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Research Paper

Designing a Model to Transform Shahid Madani University of Azerbaijan into a Fourth-Generation University

Mahdi Saeedi[1*], Peyman Yarmohammadzadeh[2], Roohollah Mahdiuon[3]

1. Master's Degree in Higher Education Management and Planning, Educational Sciences and Psychology faculty, Shahid Madani University, Tabriz, Iran.
Corresponding author: *dr.saeedi.2025@gmail.com*
2. Educational Management Department, Educational Sciences and Psychology faculty, Shahid Madani University, Tabriz, Iran.
3. Educational Management Department, Educational Sciences and Psychology Faculty, Shahid Madani University, Tabriz, Iran.

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Abstract
This study aimed to develop a model for transforming Shahid Madani University of Azerbaijan into a fourth-generation, entrepreneurial university. A qualitative research design based on grounded theory was adopted to identify the key factors influencing this transformation and to develop a conceptual model. The study population comprised university managers, staff, and faculty members. Participants were selected through criterion-based purposive sampling according to academic rank, organizational position, disciplinary affiliation, experience in entrepreneurship education, involvement in knowledge-based companies, and university–industry collaboration. Data were collected and analyzed using the grounded theory approach. The findings were organized within a paradigmatic model comprising causal, contextual, intervening, strategic, and consequential components. The causal conditions included recognizing the need for an entrepreneurial university, identifying barriers to transformation, institutional autonomy, developing and committing to an entrepreneurial mission, and implementing structural, managerial, and regulatory reforms. The central phenomenon was the process of transforming ideas into products. The strategies were developed based on the university's strengths, weaknesses, opportunities, and threats. Contextual conditions encompassed innovation and diversity in teaching and research, development of entrepreneurial competencies, institutionalization of entrepreneurship, establishing a clear entrepreneurial pathway, and securing financial resources. Intervening conditions included collaboration with the external environment and the internationalization of faculty, students, and educational and research activities. The consequences involved changes in the knowledge, attitudes, and behaviors of faculty and students, organizational transformation, and entrepreneurial outcomes. The model was validated through expert review and inter-coder agreement analysis. The agreement coefficient was 75%, exceeding the 60% acceptable threshold, thereby confirming the reliability of the coding and the credibility of the proposed model.

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Introduction

The unemployment rate of university graduates is one of the most critical pieces of information presented regarding the country's unemployed population. High unemployment among university graduates indicates the poor performance and inadequacy of higher education. Examining unemployment statistics for graduates in the summer of 1401 (Persian calendar) reveals that the proportion of unemployed individuals aged 15 and older with higher education degrees constituted 41% of the total unemployed population. Comparing this statistic with the summer of 1400 indicates a 0.3% increase in graduate unemployment. This means that the share of university graduate unemployment increased from 40.6% to 40.9% during this period (*Iran, 2021*).

Unemployment can be considered one of the most fundamental and challenging economic and social problems currently facing the country. However, the significant and noteworthy aspect of this phenomenon is the unemployment of educated individuals and groups in society. The very weak performance of our country's higher education system has led to a situation where, on the one hand, we are unable to utilize our workforce for productive activities, and on the other hand, the vast investments we have made in training and developing human resources are considered wasted due to the unemployment of these very individuals.

If we want to solve this problem, we must first answer the question: "What are the reasons for university graduate unemployment?" Experts cite various reasons for this phenomenon. Some attribute it to the rapid growth of university centers and the failure to assess the needs when admitting students in different fields. Others believe that graduates' degree-seeking mentality and viewing a degree as a social prestige symbol contribute to their unemployment. Additionally, there are many individuals who are referred to as experts, senior experts, or even PhD holders, but in reality, their scientific knowledge is limited to a collection of theoretical information and data that has little practical or skill-based application. However, in general, it seems that in addition to economic recession, factors such as the mismatch between university fields of study and the needs of the country's job market, as well as the lack of ability and skills among educated individuals to seize available job opportunities, and the saturation of the job market in certain fields of study are among the reasons for graduates' lack of success in finding suitable employment.

