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Application of a Model of Higher Education for Commercializing Knowledge and Meeting the Needs of the Study Population Comprehensive and Very Large Branches of Islamic Azad University

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Abstract

Purpose: The present study was conducted aimed to apply a model of higher education for commercializing knowledge and responding to the needs of society in comprehensive and large branches of Islamic Azad University.

Methodology: This study was applied in terms of objective, and in terms of method is in the category of data-based qualitative and exploratory research, conducted in two phases. In the first phase, while reviewing the literature, by 18 in-depth and semi-structured interviews using theoretical purposeful sampling (including 15 faculty members and 3 experts in the industry) required data were collcted that reached saturation. The data collected from the interviews were analyzed based on the systematic approach of Strauss and Corbin at three stages of open, axial and selective coding.

Findings: Finally, a summary of the developed model was presented to 4 professors, and their opinions were collected for correction and adjustment. In order to evaluate the reliability of the data, the criteria of the Grounded Theory including comprehensibility, compatibility, controllability, and generality of Strauss and Corbin (2008) were carefully investigated. In the second phase, the results of the analysis were compiled in the form of a questionnaire and the first stage of Delphi was performed on 15 experts and by calculating Kendall's Coefficient of Concordance (W) of 0.564, 25 components were excluded. Then, the second and third stages of Delphi were performed on 15 and 12 experts, respectively. Given that a significant coefficient of less than 5% was obtained for all components, no component was excluded at the second and third stages of Delphi, and Kendall's Coefficient of Concordance (W) was calculated to be 0.600 and 0.788, respectively, indicating a consensus among members.

Conclusions: Finally, the research model was developed with 6 main categories and 43 sub-categories.

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1. Introduction

Social, technological and environmental needs, the realization of which depends only on the degree of adaptation of higher education and the university to a scientific and social environment, Therefore, the emergence of new developments in the functioning of universities in the last two decades has led to a fundamental change in the mission and the type of relationship with society, one of the consequences of which is the accountability of the university. Hence, policymakers in most developed countries have already considered the interaction between the university and industry and facilitated commercialization by creating the necessary infrastructure, because in a knowledge-based economy, universities are both a source of human capital and a platform for the formation of new organizations. But in the past decades in Iran, unfortunately, due to some economic, political, managerial, cultural and educational factors, the function of training specialized human resources in interaction with the world of work has not been much considered. In fact, interaction with the labor market is a missing link in the management of the education system more than ever. The lack of professional skills of university graduates, inconsistency between academic disciplines with the needs of society and the labor market, universities increasingly relying on government budgets and tuition, and the traditional structure of industry and labor market are the problems caused as a result of the two-way interaction gap between higher education and the needs of society and the labor market, and had bad outcomes such as unemployment of university graduates, elite migration and low labor market productivity.

According to the final document of the 20-year vision of economic and social development, the Islamic Republic of Iran should be promoted to the first economic, scientific and technological status in the region in 1404. Achieving the objectives of this vision, targeting in various fields including science and technology, compiling a comprehensive scientific map of the country, emphasizing the national innovation system, creating financial funds to support research and innovation, approving and announcing the patent plan, the approval of the bill of knowledge-based companies, the establishment of the National Elite Foundation, financial and legal support for innovators and their encouragement, the approval of the regulation of commercialization of knowledge, and etc. indicate that the importance of science and technology in national development should be expanded. The issue of commercialization of knowledge is very important and scientific and industrial findings should be able to generate wealth in the country. Therefore, it can be said that the application of scientific knowledge in society is one of the important mechanisms of accountability of universities. If what is produced and published in the university does not fit into the context of society and is not used to meet the needs of society, academic work will remain obsolete and the main objective of the university, which is to meet the needs of society, will not be achieved. Therefore, the commercialization of knowledge should be considered as one of the most important missions of the university that can make the result of the university work tangible and pleasant for society.

