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Identifying the Dimensions of Knowledge-based Resistance Economy in the Iranian Universities of Medical Sciences from the point of view of Faculty Members and Managers

Shima Kazemi Malekmahmoudi[1], Kiumars Niazazari[2]✉, Negin Jabbari[3]

1. Department of Management, Gorgan Branch, Islamic Azad University, Gorgan, Iran. E-mail: kazemishima20@yahoo.com
2. Corresponding author, Department of Management, Sari Branch, Islamic Azad University, Sari, Iran. E-mail: k.niazazari@gmail.com
3. Department of Management, Gorgan Branch, Islamic Azad University, Gorgan, Iran. E-mail: neginjabbary@gmail.com

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ABSTRACT

Objective: The increasing growth of knowledge production, on the one hand, and the need for community dynamics, on the other hand, have turned a knowledge-based economy into a responsibility. The innovative performance of any country depends to a large extent on a knowledge-based economy (KBE) and elements of the integrated system of knowledge (university, industry, and government). The present study identifies the components of the knowledge-based resistance economy in the Iranian universities of medical sciences.

Materials and Methods: The research method is qualitative, and the sample was targeted. The data were collected using library and field methods through conducting interviews with 24 faculty members. All interviews have undergone "content analysis," have been recorded, turned into a text file, typed in Word, coded, classified with Microsoft OneNote, and analyzed.

Results: The results showed that from the view of participating faculty members and key experts, specifying the KBE-based model in the Iranian universities of medical sciences in the quantitative part included six dimensions of ICT, knowledge-based Human resources, structure and management system, capabilities, and facilities and resources, guidelines and obtainable socio-environmental impacts. In this method, after confirming the Cronbach's alpha of the questionnaire made by the researcher (94%), eight dimensions, including institutional and management systems, information and communication technologies, efficient knowledge-based resistance economy (resources and facilities), innovations and entrepreneurship in medical sciences (modern medical technologies), guidelines and socio-environmental impacts, structural factors, knowledge-based human resources, and inspirational elements and knowledge-based resistance economy recording systems were achieved.

Conclusion: According to the results, it can be concluded that focusing on the components of the knowledge-based economy through managing, eliminating

redundant rules and reforming deterrent rules, providing the necessary platforms and developing electronic infrastructures, utilizing capacities and human capital, expanding knowledge-based collaborations, policy-making and strategic planning can make the intellectual properties of economy resistant.

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Introduction

In the 21st century, the production of scientific knowledge and scientific movement has been thoroughly mixed with the advancement of technology. Thus, the production of scientific publications has had a significant impact on Iran's economic, social, and cultural dimensions. Globalization of the economy, competition in global markets, technology development and growth, and the development of knowledge-based activities have shaped a new stage of development called "knowledge-based economy", in which the innovative performance of the economy in producing, disseminating, and exploiting technological innovations in a conceptual framework called "national system of innovation" will guarantee the technological and economic development of countries (Sobhani & Tajali, 2012).

With the acceleration of economic integration, today's world has entered a new stage and the production-based economy is replaced by knowledge-based economy, where knowledge production and exploitation play a major role in the creation of wealth (Kazemi Malekmahmoudi, 2015). Economic sanctions and flood of cheap imported goods with low quality are threatening Iran and its health with a huge burden on the individual, the family, and the society, stagnating the economy and slowing down or even stopping the time required for synchronization and development.

Now, almost all valid scientific information is available in international databases via the World Wide Web (Mohammadi, Talachi, & Khoshkam, 2005). The existence of widespread communication networks such as Internet has evolved the search methods and data retrieval techniques, allowing researchers and scholars meet their knowledge and information needs with an access to a personal computer and an internet line without having physical presence in libraries and data centers. Considering the types and applications of knowledge, a simple and unique definition of knowledge is accepted, which is practical information (Turban, 2006). Knowledge exists in people and is a part of the complexities of human unknowns. Knowledge is on top of the pyramid;

it is organized information that are transformed, interpreted, combined and eventually processed (Niazazari et al., 2014).

The criterion of development of each country depends on the optimal utilization of available resources and facilities to achieve the goals. Knowledge-based economy components, especially research and development, increase the total productivity of production factors and cause increased economic growth through foreign savings in production and efficient use of resources (Abu Toori et al., 2013). Knowledge is a basic pillar for achieving economic development, and if knowledge is not managed correctly, it cannot be the basis for development (Mahmoudzadeh et al., 2014).