Furthermore, conducting comparative studies can be very helpful in solving the problem of graduate unemployment. For example, by 1999, China had significantly expanded access to higher education for its massive population and, as a result, faced a huge number of unemployed graduates. This situation is very similar to Iran's in recent years. To address this problem, central and local governments and universities looked to entrepreneurship as an efficient tool to solve the issues of unemployment and underemployment among university graduates. They issued numerous policies to

promote innovation and entrepreneurship among young people, the core concept of these policies and measures was "the entrepreneurial university" (*Kang & Xiong, 2021*).

Based on the definitions provided by (*Abreu & Grinevich, 2013*), (*Peterka, 2011*), (*Shattock, 2008*), and (*Etzkowitz, 2004*) for the entrepreneurial university, it can be said that these universities have a third mission in addition to education and research: economic, social, and entrepreneurial growth and transformation, according to thinkers and intellectuals. The entrepreneurial university is an innovative, risk-taking university that fosters entrepreneurial ideas and behaviors.

Universities have gone through different eras since their inception and have transformed generation after generation. Experts consider industrial revolutions as the main and root cause of this generational change. They believe:

The first-generation university emerged during the First Industrial Revolution (steam engine and mechanization). Its goal was to train the workforce.

The second-generation university emerged during the Second Industrial Revolution (harnessing electricity and production lines). In addition to training specialists, it addressed industry challenges and provided solutions through research.

The third-generation university emerged in the Third Industrial Revolution (the advent of computers and automation). Beyond the above, it became involved in industry itself by establishing startups and knowledge-based companies within the university, engaging in the design and development of new products.

The fourth-generation university evolved with the Fourth Industrial Revolution (artificial intelligence, Internet of Things), leading to the permeation of the entrepreneurial ecosystem into the surrounding environment and beyond the university. This ecosystem encompassed a municipality and even a city, like Silicon Valley (*Saadat Saresht, 2020*).

The entrepreneurial university ecosystem includes a combination of leadership, culture, regulations, financial and human resources, educational programs, entrepreneurial networks, infrastructure, and a suitable national and international environment. This ecosystem provides an environment where administrative barriers are reduced, and university, government, and societal policies support entrepreneurial behaviors. A spirit of risk-taking and not fearing failure is encouraged. Entrepreneurship education programs are offered formally or in active entrepreneurship associations. The dynamism and sustainability of the entrepreneurial university ecosystem lie in the comprehensiveness and combination of all factors and conditions (*Mousavi et al., 2020*).

Universities must educate entrepreneurs, not employees. In other words, universities must become entrepreneurial universities, not just places for awarding academic degrees. This is precisely what highly developed countries such as the United States, the People's Republic of China, and England have

done. The top five universities that have trained the most entrepreneurs are, in order: Stanford University, University of California, Harvard University, MIT, and the University of Pennsylvania, all of which are American.

If universities in our country, Iran, were to adopt the same approach and become entrepreneurial universities, there would be no need for the government to employ graduates. These graduates, with the support of the university, would either establish knowledge-based companies and startups or be employed by one of the knowledge-based companies located at the university.

Ghoraishi Khorasgani et al. (2019) in an article entitled "Consequences of Neglecting the Transformation of Universities into Entrepreneurial Universities," have categorized the following consequences:

Social Consequences including: Increased unemployment, increased depression, decreased motivation, lack of creativity and innovation, and brain drain, etc.

Economic Consequences including: Lack of sustainable economic development, low quality of domestic production, lack of entrepreneurial prosperity, etc.

Cultural Consequences including: Negative attitudes towards entrepreneurship and universities.

Political Consequences including: Increased threats and sanctions against the country.

International Consequences including: Lack of competitiveness with global markets and the exclusion of universities from competing with universities worldwide (*Ghoraishi Khorasgani et al., 2019*).

With these descriptions, let's take a brief look at the situation of Shahid Madani University of Azerbaijan. According to the latest statistics published by the Ministry of Science, Research and Technology in a project entitled "Monitoring the Employment Status of Graduates of Universities, Research Institutes and Higher Education Centers in the Country," in 2021, the employment rate of graduates of Shahid Madani University of Azerbaijan at the bachelor's level was 52%, which means 48% of the university's graduates are unemployed. This is in stark contrast to a university like Khajeh Nasir Toosi University of Technology, which has an employment rate of 92%, meaning only 8% of its graduates are unemployed.

