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Application of Organizational Information Structural Interpretive Model for Knowledge-Based Development of Human Resources Capabilities

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ABSTRACT

This research aims to use organizational information as an interpretive structural model for the development of knowledge-based capabilities of human resources. This research is mixed and after identifying indicators of the development of human resources capabilities through interviews with experts, they were modeled using the thematic analysis method. The final model was proposed using the quantitative method of interpretive structural modeling with the expert decision-making approach. The statistical population in this research is all the experts of the judicial organizations of Bushehr province, based on the purposive sampling method, 12 people were selected as a sample. MAXQDA software was used in the qualitative analysis. EXCEL software was used in interpretative structural analysis. The studied structures of developing human resources capabilities are employment potentials, specialized potentials, organizational potentials, cognitive characteristics, performance improvement, motivational and emotional characteristics, competitive advantage, productivity capabilities, and psychological characteristics. Based on the proposed model, knowledge organizations, to reduce their organizational challenges, especially in the field of human resources, need an approach to cover them in topics such as recruiting and hiring, salaries and wages, benefits, and reward, but also at higher levels of human resources such as career path, skills development, training, job enrichment, integrated performance management, employee empowerment, employee relations, psychological well-being, etc. ©authors

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1. Introduction

One of the keys to success in organizations is the knowledge-based development of human resources, which creates a competitive advantage and differentiates an organization from other organizations (Nag and Pradhan, 2023). In fact, with the dawn of the era of a knowledge-based economy, a new paradigm has been proposed regarding the position of human resources, especially knowledge-based manpower which is the most valuable asset in an organization (Reddy, Sarkar & Onishi, 2022) and its knowledge and productivity has been mentioned (Niranjan, 2020). Compared to other industries, knowledge-based organizations have distinctions such as high skill and high education of the workforce, high level of research and development, high tendency to export, having a high percentage of intangible assets (intellectual capital), products and services with short life and higher gross profit margins (Gupta, 2022). The literature review indicates that knowledge-based organizations often acquire the necessary knowledgeable people over time. But the challenge is to know how to interact with and maintain these resources in the organization or how to benefit from their talents in maintaining the company's excellence and performance which becomes challenging (Škrinjarčić, 2022). Today, organizations face micro and macro challenges, and it is expected that the business world will act at a higher level with the intensification of environmental pressures, threats, and uncertainties. Organizations need higher capacity building and organizational flexibility and introducing human resource development as a strategic partner in organizations can increase organizational flexibility in this regard (Kulichyova et al., 2021). Knowledge-based development of human resources is considered an element of success in the era of complexities and crises, which can help organizations through their policies and strategies leading them to the change movement (Hirudayaraj & Matić, 2021). According to the norms of knowledge-based theory, companies can build, combine and

use knowledge to improve the overall structure of the organization (Zamani et al., 2023). Knowledge-based human resource management can improve organizational efficiency by increasing employee efficiency (Xu et al., 2018).

A knowledge-oriented organization is a legal-real set that takes an organizational form by being placed in a planned economic-social structure and uses knowledge, human expert forces, and a dynamic organizational structure to create and produce products. It also provides services with innovative, wealth-creating, and mutation-generating capabilities, and managing and distinguishing its features need knowledge (scientific expertise and scientific skill) (Cao and Ali, 2018). In this definition, not only product production or service provision but also knowledge production and enhancement are considered critical factors. In other words, it is stated that knowledge-based organizations are used to describe companies that use their knowledge assets as the main source of competitive advantage (Ferreira, Curado & Oliveira, 2022). Knowledge-oriented organizations face emerging changes and developments in economic, social, technological, cultural, and political environments (Mukherjee and Chakraborty, 2007). In order to maintain a competitive position in the market, it is necessary for companies to be close to customers and to establish long-term relationships with customers (Alizadeh, Dirani & Qiu, 2021).