Manuel Castles considers the economy of developed countries as an economy in which economic productivity is derived from the interaction of knowledge with knowledge, rather than the effect of knowledge on raw materials, and if we do not consider traditional economy activities as a part of KBE, we are mistaken (Smith, 2003). In a KBE, the university plays a pivotal role in the process of innovation and is considered as a supplier of human capital and the creator of a physical environment for new economic organizations (Guerrero et al., 2015).

In the knowledge-based economy, innovation and entrepreneurship are considered the most important indicators for making the economy resilient. Entrepreneurship in universities redefines the traditional roles of universities, as a producer of knowledge, through basic and applied studies, technology and the factor of knowledge transfer, innovation, and support of economic development
.

Powell and Snellman (2004) defined a knowledge-based economy as the production of goods and services based on knowledge-sensitive activities that accelerate technical and scientific progress. In addition, the key component of KBE is the growing reliance on intellectual capabilities, not physical inputs or natural resources. Considering the issue of resistance economy and components of KBE has desirable outcomes for the society and helps to preserve and develop power in the university system that can lead to a competitive advantage and economic growth. Entrepreneurship and innovation are creative activities for the production of new services and products in line with the resistance economy, and knowledge sharing is considered the most important function of economic growth (Piri et al., 2017).

From the Iranian supreme leader's point of view, all factors should move towards the realization of economic goals in the resistance economy. Realization of social justice, gaining international authority, survival of the country, and proving the practical efficiency of the religious and Islamic system are the most important goals of the resistance economy (Deputy of budget and planning, Ferdowsi University of Mashhad, 2014). Structured participation of the public and thinking about long-term horizons of policy-making and macro-planning can only be achieved if the culture of resistance economy is institutionalized (Sabktaktin et al., 2013).

Nowadays, universities are the scout of the development and advancement of research and knowledge production, and academic libraries play an important role in this regard. Access to scientific information is the main issue of notification (Davarpanah, 2003).

Shahnazi (2012) showed that KBE has its own infrastructure and characteristics. The four characteristics of the formation and realization of KBE are derived from four layers. The basic infrastructure and initial layer include education, information and communication technologies (ICT), and research and development expenses; the second layer includes researchers and technicians whose costs were spent on their training; the third layer of KBE characteristics includes unpublished research and inventions, the results of which are shown in the fourth layer of KBE, i.e., knowledge-based industry and services.

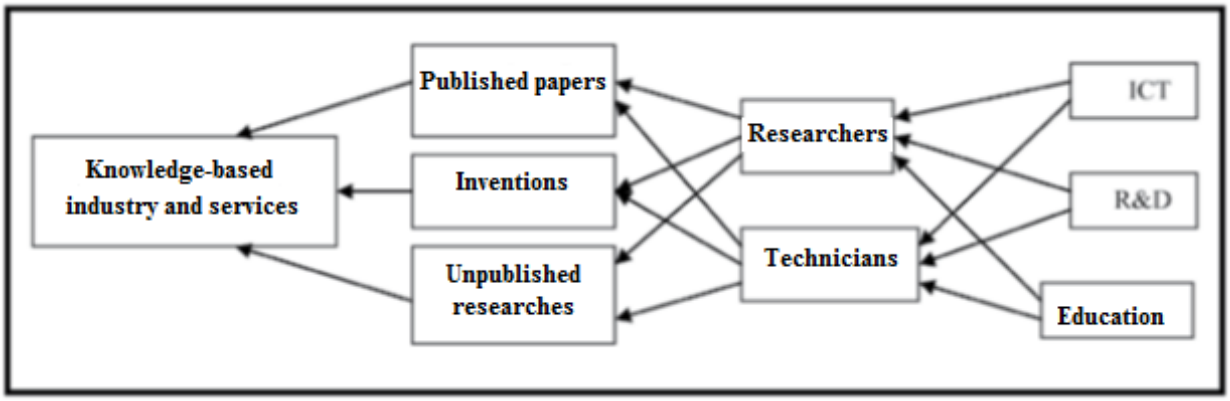

Figure 1. Layers of a knowledge-based economy

Banoa and Taylor (2014) stated that universities play an important role in the development of the country's future, and the opportunity to compete on a playing field is largely regarded as the result of KBE. Also, from Margaret and Kavitha's (2014) point of view, "knowledge communities" and their progressive role against pressures and changes associated with globalization have become more important in the contemporary era, and the successful execution of modifications in higher education institutions needs five major factors of commitment, research and development, scientific and financial independence, the collaboration of the institute and industry, and international cooperation. Human capital formation, knowledge base structure, dissemination and utilization of knowledge, and preservation of knowledge are the four important missions of higher education that lead to social and economic development.

