Journal of System Management
(JSM)
Online ISSN: 2538-1571
Print ISSN: 2322-2301
Vol. 7, No. 3, (27) 2021, pp. 263-281
Research Paper

Identifying Indicators and Components of Knowledge Capital and Human Resource Strategies in the Iranian Higher Education System

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Abstract **The present study aimed to identify the indicators and components of knowledge capital and human resource strategies in the Iranian higher education system. Participants in the present study were managers and deputies of human resources in the higher education system and university professors.Sampling was performed in a purposeful and theoretical manner. Theoretical saturation of the samples was obtained after interviewing 10 people. The number of samples was not determined before performing the study and the sampling process continued until some kind of information saturation was obtained, i.e. no new information was extracted from the data during the interview. The instrument of the present study was semi-structured interviews whose validity and reliability were confirmed by confirmatory factor analysis and Cronbach's alpha test. Three coding steps were used to analyze the data. Using open coding, model categories were identified. Then, in the axial coding stage, the link between these categories was determined in the form of a coding paradigm. In the selective coding process, the conceptual model was determined in the form of three dimensions and including 14 components as follows: knowledge process capability (knowledge application, knowledge transfer, knowledge integration, knowledge production), human resource strategies (recruitment, human resource development, employee performance, service compensation, working relations), and knowledge capital (human capital, structural capital, innovative**

Received: 23/08/2021 Accepted: 21/11/2021

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capital, social capital, and process capital) were identified.According to the findings of this study, suggestions are presented so that the officials, decision-makers, and educational planners in the higher education system be familiar with the dimensions, components, and mechanisms of knowledge acquisition and human resource strategies in the higher education system and take necessary executive measures while planning and making the necessary policies.

Keywords *Knowledge Management, Knowledge Capital, Knowledge Process Capability, Human Resource Strategies, Iranian Higher Education System*

Introduction

Industrial economies are fundamentally shifting from the exploitation of natural resources to the utilization of intellectual capital. Many managers and thinkers of management science consider this course as a new beginning for knowledge management. This has led many researchers to investigate and explain how to manage knowledge. In other words, as we face new businesses, we are looking for new management practices. Various studies on knowledge concepts, knowledge processes, and knowledge management architecture support this claim. Many organizations are trying to use the success of knowledge management to exploit knowledge capital with a focus on knowledge management operations and with high investment in information technology (Antunes & Pinheiro, 2020). Laurini (2020) defines knowledge management as an explicit, systematic, strategic, and new knowledge program to optimize a company's effectiveness and revenue. Most importantly, knowledge management is essentially a human social process (Arpaci, 2017). In addition to knowledge management, another way that organizations can actively manage change is to continuously grow and develop their cultural sector to become a learning organization (Dayan, Heisig & Matos, 2017). Knowledge management is a science that supports easy and fast communication and exchange and transfer of information in the organization and can express

innovation, ability, and efficiency in organizations, especially universities. In such circumstances, one of the factors of progress and excellence of any organization in improving organizational performance is to be able to use knowledge as a sustainable competitive advantage (Musakhani, 2009). Knowledge management is considered as one of the important and valuable approaches of today's universities that by establishing such a system can prevent the outflow and extinction of the organization's intellectual capital (Khatami, 2009).In this paper, theoretical issues regarding knowledge capital and the capability of knowledge management, then research background, method and pattern, findings, and finally conclusions will be explained, respectively. According to the above topics, this paper aims to identify the indicators and components of knowledge capital and human resource strategies in the Iranian higher education system.

Background

Knowledge process capability is the ability of an organization to use knowledge capital in a series of coordinated knowledge processes to produce valuable knowledge (Akhavan, Philsoophian, and Karimi Gavareshki, 2017). Organizational process capability includes a short-term, external and internal process capability of the organization to perform organizational activities. Knowledge process capability refers to the ability of a company to use knowledge capital in a series of coordinated knowledge processes in order to create valuable knowledge (Rashidalipour, Ansari, and Seyed Javadin, 2019). There are four processes of shared knowledge: production, transmission, integration, and application. The university environment is suitable for applying the principles and methods of knowledge management. There are several reasons for this: 1) Universities usually have a more modern information infrastructure (although in developing countries this aspect is relatively weak, compared to other institutions and organizations in these countries, this is still true); 2) Sharing knowledge with others is typical for teachers