Knowledge-oriented organizations with other businesses have distinctions such as high skill and education of the workforce, high level of research and development, high tendency to export, and high percentage of intellectual capital, products, and services with a short life curve and margins. Gross profit is high (Park, Jeong & Ju, 2021). Saving knowledge in the organizational recruitment and selection system is a suitable platform for discovering and cultivating talents (Asali, Davoodi & Mirtavousi, 2023). Today, the economy of successful countries is based on a knowledge-based economy. Therefore, if a country wants to have

fundamental growth and development, it should expand the knowledge-based economy. The most important characteristic of the growth of the knowledge-based economy is the growth of tangible and intangible knowledge resources of the organization (Rahimi et al., 2021). The main factor behind the success of these companies is their human power and intellectual capital, according to which, innovation and creativity are created and lead to the prosperity of the company and technologies (Alkhateeb & Abdalla, 2020).

Therefore, considering the small growth of the number of knowledge-based organizations in Iran, their high bankruptcy rate, and the lack of sustainability of human resources in the aforementioned companies, a model for the development of human resources has been presented. This model can lead to longevity and prosperity in the organizations as well as the development of human power.

The findings of the research can be generalized to other knowledge and learning organizations. The result of this research is an attempt to fill the existing knowledge gap in the field of providing a suitable system model for the development of human resources from the point of view of academic research.

2. Literature Review

The necessity of human resource development can be seen in the challenging environment of organizations and the ever-increasing acceleration of creativity and innovation. Shifting the relative advantage of organizations from manual forces to knowledge workers, and the change in the concept of work and job (collective jobs, flexibility) are among the important issues. Intense competition in the business environment, information and communication technology emergence, the demand for receiving higher quality services, and changing the attitude of people towards work (work as a provider of needs secondary people) are the findings in studies conducted in the field of HRD, indicating the extent of different organizational contexts and

examining the subject of HRD in various organizations (Lloyd and Payne, 2021).

As an example, researchers have shown the development of human resources in creating organizational brands based on the perspective of dynamic capabilities in the hotel industry (Francois, Adams & Oyedijo, 2020). A study on knowledge and skills needed to develop in small hotels in Chiangrai showed management, marketing, innovation, technology, language, and creative thinking in HRD (Chuminthachak, 2019).

Jang and Ardichvili (2020) examined the role of HRD in corporate social responsibility and sustainable innovation of multinational companies in Europe, Asia, and North America. Uraon and Gupta (2019) examined the effects of HRD practices HRD in Indian software companies. Otoo et al. (2019) measured HRD in the banking industry and also examined the effects of HRD in the pharmaceutical industry. Park et al. (2021) studied the subject of HRD in connection with online training courses in a bank, software, and manufacturing company. A study by Al-Hanawi, Khan & Al-Borie (2019) on HRD in the health system of Saudi Arabia has been carried out. We can also point to studies that examine HRD at a macro-level and the level of government policies and policies (South Korea), such as the study by Roh et al. (2020) or Park et al. (2020), who investigated government support of HRD in South Korean small and medium enterprises (SME).

As stated, there are very few human resources studies, especially HRD, both in internal and external studies in knowledge-based organizations, and the study platform of knowledge-based organizations has been neglected. Whereas, today much emphasis is on knowledge economies. Knowledge-based economy emphasizes five axes of information and communication technology, human capital and education, innovation, entrepreneurship, and economic and institutional regime. The most important pillar of the knowledge-based economy is its human power (Hassen, 2020). What managers in knowledge-based companies should also focus on is the value of each

employee as an individual, because, ultimately, it is these employees who must realize strategic and business goals. And they should create new insights for growth, development, creativity, and innovation for their forces (Nicolaescu et al., 2020). As mentioned, Government organizations have a great need to maintain and empower human resources, so it is important to use a knowledge-based approach to empower human resources in these organizations. The Iranian organizations lacked a model to be led by for achieving progress through empowering HR.

