since human resources are a major and fundamental factor in any organization, organizational productivity and efficiency depends on performance of the employees of that organization (Zare, 2001, 4). Several studies have indicated that lack of meeting the needs of employees in the organization can be manifested in the form of low efficiency, low profitability and unfulfilled goals, since performance of employees is closely related to their satisfaction. Meeting the needs of employees will be very effective in enhancing the efficiency of employees (Zare, 2001, 4). Due to a research gap on the hazards and problems of firefighting and performance assessment of this organization in Ilam city, the author decided to conduct this study to provide useful information for the officials of this organization to increase its efficiency, prevent a reduction in job performance, and reduce boredom of its employees.

Given what was stated above, this study aims at answering the following questions.

1- What are the ways to improve the performance of Ilam fire department?

2- What is the priority of ways to improve the performance of Ilam fire department?

1.1. Theoretical foundations of research:

1.1.1. Organizational Performance

Performance is the process of explaining the quality of effectiveness and efficiency of the past actions. Based on this definition, performance is divided into two components: 1) Efficiency that describes how the organization uses resources in the production of services or products, that is, the relationship between the actual and desired combination of inputs to produce certain outputs, 2) Effectiveness that describes the degree of achieving organizational goals (Rahnavard, 2008).

1.1.2. Organizational performance measurement

In addition to financial metrics, other aspects of the organizational performance should be considered with increasing competition in the market. Thus, given the importance of measuring performance in organizations, in addition to financial dimensions, non-financial dimensions should also be considered in this regard. For this purpose, various frameworks and models have been proposed to measure the performance, including Malcolm Award model and performance pyramid and balanced scorecard frameworks. Performance measurement systems are designed as a tool for monitoring. According to Nani et al. (1990), performance measurement is the process of ensuring that an organization pursues strategies resulting in the achievement of goals. Although performance measurement in the public sector is relatively new, considerable number of studies have been conducted on the performance measurement, performance indicators, performance assessment, and quality assurance since 1970 (Holloway, Rose & Lawton, 1999).

1.1.3. Performance management

Performance management involves establishing a system for using information related to measure the performance of the organization, by using the results of performance assessment in setting goals, allocating resources and informing managers to maintain or change the current policy to achieve goals (Li, 2001, quoted in Bayazi Tehranband, Aghili and Moein Najafabadi, 2009).

1.1.4. The relationship between performance assessment and performance management

The ability to define, measure and assess performance is one of the requirements for an improvement in any organization. Any organization needs to empower itself in the area of measurement, assessment and presenting its performance to improve its performance. Performance management provides tools to improve organizational performance through communicating and modifying individual, group, and organizational goals and outcomes. In addition, it is a tool for identifying and encouraging superior performance and managing affairs based on assessment results.

1.2. Review of literature

Ghasemi et al. (2016) examined the optimization of fire department resources by considering failure time of machinery. The results showed a 20 % improvement in search and rescue operation time by increasing one resource. Kordi et al. (2016) investigated the selection of a successful management and executive system in the Fire and Safety Services Organization. In this article, considering two management and executive systems (1- Current management system affiliated to municipalities and 2- Independent and integrated national management system, key criteria in managing and implementing fire department operations were identified. AIA Minnesota (2002) distributed a questionnaire with Cronbach's alpha of 0.9 among experts and managers and found that these criteria have different impacts on these management systems. AHP method and EXPERT CHOICE software were used to weight the mentioned criteria. Finally, an independent and integrated management system with a final weight of 9.0.0 was selected as a successful and efficient management and executive system in the fire organizations. He (2013) conducted an article entitled "Assessing the performance of potential fire risk assessment and its application in fire resistance design". This article describes the design of possibility of fire resistance. The design parameters of fire resistant surfaces and fire intensity were considered as default quantities. This method has been assumed with two solutions of safe building design and a periodic solution. This method is also comparable to the experimental findings of articles (He, 2013).

2. Methods

The current research was conducted using a qualitative-quantitative method. The statistical population of this study included experts of the Fire and Safety Services Organization of Ilam city in the qualitative section and it included staffs and some retirees of this organization, who completed the questionnaires, in the quantitative stage. In the present study, due to small size of statistical population, whole population was studied. The first population of the study included 10 experts of the Ilam Fire and Safety Services Organization, and the second population of the study included 83 staffs and some retirees of the Ilam Fire and Safety Services Organization.