Tocan (2012) believes that the key variables of the four pillars of a knowledge-based economy include economic incentives and governance system, education and human resources, the innovation system, and information and communication technology.

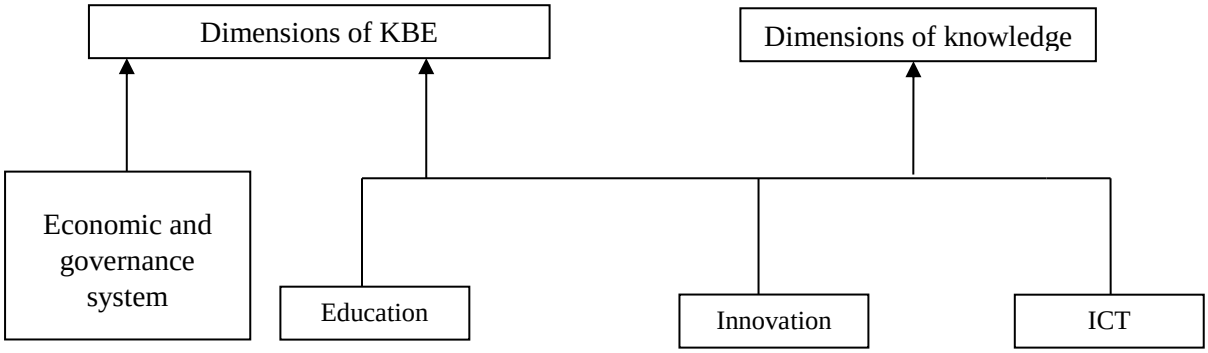

Figure 2. Key variables of a knowledge-based economy

Therefore, according to the above studies, it can be deduced that making policies regarding research and development is based on teamwork, and universities have a significant effect on educating and training the applicants of the labor market (Kazemi Malekmahmoudi, 2015).

In developing countries, academic environments are often far from industries, and there is a weak connection between the two institutions, and consequently, industrial evolutions take place slowly in those countries. In this novice debate, there is a major lack of applied research in Iranian medical universities and colleges for various reasons, including the priority of healthcare and the lack of any issues related to the knowledge-based economy.

Materials and Methods

The present study is a qualitative research with a mixed approach. The data were collected using library and field methods. In the library method, the study of literature, books, and related research. Also, searching the relevant scientific and specialized sites was carried out. The semi-structured interview was conducted in the field method. The sampling method was targeted and 24 participants participated. On average, each interview lasted about 45 minutes. To increase validity, the data were reviewed continuously and interviews were recorded. The data were reviewed by peers and co-workers in order to improve the accuracy and reliability. Recorded interviews were converted into text files and typed in Word software and then categorized and coded with Microsoft OneNote. All interviews have undergone “content analysis”, have been recorded, written, coded, classified, and analyzed. When necessary, feedback and referral were made and the referrals to key contributors were also proposed by participants. During the research process, from data collection to the end of the analysis and reporting findings, ethical standards such as informed consent, anonymity preservation, confidentiality of information, right of withdrawal at a desired time, and permission to record interviews were observed.

Results

Generally, in the qualitative part, responsiveness was at a positive level. Some demographic information of the faculty members and contributing managers were as follows.

Table 1. Profile of faculty members and contributing managers in terms of gender, rank, and work experience

Participant	Gender	Experience	Academic rank
P1	Female	3	Professor
P2	Female	30	Associate Professor
P3	Male	5	Professor
P4	Female	20	Professor
P5	Female	22	Associate Professor
P6	Female	27	Professor
P7	Female	3	Professor
P8	Male	2	Professor
P9	Male	16	Associate Professor
P10	Female	8	Associate Professor
P11	Male	22	Associate Professor
P12	Female	9	Assistant professor
P13	Female	23	Assistant professor
P14	Male	23	Assistant professor
P15	Male	4	Assistant professor
P16	Male	23	Assistant professor
P17	Male	22	Associate Professor
P18	Male	19	Assistant professor.
P19	Female	9	Associate Professor
P20	Male	10	Assistant professor
P21	Female	12	Assistant professor
P22	Male	6	Associate Professor
P23	Female	17	Assistant professor
P24	Male	5	Professor

The data extracted from interviews were grouped and codified, and after confirming the CVR Index and CVI, the dimensions and indicators of the model were identified. According to the review of the texts and findings extracted from the interviews of the contributing experts, the general and pivotal categories as well as the items of the knowledge-based resistance economy, were extracted as shown in the table below.