3. Method

The current research, which aims to provide a model for the development of human resources capabilities with an interpretive structural approach in the judicial organizations of Bushehr province, uses a mixed methodology. The quantitative part is applied with a descriptive-survey nature.

It uses an exploratory approaching the qualitative part; the indicators of the development of human resources capabilities were identified through interviews with experts and modeled using the thematic analysis technique. Afterward, the designed model was validated using the quantitative data.

In the qualitative method, factors on the knowledge-based development of human resources have been identified based on the interviews. In the following, with the expert decision-making approach of the interpretive structural modeling method, the knowledge-oriented HR model has been presented. The statistical population in this research comprised all the experts of the judicial organizations of Bushehr province. 12 people were selected as a sample through purposive sampling. MAXQDA software

was used in the qualitative analysis and EXCEL software was used in interpretative structural analysis. Qualitative data analysis in this study was performed using thematic analysis. Also, via the ISM method the relationship between indicators at several different levels were examined. The interpretive structure model can determine the relationship between indicators that are individually or collectively dependent on each other.

4. Findings

This study is based on the opinion of 14 experts (9 males and 5 females) in the studied field. In terms of age, 2 people were under 35 years old, 5 people were between 35 and 45 years old, and 7 people were over 45 years old. In terms of education, 10 of the experts have a doctorate and 2 had master's degree. Finally, 5 people had between 10 and 20 years of work experience and 9 people had more than 20 years of work experience.

In the first stage, qualitative data was collected through in-depth interviews with research participants. In the process of open coding, many themes were obtained, and during the back-and-forth process of data analysis, the collection of these primary qualitative data was reduced to fewer categories. The purpose of axial coding (shown in Table 1) is to create a relationship between the generated categories (in the open coding stage). This action is usually done based on the paradigm model and helps the theorist to carry out the theorizing process easily. The basis of communication in coding is based on the expansion of one of the categories.

Table 1. Open and axial coding

Axial codes	Description- open codes
Employment potential	This factor is formed due to the potential capabilities of people outside the organization and also based on organizational needs.
Specialized potentials	This factor is created based on educational needs, the state of skills and expertise of human resources.
Organizational potentials	This factor is formed based on the desire for stability and non-change of people, as well as lack of motivation and negative feelings of people in the organizational environment.

Axial codes	Description- open codes
Cognitive strategies	This strategy is created with the aim of selecting and hiring human resources with specialized and professional capabilities. By investing in the quality of recruitment, organizational costs are reduced.
Optimization strategies	This strategy is the main factor in improving the efficiency of organizational resources, increasing innovation and centralizing resources.
Motivational and emotional strategies	Considering the importance of people's emotions and feelings, this strategy deals with identifying individual emotions and increasing motivation, and by strengthening motivation and managing emotions correctly, it improves the condition of human resources and removes the level of incompetence.
Competitive implications	By attracting specialized forces, the competitive advantage of the organization is improved. Establishing organizational justice and increasing organizational competitive advantages helps the organization to achieve its predetermined goals.
productivity implications	This outcome is aimed at developing the skill dimensions and specialization of employees in order to increase individual agility and creativity. Also, this result is favorable for creating a career path.
Psychological consequences	This outcome is based on the improvement of interpersonal communication as well as the reduction of contradictory behaviors to increase the trust and security of employees.

The ISM approach enables experts to map the complex relationships between a large number of elements in a complex decision-making situation. This method works to order and direct the complexity of relationships between structures. In this method, by analyzing the impact of one structure on other structures, the order and direction of the complex relationships between the structures of a system are investigated and thus the complexity of the relationships between the structures is overcome. This method is an interactive learning process in which a set of different structures are structured in the form of a systematic and comprehensive model. Using this method, the impact of a structure on other structures is checked. Therefore, it is possible to identify the relationships between the structures and provide a structural-interpretive model of the structures and finally classify the structures based on the

power of penetration and the degree of dependence. The studied structures of developing human resources capabilities are employment potentials, specialized potentials, organizational potentials, cognitive characteristics, performance improvement, motivational and emotional characteristics, competitive advantage, productivity capabilities, and psychological characteristics. Symbols like Table 2 are used to identify the relationship pattern of elements.