Although measures have been taken to expand entrepreneurship at Shahid Madani University of Azerbaijan and knowledge-based companies have been established there, most students are not interested in entrepreneurial activities. Furthermore, most of the established companies fail to reach the product commercialization stage and[1] stop at the initial stages. Consequently, the results achieved in the field of entrepreneurship are very weak compared to other universities. All of these factors indicate the lack of a comprehensive model and pattern for transforming Shahid Madani University of Azerbaijan into an entrepreneurial university. The existence of such a model would prevent the current scattered efforts and create coherence and coordination of all resources,

policies, and measures in order to realize the entrepreneurial university. Therefore, the transformation of Shahid Madani University of Azerbaijan and its conversion into a fourth-generation university is not only a necessity, but neglecting it will lead to a sharp decline in scientific credibility, a drop in the university's ranking in national and international rankings, and ultimately, a lack of interest from elite students and faculty to be present at this university.

In our country, most universities are at the second generation of universities, meaning they are research-oriented universities. They do not have significant activity in commercializing research findings, training entrepreneurs, and transforming into third-generation universities, which are entrepreneurial universities. Commercialization activities in domestic universities are mostly limited to the establishment of science and technology parks, which do not provide significant outputs to the business market (*Salamzadeh et al., 2011*).

- Research Objectives

Identifying causal, contextual, intervening factors, strategies, and consequences of transforming a university into an entrepreneurial university.

Presenting an entrepreneurial university model for Shahid Madani University of Azerbaijan based on the identified components.

Materials and Methods

The aim of the present study is to understand and categorize the mental models of faculty members and managers of Shahid Madani University of Azerbaijan. This understanding will be used to design a conceptual model for transforming the university into a fourth-generation, entrepreneurial university. To achieve this, a qualitative approach and grounded theory method have been employed. This approach will enable the identification of factors influencing the transformation of this university into an entrepreneurial university and the presentation of a conceptual model. Qualitative methodology provides researchers with the necessary tools to extract theoretical foundations from the general or overall characteristics of a subject that are simultaneously rooted in observations or empirical data. Grounded theory, furthermore, is a type of qualitative research method that inductively employs a systematic series of processes to develop a theory about the phenomenon under study (*Corbin & Strauss, 2008*).

The statistical population of this research included all managers, staff, and faculty members of Shahid Madani University of Azerbaijan (370 individuals). Sampling was conducted using purposive, criterion-based sampling (based on indicators such as academic rank, faculty position, specialized group, experience in entrepreneurship education, activity in knowledge-based companies, and involvement in the university's industry relations sector). In this method, the number of samples is not predetermined, and additions continue until

theoretical saturation is reached. Therefore, interviews also continue until the data and information categories are saturated, and the intended theory is described in full detail and with accuracy (*Sarfo & Ofori, 2017*).

It is worth noting that theoretical data saturation was confirmed by the eleventh interview. However, to ensure this and fill conceptual gaps in the model, the analysis of interviews continued until the thirteenth interview. In addition, to ensure complete theoretical saturation, documents such as the university's strategic plan were also analyzed and coded.

Data collection in this research was conducted using in-depth interviews with general guidelines. The qualitative data obtained from the interviews were then analyzed using the *Corbin and Strauss (2008)* method in three stages: open, axial, and selective coding, and a conceptual model was extracted.

To validate the designed model, the following procedure was followed:

One method of assessing research validity is to ensure that the findings are consistent with existing realities in the literature and research background. Considering the analysis of articles, the results were largely consistent with the realities of the entrepreneurial university literature.

In another strategy for calculating the reliability of the findings, all interviews were selected. In this method of ensuring reliability, each interview is coded by a researcher at two different times, and then the codes obtained from each interview at two different times are compared to determine the degree of agreement between the two codings. In this study, the selected interviews were coded twice with a 20-day interval. In total, 387 concepts were extracted. Among these, agreement existed between the codings for 341 concepts. Therefore, the calculated reliability in this retest was 88%, which, considering that this amount is more than 60% (*Shateri, 2015*), confirms the coding reliability.

Furthermore, this research was reviewed and revised by the faculty members studied, and cases that were suggested for correction or modification of the final theory were applied in the final theory. One way to demonstrate reliability is to audit the process. Reliability results are auditable when another researcher can demonstrate the decision path used by the researcher throughout the interview. Therefore, the researcher demonstrated data reliability by showing the path of their decisions and also by providing all raw data, analyzed data, codes, categories, study process, initial goals, and questions to the supervisors and advisors. With the careful audit of these experts, the correctness of all research steps was examined. In addition, the current research used the intra-subject agreement method to calculate the reliability of the interviews conducted (*Naderi et al., 2020*).