2.1. Validity and reliability of data measurement tools

The questionnaire used in this study was extracted through interviews with experts. The validity of the questionnaire was determined at relatively high level with a lot of work done on the indicators and asking the questions of this research and obtaining the opinion of supervisor. Also, the reliability of the test for questionnaire questions was calculated to be 0.86 %, indicating a desirable level of reliability. It can be stated that the questionnaire questions could measure the subject matter to an acceptable extent. Therefore, the research has had a good and acceptable reliability.

3. Results

3.1. Descriptive indices of variables

Table 1: Descriptive indices of research variables, central indices, dispersion indices and indices of shape of distribution of qualitative variables

Descriptive indicators	Provision of facilities and equipment	Management of stations	Commanding and operation management	Databank	Management and planning development	Human resources management
Mean	4.3668	4.1596	3.9431	4.0241	4.1534	4.1754
Median	4.4444	4.2500	4.0000	4.0000	4.2000	4.2222
Mode	4.44	4.25	4.22	4.00	4.10	4.11[a]
SD	.46424	.63267	.58801	.69801	.49997	.43316
Variance	.216	.400	.346	.487	.250	.188
Skewness	-1.115	-.516	-.824	-.506	-1.022	-.667
Standard error of skewness	.264	.264	.264	.264	.264	.264
Kurtosis	2.511	-.558	.676	-.148	2.161	.789
Standard error of kurtosis	.523	.523	.523	.523	.523	.523
Minimum	2.44	2.50	2.11	2.00	2.40	3.00
Maximum	5.00	5.00	5.00	5.00	5.00	5.00

Descriptive indicators	Specific organizing	Development and public relations	Public culture of coping with accidents	Motivation of staffs	Wages and welfare facilities	Urban infrastructure
Mean	4.2390	4.0916	4.1373	4.2771	4.5253	4.1958
Median	4.3333	4.2000	4.2000	4.3333	4.8000	4.2500
Mode	4.33[a]	4.20	4.00	4.33	5.00	4.50
SD	.61054	.55021	.67638	.50154	.62369	.67178
Variance	.373	.303	.457	.252	.389	.451
Skewness	-1.159	-.562	-1.496	-.894	-2.390	-1.243
Standard error of skewness	.264	.264	.264	.264	.264	.264
Kurtosis	1.932	.482	3.611	1.413	7.784	2.302
Standard error of kurtosis	.523	.523	.523	.523	.523	.523
Minimum	2.00	2.20	1.20	2.67	1.40	1.50
Maximum	5.00	5.00	5.00	5.00	5.00	5.00

The first row shows the number of data and the second row shows the mean of data. The median indicates that 50% of the data is less than middle number and 50% of the data are more than the middle number of the set. The proximity of the mean and median values shows the symmetry of data. Mode also indicates data had the highest relative frequency. Standard deviation and variance indicate dispersion of data. Skewness indicates asymmetry with respect to a certain index. If the skewness coefficient is smaller than - 2 or + 2, the assumption of normality will be rejected. Finally, Kurtosis coefficient is the index of measuring the dispersion of research population to its normal distribution. The ratio of the kurtosis coefficient to the standard error is called standard error of kurtosis coefficient.

Determining the status of research variables

Human resources management

Statistical statement of the hypothesis:

$$\begin{cases} H0 : \mu < 3 \\ H1 : \mu > 3 \end{cases}$$

Based on Table 2, the confidence interval for the difference between the means of the two groups is calculated according to two columns to the right of the table output as follows:

$$1.0808 < \mu - 3 < 1.2700$$

Based on the above results, for the confidence interval of the difference between the mean population equal to 3, it can be stated $\mu - 3 > 0 \rightarrow \mu > 3$ at 95% probability level, so at the 5% error level, it can be stated that according to the respondents, the human resource management status is more than average level.

Management and planning development

Statistical statement of the hypothesis:

$$\begin{cases} H0 : \mu < 3 \\ H1 : \mu > 3 \end{cases}$$

According to Table 2, t-test equals the mean number 3 (sig <0.05), indicating that the null hypothesis can be rejected and lack of equality of mean with number 3 is accepted at 5% error level.