The findings showed that, from the viewpoint of the faculty members and key collaborators, the dimensions of the realization of a resilient economy based on a knowledge-based economy in the medical sciences university included information and communication technology, innovation and entrepreneurship in medical sciences, knowledge-based human resources and teams, structural and managerial system, resources and facilities and capabilities, general policies and socio-environmental impacts. Each of these dimensions included the components described in Table 2.

Table 2. Primary table of knowledge-based resistance economy in the Iranian universities of medical sciences (Result of qualitative checklist and interviews)

Dimension	Item (Indicator)
ICT	1. The existence of a database related to plans and projects and research theses
	2. The existence of a database in each area to prevent similar studies
	3. Strengthening the relationship between university and industry and markets
	4. Establishing and strengthening the communication between universities and research and technology centers and units
	5. Access to information in the field of university knowledge and the Ministry of Health
	6. Speeding up the Internet and bandwidth
	7. Improving the information system and changing paper services to automation and facilitating its usage
	8. Availability of work database and automation filtering system
	9. Easy access to library and IT
Innovation and Entrepreneurship in Medical Sciences	10. Use of medical products of the country
	11. Creating jobs for students with acquired skills
	12. Evidence-based medicine intervention design (Scientific and collaborative evidence-based medical science)
	13. Conducting research leading to medical products, processes, and procedures
	14. Increasing public awareness and education on diseases and health promotion
	15. Good production for the customer and profitability of production
	16. Inclusion of research in student's curriculum
Human resources	17. Timely financial and spiritual support of researchers
	18. Expanding the absorption of Ph.D. and post-doctoral students in research and technology
	19. Establishing and strengthening medical networks
Management system and structure	20. The improvement of extra hierarchies and decrease of automation steps, and provision of easy access
	21. Dynamic system and process optimization and refinement
	22. Modification of long and frequent processes
	23. Transparency of contracts for the implementation of knowledge-based projects
	24. Developing incentive laws and practices for assessing skills and creativity to create an opportunity to flourish
	25. Prioritization and validation of scientific productions
	26. The accompaniment of senior officials and principals with product-driven knowledge-based projects
	27. Establishment of a reference and comprehensive laboratory and knowledge-based centers for the required diagnostic and therapeutic needs
	28. Support and equip pharmacies and medical centers with the economic knowledge-based products
Resources, facilities, and capabilities	29. Support and the development of growth centers and clinical research units
	30. Establishment of technology research cores and student technology research teams
	31. Equip and digitize libraries
	32. Supporting the transfer of modern knowledge through virtual IT and ICT education
	33. The examination and determination of the native advantages of the region in the development of health knowledge and attention to climatic conditions and a variety of medicinal herbs
Socio-environmental policies and impacts	34. Promoting the status of medical science and improving the quality of medical journals
	35. The transformation of research projects into productive projects
	36. The production of knowledge leading to the provision of optimal services in the acceptance, treatment, discharge, and follow-up of patients
	37. The modification of student admission system and the education of entrepreneur students
	38. The modification of wrong, traditional beliefs

The statistics of the participating population in the quantitative part are based on demographic qualities as described below.

Table 3. Distribution percentage of faculty members and researchers based on sex

Sex	Percentage
Men	49.7
Women	50.3

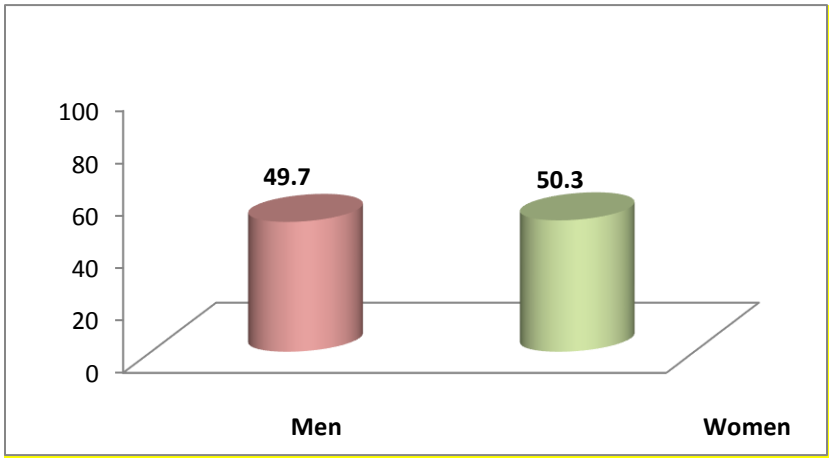

Figure 3. Distribution of faculty members and researchers based on sex

Table 4. Distribution of faculty members and researchers based on their experience