and speakers. 3) The goal of students is to acquire knowledge from available and accessible resources in the shortest possible time (Abbasi, Afsharnia, and Cheshmeganzadeh, 2020). Knowledge creation includes activities for the development, acquisition, regulation, and storage of knowledge. At this stage, knowledge can be developed through internal knowledge by research, experience, or experiential learning. Knowledge can also be obtained from external sources such as market, customers, suppliers, and competitors, and is obtained through search and research (Manafi Sharafabad, 2019). Aghajani, Hassanali et al. (2018) in a study entitled " A Native Model for Evaluating the Impact of Knowledge Management on the Performance with the Mediating Role of Organizational Process Empowerment at Universities" concluded that knowledge management is considered as one of the important and valuable approaches of today's universities and by establishing such a system, the outflow and disappearance of the organization's intellectual capital can be prevented. Moreover, universities should pay more attention to the variables of knowledge process capability and organizational process capability for better performance. Sousa and Rocha (2019), examined the strategic knowledge management of a digital environment: tacit and explicit knowledge in Fab Labs. The study described how users learn in Fab Lab, a digital manufacturing lab. In this study, 7 semi-structured interviews were conducted. The results showed that in almost all laboratories, information is shared orally and the transfer of tacit knowledge is unstructured. Studies show that so far no research has been conducted to provide a model for the transfer of tacit knowledge to explicit knowledge in defense organizations. Centobelli, Cerchione, & Esposito (2018) performed a study entitled " Aligning enterprise knowledge and knowledge management systems to improve efficiency and effectiveness performance: A three-dimensional Fuzzy-based decision support system". Their results highlighted that the proposed decision support system allows managers to evaluate knowledge management processes and identify which knowledge

management systems to adapt to improve alignment with the nature of the knowledge their enterprise possesses as well as to increase their level of efficiency and effectiveness. Donnelly (2019) conducted a study entitled: "Aligning knowledge sharing interventions with the promotion of firm success: The need for strategic human resource management to balance tensions and challenges". Knowledge sharing plays a key role in facilitating organizational goals. However, the extensive digitization of employee knowledge can potentially undermine the full realization of the premises for sustainable competitive advantage advanced by the knowledge-based view. Mezghani, Exposito, & Drira (2016) in their study entitled "A collaborative methodology for tacit knowledge management: Application to scientific research" stated that Tacit knowledge, which refers to the know-how, is critical to understand and reuse because it is located in the human minds. It represents the foremost element for human and team evaluation. Seeking tacit knowledge is achieved only by communicating with the concerned persons, which makes losing it axiomatic if people leave their work without documenting their know-how. So, providing a collaborative environment based on a common conceptualization of the domain to formalize the experts' knowledge and to share their outcomes is necessary.When new knowledge is acquired, the law-making process must turn knowledge into usable and accessible opportunities that can be stored in the organization's knowledge repository. Knowledge transfer refers to the distribution or dissemination of knowledge between the point of production and the point of use. It can occur at various organizational levels, including individuals, groups, divisions, and departments, and channels can be formal or informal. Without knowledge transfer, the effect of existing knowledge on organizational performance is minimized. Thus knowledge transfer may be difficult, while valuable knowledge is embedded in individuals, contexts, or situations. Therefore, strengthening an organization's ability to promote and increase the share of knowledge is an important issue in relation to knowledge transfer.

Knowledge integration is defined as a company's ability to provide, reconstruct, and interpret existing knowledge to reduce the frequency, increase compatibility, replace obsolete knowledge, and maximize knowledge collaboration. Knowledge integration cannot be done without a common standard example, The application of knowledge shows the real application of valuable knowledge to develop the competencies of the organization and determine the position of the source of competitive advantage (Kafashpoor, Shirazi, & Hoseini Daluii, 2016). In fact, knowledge management is what drives the flow of knowledge towards the key functional goals of the organization. The key goals of organizations are typically formed by financial and market goals. Paying attention to knowledge and human resources and how to utilize them in the organization as opportunities to achieve a competitive advantage in business are considered the changes of the present century. Moreover, establishing strategic alignment between organizational units with the overall strategy of the company is one of the main tasks of the organization management, according to which the choice of strategy of other parts of the organization should be done considering the overall strategy of the company (Bashir and Farooq, 2019). The higher education system, as an organization that relies heavily on its human resources capabilities, is constantly looking for the causes that reinforce this effect. The managers of this complex follow one of the ways to achieve this goal in establishing a knowledge management system. They believe that knowledge management can play a key role in strengthening the capabilities of human resources in this organization. Therefore, employees in any organization, as the most important strategic factor in creating a competitive advantage, need to improve the level of knowledge, awareness, and acquisition of competencies and capabilities, and this important goal is achieved with effective strategies and systems and efficiency of human resources (Tian, 2017). Hence, considering that human resource strategy as one of the most important and at the same time the most complex task strategies affecting the performance of

