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Original Article

Designing a Hierarchy Process of Human Resource Motivation in Scientific-Research Systems

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Abstract

Background and Aim: Motivation encourages employees to engage in their jobs and, consequently, to achieve organizational goals. So, the purpose of this research is to design a Hierarchy process of human resource motivation in scientific-research organization based on fuzzy Approach.

Materials and Methods: The population consists of academic experts. The data analysis was conducted in Yager Fuzzy Space. The present study is a survey and, in terms of objectives, is applied. Additionally, it is descriptive-survey in terms of the data collection method.

Results: Based on *MD* (Fuzzy Degree of Membership), the internal motivation factors have a higher degree of membership compared to external factors, which shows the importance and effectiveness of internal factors in creating motivation, it also shows the applicability of this model according to the current situation. The research findings include the Interpretative Structural Integrated Model at four levels that is consistent with motivational models such as Maslow, Alderfer, and Herzberg.

Conclusion: The optimization of service compensation plans is placed at the lowest level and the optimal work environment and the promotion of safety and health are placed at the highest level, i.e. the first level. The higher the elements are, the less their stimulus and the higher their degree of dependency would be. Therefore, the optimal work environment, enhancement of safety and health are the most dependent elements of the model and optimization of service compensation plans is the most driving element of the model.

Keywords: Herzberg motivation model, Motivational factors, Yager fuzzy model, Interpretive structural modeling

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Introduction

To achieve excellent results, it requires hard work and support from various parties, especially in the field of lecturer performance. This is because obtaining educational performance necessitates financial adequacy, time, and refined intellectual intelligence. Therefore, in attaining research and service performance, it is not sufficient to be capable; one must also possess a spirit of service to promote change and prosperity for the surrounding community. (1). Motivation is an internal state that makes a person carry out an activity (2). Other scholars claim motivation means the desire to work hard to meet goals of an organization so that this effort addresses some individual needs (3). Beyond its role in protecting employees' psychological health, the psychosocial safety climate (PSC) may be considered a contextual factor that affects employee work motivation (4). Mitsakis & Galanakis (5) conducted an empirical study investigating the applicability of Herzberg's theory in various workplaces of the 21st century, including correctional officers, employees in the retail sector, and front-line employees in the telecommunications industry. Through a systematic review, they explored whether Herzberg's motivational and hygiene factors, such as working conditions, relationships with peers, administrator feedback, etc., significantly contribute to enhancing the satisfaction and motivation of employees, and the absence of such factors leads to increased turnover. It was found that the strongest predictors for employees' perceived job satisfaction, included the nature of the work along with recognition and achievement. Motivation directly effects on organizational performance (6). Over the past decades, researchers have written articles and texts on motivation in workplace. Researchers such as Maslow, Alderfer, Herzberg, Vroom, Porter, Lawler, Hackman, and Oldham have written in detail in this regard. Based on Huckman and Oldham's theory of motivation, workers understand certain aspects of their jobs. These dimensions are raised as separate concepts of "work core dimensions": if the job contains an "adequate" amount of "skill variation", "work identity", "importance of work," "independence," "work feedback," "the feedback factor" and "interaction with others", consequently three cognitive modes are formed, and employees are motivated (7).

According to Putnam, the mutual trust and interaction of members in the network is a means to motivate and improve life satisfaction (9, 7). Thiedke described the motivation factors as the conditions of the work environment, the nature of the job, adequate salary, job interest and appreciation (10). The two-factor (motivation-hygiene) theory was presented by a psychologist called Frederic Herzberg. Herzberg's goal was to identify environmental and motivational factors. Herzberg believed that a motivation should be chosen that matters most to people (11). As Pintrich and Schrauben have stated, motivations of employees are affected by the value they are evaluating, which also leads to the presentation of behavior. Router states incentive prompts. He states that a person performs an activity only when he expects an outcome of that, or when it is valuable for him (11; 12). The results of Lotfi Azimi et al (13) showed that academic self-concept has a significant positive correlation with internal motivation and academic achievement. Academic self-concept in the relationship between academic motivation and academic achievement, work as an intermediate variable. According to the results of a research by Chaghari et al (14), identifying effective motivational factors in active participation of nurses in educational courses, and also effective factors in applying the lessons are essential for improvement the effectiveness of trainings related to validation standards. Adding professional nature to these trainings, applying training, using a clinical monitoring model and using a reward exchange model are ways to increase the motivation of nurses in this field. Hassanzadeh (15) carried out research entitled "selection of optimal production project for investment using Yager fuzzy multi-attribute decision making (FMADM) method" with the aim of using multi-criteria decision-making method to select the appropriate product for investment in production and institutionalization of the use of scientific methods for organizational decision making, and prevention of possible losses caused by making false decisions. Nasiripour et al (16) conducted a study to determine the effective factors on job satisfaction of staff at