To calculate interview reliability using the intra-subject agreement method, a PhD student in entrepreneurship was requested to participate in the research as a research collaborator (coder). The necessary training

and techniques for coding interviews were transferred to her. In each interview, codes that were similar in the opinion of the two individuals were identified as "agreement," and dissimilar codes were identified as "disagreement." Then, the researcher, along with this research collaborator, coded 4 interviews. The intra-subject agreement percentage, which is used as a reliability index for analysis, is calculated using the following formula.

Intra-Subject Agreement Percentage = (Number of Agreements * 2) / (Total Number of Codes)

Based on the calculations, the intra-subject agreement percentage was 75%, which, considering that this amount is more than 60%, confirms the coding reliability.

Finding

Data analysis was conducted based on Strauss and Corbin's guidelines, which include three stages of coding: open, axial, and selective. Following these stages, the following results were obtained:

Causal Conditions: These are essentially the main factors that bring about the core phenomenon. From the perspective of the interviewees, the factors influencing the creation of an entrepreneurial university in this research are: 1) Understanding the necessity of an entrepreneurial university. 2) Identifying obstacles to becoming an entrepreneurial university. 3) Complete university independence and autonomy. 4) Developing a mission statement with an entrepreneurial vision and commitment to it. 5) Structural, managerial, and regulatory reforms. These five factors are the main elements influencing the entrepreneurial university.

Intervening Environmental Conditions: These are general contextual conditions that affect strategies. The results obtained from interviews with faculty members in this section indicated that three components can be effective in the strategies for creating an entrepreneurial university: 1) Collaboration with the external environment. 2) Internationalization of faculty and students. 3) Internationalization of the educational and research environment.

Contextual Conditions: Contextual conditions refer to specific conditions that affect strategies. After interviewing faculty members, they described the contextual conditions of the entrepreneurial university in five areas: 1) Diversity and innovation in education and research. 2) Development of entrepreneurial capabilities. 3) Institution building and infrastructure development. 4) Clearly defining the entrepreneurial path. 5) Financial resources.

The above three conditions – causal, intervening, and contextual – are interconnected and influence the core phenomenon (the process of transforming an idea into a product). The core phenomenon is a category to which all other main categories are related.

Creating an entrepreneurial university requires adopting correct strategies and approaches. Based on the views of the interviewed faculty in this research, these

strategies should be developed considering four categories of factors: 1) Entrepreneurial opportunities. 2) Entrepreneurial threats. 3) University strengths. 4) University weaknesses.

Consequences: Consequences refer to the outputs resulting from the implementation of strategies. Consequences are summarized in four components: 1) Faculty changes (knowledge, attitude, behavior). 2) Student changes (knowledge, attitude, behavior). 3) Organizational changes. 4) University entrepreneurial outcomes.

Based on the (open, axial, and selective) codings and relying on the views of faculty members, and in response to the question, "How can a model be designed based on grounded theory to transform Shahid Madani University of Azerbaijan into an entrepreneurial university?", the following model was designed and explained in the form of a logical pattern. This model includes the causes, contexts, and intervening factors in the phenomenon of Shahid Madani Entrepreneurial University, as well as the strategies for its creation and the resulting consequences.