Experience (year)	Percentage
Less than 5	29.8
9 – 5	25
14 – 10	8/3
19 – 15	13.7
More than 20	23.2

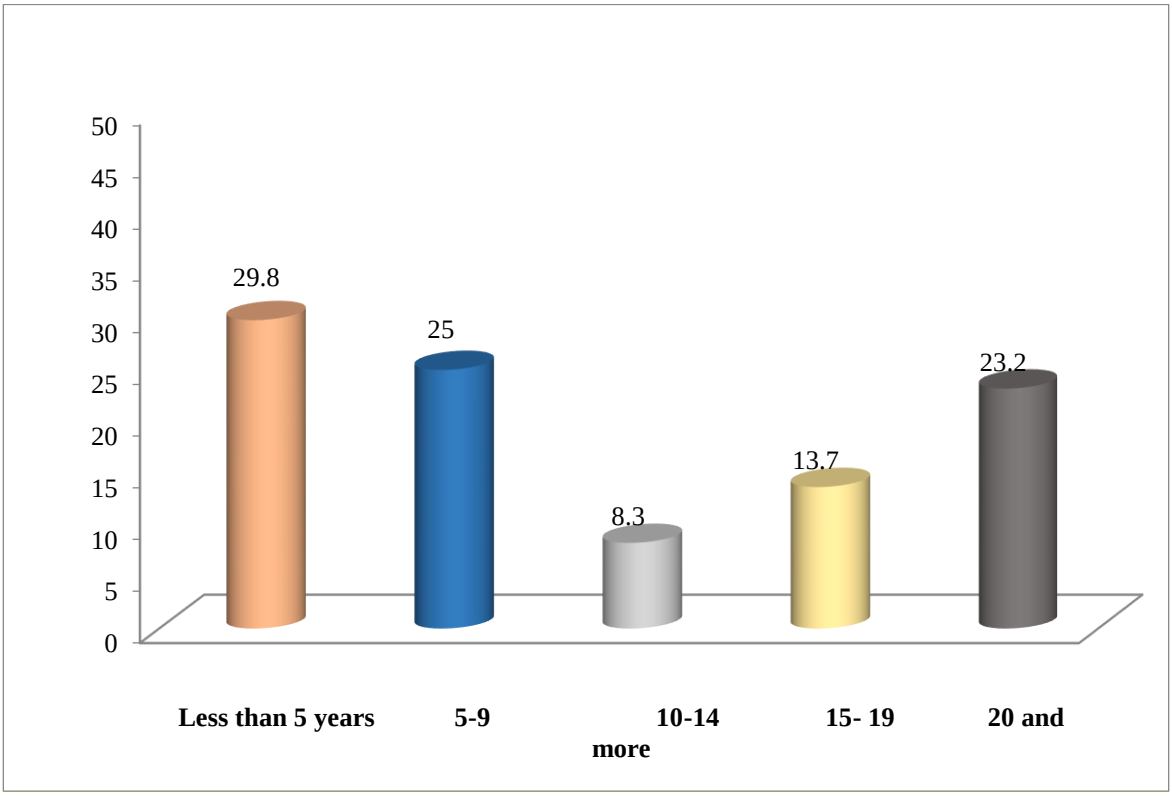

Figure 4. Distribution of faculty members and researchers based on work experience

In the qualitative analysis, necessary hypothesis for the relation of factor analysis were done. KMO index and Bartlet's test showed that factor analysis is appropriate for the data.