Reviewing previous national and international studies in the field of knowledge commercialization in universities found that in most of these studies, the barriers, necessities and mechanisms of knowledge commercialization in universities have been studied. For example, Hosseinghlipour, et al (2011) has identified barriers to the commercialization of knowledge in entrepreneurship. The main barriers identified include non-competitiveness, university environment, negative attitude, corporate thinking in the university, inefficiency of laws and regulations, weak educational system, and etc. Abbasi Esfanjani and Forouzandeh Dehkordi (2014) have investigated the factors affecting the commercialization of knowledge and mentioned environmental, structural, political, legal, cultural, economic, and educational and research mechanisms as factors and requirements. Narimani and Vaezi (2018) in a study attempted to identify individual factors affecting the commercialization of academic research. According to the study results, 9 categories of experience and knowledge, basic skills, creativity, ethics orientation, motivation, human resource development, human resource hiring, communication network and participation were identified. Wynn and Jones (2017) in a study entitled "Academic Knowledge Transfer and University Entrepreneurship Collaborations" have shown that universities have been able to enhance the entrepreneurial process through

existing knowledge-based companies that commercialize and transfer knowledge. Jameson and O'Donnell (2015) in a study conducted on the process of recognizing the components of entrepreneurship in the university identified four parts of mission and values, development of skill and mental set, strong command center and organization as different parts of the research process of an entrepreneurial university.

According to the existing literature, a group of studies by content approach have addressed the issue of knowledge commercialization and sought to identify the factors influencing knowledge commercialization or barriers to knowledge commercialization. With no comprehensive and integrated model for higher education accountability by knowledge commercialization approach, there is a gap that has been identified in the existing literature. Regarding the importance of Iran's contribution to the world's natural resources and the desired situation of human resources in the country, the position of the Islamic Republic of Iran in terms of economic indicators such as GDP, innovation and competitiveness compared to other countries that lack many material, financial, spiritual and human assets is not a worthy position. Therefore, regarding the fundamental role of universities in meeting the needs of society and at the same time the challenges that these universities face, balanced meeting of the needs of stakeholders, as the focal point of universities, is vital. Academic units, especially the Azad University, have shown that they cannot meet the needs of stakeholders and different classes of society using old approaches and strategies. In other words, the ideas and strategies that have been used in higher education over the past decade to the present day are not suitable for meeting the unique economic, scientific, political and social expectations of the higher education system, and universities should move towards implementing new strategies, and many universities around the world are now seeking to renew and reform their previous policies is to apply the principles of sustainability in their policies and management in order to investigate the unsustainable capabilities that have been promoted over the years through higher education and reconsider the nature of their relationship with society.

Accountability has a complex concept and each scholar emphasizes certain aspects of it according to his perception, experience and analysis (Shakeri, 2015). Based on the definitions provided by various experts on accountability, it can be generally stated that accountability is the degree of adherence of the organization to the final promise, commitment to the assigned responsibility and a criterion for measuring, reporting and evaluating performance in social systems (Torkzadeh, et al, 2020), in order to make optimal use of resources in order to achieve the objectives, effectiveness and productivity of the system (Hanushek, et al, 2011).

Meyerson, et al. (2006) considered accountability as the basis of performance measurement, evaluation and reporting and believed that accountability should be used as a criterion for measuring performance, reporting and evaluation in the organization. The researchers believe that accountability is achieved when public services are provided efficiently with good quality and low price. Therefore, accordingly, the criterion of responsible and accountable behavior is efficiency and quality of services (Rajabzadeh, et al, 2020).

Bones (2005) listed five other elements needed for accountability to be considered as a social relationship: a) accountability should be accessible to the public, b) the role-player should provide an explanation for his action, c) this explanation should be given to a specific group, d) the role-player should feel compelled to come forward, and f) discussion and judgment about the role-playing behavior should be possible, so that the role-player can be punished for his behavior (Shakeri, 2015).

Accountability can have very different meanings, depending on the discipline. The term accountability in political discourse is used to indicate explicitness and trustworthiness. The European Commission considers this term to mean transparency, precision, and responsibility and very broad concepts such as sharing, consultation and participation (Ahmadi, 2013). The researchers believe that accountability, as perceived from the perspective of social relations, consists of three stages: a) playing a role that feels compelled to inform others of its actions. This perceived obligation by the role player can be formal or informal (Liu, 2011).