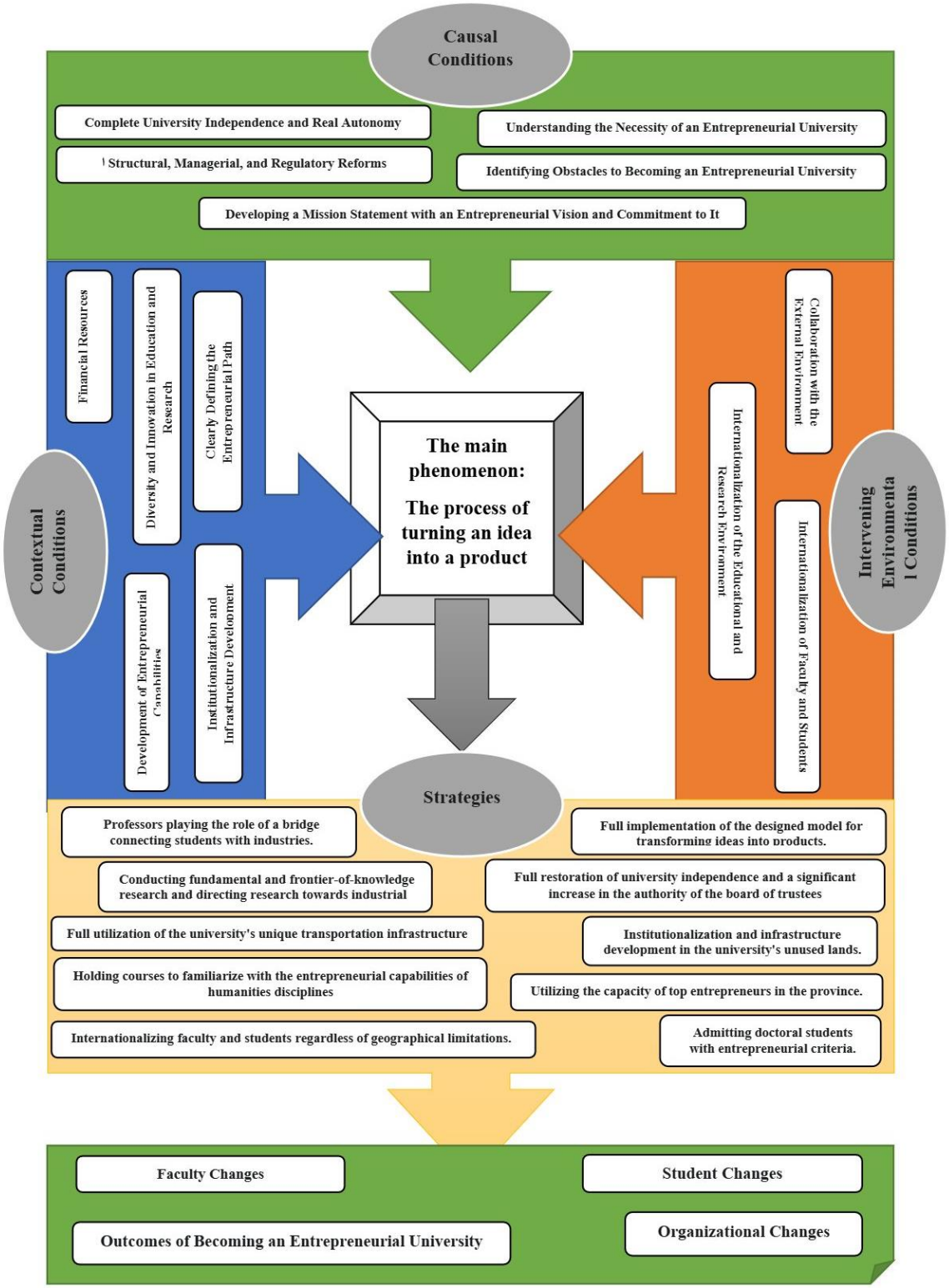

Figure 1. Grounded Theory Paradigm Model for Transforming Shahid Madani University of Azerbaijan into an Entrepreneurial University

Discussion & Conclusions

The obtained model indicates that the entrepreneurial university of Shahid Madani is influenced by certain conditions. To become an entrepreneurial university, the most important part and central core is the "idea to product transformation process." This requires strategies and approaches, and ultimately, its creation and formation will have consequences. An important point that seems necessary to mention is the method of categorizing the 21 sub-categories within the 6 main categories of grounded theory, which was done entirely based on expert opinions. Conditions are categorized into three types: causal conditions, intervening environmental conditions, and contextual conditions. The validation of the designed model is fully explained in the findings section. In the following, we will elaborate on these three conditions, strategies, and consequences:

- Causal Conditions (5 categories):

This dimension (axis) includes five categories, which are:

Understanding the Necessity of an Entrepreneurial University: University managers at various levels must fully understand that, due to reasons such as facing new conditions and challenges, solving the problem of graduate unemployment, and responding to the growing needs of society, transforming into an entrepreneurial university is an unavoidable necessity. Any delay in implementing this will have a heavy cost for the country.