Table 5. Factor Analysis relation hypothesis tables

Factor Analysis relation hypothesis			
.877			Kaiser-Meyer-Olkin Measure of Sampling Adequacy
Sig=.000	Df=703	Approx. Chi-Square =4382.825	Bartlett's Test of Sphericity

After confirming the KBE measurements (dimensions and inicators) in the qualitative part, for determining the appropriate number of factors, factor analysis and Eigenvalues were used. In this factor analysis, to offer a better image of the factors, Varimax gyration was used. Analyzing the variance of factors showed that eight factors devoted about 64 percent of the portion to themselves. So it was observed that these eight factors can explain 64 percent of the data related to the 38 components of the knowledge-based resistance economy in the Iranian universities of medical sciences.

Table 6. portions of KBE-Based resistance economy dimensions in the Iranian universities of medical sciences

Row	Dimension (dimensions and factors)	Variance	Cumulative frequency
1	Institutional and management systems	11.123	11.123
2	Efficient knowledge-based resistance economy (resources and facilities)	10.362	21.458
3	Information and Communication Technologies (ICT)	9.434	30.919
4	Innovations and entrepreneurship in medical sciences (modern medical technologies)	9.060	39.979
5	Socio-environmental impacts and policies	8.041	48.020
6	Structural factors	6.477	54.497
7	knowledge-based human resources and inspirational elements	4.758	59.255
8	knowledge-based resistance economy recording systems (knowledge-based databases)	4.649	63.904

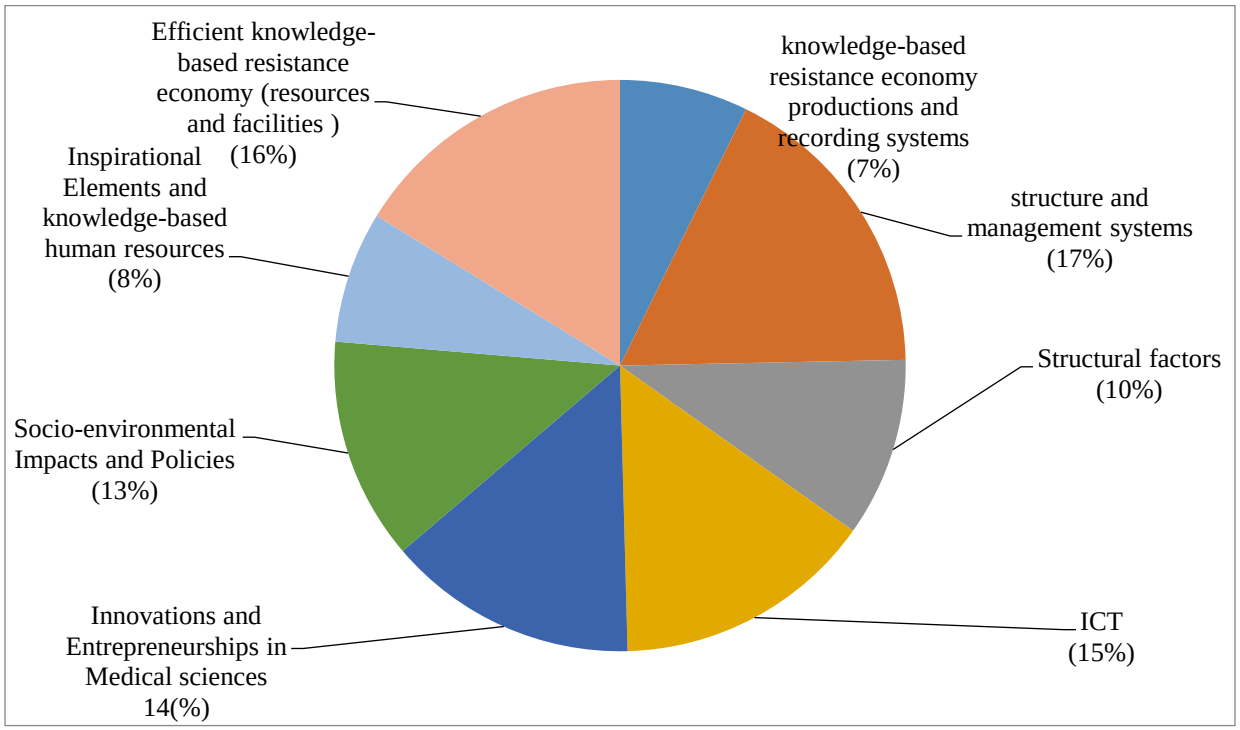

Figure 5. Dimensions of knowledge-based resistance economy in Iranian universities of medical sciences

As Table 6 and Figure 5 show, eight identified factors have a portion of close to 64 percent. First factor or dimension 1, 11.123 percent; dimension 2, 10.364 percent; dimension 3, 9.434 percent; dimension 4, 9.060 percent; dimension 5, 8.041 percent; dimension 6, 6.477 percent; dimension 7, 4.758 and dimension 8, 4.649 percent.

