Int. J. Nonlinear Anal. Appl. 16 (2025) 2, 129–141
ISSN: 2008-6822 (electronic)
http://dx.doi.org/10.22075/ijnaa.2023.31033.4549

Identifying and ranking the main and sub-indicators of the model of the indigenous Entrepreneurial University in Iran Using PLS (South Khorasan Province)

Abolfazl Khoshhal[a], Nour Mohammad Yaghoubi[b,*], Habibollah Salarzehi[b]

[a]*Department of Public Administration, Zahedan Branch, Islamic Azad University, Zahedan, Iran*

[b]*Faculty of Management, Economics and Accounting, University of Sistan and Baluchestan, Zahedan, Iran*

(Communicated by Mohammad Bagher Ghaemi)

Abstract

This study is conducted to identify and rank the main and sub-indicators of the model of the indigenous entrepreneurial university in Iran in South Khorasan Province. For this purpose, structural equation modeling (SEM) and SMART PLS software were used to identify the main and sub-components and modeling, and the Friedman test was then used to prioritize these factors in the model. The results suggest that the dimensions of the entrepreneurial university are structural factors, content factors, contextual factors, the core of the entrepreneurial university, and knowledge exchange. The studied factors are differently important. According to the results of the ranking, the contextual factors have the highest priority and knowledge exchange the lowest. The order of the importance of the factors indicates that contextual factors, structural factors, the core of the entrepreneurial university, content factors, and knowledge exchange are the most important factors, respectively. Besides, these 5 main factors have sub-factors of professionalism, organizational capacity, development of the organizational environment, various investments, entrepreneurial perspective, curriculum planning, the teaching-learning process, strengthening the entrepreneurial culture, establishing a science and technology park, creating business productivity, and the strong technical core of the entrepreneurial university, which measure the effect of the entrepreneurial university, entrepreneurial paths, and commercial and foreign relations of the university for knowledge exchange and dissemination of scientific findings and research contracts.

Keywords: modeling, entrepreneurial university, higher education, structural equation modeling (SEM), South Khorasan Province
2020 MSC: 97Axx

1 Introduction

Entrepreneurship in its various forms has made a significant contribution to the industrial revolution and related political, economic, and social changes. Entrepreneurship is so important that even some economists have reconsidered the role and place of entrepreneurship in the thinking of advanced economy and the importance of entrepreneurs in creating competitive advantages. Many economists recognize entrepreneurship as the fourth production factor [29].

*Corresponding author
Email addresses: abo.khoshhall@gmail.com (Abolfazl Khoshhal), yaghoubi@mgmt.usb.ac.ir (Nour Mohammad Yaghoubi), salarzehi@mgmt.usb.ac.ir (Habibollah Salarzehi)

Received: May 2023 *Accepted:* July 2023

One of the factors affecting the development of entrepreneurship is paying special attention to strengthening the educational system. entrepreneurship education and promotion have currently a special place, on average, in all developing and developed countries at all levels of education [20]. In this situation, universities, as institutions that produce and disseminate knowledge, are no longer just places for education and research and are expected to be more actively involved in the development of the national and regional economy [13]. This expectation is to the extent that this dynamic and active involvement is seen as the third mission of universities. One of the special effects of universities on their environment has crystallized in the form of the concept of the third-generation university or entrepreneurial university, which is the result of the university's attention to the needs of society and the interactive communication of the government, industry, and the university [3].

So, the shift of universities from first- and second-generation universities to entrepreneurial ones is not only necessary but neglecting it will have negative consequences. This becomes more important due to the unemployment of the educated class, and measures should be taken for it as soon as possible [35]. Through basic and applied research, technology, knowledge transfer, innovation, and support for economic development, entrepreneurial universities revise the definition of the traditional roles of universities in society as knowledge producers [17]. By generating knowledge and creating ideas, they turn them into action and move in this direction. The mission of entrepreneurship has been imposed on universities by the idea of knowledge-based development and the development programs of countries. This trend can be observed in developed countries since the late 1980s [16].