Identifying Obstacles to Becoming an Entrepreneurial University: Managers and planners of each university should identify their specific obstacles and general obstacles in order to overcome or reduce them and pursue the path of entrepreneurship. One of the general obstacles is administrative bureaucracy. Overcoming bureaucratic obstacles is one of the keys to success in transforming into an entrepreneurial university. Universities that can eliminate or reduce barriers and limitations in communication with society and industry will move towards entrepreneurship more quickly.

Complete University Independence and Real Autonomy: University managers should not be merely subject to regulations and bylaws. Rather, they should use their authority to make innovative and flexible decisions and provide the necessary platforms to achieve the university's goals.

Developing a Mission Statement with an Entrepreneurial Vision and Commitment to It: University managers should develop a mission statement with an entrepreneurial vision in such a way that it becomes the university's standard of practice. This means that entrepreneurial goals should be measurable with relevant performance indicators. Commitment to these goals is also very important. Committed universities keep their programs up-to-date and continuously review and revise them.

Structural, Managerial, and Regulatory Reforms: Reforms should be aimed at creating a flexible structure with fewer management levels. A strategy of

decentralization and reducing administrative tasks can be effective. Also, to become an entrepreneurial university, we need intelligent managers with strategic and efficient perspectives who, by redefining university policies and new policymaking, create coordination and integration of entrepreneurial activities.

- Contextual Conditions (5 categories):

This dimension (axis) includes five categories, which are:

Diversity and Innovation in Education and Research: Factors such as increasing interdisciplinary research, problem-solving oriented research, employment-focused education, avoiding mere imitation of foreign research, industry-transforming research, conducting research by knowledge-based companies, and principled entrepreneurship education by experienced specialists lead to the emergence of diversity and innovation in education and research.

Development of Entrepreneurial Capabilities: Cultivating entrepreneurial skills such as self-confidence, business and emotional intelligence, business survival methods, how to deal with uncertainty, marketing, familiarity with the specific characteristics of academic disciplines, and their commercialization conditions contribute to students' success on the path of entrepreneurship.

Institutionalization and Infrastructure Development: For the commercialization of knowledge and transformation into an entrepreneurial university, the existence of certain entrepreneurship-related institutions and infrastructure is necessary. These institutions include: patent centers, accelerators (incubators), growth centers, and technology parks.

Clearly Defining the Entrepreneurial Path: The entrepreneurial university should support the process from idea to product by providing the necessary tools and skills to transform an idea into a business plan. This process should also be fully explained and clarified for students so that they can gain a complete understanding of the entrepreneurial path.

Financial Resources: Given the limited government resources and the increasing criticisms of the university funding structure, universities must create new sources of income for themselves to be able to financially support their startups. The only way to do this is to establish an investment fund with the participation of the private sector and banks. The duty of this fund is to invest in pure and novel ideas that, based on expert review, can bring significant economic benefits to their shareholders, including the university, if implemented. These funds gradually lead to independence from government budgets and aid, and the university secures its financial resources through the sale of products and services of its subsidiaries.

- Intervening Environmental Conditions (3 categories):

This dimension (axis) includes three categories, which are:

Collaboration with the External Environment: The entrepreneurial university must be actively connected and in continuous cooperation with its environment. Factors such as knowledge exchange with industry, strong ties with growth centers and science and technology parks, activating industry relations offices in universities, communication with marketing centers, participation of banks and the private sector, and hiring or collaborating with graduates indicate cooperation with the external environment.

Internationalization of Faculty and Students: Factors such as international exchange of faculty and students, increasing international sabbatical opportunities, searching for and attracting entrepreneurial and international students and faculty, increasing international faculty members, increasing international students, increasing faculty members participating in conferences abroad, and increasing faculty members sent on sabbatical opportunities lead to the internationalization of faculty and students.

Internationalization of the Educational and Research Environment: Factors such as expanding international communications and interactions, increasing international research projects, offering courses in international languages, increasing the number of joint courses with reputable global scientific institutions, concluding international contracts, and attracting international funding lead to the internationalization of the educational and research environment.

- Strategies (4 categories):

In this dimension (axis), four categories - entrepreneurial opportunities, entrepreneurial threats, university strengths, and university weaknesses - which were extracted from the interviews, were implemented in the SWOT matrix, and strategies were developed for Shahid Madani University to become entrepreneurial. In summarizing the strategies, the following can be mentioned:

Full implementation of the designed model for transforming ideas into products.

Professors playing the role of a bridge connecting students with industries.