According to Table 8-4, the confidence interval for the difference between the means of the two groups is calculated based on the two columns to the right of table output as follows:

$$1.0442 < \mu - 3 < 1.2626$$

Based on the above results, for the confidence interval of the difference between the mean population equal to 3, it can be stated $\mu - 3 > 0 \rightarrow \mu > 3$ at 95% probability level, so at the 5% error level, it can be stated that according to the respondents, management and planning development status is more than average level.

Databank

Statistical statement of the hypothesis

$$\begin{cases} H0 : \mu < 3 \\ H1 : \mu > 3 \end{cases}$$

According to Table 2, the confidence interval for the difference between the means of the two groups is calculated based on the two columns to the right of the table output as follows:

$$0.8717 < \mu - 3 < 1.1765$$

Based on the above results, for the confidence interval of the difference between the mean population equal to 3, it can be stated $\mu - 3 > 0 \rightarrow \mu > 3$ at 95% probability level, so at the 5% error level, it can be stated that according to the respondents, databank status is more than average level.

Commanding and operations management

Statistical statement of the hypothesis

$$\begin{cases} H0 : \mu < 3 \\ H1 : \mu > 3 \end{cases}$$

According to Table 2, the confidence interval for the difference between the means of the two groups is calculated based on the two columns to the right of the table output as follows:

$$0.8147 < \mu - 3 < 1.0715$$

Based on the above results, for the confidence interval of the difference between the mean population equal to 3, it can be stated $\mu - 3 > 0 \rightarrow \mu > 3$ at 95% probability level, so at the 5% error level, it can be stated that according to the respondents, commanding and operations management status is more than average level.

Management of stations

Statistical statement of the hypothesis

$$\begin{cases} H0 : \mu < 3 \\ H1 : \mu > 3 \end{cases}$$

According to Table 2, the confidence interval for the difference between the means of the two groups is calculated based on the two columns to the right of the table output as follows:

$$1.0215 < \mu - 3 < 1.2978$$

Based on the above results, for the confidence interval of the difference between the mean population equal to 3, it can be stated $\mu - 3 > 0 \rightarrow \mu > 3$ at 95% probability level, so at the 5% error level, it can be stated that according to the respondents, stations management status is more than average level.

Provision of facilities and equipment

Statistical statement of the hypothesis

$$\begin{cases} H0 : \mu < 3 \\ H1 : \mu > 3 \end{cases}$$

According to Table 2, the confidence interval for the difference between the means of the two groups is calculated based on the two columns to the right of the table output as follows:

$$1.2654 < \mu - 3 < 1.4682$$

Based on the above results, for the confidence interval of the difference between the mean population equal to 3, it can be stated $\mu - 3 > 0 \rightarrow \mu > 3$ at 95% probability level, so at the 5% error level, it can be stated that according to the respondents, provision of facilities and equipment is more than average level.

Urban infrastructure

Statistical statement of the hypothesis:

$$\begin{cases} H0 : \mu < 3 \\ H1 : \mu > 3 \end{cases}$$

According to Table 2, the confidence interval for the difference between the means of the two groups is calculated based on the two columns to the right of the table output as follows:

$$1.0491 < \mu - 3 < 1.3425$$

Based on the above results, for the confidence interval of the difference between the mean population equal to 3, it can be stated $\mu - 3 > 0 \rightarrow \mu > 3$ at 95% probability level, so at the 5% error level, it can be stated that according to the respondents, urban infrastructure status is more than average level.

Wages and welfare facilities

Statistical statement of the hypothesis:

$$\begin{cases} H0 : \mu < 3 \\ H1 : \mu > 3 \end{cases}$$

According to Table 2, the confidence interval for the difference between the means of the two groups is calculated based on the two columns to the right of the table output as follows:

$$1.3891 < \mu - 3 < 1.6615$$

Based on the above results, for the confidence interval of the difference between the mean population equal to 3, it can be stated $\mu - 3 > 0 \rightarrow \mu > 3$ at 95% probability level, so at the 5% error level, it can be stated that according to the respondents, wages and welfare facilities status is more than average level.