universities, the present study seeks to provide a model on the impact of knowledge capital on the capability of knowledge process and human resource strategies. The higher education system is focused on non-profit and non-governmental institutions and universities in Mazandaran province. In such a way that the organization can adopt appropriate strategies in the field of human resource development, employee relations, recruitment, employee performance, and compensation of services to direct its human capital to the development, acquisition, regulation, and storage of knowledge, and consequently achieve its macro goals.

Method

The present research was quantitative and qualitative. A qualitative method was used to collect items related to variables and a quantitative method was used to test the model. In the quantitative method, structural equations were used with the AMOS 21 software. The statistical population was 10 experts of governmental and non-governmental universities and institutes of higher education in Mazandaran province who had sufficient knowledge and experience in conducting research on human resource strategies in the higher education system. In order to conduct the research, after designing general questions and formulating the interview process, in-depth interviews were conducted with experts. The interviews were open and lasted 60 to 100 minutes with each expert. At the end of each interview, it was fully implemented on paper and the initial data encoding was performed to extract the basic concepts. After completing all the interviews, an in-depth study of the theoretical foundations and previous research was conducted to combine the opinions of experts, past concepts, and experiences of the researcher and perform the next steps of data analysis and design the model. The designed model was then provided to several experts and after receiving their suggestions and comments on the classification of categories and concepts, the final model of the present study was designed. Sampling

was performed purposefully and continued until the theoretical saturation of the data. In this study, 10 semi-structured face-to-face interviews were conducted with experts, and after 9 interviews, repetition was observed in the received information. But to be sure, continued until interview 10. Kvale (1996) stated that given the time and resources available, 15±10 samples are enough to conduct the interview. The interviews were analyzed based on content analysis. In the present study, an open interview was used to collect data in the qualitative section. Obviously, the use of existing documents related to the research topic falls into this scope, which the data collected in this study were combined using the content analysis technique. Then, the obtained codes were compiled in the form of a researcher-made questionnaire and thus the research tool in the quantitative section was a questionnaire. To check the validity, the findings were presented to the participants and their opinions were studied and applied. In the end, this research was studied and reviewed by professors and some cases were expressed to correct or change the final theory. The reliability of the data was confirmed by showing the path of the researchers' decisions to the professors and providing them all the initial and analyzed data, codes, categories, study process, initial goals, and questions, as well as careful examination of the correctness of all research steps by experts. To evaluate the reliability of the retest, some of the interviews were selected from among the interviews conducted. Each interview was coded twice in a short period of time. Then, the specified codes were compared with each other. This method was used to evaluate the coding stability of the researcher. In each interview, codes that were similar in time interval were identified as "agreement" and dissimilar codes were identified as "disagreement."Thematic analysis was used to analyze the data. The data obtained from the interviews were analyzed in three stages of open, axial, and selective coding. In the open coding phase, model categories were identified. Then, in the axial coding phase, the link between these categories was determined in the form of a coding paradigm. In the third

part, the relevant model was developed by examining the relationship between themes.

Findings

In the qualitative section of the research, the main focus of the questions was related to exploring the factors affecting the dimensions, components, and indicators related to knowledge capital in the higher education system as the main concept. To achieve this, in the first stage, the main categories and sub-components are presented based on open and centralized coding of data from in-depth and exploratory interviews with key experts and the refinement of conceptual codes. Accordingly, in order to perform open and centralized coding in the first stage, the data at the sentence and phrase level were examined for each of the interviews, and concept codes were extracted from the transcripts of the interviews. In the next stage, by performing refinement and reduction operations, these components were organized in the form of sub-categories and named by continuous review. Copies of interviews were re-examined to ensure that each of the concepts and categories was properly organized; And by reviewing these categories, the achievement of logical saturation for the main categories and sub-categories was examined. Open and axial coding stopped when a meaningful classification was obtained after several reviews of interview transcripts. Overall, from the analysis of qualitative research data in the coding stage 76, the initial conceptual code was obtained. After reviewing and matching these codes and removing duplicate codes, common codes were recorded.