Full restoration of university independence and a significant increase in the authority of the board of trustees.

Full utilization of the university's unique transportation infrastructure.

Institutionalization and infrastructure development in the university's unused lands.

Conducting fundamental and frontier-of-knowledge research and directing research towards industrial projects.

Utilizing the capacity of top entrepreneurs in the province.

Holding courses to familiarize with the entrepreneurial capabilities of humanities disciplines.

Admitting doctoral students with entrepreneurial criteria.

Internationalizing faculty and students regardless of geographical limitations.

- Consequences (4 categories):

This dimension (axis) includes four categories, which are:

Faculty Changes: Faculty members must understand that every discipline has entrepreneurial potential. They must convert their knowledge and wisdom into wealth by inventing and discovering innovative methods. They should be active in concluding research contracts in competitive international markets and train skilled entrepreneurs by creating creative, innovative, and risk-taking mindsets and attitudes in students.

Student Changes: Students must abandon the view that universities are just for entertainment and, with a technological perspective on course topics and classes, pursue the implementation of their ideas. They must have an entrepreneurial spirit (risk-taking, innovative, critical thinking, and a desire to shape the future).

Organizational Changes: The university organization must digitize itself by employing emerging technologies and reducing the boundary between its physical and virtual capabilities. Also, by using the knowledge management process, it should become a productive and generative university. By reducing dependence on government budgets, it should increase its connection with industry and participation with technology-oriented and innovative organizations. Employees should be recruited who have entrepreneurial attitudes, behaviors, or experience. This will create and strengthen an entrepreneurial culture.

Outcomes of Becoming an Entrepreneurial University: By transforming the second-generation university into an entrepreneurial university, the problem of graduate unemployment is solved. They are either employed in knowledge-based companies that are subsidiaries of the university, or they establish their own knowledge-based companies. These companies, relying on the knowledge and creativity of their members, solve the problems facing the industry and transform industries. From a macro perspective, the growth and development of these companies lead to wealth creation, economic growth, and an increase in national per capita income, which will bring social welfare and progress. By continuing this trend, the country will become one of the economic and industrial superpowers.

The main audience for this model is staff and managers involved in the strategic planning and decision-making process for the university. This model can be used as a pilot project at the university or faculty level. Other universities can also adapt and localize this model to their own conditions and requirements by forming working groups, or even improve it in certain areas.

- Practical Suggestions

Young and motivated faculty members can act as a bridge between creative students and industries located in Shahid Salimi Industrial Town, so that these students become familiar with the problems facing companies and seek solutions with the help of their professors.

The large area of Shahid Madani University and its unused land can provide an

opportunity for the university to build inexpensively to carry out its necessary institutionalization.

The presence of a railway station has made transportation easy and inexpensive at this university, which can be used as a unique opportunity to increase communication with the East Azerbaijan Science and Technology Park and industries in other provinces.

Shahid Madani University must regain its full independence as a board of trustees' university and practically use its authority to develop a mission statement with an entrepreneurial vision.

University professors must understand that all disciplines, including humanities disciplines, have entrepreneurial potential, and perhaps even more so than technical disciplines.

University professors must understand that the low academic level of students cannot be an obstacle to entrepreneurship, because this problem can be solved by utilizing the capacity of the professors themselves or by communicating with other scientific centers.

In entrepreneurship education, the capacity of the province's top industry figures and successful entrepreneurs should be used.

Restoring the independence of the university and bringing the authority of the university's board of trustees from paper to practice.

Admission of students, especially at the doctoral level, should be compatible with entrepreneurial criteria, such as: experience in knowledge-based companies or collaboration with industries.

Conclusion of cooperation agreements with real and fruitful industries should be prioritized, and artificial agreements should be avoided.

Internationalization of students and faculty should not be limited to a few neighboring countries, and efforts should be made to send faculty on more sabbatical opportunities and hold joint educational courses with reputable global scientific centers.

Any stage of the idea-to-product transformation that faces obstacles or has shortcomings should be immediately raised as the main and priority problem of the university to be resolved.

In education, attention should be paid to the current abilities and skills needed by society and the job market, and the lack of practical experience during education should be compensated by students' activity in industry and involvement in real situations.

Research should be fundamental and at the frontier of knowledge. Also, directing student research towards industrial and applied projects will be very useful.

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