educational hospitals in Qazvin based on the Herzberg theory. The results indicate that job security is considered as the most important deterrent that have rule in improvement of employees' performance. Attention and planning to provide proper salary and wage factors and job security, as hygiene factors, and sense of responsibility in work and feeling of success in work, as motivational factors, can be more effective than other factors in improving employees' performance. The results of the study by Mollae et al. (17) entitled as "application of fuzzy multi-attribute decision-making in prioritizing the competitive strategies of the cement industry" indicate that the strategic management of art and knowledge is to explain, formulate, implement, and evaluate multiple task decisions that enables the organization to achieve its long-term goals. The purpose of Haji Hasani's research (18) The subject of identity styles and its role in different stages of life has been confirmed by numerous researches. However, the role of identity styles effects on academic motivation (19). The level of quality of life in nurses has important role on their function and plays major role at the level of giving services to patients and the health system (20). This study provides the first evidence of burnout as a mediating mechanism in the so-called black box that relates high performance work systems to employee outcomes in the context of tourism and hospitality, and it contributes to the field with important theoretical contributions, as well as managerial recommendations (21). challenge job are thought to play a motivational role and may very well have a positive effect on employee engagement (22). The results of this study indicate that motivation has a positive and significant effect on performance, and job satisfaction has a positive and significant effect on employee performance. (23).The results showed that commitment has no effect on job satisfaction, competence has no effect on job satisfaction, leadership style has no effect on job satisfaction, work culture has an effect on job satisfaction, commitment has no effect on employee performance, competence has no effect on employee performance(24). Results suggest that abusive supervision has an indirect negative association with public service motivation, via job satisfaction (25). Research of Nezakati et al. (26) has investigated the Yager model (multi-attribute fuzzy) in environmental risk assessment.

The present study aimed to design a human resource motivation process in scientific-research system based on a fuzzy approach from the point of view of human resource experts. The main research questions are as follows:

What is the most important indicator in evaluating motivational designs in scientific-research systems? Which internal motivational factor has a higher rating based on the Yager fuzzy approach? Which external motivational factor has a higher rating based on the Yager fuzzy approach? Which one of the factors has the highest rating from among the overall external and internal motivational factors? Based on the fuzzy approach of external factors compared to internal factors, which one is of motivational priority in scientific research systems?

Methods

The present study is survey, and in terms of objectives is applied. Also, it is descriptive-survey in terms of data collection method. Research background and literature is reviewed through bibliographic and archival studies, internet, articles, and interviews with some senior and strategic managers of the organization in line of analogy. With regard to the aim of the research, the statistical population of this research included all employees at Payame Noor University of Lorestan Province. In the present study, due to the complexity of the proposed matrix, a sample of 39 academic staff is selected and the data were collected by decision matrix from three sample groups. Yager fuzzy technique was used in this study to overcome the weaknesses of quantitative decision-making techniques, and fuzzy or inaccurate numbers were used instead of definite numbers. One of the advantages of this model is the reflection of human thought and knowledge due to the use of fuzzy numbers instead of definite numbers for judgment, and the results obtained are acceptable in different domains. The research process consists of two main phases of the Yager approach and interpretive-structural modeling. In the first stage, the important elements of the model are identified and determined with respect to the criteria in the fuzzy approach and then in the second stage, using interpretive-structural

modeling, the design of the human resources motivation process is modeled. There are six main steps for structural-interpretive modeling:

- Determining dimensions and variables of the model
- Formation of self-interaction structural matrix (SSIM).
- Access matrix (zero and one matrix in hand).
- Compatibility and transferability matrix
- Leveling dimensions and determining relationships
- Draw the influence-dependency power diagram.

In this section, first the matrix of data obtained from the statistical population is provided, the statistical population concluding the data that have evaluated different motivation strategies with respect to the considered criteria; and then is analyzed through Shannon and Topsis mathematical algorithms and presented in the form of matrix and tables.

Results

First, external and internal factors of motivation in Table 1 are introduced based on abbreviations. According to data analysis, job satisfaction and material needs' satisfaction are two criteria with the highest weight and constructive competition and positive mental impression toward the organization are two criteria with the least weight in the analysis and evaluation of motivational strategies.