Table 1

Dimensions, Components, and Indicators

Quotes	Themes	No
The low status of science and scientist in society, effective management based on human resources, lack of tools to identify and assess the knowledge needs of individuals, knowledge capital is not a superior criterion	Human capital	1

Quotes	Themes	No
for individuals, knowledge capital is not a criterion for determining the competence of individuals, severe scientific weakness of some forces and not repairing it with knowledge capital, emphasizing consequentialism in universities and identifying and applying the best practices.		
Lack of trust in superiors, strengthening team spirit and loyalty, flexibility and quick response to change, ambiguity of university goals for staff, increasing the quality of education and research, developing intangible assets, training teamwork and related techniques in all organizational levels, development of working groups with a high standard of performance, efforts to create a culture of support, informal meetings outside the workplace, mutual trust.	Social capital	2
Recruitment of creative and innovative staff in universities, supporting creative and innovative ideas, the number of inventions, discoveries, articles, and books presented by university professors and students, utilizing creativity and innovation to solve organizational problems, preserving the intellectual property of others, material and spiritual support of managers for knowledge capital, progress in research, innovation, education, and their benefits.	Innovative capital	3
Quick access to equipment and technology, development of hardware and software facilities, processes, information systems, and databases, Access to up-to-date and required software, Allocation of physical space for scientific meetings, provision of information and communication technology infrastructures including hardware, software, and fixed and mobile communication networks, application of knowledge storage technology tools	Structural capital	4
Adaptation of new technologies to existing university processes, identification of key processes that are most valuable to students, re-engineering of these processes with the aim of improving process characteristics, documenting these processes, utilizing operational information systems and application software that are used in the daily operations and executive affairs of the employees of the organization, utilizing decision support systems and management analytical software, application of new approaches in the training process, financial communications, contracts, etc.	Process capital	5

Quotes	Themes	No
Feeling of vitality and energy from knowledge capital, enjoying knowledge capital, observing fairness in scientific criticism, managers' attention to tacit knowledge and focus on explicit knowledge, allocation of research times, emphasizing the role of interdisciplinary studies for professors, replacing knowledge groups with educational groups, forming scientific associations of professors in universities, identifying appropriate mechanisms for optimally acquiring knowledge, identifying and acquiring knowledge from internal and external sources of the organization, identifying strategic points of knowledge.	knowledge production	6
Unaccustomed to receiving knowledge of others and preventing the spread of laziness, formal meetings are a kind of knowledge capital, proper interaction in scientific topics, familiarity with communication skills in the workplace, knowledge organization, allocating enough time for knowledge capital, forming a knowledge management unit in offices, paying attention to scientific meetings with special specialized topics, organizing the knowledge capital system and easy access to it, permanent presence of technology specialists in universities, in-service training.	Knowledge transfer	7
Knowledge and experience documentation, knowledge internalization, knowledge externalization, knowledge combination, knowledge socialization, modeling, information analysis.	Knowledge integration	8
Attitude to the application and sharing of knowledge at different levels of the organization, not being indifferent to receiving up-to-date knowledge, the importance of the scientific position in the administrative hierarchy, not being afraid of using new technologies, teaching skills necessary for knowledge capital, using individuals' knowledge in decision-making, paying proper attention to documentation, strive to produce knowledge in the organization and share the organization's intellectual and creative resources, display and facilitate the knowledge supply to employees, help employees to apply knowledge in the organization.	knowledge application	9
Recruitment of the best professors and staff, paying enough attention to the scientific competence in employment, Not being bored in scientific discussions, initial interviews with applicants to teach or work in universities.	Recruitment and employment	10