Higher education accountability can be defined as the pursuit and implementation of activities (education and research) within the framework set by the scientific community, with respect for ethical and professional

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principles and standards internationally accepted without feeling external pressures (Pardakhtchi, et al, 2012). Table 1 shows the most fundamental developments in higher education accountability.

Table1. Developments in higher education accountability during the last fifty years (Source: Nili et al., 2010: 69)

Legal accountability	Scientific accountability
Accountability to the government	Accountability to the government and people
Accountability to the resource	Accountability for processes and outcomes
Accountability to the limited customers	Accountability to diverse and numerous customers

Higher education accountability, especially in the contemporary era, means meeting local and national needs considered by the experts in the field of social services mission of higher education. According to researchers, service means the transfer and implementation of the application of knowledge-based learning and the experience of graduates to customers, which is mainly the result of the second type of knowledge with applied knowledge (Welle-Strand, 2000: 225). The researchers also believe that this mission is called the approach of social commitment in higher education and the distinguishing feature of modern universities. They believe that universities should deliver students to society who can with knowledge, skills and preparation provide social services and meet the expectations of the national and local society. Therefore, this mission focuses on the link between the university and society, involving universities in the process of regional and national development by increasing students' skills and cultural awareness, as well as the development of technology and innovation. In other words, this link is to deepen the harmony between students' experiences and learning outcomes with their job and economic plans (Nili, et al, 2010). The researchers call such a university that is able to produce these outcomes a pragmatic university that its level of social accountability is high. Some of these outcomes are central competencies; others are called key competencies and general skills (Sharipour, et al, 2008).

Higher education by systematic approach is considered as a sub-system influenced by the evolution of macro, economic, social, cultural and political national and international systems. Of course, the higher education system, in turn, controls all economic, social, cultural and political systems. Any planning for the development of higher education disregarding these fields, whether on a local, national, regional or global scale, is not useful because universities and institutions of higher education should always move within the framework of systems beyond the environment and at the same time attempt to improve their current living conditions. Universities and higher education institutions play a key role in the fundamental changes in today's societies. This role begins with the training of the experts and continues with the production of knowledge; applied and developmental basis, and the development of the scope of research. Providing specialized services to society is the third role played by universities and higher education institutions, and the commercialization of knowledge as a new role for universities in the 21st century has become an undeniable role (Ardalan, et al, 2014).

In the past, the mission of universities was only education and research, which played a role in developing the knowledge economy through activities in the commercialization of scientific knowledge (Boehm and Hogan, 2013). But today, due to changes in the global environment and the relationship between the three main functions (industry, government and university), a third mission has been assigned to universities i.e. university entrepreneurship and participation in the economic and social development of societies (Rouhani, 2012). And this mission is more than just working and engaging in research to provide knowledge base to develop the industry (Guerrero, et al, 2010). Because Entrepreneur University is a university that actively attempts to innovate about businesses and be effective on the future of society (Samadi Mirkolai and Samadi Mirkolai, 2016: 128).

Most definitions of university entrepreneurship refer to knowledge commercialization activities and the use of university intellectual property for financial and commercial benefits (Toole and Czarnitzki, 2007). In this regard, Toole (2007) used the concept of commercialization of academic intellectual assets instead of

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commercialization of knowledge and technology and in fact considered it synonymous with academic entrepreneurship. They defined university entrepreneurship as a special form of knowledge and technology transfer and believed that this phenomenon occurs when researchers from universities and non-profit research institutions decide to commercialize the knowledge produced or developed in their institutions (Pourezat and Heidari, 2011). Knowledge commercialization is in fact any activity of faculty members that leads to the provision of knowledge products and services that can be directly and indirectly effective on the economic and social development of society. It should be noted that this definition is the basis of research. Etzkowitz et al. believed that collaboration between university and industry enriches theorizing in universities. Because academics become familiar with industry issues and offer more practical theories, the cycle of theory and practice is better formed (Etzkowitz, et al, 2003).