The Decision Matrix of Internal (Motivational) Factors: Based on the fuzzy approach, the priority of external (health) and internal (motivational) factors in scientific-research systems Based on membership degree in fuzzy set decision making Calculated and it has become a basis for forming the SSIM matrix (Table 2). The degree of membership in fuzzy set decision making for all factors is shown in Figure 1.

Interpretative- Structural Modeling (ISM)

The use of ISM is significant for leveling and explaining the relationship between research elements (27). To implement the ISM technique and to explain the relationship of elements, the following process should be followed:

1. Determining the variables of the model: These variables are derived from the study of subject literature and interviews with experts. Structural Self-Interaction Matrix (SSIM): Based on the data in Table 2, the relationships between the elements of the model have been set by experts in the form of SSIM matrix.

2. Initial reachability matrix: By replacing the symbols of SSIM as zero and one, the reachability matrix is designed

3. Final reachability matrix (adaption of reachability matrix): After the formation of the initial reachability matrix, its internal consistency must be

Table 1. Separation of external and internal factors of motivation based on acronyms.

Factors	Strategies	Acronyms
External factors (Hygiene)	Optimization of service compensation programs (satisfaction with wages and salaries)	A
	Promote safety and health	B
	Participatory management style (collaborative decision making and planning)	C
	Logical and fair assessment of employees' performance	D
	Good work environment	E
	Security and job stability	F
	Communication and group atmosphere of work (group culture)	I
	Floating working time	L
Internal factors (Motivation)	Reward and encouragement (appreciation)	G
	Professional and organizational promotion	H
	Optimal job design (enrichment, job development, job diversification, etc.)	J
	Professional-educational promotion	K
	Staff training and empowerment	M
	Decentralization (increasing job opportunities in areas such as self-control and self-assessment)	N

established. In this step, the trajectory between the

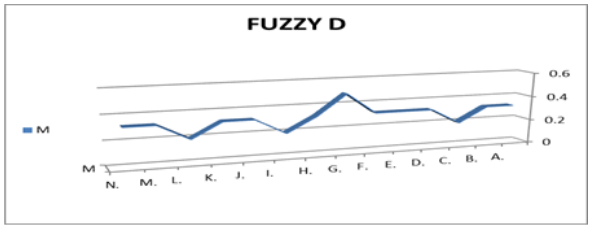

Figure 1. Adaption of options in terms of membership degree in decision $\tilde{D}$ fuzzy set of the external (hygiene) and internal (motivational) factors.

Table 2. SSIM.

ji	A	B	D	E	F	G
A. Optimization of service compensation programs	-	V	V	V	O	X
B. Promote safety and health		-	O	A	X	O
D. Logical and fair assessment of employees' performance			-	V	X	V
E. Good work environment				-	V	A
F. Security and job stability					-	O
G. Reward and encouragement (appreciation)						-

factors must also be investigated. If i leads to j and j to k, then should lead to kIn the present study, the trajectory between the factors has been ignored because of the comprehensive consistency of data.

4. Determining the variables' level and forming the matrix: In order to determine the type of relationship and the level of the elements of the model, the set of outputs and set of inputs for each element must be determined, and then, the set of two-way relationships of each of the matrix elements is determined.

5. Drawing diagram: According to the obtained level, in Figure 2 the criteria are arranged top-down based on their priority. Using the matrix derived from a received matrix based on the levels, the structural model is drawn by the nodes and lines.

6. Analysis of the driving power and degree of dependence of MICMAC:

The driving and dependence power of each variable is calculated at this stage. Elements can be classified into four levels according to their driving power over other elements and the degree of dependence of each element on other elements:

1. The level of independence: elements that have the least dependence and driving power on other elements are placed in area (1) in Figure 3.
2. Dependency: elements that are highly dependent on other elements and have low driving power on other elements are placed in area (2) in Figure 3.
3. Relationship: elements that have a two-way relationship with other elements (high driving power and high degree of dependence) are placed in area (3) in Figure 3; any change in these elements causes changes in other elements.
4. Driving power (non-dependence): elements that have significant driving power on other elements and have low dependence are placed in area (4) in Figure 3.