Quotes	Themes	No
Knowledge capital is a job duty, few numbers of formal and unfriendly courses in the university, the use of internal forces as in-service universities, the fit of in-service courses with the needs of staff, no fear of making mistakes in the use of technology, continuing to teach modern technologies, respect Asking culture, the existence of a culture of reading and the availability of resources, designing incentive and motivational systems to strengthen creativity and innovation, learning and human resource development of universities, sharing and developing organizational culture	human resource development	11
Damage to the position in the workplace, endangering job security, large university population, and multiple problems, identifying individual strengths and weaknesses and identifying individual performance, providing performance feedback, identifying organizational training needs.	Employee performance	12
Willingness of individuals to participate in informal groups, appropriate income of staff, general atmosphere of eagerness to share knowledge, appreciation and reward for teamwork, provision of reward packages and good benefits, appropriate salary levels, and benefits to staff and faculty.	Service compensation	13
Helping each other to complete information, helping each other to eliminate weaknesses, being envied by others, forgiving people's scientific mistakes, strengthening the spirit of teamwork and loyalty.	Employee relations	14

The findings of the qualitative section are in the form of findings from the coding results with the approach of analysis of the content and concepts of the data. The most basic task at this stage is open coding. Based on this, common concepts of recording units were recorded and common codes were counted. The results of open coding and the code number of the interviewee to each of the factors were examined by experts. Table 1 shows the dimensions, indicators, and components of expert respondents in interviews to the most important categories of coding. Also, Table 2 shows the basic and organizing themes.

Table 2

Analysis of Basic, Organizing, and Comprehensive Themes

No.	Organizing themes	Basic themes
1	Background and basic conditions	Human capital, social capital, innovative capital, structural capital, process capital
2	Causal conditions	Knowledge capital
3	Interfering conditions	Knowledge process capability (knowledge production, knowledge transfer process, knowledge integration, knowledge application)
4	Central category	Indigenous model of the impact of knowledge management on human resource strategies in the Iranian higher education system
5	Strategies	Human resource strategy
6	consequences	Recruitment and employment, human resource development, employee performance, service compensation, employee relations

The model obtained from the qualitative analysis is shown below.