Table 2. Modes and symbols used in expressing the relationship between variables

Symbol	V	A	X	O
Relation	Variable i affects j	Variable j affects i	Two-way relationship	Absence of relationship

According to the symbols listed in Table 2, the structural self-interaction matrix will be as Table 3.

Table 3. Structural self-interaction matrix of SSIM

	SSIM	C01	C02	C03	C04	C05	C06	C07	C08	C09
Employment potential	C01		A	A	A	V	V	V	V	V
Specialized potentials	C02			V	V	V	V	V	V	V
Organizational potentials	C03				X	V	V	V	V	O
Cognitive strategies	C04					V	V	V	V	V
Optimization strategies	C05						V	V	O	X
Motivational and emotional strategies	C06							X	V	A
Competitive	C07								V	A

implications										
productivity implications	C08									A
Psychological consequences	C09									

Formation of the received matrix

The received matrix is obtained by transforming the structural self-interaction matrix into a two-valued matrix of zero and one. In the received matrix, the dimensions of the main diameter are equal to one. Also, secondary relationships should be checked to be sure. That is, if A leads to B and B leads

to C, then A must lead to C. That is, if the direct effects should have been included based on the secondary relationships, but this did not happen in practice, Table 3 should be corrected and the secondary relationship should also be shown. Therefore, the received matrix of research variables is presented in Table 4.

Table 4. Received matrix of research variables

RM	C01	C02	C03	C04	C05	C06	C07	C08	C09
C01	1	0	0	0	1	1	0	1	1
C02	1	1	1	1	1	1	1	1	1
C03	1	0	1	1	1	1	1	1	0
C04	1	0	1	1	1	1	1	1	1
C05	0	0	0	0	1	1	1	0	1
C06	0	0	0	0	0	1	1	1	0
C07	0	0	0	0	0	1	1	1	0
C08	0	0	0	0	0	0	0	1	0
C09	0	0	0	0	1	1	1	1	1

Create the final access matrix

After the initial access matrix is obtained, the final access matrix is obtained by entering transferability in the relations of the variables. If, based on secondary relationships, direct effects should have been

included but did not occur in practice, Table 4 should be corrected and the secondary relationship should also be shown. The final access matrix of research variables is presented in Table 5.

Table 5. Final access matrix of research variables

TM	C01	C02	C03	C04	C05	C06	C07	C08	C09
C01	1	0	0	0	1	1	1*	1	1
C02	1	1	1	1	1	1	1	1	1
C03	1	0	1	1	1	1	1	1	1*
C04	1	0	1	1	1	1	1	1	1
C05	0	0	0	0	1	1	1	1*	1
C06	0	0	0	0	0	1	1	1	0
C07	0	0	0	0	0	1	1	1	0
C08	0	0	0	0	0	0	0	1	0
C09	0	0	0	0	1	1	1	1	1

Determining relationships and leveling dimensions and indicators

To determine the relationships and leveling of the criteria, the set of outputs and the set of inputs for each criterion should be extracted from the received matrix.

-Access set (row elements, outputs or effects): Variables that can be accessed through this variable.

- Prerequisite set (column elements, input or effects): variables through which this variable can be reached.

Table 6. Set of inputs and outputs to determine the level

commons	Input: Effectiveness	Output: effect
C01,C05	C01,C05,C06,C07	C01,C02,C03,C04,C05,C08
C02,C04,C05,C08	C01,C02,C03,C04,C05,C06,C07,C08	C02,C04,C05,C08
C03,C05	C01,C03,C05,C06,C07	C02,C03,C04,C05,C08
C02,C04	C01,C02,C03,C04,C05,C06,C07	C02,C04,C08
C01,C02,C03,C05	C01,C02,C03,C05,C06	C01,C02,C03,C04,C05,C08
C06	C06	C01,C02,C03,C04,C05,C06,C07,C08
C07	C06,C07	C01,C02,C03,C04,C07,C08
C02,C08	C01,C02,C03,C04,C05,C06,C07,C08	C02,C08

The set of outputs includes the criterion itself and the criteria that are affected by it. The set of inputs includes the criterion itself and the criteria that affect it. Then, the set of two-way relations of the criteria is determined.