Discussion

The findings showed that in the Iranian university of medical sciences, the categories of the knowledge-based economy for the success of the resistance economy included information and

communication technologies, innovation and entrepreneurship in medical sciences, human resources and knowledge-based team, management and structural system, capabilities and facilities, policies and socio-environment effects.

In a study on the knowledge-based economy, Khaloobagheri et al. (2013) emphasized the improvement of the level and quality of laws and regulations and the establishment of laws protecting the rights of individual ownership as the government's priorities in raising the level of the knowledge-based economy in Iran, which is in line with the component of the reforming and improving codes and guidelines and the clarification knowledge-based projects' contracts and the component of the incentive laws for creativity in the management system and structure of this research. Accreditation is mentioned through prioritization.

The results of the study carried out by Aref and Bakhtiari (2012) indicated that the production of science leads to the production of technology and wealth, but without planning and creating the appropriate infrastructure, the achievement of technology and industry arising from the knowledge within the country will not be possible. This is in line with the component of carrying out research leading to the production of knowledge in applied knowledge-based research and optimization of the structure.

Shahnazi (2012) carried out a study entitled as factors affecting the production of high-tech industries in the knowledge-based economy and concluded that KBE has four layers: the basic infrastructure and the initial layer, including education, information and communication technologies (ICT), and research and development expenses; the second layer includes researcher and technicians that costs were spent on their training; the third layer including unpublished researchers and inventions and the fourth layer of knowledge-based industry and services that are in line with the components of education and support of knowledge-based human resources, continuous interactions with industry and the market, the use of medical science products, increased awareness and education.

Banoa and Taylor (2014) examined the relationship between universities and the knowledge-based economy in one of the developing countries using the ideas and perceptions of university leaders and staff and revealed that universities play a crucial role in the development of the country's future and the opportunity to compete in a playing field is largely regarded as the result of KBE, which is in line with the results of the current study in which the faculty members and managers' participation in determining the components of the resistance knowledge-based economy was positive.

Tzortzaki and Mihiotis (2014) reviewed knowledge management and future research directions to enrich the research literature on the development and evolution of results. They found that knowledge production is the main knowledge capital in organizational environments largely

dependent on ability, learning, and adaptation. Their research, in line with the results of the current research, has considered the production of technological knowledge essential for economic development.

Investigating the level of relations between the three institutions of government, industry, and organizations, Choi, Yang, and Park (2015) discovered a distinct pattern of triple helix among the developed and non-developed countries. In the developed countries, the participation of academic units with industrial and governmental units has increased, but in non-developed countries, this partnership is weaker. Therefore, the need for more academic participation in our developing country is felt, which is in line with the link between government and industry and the educational organizations of the current research.

In the study of scientific productions, the contribution of government and state institutions of Iran over time shows a fluctuating curve and a lack of growth rates in scientific products. With the participation of knowledge-based institutions and interaction with the public sector and industry, knowledge-based economic management can be used as a basis for the success of a resilient economy.

According to the discussion, it can be concluded that the complex competitive environment of today's world brings organizations to perfectionism. Educational organizations and universities also need to adapt their programs and performance to their economic and social requirements and economic policies of the government and at an international level in order to achieve goals and plans.

Conclusion

Considering recent knowledge-based approaches of universities and the University of Medical Sciences in recent years, it is promising that it is important for the university to be effective in solving community problems and play a more active role in the development of a knowledge-based sustainable economy while preserving and improving its educational and research quality. Therefore, capacity building, providing the necessary resources, paying attention to applied and qualified disciplines in medicine, and gaining value from the knowledge and foundations of different knowledge-based sciences should be an important strategy in providing university economics and knowledge-based society development.

Author Contributions

Conceptualization; methodology; data collection; writing—original draft preparation; writing—review and editing. S. K.M.; project administration, K.N. & N.J.

Ethical considerations

This work is the result of the doctoral dissertation in the field of management in the Islamic Azad University. In this research, attempts were made to comply with ethical standards in the research and confidentiality of information and informed consent in partnership. The interview time and permission to exit the study were coordinated with participants.

Data Availability Statement

Not applicable

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Conflict of interest

The authors declare no conflict of interest.

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