Currently, the existing model of universities in Iran focuses more on education and research and pays less attention to the role of the entrepreneurial university, which is one of the important missions of the university. The high unemployment rate of university graduates in the labor market, the weakness in the formulation and proper implementation of economic development plans, the lack of a comprehensive and all-inclusive plan for the training of specialized human resources and etc. are among the most important factors that today become problems under the title of employment for graduates of higher education. Although in recent years, cooperation between university and industry in some fields of nuclear energy and petrochemicals has brought important achievements for the country, but this cooperation and research in higher education is far from developed countries. However, in the 21st century, knowledge is considered as one of strategic and even superior natural and economic resources. Currently, university, as the most important sector of knowledge production and supply, faces the challenge of meeting the needs and expectations of society. Hence, they should make great efforts to transfer and apply knowledge in the economic, social and industrial sectors.

Therefore, this study attempted to address the importance and mission of universities from a different perspective, which is university entrepreneurship and the move towards knowledge commercialization. The theoretical principles of research are devoted to reviewing the research literature on the process, higher education accountability and knowledge commercialization.

Table2. A review of past national and international research

title	result	researcher
Design an effective accountability model of Islamic Azad University using the qualitative approach of grounded theory	According to the study results, the effective accountability model of Islamic Azad University in the form of six dimensions of Strauss and Corbin's model including causal factors (human resources, scientism in the university, motivation in the university, university quality evaluation, development based on needs assessment, education and learning process), main category (responding to students, labor market and society), contextual factors (political, economic, social, cultural, and global and higher education policies and plans), confounding factors (university structure, proportionality of supply and demand and educational and research facilities), strategies (attracting participation, university interaction with society, overseas interactions and provision and allocation of resources) and outcomes (skills development, social and cultural promotion of students, quality improvement of university, satisfaction promotion of external stakeholders, reducing brain drain and promoting entrepreneurship).	Maleki, et al. (2020)
Provide a framework for the environment accountability in the higher education curriculum	According to the study results, the framework of the environment accountability in the higher education curriculum consisting of 18 elements of the curriculum with 111 components and related features was developed. These elements are: curriculum logic, goal setting resources, needs assessment, prioritization strategy, teaching concept, learning concept, instructor role, learning environments, place of teaching and	Torkzadeh, et al. (2020)

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	learning, time of teaching and learning, content and teaching and learning references, evaluation of teaching and learning, curriculum accreditation, curriculum planning system, management and supervision of curriculum implementation, appropriateness and prioritization, pathology of barriers to curriculum implementation, curriculum evaluation and modification, and curriculum review and modification.	
Develop a conceptual framework for organizational capacity of the higher education sector to meet expectations	According to the study results, organizational capacity has five main themes of strategic, structural, systemic, process, cultural, resources and infrastructure development, and a theme of social accountability as the outcome of the studied phenomenon. In this regard, it is suggested to study the levels of individual and environmental analysis for capacity.	Rajabzadeh, et al. (2020)
Accountability through disclosure of intellectual capital	According to the study results, human and internal (organizational) capital is the most obvious category of intellectual capital. The board and the size of the university also have a positive effect on the accountability of Italian public universities.	Nicolo, et al. (2020)
Effective components of knowledge commercialization based on knowledge management	According to the study results, the factors of knowledge commercialization include government forces, economic forces, education system, macro rules and regulations, technological advances, competitors, customer orientation and other issues related to the commercialization of the results.	Mit, et al. (2018)
Towards successful commercialization of university technology	According to the study results, the transfer of technology from university to industry includes many mechanisms such as joint research, contract research, consulting services, technology licensing, postgraduate education and advanced training for personnel.	Su and Shin (2018)