For the C_i variable, the access set (output or effects) includes the variables that can be reached through the C_i variable. The prerequisite set (inputs or effects) includes the variables through which the variable C_i can be reached. After determining the achievement set and the prerequisite set, the subscription of the two sets is calculated. The first variable for which the commonality of the two sets equals the attainable set (outputs) will be the first level. Therefore, the elements of the first level will have the most influence on the model. After determining the level, the criterion whose level is known is removed from the whole set and the set of inputs and outputs is formed again and the next variable level is obtained.

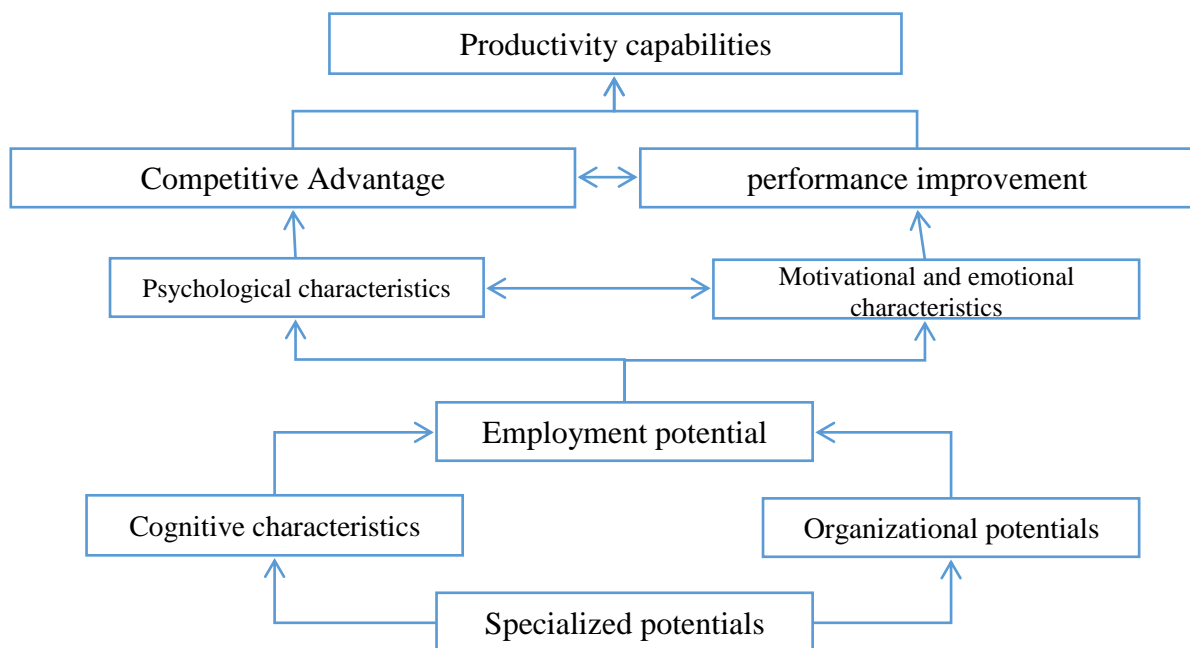


Figure 1. Knowledge-based model of human resource capabilities development

In the same way, the amount of influence variables of the same level have mutual on the next levels is reduced and the interaction with each other.