Staff motivation

Statistical statement of the hypothesis:

$$\begin{cases} H0 : \mu < 3 \\ H1 : \mu > 3 \end{cases}$$

According to Table 2, the confidence interval for the difference between the means of the two groups is calculated based on the two columns to the right of the table output as follows:

$$1.1676 < \mu - 3 < 1.3866$$

Based on the above results, for the confidence interval of the difference between the mean population equal to 3, it can be stated $\mu - 3 > 0 \rightarrow \mu > 3$ at 95% probability level, so at the 5% error level, it can be stated that according to the respondents, staff motivation status is more than average level.

Public culture of coping with accidents

Statistical statement of the hypothesis:

$$\begin{cases} H0 : \mu < 3 \\ H1 : \mu > 3 \end{cases}$$

According to Table 2, the confidence interval for the difference between the means of the two groups is calculated based on the two columns to the right of the table output as follows:

$$0.9897 < \mu - 3 < 1.2850$$

Based on the above results, for the confidence interval of the difference between the mean population equal to 3, it can be stated $\mu - 3 > 0 \rightarrow \mu > 3$ at 95% probability level, so at the 5% error level, it can be stated that according to the respondents, public culture of coping with accidents status is more than average level.

Development of public and inter-organizational relations

Statistical statement of the hypothesis:

$$\begin{cases} H0 : \mu < 3 \\ H1 : \mu > 3 \end{cases}$$

According to Table 2, the confidence interval for the difference between the means of the two groups is calculated based on the two columns to the right of the table output as follows:

$$0.9714 < \mu - 3 < 1.2117$$

Based on the above results, for the confidence interval of the difference between the mean population equal to 3, it can be stated $\mu - 3 > 0 \rightarrow \mu > 3$ at 95% probability level, so at the 5% error level, it can be stated that according to the respondents, development of public and inter-organizational relations status is more than average level.

Specific organization

Statistical statement of the hypothesis:

$$\begin{cases} H0 : \mu < 3 \\ H1 : \mu > 3 \end{cases}$$

According to Table 2, the confidence interval for the difference between the means of the two groups is calculated based on the two columns to the right of the table output as follows:

$$1.1056 < \mu - 3 < 1.3723$$

Based on the above results, for the confidence interval of the difference between the mean population equal to 3, it can be stated $\mu - 3 > 0 \rightarrow \mu > 3$ at 95% probability level, so at the 5% error level, it can be stated that according to the respondents, specific organizing status is more than average level.

Table 2 - Results of the test comparing the means of research variables

T statistic value	df	Sig (sig)	Mean difference	95% confidence interval of mean difference		Result
				Lower bound	Upper bound	
				Human resources management		
24.721	82	.000	1.17537	1.0808	1.2700	Accepted
				Management and planning development		
21.017	82	.000	1.15341	1.0442	1.2626	Accepted
				Databank		
13.367	82	.000	1.02410	.8717	1.1765	Accepted
				Commanding and operations management		
14.612	82	.000	.94311	.8147	1.0715	Accepted
				Management of stations		
16.699	82	.000	1.15964	1.0215	1.2978	Accepted
				Provision of facilities and equipment		
26.823	82	.000	1.36680	1.2654	1.4682	
				Urban infrastructure		
16.217	82	.000	1.19578	1.0491	1.3425	Accepted
				Wages and welfare facilities		
22.281	82	.000	1.52530	1.3891	1.6615	Accepted
				Motivation of staff		

23.199	82	.000	1.27711	1.1676	1.3866	Accepted
			Public culture of coping with accidents			
15.319	82	.000	1.13735	.9897	1.2850	Accepted
			Development of public and inter-organizational relations			
18.074	82	.000	1.09157	.9714	1.2117	Accepted
			Specific organization			
18.488	82	.000	1.23896	1.1056	1.3723	Accepted

Investigating the priority of research factors

Friedman test was used to prioritize the research factors.

$\begin{cases} \text{H0 = Factors are equally important} \\ \text{H1 = Priorities of at least two factors are different} \end{cases}$

To prioritize the effective factors, the H_0 was first tested and since Sig is less than 5% (considered error level), the H_0 (equality of priorities) is rejected and the H_1 hypothesis (inequality of priorities) is confirmed. The results of processing the relevant data are presented in Table 3.