2. Methodology

The objective of the present study was applied because the objective of this research is to apply the model of higher education for commercializing knowledge and meeting the needs of society in comprehensive and very large branches of Islamic Azad University. In terms of method, it is in the category of qualitative data research of grounded theory and exploratory. The statistical population of this study consists of two parts. The first group participating in this study includes faculty members in the fields of management (education, higher education, human resources, and knowledge management) and industry experts. 18 people were selected by purposeful method and the participants who were at least: 1) familiar with the category of higher education and commercialization of knowledge and had studies and articles in this field and 2) professors who were faculty members of the Azad University or collaborated with the Azad University as visiting professors. The second group participating in this study was faculty members and university experts familiar with the fields (higher education and commercialization of knowledge). The panel members included 42 academic experts who were selected according to their level of education, familiarity with research method, research background and experience in the field of higher education and commercialization of knowledge (teaching, professional work or both). The data collection tool in the first part of the research was semi-structured and in-depth interviews with the participants, which were conducted between 30 and 105 minutes with open-ended questions. The interviews were sometimes repeated in order to share preliminary findings, complement, correct, and modify data. With the coordination of the participants in this study, these interviews were recorded in order to conduct a more detailed analysis and review of the participants' proposed views by reviewing the interviews. The data were analyzed and coded immediately after each interview. According to the results of the analysis of each interview, the research questions were corrected and the course of the research was determined. Taking notes quickly of each interview and setting up very detailed analytical notes on each concept obtained from the data helped the researcher to get rid of the many ambiguities that arose during the research. Data collection tool in the second part of the research was a researcher-made questionnaire by Delphi technique. This questionnaire was designed and developed with the analysis and coding of expert interviews at the first stage of the research. The questionnaire consists of two

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separate parts (closed and open) which include 20 questionnaires in the first round, 18 questionnaires in the second round and 15 questionnaires in the third round distributed in person and by e-mail among faculty members, and explained by telephone or in-person after one to three weeks, with the follow-up to receive the answer, and finally, after an average of 4 calls, a total of 53 experts were selected in all three rounds. 42 completed questionnaires were received and the results were analyzed.

In the first part of this study, data analysis is based on the systematic approach of Strauss and Corbin (2008) that after open, axial and selective coding, concepts and categories will be formed and the systematic relationship between categories will be determined. First, all the statements obtained from the interview with the participants were transcribed and after several reviews the important cases were extracted and categorized separately for each interviewee. In this study, the analysis unit was paragraph, that is, after excluding statements that were not related to the subject of the research, the information were categorized into tens of paragraphs. At the next stage, the concepts derived from the statements were extracted and coded. First, appropriate codes were assigned to different data, and finally these codes were categorized (open coding). At the next stage, the researcher moved away from open coding and investigated the relationship between each category and its subcategories. At this stage, the researcher puts the main category at the center and relates the other categories to it (axial coding). Finally, the researcher while 1) reviewing open and axial coding, 2) reflecting on the main phenomenon and relevance of each of the open category clusters and 3) reflecting on the resulting category clusters and finalizing the main category block, which itself contains several components, has finalized the process of reaching a theory and stating its causes by summarizing and explaining the relationship between the categories. The number of open, axial and selective codes in each paradigm is given in Table 3.

Table3. Number of open, axial and selective codes

Paradigm	Open coding	Axial coding	Selective coding
Causal conditions	76	43	9
Strategies	77	40	15
Contextual conditions	63	46	12
Confounding conditions	46	32	9
Outcomes	59	25	11
Phenomenon orientation	55	36	11

Kendall's Coefficient of Concordance (W) was used to analyze the data in the qualitative phase of the research using Delphi technique. The data required for the Delphi technique were collected through semi-structured and in-depth interviews with participants in the first phase of the research in the form of a researcher-made questionnaire. Based on the subject, the required specialties were determined and panel members were identified and selected at three stages using non-probabilistic sampling methods. After determining the panel members, Delphi technique was done at three stages. For designing the questionnaire, in this study, two ranges were used: 1) the appropriateness of the components with the dimension and 2) the importance of the component to collect the opinion of experts. In this part, each respondent should select from 1 to 10 an option for both ranges. The questionnaires for each round were distributed and collected in person and electronically (e-mail and sending in what's App and Telegram). Then, at all three stages of Delphi technique, Kendall's Coefficient of Concordance (W) were used among 42 professors and faculty members to determine the degree of consensus among panel members. The results of the three rounds of Delphi technique show that Kendall's Coefficient of Concordance (W) was calculated for the panel members' responses about the appropriateness of the components with the dimension and the importance of the factors on commercialization according to Table 3 which were all significant in the second and third rounds. Given that the degree of consensus of members in the three rounds does not show significant growth, so we can end the repetition of Delphi rounds.