Table 7. Power of influence and degree of dependence of research variables

Research variables	Symbol	The degree of dependence	Penetration power
Employment potential	(C01)	4	7
Specialized potentials	(C02)	1	10
Organizational potentials	(C03)	3	9
Cognitive characteristics	(C04)	3	9
Motivational and emotional characteristics	(C05)	6	6
performance improvement	(C06)	8	4
Competitive Advantage	(C07)	8	4
Productivity capabilities	(C08)	10	1
Psychological characteristics	(C09)	6	6

In figure 2, the MicMac diagram of the components is given.

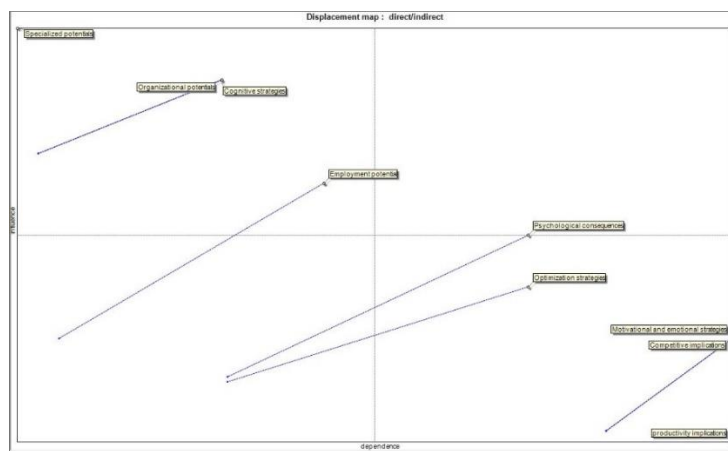


Figure 2. MicMac diagram

All relationships were analyzed based on the diagram in Figure 2.

Table 8. All the direct and indirect relationships in MicMac analysis

RANK	LABEL	DIRECT INFLUENCE	LABEL	DIRECT DEPENDENCE	LABEL	INDIRECT INFLUENCE	LABEL	INDIRECT DEPENDENCE
1	C02	2105	C06	1842	C02	3333	C08	2982
2	C03	1842	C07	1842	C03	2324	C06	2456
3	C04	1842	C08	1842	C04	2324	C07	2456
4	C01	1315	C05	1315	C01	833	C05	877
5	C09	1052	C09	1315	C09	526	C09	877
6	C05	789	C01	789	C05	482	C01	175
7	C06	526	C03	526	C06	87	C03	87
8	C07	526	C04	526	C07	87	C04	87
9	C08	0	C02	0	C08	0	C02	0

Based on the interpretive structural model entered into the MicMac software, all the direct and indirect relationships of the components were analyzed.

5. Discussion

The interview data collected from the experts in judicial organizations of Bushehr province were analyzed using the thematic analysis approach. 9 main categories, 23 subcategories categories and 80 codes were identified.

- 1- Employment potentials included three main categories (1. Job ambiguity 2. Lack of knowledge of talented and expert people, 3. Unequal conditions)
- 2- Specialized potentials had two categories (1. Management conflicts, 2. Individual conflicts)
- 3- Potentials an organization had three categories (1- Organizational structure, 2- Organizational communication and technology, 3- Organizational training)
- 4- Cognitive features had three categories (1. Clear visualization of the labor market, 2. Clarification of organizational selection, 3. Revision of recruitment strategies)
- 5- Ability to improving performance had three core categories (1. Empowering human resources, 2. Improving organizational processes, 3. Performance evaluation)
- 6- Capability of motivational and emotional features had two categories (1. Strengthening organizational relationships, 2. Strengthening individual & organizational motivation)
- 7- Capability of advantage Competitiveness had two categories (1. Balance of employment system, 2. Fair distribution of responsibilities)
- 8- Productivity abilities had three core categories (1. Career path management, 2. Creation of functional stability, 3. Empowerment of human resources)
- 9- Psychological characteristics had two categories. The category is (1. the compatibility of morale and work environment, 2. individual creativity.