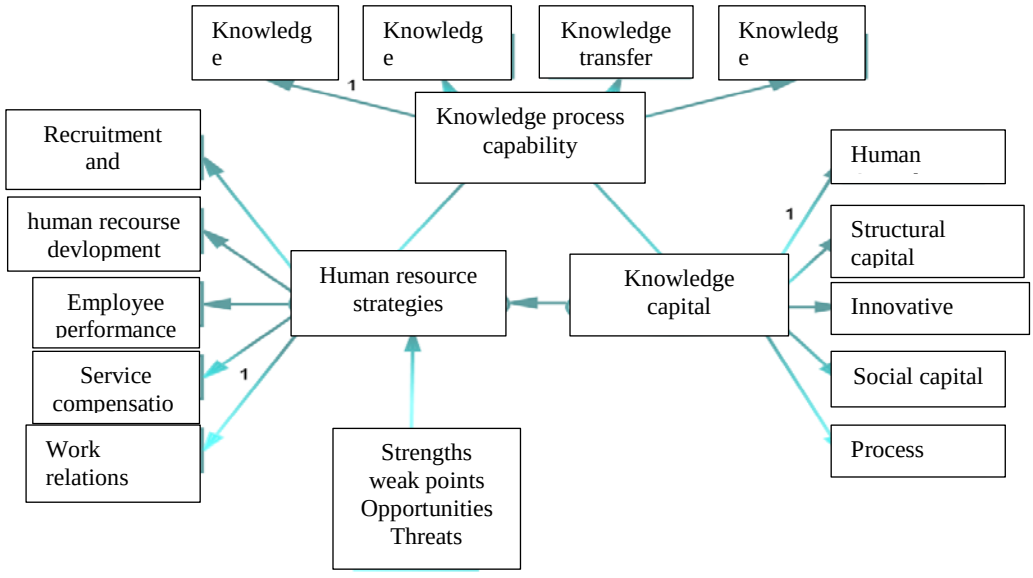

Figure 1

Designed Model

Conclusion

The present study sought to identify the indicators and components of knowledge capital and human resource strategies in the Iranian higher education system and the research questions were answered using qualitative methods. According to the results of the qualitative section, the knowledge capital model in the Iranian higher education system has three dimensions and 14 components as follows: knowledge process capability (knowledge application, knowledge transfer, knowledge integration, knowledge production), human resource strategies (recruitment and employment, human resource development, employee performance, service compensation, work relations), and knowledge capital (human capital, structural capital, innovation capital, social capital, process capital). Knowledge capitals represent a set of abilities and capabilities of an organization that are considered essential for economic growth, competitiveness, human development, and quality of life. In fact, intellectual capital provides a new resource base through which an organization can compete. This capital consists of three main and interrelated components that are interdependent. The first and most important component of intellectual capital is human capital. This capital includes various elements of human resources (e.g. attitude, competencies, experiences, and skills, tacit knowledge and innovation, tacit knowledge and talent in the minds of people in organizations) and it is important for organizations as a source of strategic innovation and reconstruction. The second component of intellectual capital is structural capital. This capital is the supportive infrastructure of human capital and includes all the inhuman reserves of knowledge in organizations that create value for organizations. The third component of intellectual capital is relational capital, which identifies the formal and informal relationships of an organization with external stakeholders and their perceptions of the organization, as well as the exchange of information between the organization and them. One of the most vital activities of managers is the management of the most important capital of the

organization, namely human resources, and the most effective way to achieve competitive advantage in the current situation is to make the employees of organizations more efficient through their proper management. One approach is based on competency from which the manager looks at employees and emphasizes the development of human resources. The main goal of this management is to create strategic capability through skilled, committed, and motivated employees to strive for achieving sustainable competitive advantage. To achieve effectiveness, organizations should manage their human resources with long-term functions and using strategic human resource management in order for these human resources to perform the required behavior and competencies in accordance with the internal and external environment of the organization. The functions of strategic human resource management mean that organizations can influence the skills, attitudes, and behaviors of employees appropriate to their job to achieve organizational goals. In fact, the successful implementation of everything in the organization, including planning, implementation, and control of organizational macro strategies, implementation of transformation programs, and advancement of organizational goals will not be possible without serious management and attention to human resources. Among these, successful organizations are those that take advantage of the opportunities created by management tools and new technologies; intellectual capital is one of these tools. With the complexity of competition, innovation is one of the main benefits for the life of organizations. All organizations need new and innovative ideas to survive. New and innovative ideas are breathed into the body of the organization and save it from annihilation. Innovation not only enables organizations to gain a competitive advantage over competitors but also provides a useful tool for improving organizational performance. Sustainable development and achieving economic, social, political, and cultural prosperity of a country goes beyond the human resources of that society. In fact, human resources are considered as the main essence and

center of gravity of the development process of any society, and the level and quality of knowledge, insight, and skills of human resources determine the rate of growth and development of a country. Therefore, investing and planning in the development of intelligent, skilled, and mentally flexible human resources and thought mobility, is a prerequisite for the creation and continuation of any change and development in all dimensions of society. Therefore, human training organizations or the main custodians of human resource education are one of the important pillars, and in other words, they are the support of governments for training human resources and ultimately achieving sustainable development. These organizations have a special place in macro-planning, extensive evaluations and studies, the results of which include promotional strategies. The higher education system, as the highest level of the education pyramid, is one of the most important and valuable institutions that society has at its disposal for the development of human resources. This system is not only recognized as the main foundation of human resource development in most countries of the world but also provides the intellectual and cultural infrastructure of a society to have new methods and technologies. For this reason, the role of this institution in the comprehensive development of countries, both in advanced and developing countries, is considered significant and irreplaceable. Iran's higher education system has interrelated educational, research, social, and cultural roles, and having this complex role has caused attention only to quantitive growth of universities and higher education centers, regardless of their scientific development and quality standards does not guarantee the effective and serious role of this system in training the human resources of the society. Having the desired quality, the fit between education and research, taking into account the needs of society, benefiting from up-to-date scientific information and communication, and having an effective system for monitoring and evaluation are some of the items that along with quantitative expansion, can lead higher education to play the expected development role. Therefore, considering

the role and position of universities and higher education centers and the high sensitivity of individuals and organizations to the performance of this institution, the system should have balanced growth in both quantitative and qualitative dimensions. The sensitivity of the performance of this system in the development process on the one hand and the inevitable increase in social demand, followed by the capacity of universities and higher education centers, as well as the limitation of specialized and committed material and human resources in society, on the other hand, review the performance of universities and make higher education centers essential. In addition, in recent years, the need to pay more attention to the comparative advantage of each of the geographical areas of the country has been raised as one of the important priorities of higher education planners. According to the results of the literature review and the findings of the analysis of interviews and questionnaires, research proposals are proposed and presented to the officials, decision-makers, educational planners, and curriculum planners in higher education with dimensions and components and familiarize knowledge capital mechanisms and human resource strategies in higher education and take the necessary executive measures while planning and making policies.

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