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Table4. Results of Kendall's Coefficient of Concordance (W) calculations for Delphi triple cycles

round	No.	Kendall's Coefficient of Concordance (W)	Significance level
1	15	0.564	0.006
2	15	0.600	0.001
3	12	0.788	0.001

3. Findings

In response to the research question (what is the appropriate model for higher education to meet the needs of today's society using the knowledge commercialization approach?), Qualitative data collected from the process of conducting semi-structured interviews with the subjects (industry and university experts) were analyzed in the form of open, axial and selective coding. A summary of the results obtained from the implementation process of the three coding stages is given in Table 5.

Table5. Dimensions and components obtained from Kendall's Coefficient of Concordance (W)

dimension	Socio-cultural factors	Economic-political factors	Structural factors
Causal conditions	1. Culture that governs society 2. Universities pay attention to local demand 3. Localization of universities	1. Auditing and financial evaluation in universities	1. Research-oriented universities 2. Quality assessment of universities
Contextual conditions	1. Social-generational changes	1. Making money 2. Relationship between industry and university	1. Policy-making and macro-educational planning 2. Technological developments
Confounding conditions	1. Motivation in universities	1. Decision-making power of universities 2. Public policies of the Ministry of Science 3. Government support policies	1. Implementation of the appropriate policy
strategy	1. Strengthening the social responsibility of universities 2. Evaluating the effectiveness of universities	1. Evaluate and monitor financial issues	1. Infrastructure 2. Planning and feasibility study of the plan 3. Having strategic and systemic thinking 4. Process agility
outcome	1. Meeting the needs of society 2. Empowerment of human resources 3. Satisfaction of stakeholders 4. Transparency and accountability	1. Entrepreneurship and job creation 2. Industry growth	1. Scientific-technological growth
Phenomenon orientation	1. Establishing new businesses 2. Development and growth 3. Stakeholders of society 4. Academics in the affairs of universities	1. Making money through knowledge 2. Investing in ideas and startups 3. Supporting the public sector 4. Establishing companies based on knowledge and economics 5. Support for banks and investment funds 6. Support of capital owners 7. Budgeting	1. Platform for turning an idea into a product 2. Legal platform

As shown in Figure 1, the paradigm model consists of three stages of coding and ten parts of causal conditions, contextual conditions, confounding conditions, phenomenon orientation (consisting of 6 parts), strategies and outcomes. At this stage, using the categories extracted from the coding stage, the category of

knowledge commercialization as phenomenon orientation is placed in the center of the coding paradigm and then the other parts of the coding paradigm were identified. At this stage, the data theorist (researcher) has used the text of the studied phenomenon according to his understanding of the text of the studied phenomenon, in the form of selective coding and Delphi technique, then professors and faculty members at three stages agreed on the components of the research and the validity of the qualitative phase was confirmed by Kendall's Coefficient of Concordance (W). Finally, the final conceptual model of applying the higher education model for commercializing knowledge and meeting the needs of society in the Islamic Azad University was illustrated using the selective coding process and the results obtained from the Kendall test are presented.