Discussion

Employees' motivation and factors having effect on this, and factors that cause job satisfaction or employee's dissatisfaction have been focus of attention for long, by organizational analysts and managers. Various ideas and different perspectives in this field confirm that employees would work with high spirits when the goals of the organization are close to the goals of employees, and when management can provide the necessary incentives for them. Most of employees' activities in different areas of organization are related to their motivation; therefore, it is imperative that while gaining awareness of their status, managers take appropriate measures in order to make their efforts promote motivation programs. One of the proposed strategies include assessing the motivation system and its related plans in order to become aware of its current situation. Creating an efficient and effective incentive system can help improve the efficiency of the system. On the other hand, employees' motivation can be improved using the information derived from the evaluation of incentive plans and identifying weaknesses, strengths, threats and opportunities; Therefore, the design of motivation strategies is regarded as one of the most effective systems and tools

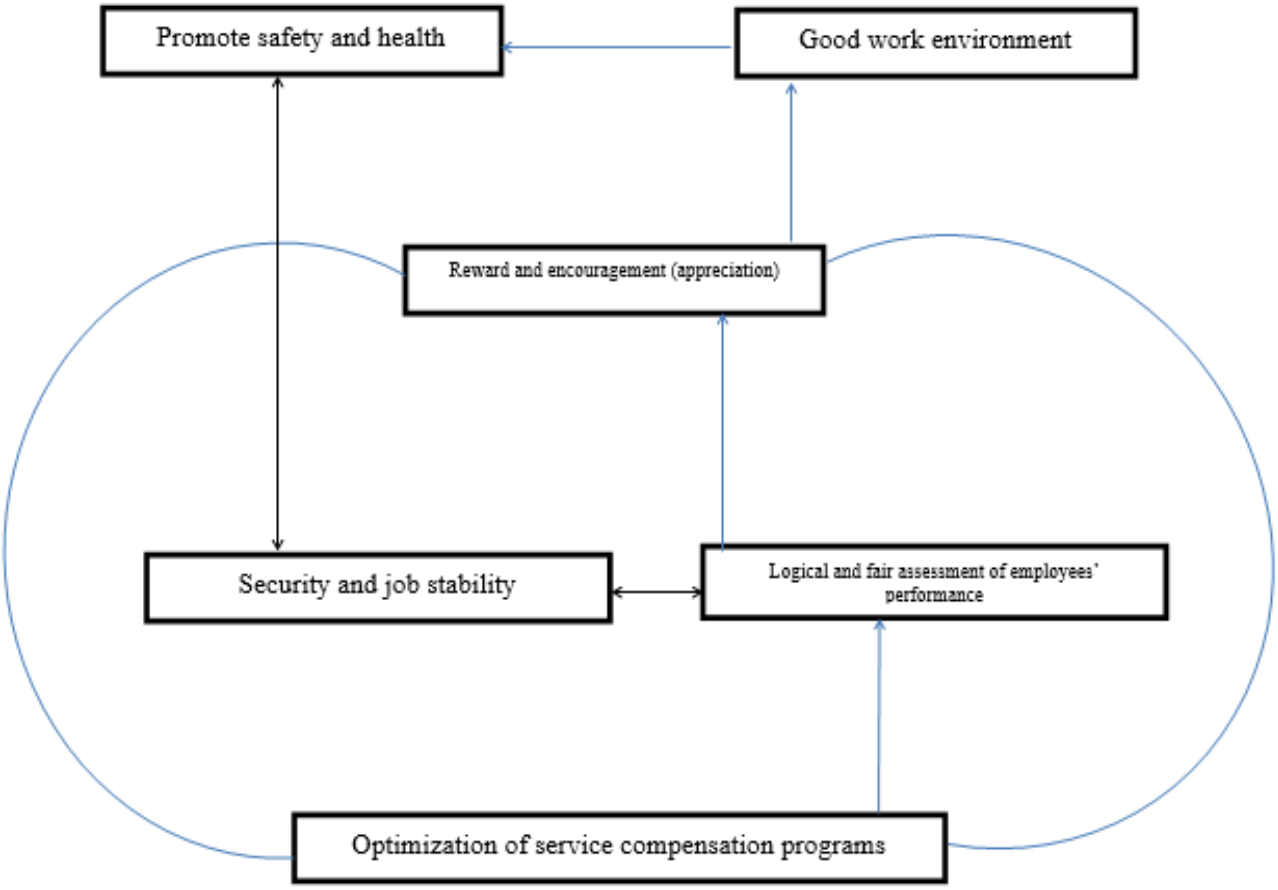

Figure 2. Geometric diagram of ISM dimension interactions.