Although entrepreneurial universities play a vital role in higher education, indicators of academic entrepreneurship have not been fully defined in a way that shows the types of activities and stages of academic entrepreneurship and is suitable for the conditions of higher education. Academic entrepreneurship actions cannot be monitored and evaluated in different educational units, and these actions cannot be integrated into the professional development program of faculty members without these indicators. In this way, the faculty members will not be motivated enough to carry out these activities, and the universities will lack the necessary basis to support these activities. Moreover, the Ministry of Science, Research and Technology and higher bodies will not be able to compare universities in terms of academic entrepreneurship indicators and the zoning of higher education in the country according to the development of academic entrepreneurship [8]. In this regard, this study seeks to provide a literature review and answer two basic questions: What are the indicators of academic entrepreneurship? and how are they ranked in South Khorasan universities?

2 Theoretical foundations and literature review

2.1 Entrepreneurship and entrepreneurial universities

As the central element of third-generation universities, entrepreneurship has attracted the attention of educational circles in different countries since the end of the 20th century and has taken many research fields [2]. A review of the literature on entrepreneurship shows that this term was first developed in economic theories by economists and then entered the schools and theories of other disciplines. Entrepreneurship is the key factor of economic development in the modern era and a vital element of higher education in the present era [26]. Entrepreneurship is referred to as a process in which a new idea is transformed into a new product or service and can lead to increased productivity, wealth, prosperity, and employment. The implementation of entrepreneurial programs is today believed to start at the family and school levels and continue to the university and organization [36]. Entrepreneurs lead to entrepreneurship in various companies, organizations, and enterprises. One of the institutions that can be effective in developing entrepreneurship in different societies is the university. Scientific entrepreneurship in entrepreneurial universities provides a driving force for economic growth and stimulates competition in global markets. Universities have undergone fundamental changes in different countries, especially in developed countries, due to their important role in training specialized workforce [11]. As the main centre for the training of specialized and trained human resources, the Entrepreneurial University can always inject new energy into the vital arteries of the growing society due to having new ideas. Furthermore, society will manage to realize the idea of development by applying the emerging ideas of academics.

2.2 The formation and development of entrepreneurial universities

The successive renovation of universities happens step by step with social changes such as the growth of the national government and the emergence of the knowledge-based economy. Universities used to have a secondary position in the industrial society, providing educated people and basic research. However, universities play an increasingly prominent role in the knowledge-based society and establish the foundation on which industries and enterprises are formed [22].

In today's knowledge-based economy, universities significantly contribute to the innovation cycle as both producers and disseminators of knowledge. This is more prominent in entrepreneurial societies where knowledge-based

entrepreneurship is the driving force of economic growth, job creation, and competitiveness in global markets. Academic entrepreneurship can be considered a type of organizational entrepreneurship. Like many social institutions, universities underwent major changes throughout history due to environmental expectations and changes in societies. Universities gradually started to do applied research. The relationship between the industry and the university later became more complicated with the acceleration of the simultaneous growth of science and technology. In this way, entrepreneurial universities emerged [38]. Entrepreneurial universities can be deeply understood by examining their historical background and formation process. These universities were not formed all at once but under titles such as research institutes or institutions affiliated with scientific research centers, and the concept of an entrepreneurial university has been raised over several decades. A brief review of the history of the formation of entrepreneurial universities is given in Table 1.

Table 1: The history of the formation of entrepreneurial universities in the world and Iran

Reference	**Year**	**Description**	**Scientific Result**
[30]	1962	The United States' first technology partnership program to establish higher education institutions and universities	The first technology partnership program
[34]	1998	Only 24% of university graduates were self-employed in the early 1980s.	The first study on the need to move towards entrepreneurship
[14]	2000	Providing the first point of view of entrepreneurship	Inventing the concept of academic entrepreneurship
[13]	2004	Realizing that MIT has a distinguished contribution to the industry	Providing the MIT model
[39]	2005	A study on research groups that have most of the characteristics of business companies, except those that have a profit motive	Emergence of the concept of quasi-corporation and entrepreneurial university
[12]	2006	Examining some prestigious universities in the United States that have been successful in realizing the entrepreneurial university model	Initiation of field studies on entrepreneurial universities
[21]	2012	Attempting to find relevant academic research to be applied to industrial goals	Applying academic research to practice
[31]	2013	Extracting the factors affecting the structure of the entrepreneurial university	Identifying the structural components of the entrepreneurial university
[27]	2002	Explaining the key components of the entrepreneurial university	The first theorizing about entrepreneurial universities in Iran
[16]	2009	Providing a model to explain the factors affecting the formation of an entrepreneurial university culture: a study on the Faculty of Management and Accounting, Islamic Azad University, Karaj Branch	The first case study of entrepreneurial universities in Iran
[4]	2010	Examining the status of entrepreneurial organizational culture in Tehran University	