Table 3- Statistical results of measuring the equality of priorities of research factors

Number of factors	Chi square	df	Sig	Result
83	120.195	11	0.000	Accepted

*Significant at the 0.05 level

According to Table 3, and considering the chi-square statistic and its degree of freedom and the significant level (sig = 0.000), and considering α = 0.05, the hypothesis of equality of means is rejected, so we can prioritize the factors. Results of prioritizing the factors are presented in Table 4. At a significance level of 0.05, there is a difference between the mean ranks of effective factors.

Table 4- Results of the mean ranks of factors using Friedman test

Factors	Mean rank
Human resources management	5.91
Management and planning development	6.08
Databank	5.39
Commanding and operations management	4.55
Management of stations	6.08
Provision of facilities and equipment	7.92
Urban infrastructure	6.96
Wages and welfare facilities	9.34
Staff motivation	7.04
Public culture of coping with accidents	6.04
Public relations development	5.60
Specific organization	7.10

* Significant at the 0.05 level

Based on results of Table 4 and mean ranks, the highest mean rank (9.34) is related to wages and welfare facilities and the lowest mean rank (4.55) was related to commanding and operations management.

4. Discussion and Conclusion

Performance is the process of explaining the quality of effectiveness and efficiency of the past actions. Based on this definition, performance is divided into two components: 1) Efficiency that describes how the organization uses resources in the production of services or products, that is, the relationship between the actual and desired combination of inputs to produce certain outputs, 2) Effectiveness that describes the degree of achieving organizational goals (Rahnavard, 2008). Performance can be assessed at three levels, including individual, group, and organizational levels. Thus, organizational performance is a general structure that reflects how organizational operations are performed. Organizational performance is viewed as the organization's ability in using resources effectively and producing sustainable, considering the stakeholders' goals.

In general, organizational performance refers to way of performing the organizational mission and tasks and activities and its outcomes. The meaning of the term "performance" is important, since will be is possible to assess or manage performance by defining it. Performance assessment involves measurement of data that indicate progress towards the desired results. These results should be obtained by performing certain activities. The present study was conducted to identify and prioritize the influential factors in improving the performance of the Ilam Fire and Safety Services Organization. The current research was conducted using a qualitative-quantitative method. First, 10 firefighters were interviewed and their opinions were coded and categorized. Then, 12 categories of factors affecting the improvement of fire performance in Ilam city were extracted. These factors were extracted through a questionnaire that was distributed among second statistical population of the study consisting of 83 operational staff and some retirees of the Ilam Fire and Safety Services Organization to confirm or reject the accuracy of the factors. One-sample t-test was used to confirm the factors and Friedman test was used to rank them. Based on the results of Table 4 and mean ranks, the highest mean rank (9.34) was related to wages and welfare facilities and the lowest mean rank (4.55) was related to commanding and operations management.

Based on the obtained results, the following applied recommendations are presented:

1-It is recommended to managers of the Fire and Safety Services Organization to act according to the prioritization obtained in the present study in their policy-making. In this regard, they should focus their attention first on improving and strengthening the wages of their staff.

2- Provision of appropriate facilities and equipment was ranked second. It can play an important role in improving performance, so it is recommended to use the opinions of experts in this area in the provision of equipment.

3- According to the obtained result, this department needs specific organization to improve its performance in accordance with its performance conditions, and country's macro-management department should plan this organization in the form of guidelines.

1- Improving and changing the motivation of staff in Ilam Fire and Safety Services Organization is possible with the necessary training that will improve performance.

2- Examining other factors in a mid-term planning and using expert and management opinions for implementation

3- Integrating fire departments throughout Iran like other relief organizations such as emergency, police, and Red Crescent

4- Creating a sustainable income for fire department

Research limitations

1. Low level of research culture of the studied organization

2. Low number of fire stations and safety services in Ilam

3. Time-consuming interviews and distribution and collection of questionnaires

4. Low knowledge of some experts of this organization in the field of research

Recommendations

To advance scientific and research goals in this regard, the following recommendations are presented to researchers:

1- Conducting research on assessing the performance of this organization in various departments

2-Using new approaches in model design to improve the performance of Ilam Fire and Safety Services Organization.

3- Considering the conditions of uncertainty for future research according to the performance conditions of this organization to obtain better results.

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