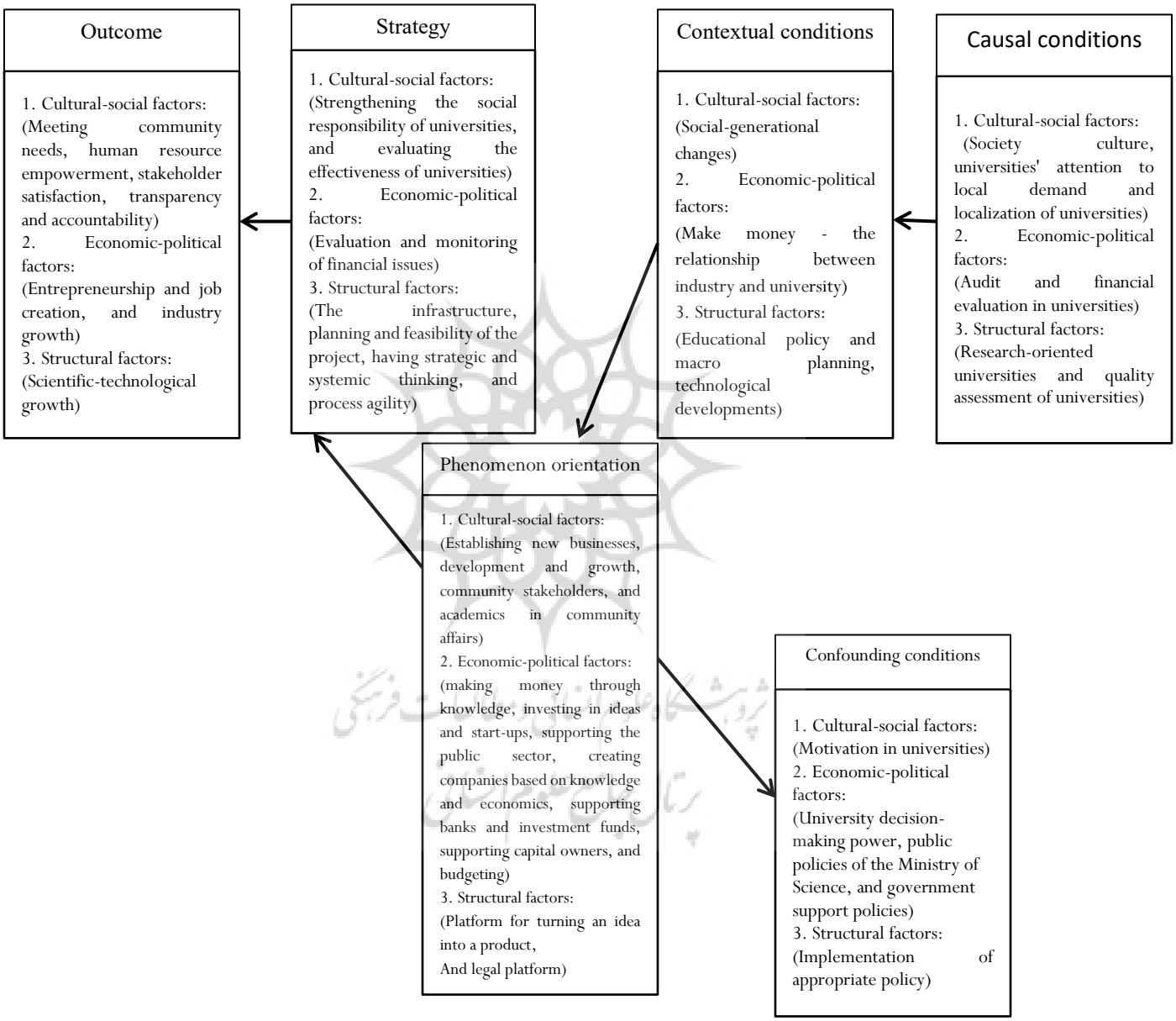

Figure1. Conceptual model of research

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4. Discussion

The commercialization of higher education can be one of the major concerns and threats posed by globalization, which may distort the mission and shake universities in fact-finding and develop the frontiers of knowledge. But on the other hand, the commercialization of knowledge in higher education can increase the quality of university education and research (through competition between universities) and improve efficiency in the allocation of resources (especially financial resources) by stakeholders to the university. Because when universities move towards commercialization, they will economize on education and research services and calculate their real price to cover their costs, and in this way they can demand the costs of higher education from real stakeholders and minimize their dependence on government budgets and public resources. In other words, the commercialization of higher education can lead to the optimization of resource allocation behavior of different stakeholders (both universities as suppliers and the family as applicants) and prevention of the loss of resources (financial resources, life or time of students, and etc.). If the country's universities are able to offer their educational and research programs in accordance with international standards to applicants, the problem of unemployment of many graduates and the lack of relationship between the education received and the real needs of society and industry will be easily solved. Commercialization of knowledge and the university entrepreneurial culture promotes the tendency to innovation in the university and leads to outcomes such as sustainable development, meeting the needs of society, preventing brain drain, scientific-technological growth, entrepreneurship and job creation, human resource empowerment, industry growth and etc. Therefore, playing the economic role of universities and higher education centers requires accurate and timely information of policy makers of this system about the needs and conditions of society.