To assure the validity, the interview protocol was re-evaluated many times and its content and processes were reviewed.

Park et al (2020) also showed that paying attention to training and learning in the organization empowers employees. Based on their research, Otoo et al (2019) showed the impact of using information technology

on improving the performance of human resources.

Heard (2005), states that the development of human skills is the responsibility of human resources to adjust several deficiencies such as knowledge gaps (Ferreira et al., 2022). Human resource management measures such as training and development affect knowledge management processes and pre-knowledge management behaviors, such as the motivation to share knowledge (Jimenez-Jimenez and Sanz-Valle, 2013; Gagné et al., 2019). Ju (2019), state that learning, developing and creating a suitable organizational environment and culture are within the scope of HRD and HRD can play a pivotal role in increasing innovation and creativity of companies.

After identifying the variables of the first level, these variables were removed and the set of inputs and outputs was calculated without considering the variables of the first level. The common set of identification and the variables whose commonality is equal to the set of inputs were selected as the second level variables. Based on the output of ISM calculations, the variable in productivity potentials (C08) was the first level. To determine the elements of the third level, the variables of the second level were removed and once again the set of inputs and outputs was calculated without considering the variables of the second level. Based on the shared set of identification and the variables whose share was equal to the set of inputs the third level variables were selected. According to the output of ISM calculations, variables in improving performance (C06) and competitive advantage (C07) were placed in the third level.

Variables in psychological characteristics (C09) and motivational and emotional characteristics (C05) were at the fourth level, and the general and functional variable (C01)

were at the fifth level. The variables of organizational potentials (C03) and cognitive characteristics (C04) were the sixth level, and finally, specialized potentials (C02) was the most basic element of the model.

6. Conclusion

Based on the proposed model of knowledge-based development of human resources, knowledge organizations to reduce their organizational challenges, especially in the field of human resources, need an approach that not only covers topics such as recruiting and hiring, salaries and wages, benefits, and rewards but also at higher levels of human resources such as career path, skills development, training, career enrichment, integrated performance management, employee empowerment, employee relations, psychological well-being, etc. guide them to cultivate more advanced human resources. What makes knowledge-based companies get better results from HRD is the view that a systemic approach gives to examining the issue of HRD. And it causes them to expand their view to the outside environment for the development of human resources and examine HRD in their organizational space with a holistic view.

Knowledge organizations as knowledge-based economy enterprises are one of the basic factors of national per capita production growth, sustainable self-sufficiency solutions in strategic products and technology improvement and productivity increase of production factors, and due to their high dynamism and flexibility, they have a suitable capacity to face the mentioned problems. Therefore, the proposed model for the development of human resources in knowledge-based organizations, can contribute to solving the issues related to the development of human resources, improving the quality of people's

performance, reducing costs, strengthening creativity and innovation, increasing. The competitive advantage of the model is to reduce the dropout and prevent problems such as burnout, lack of motivation and job dissatisfaction that lead to a decrease in the productivity of employees in the organization from the side of human resources. In short, the proposed model in the development of knowledge-based human resource management have the following advantages:

- This model provides a holistic picture of job knowledge requirements of human resources.
- It helps the success of hiring specialists.
- It can minimize allocation of time, cost, and facilities in knowledge workers who are less likely to succeed.
- It can help to distinguish between abilities that can be learned and abilities that are more difficult to develop.
- It specifies the skills, knowledge, and characteristics required for the expected job or role.

Based on the obtained results, the following suggestions are made:

- Creating a link between human resource planning and the organization's knowledge-oriented strategic plan.
- Minimizing the opportunity to make inappropriate decisions by creating a common vision between different organizational departments.
- Coordination and coherence between decisions and planning among different departments of the organization.
- Ensuring the effective use of human resources in line with the development goals of the organization.
- The possibility of focusing on priorities and planning to achieve strategic goals, and,

- Providing a systematic basis for the promotion of employees to increase efficiency and effectiveness.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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