for promoting organizational performance. Conducted studies have determined that successful organizations have motivated staff, and lack of motivation leads to a decrease in employees' productivity in the organization. Efforts for explaining employees' behaviors have attracted the attention of researchers on reasons that make individuals eager or uninterested. Along with the studies mentioned, a number of management psychologists have also tried to provide a precise definition for motivation. They have also applied all or part of their efforts and abilities to present theories for explanation or process of motivation, so as to provide a way to understand, predict and control the behavior of employees. This indicates the importance and necessity of the present study. Attention and emphasis on the optimal design of incentive schemes and plans will enable individuals to accept organizational goals and respect organizational terms and conditions, and also work toward the achievement of organizational goals and participate actively in managing affairs of the organization. According to the results of this research,

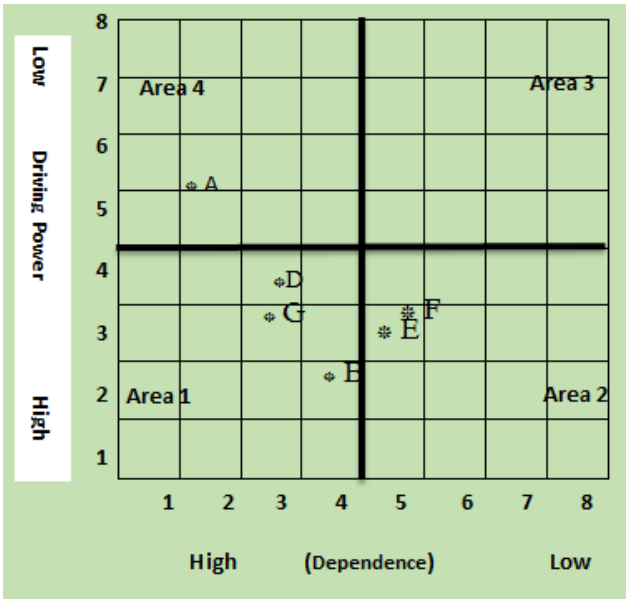

Figure 3. Driving power-dependence matrix.

job satisfaction and material needs' satisfaction were two criteria, with the highest weight in the analysis and evaluation of motivational strategies. In return, conflict, constructive competition and positive mental impression toward the organization were two criteria with the least weight. Also, the results showed that reward and encouragement (appreciation) strategy of the internal factors of motivation was more effective job motivation, than other factors. Optimization strategies for compensation programs, improvement of safety and health, the rational and fair assessment of performance, the optimal work environment, security and job stability were more effective than other external factors of motivation; In addition, based on the data analysis and considering $\mu\tilde{D}$, Optimization of service compensation plans was placed at the lowest level, and optimal work environment and the promotion of safety and health were placed at the highest level, i.e. the first level. The higher the elements were, the less their stimulus, and the higher their degree of dependency would be; Therefore, the proper work environment and promotion of safety and health were the most dependent elements of the model, and optimization of service compensation plans was recognized as the most driving element of the model. Because according to the conceptual model and driving and dependency diagram, they were the basis of the model and the origin of other elements and also affected all elements of the model; therefore, they should be considered as the strongest element in the process of motivation. overall, the elements of the fourth level, or the last level which was the lowest part of the model, had the most influence on the model and the model changes with their change. The results of the research are in line with the findings of Ahmadi, Tajeri & Aghajani (19), Shams & Madani(20), Rafiei et al (10), Judat et al. (28), Thiedke (29), Raeesi & Mohebbifar (30), Takahashi (31), and Nasiripour et al. (16) that were referred to in the background section.

Conclusion

The internal factors of motivation exhibited a higher degree of membership compared to external factors, highlighting the greater importance of internal factors in motivation. This observation aligns with Herzberg's motivation model, indicating the applicability of this model in the current context. In the present study, crucial elements in motivation management were identified using a fuzzy approach, resulting in a total of six determinants. Then, using the interpretive-structural modeling technique, the type of relationships was identified by the experts. Using the proposed model of ISM in this research, the motivation process was presented in four levels with respect to one-way or two-way relationships, which was consistent with motivational models such as Maslow, Alderfer, and Herzberg. In fact, the model presented a comprehensive and integrated approach of all theories and motivational models according to the present situation. In this model, the mutual relationships and effectiveness between the elements and the elements' relations of various levels were well visible, which led to a better understanding of the decision atmosphere.

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Conflict of Interest

The authors declare that they have no conflict of interest.

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