Investigation of the process of policies and executive measures of higher education in the Fourth Development Plan indicates the approval of knowledge commercialization activities and the announcement of regulations on how to participate in the profits from the commercialization of research results. Obviously, the realization of this will lead to the strengthening of ties and relations between universities and industrial centers. Certainly, organizing industry offices using appropriate strategies will bring countless benefits to both parties involved in the process, including graduates of universities and higher education institutions are getting better and more out of the available job opportunities and the realization of this leads to increasing the efficiency of the higher education system and creates a positive return on investment. Another benefit is that industry managers have the opportunity to carefully repair and supply the manpower they need from among graduates who generally have acceptable skills and abilities.

Consistent with this study, the following suggestions are presented. According to the study results, the following stages are suggested to apply the higher education model for commercializing knowledge and meeting to the needs of society: The suggestions related to the current situation of universities include 1) creating databases appropriate to the current situation of universities to collect information about the needs of the market, industry, technologies and capabilities of the university and providers of various financial and non-financial resources for the use of academic research, 2) holding joint university-industry meetings to increase communication and awareness of the needs and capabilities of the parties, which is the basis of commercialization, and establish trust-building mechanisms, 3) investigating the supply and demand of applied research of universities based on the needs of the country and 4) facilitating the use of demand-oriented and applied plans of organizations and institutions in order to solve the problems and meet the needs of society.

The suggestions related to the cultural conditions of universities include 1) organizing the reward system based on the results of academic research on technology development criteria and combining these criteria in the system of professional development of faculty members to encourage university entrepreneurship and commercialization of knowledge at the university level, 2) culture-building and informing about opportunities, advantages and procedures related to the commercialization of research findings through holding symposiums, workshops and training courses and providing support and consulting services in the

field of entrepreneurship for researchers and technologists and 3) providing educational and information services to inform, prepare and encourage faculty members regarding the commercialization of their research results.

The suggestions related to the legal and political conditions of universities include 1) modification and reform of rules and policies of universities in the field of contracts with companies and effective distribution of revenue from the commercialization of knowledge in order to motivate professors and students to be involved in this process, 2) formulation and application of appropriate legal rules and regulations and design and establishment of certain organizations for registration and protection of intellectual property ownership with the cooperation and coordination of the scientific system (Ministry of Science, Research and Technology and affiliated institutions), the executive system of the government and responsible organizations, the legislative system (parliament and other legislative and planning institutions and the judicial system, and 3) providing financial resources and investment, especially in the development of research and development infrastructure, conducting research , especially at the stage of turning an idea into an invention and prototyping and launching a new business based on the results.

The suggestions related to the structural conditions of universities include 1) setting up and establishing an organizational unit with a specific organization to manage commercialization affairs at the university level, along with equipping the relevant unit with specialized human resources, 2) development of research marketing (supply orientation) and strengthening the university-industry relationship in meeting research needs; information infrastructure; target markets (demand orientation); and organizational structure, 3) forming and strengthening groups with multidisciplinary research teams and research cooperatives to accumulate and mobilize resources and divide the work during the design, implementation and commercialization of research results, 4) granting freedom of action to university professors and researchers to enter the field of business and commercial activities. Of course, this freedom of action should be such that it does not interfere with the academic missions of the university and their duties towards scholars, 5) strengthening the relationship between the University Technology Transfer Office and other departments and faculties that have capable and experienced personnel in the field of knowledge commercialization and handing over all activities related to the exploitation of the university's intellectual assets to it, and 6) provision of practical trainings for professors by the Education Department of the University through the problems of the executive departments by the managers so that the professors can formulate their curriculum with a problem-oriented method and provide trainings accordingly.

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