(Source: The findings)

2.3 The steps for the implementation of the structure of entrepreneurial universities

The first step for the implementation of the structure of the entrepreneurial university includes the following: examining the current state of the university structure through research, collecting and analyzing data to promote entrepreneurship and technology, modifying the existing structure to transform it into an entrepreneurial structure, designing and describing the entrepreneurial structure model, experimental implementation of the entrepreneurial structure model, and evaluating and finalizing the entrepreneurial structure model. A university that seeks to promote

entrepreneurship methods and advanced technology has a structure that enables the updating of creativity and ideation and foresees it in its various tasks [25, 18].

Such a university develops horizontally and dynamically. Thus, there is a very high flexibility to create transformation and movement towards individual and group development in such a center. Entrepreneurial universities are affected by variables such as technology, culture, and environment, which will be included in the combination of entrepreneurial goals. Solutions such as setting goals, examining the state of the university in terms of organization and entrepreneurship, paying attention to the development of technology, analyzing needs, classifying and evaluating feasible plans, holding training courses for professors, holding communication and marketing courses, etc. are proposed to establish a university suitable for promoting entrepreneurship combined with technology [33].

2.4 Literature review

To measure entrepreneurship education in 16 public universities in Ethiopia based on the self-assessment tool of the European Commission/Organization for Economic Cooperation and Development along with two score cards, Maad and Zhang [28] stated that there is entrepreneurship education in the early stage of development in public universities in Ethiopia. Entrepreneurship is mainly taught in business schools and faculties of agriculture, although recently it has also been included in the curricula of other schools, mainly institutes and faculties of technology.
In a study titled "Entrepreneurial Transformation in the Middle East: Experiences from Tehran Universities", Guerrero et al. [19] examined the interrelationships of internal factors (human, financial, and physical factors) and environmental factors (formal factors such as organization and entrepreneurial governance structure). They found that all universities studied focus on education, research, and entrepreneurial missions simultaneously., arguing that the main structures of the entrepreneurial university are mission, environmental factors, and internal factors, respectively.

Ketikidis et al. [23] conducted a study entitled "An Entrepreneurial Model for Internationalisation of Higher Education: The Case of City College, an International Faculty of the University of Sheffield". The proposed model included the concepts of effective management and operation structure, providing distributed training, entrepreneurship and innovative spirit, and internationalization as the strategic spirit and core. They suggested that the organizational structure and entrepreneurial culture of the university facilitate the strategic transformation of entrepreneurship in higher education.

According to the results of a study titled "Entrepreneurial University Conceptualization: Case of Developing Countries" by Yadollahi Farsi et al. [40], elements such as resources, facilities, mission, and obstacles are involved in advancing the concept of entrepreneurial university. Kordnaeij et al. [27] conducted a study titled "The Study of the Characteristic of Entrepreneurial University in Tarbiat Modares University". The results indicated that the characteristics of an entrepreneurial university, including entrepreneurial culture, continuous interaction with the environment, shared vision, human resource strategies, and human resources are favourable conditions in Tarbiat Modares University, but the entrepreneurial structure and financial independence are not so. In a study titled "Designing A Conceptual Model for an Entrepreneurial University; Using Corporate Entrepreneurship Approach", Behzadi et al. [9] stated that the model of entrepreneurial university from the perspective of organizational entrepreneurship includes the components of the quality of graduates, dissemination of scientific findings, attracting financial resources, research contracts, patents, creating reproductive businesses, establishing a science and technology park, entrepreneurial organizational culture, flexible organizational structure, professors' entrepreneurial approach, macro management, course content, and student characteristics.

3 Conceptual model

After reviewing the literature, the five main indicators of structural factors ([31, 10]), content factors ([24, 15]), contextual factors ([24, 37, 9]), the core of the entrepreneurial university ([37]), and knowledge exchange ([7, 9]) are referred to measure the main and sub-indicators of the model of the indigenous entrepreneurial university in Iran and rank them in terms of importance. These indicators, which have been discussed as the most recent important indicators of the entrepreneurial university, are used in this study to design a conceptual model. Figure 1 shows this model.

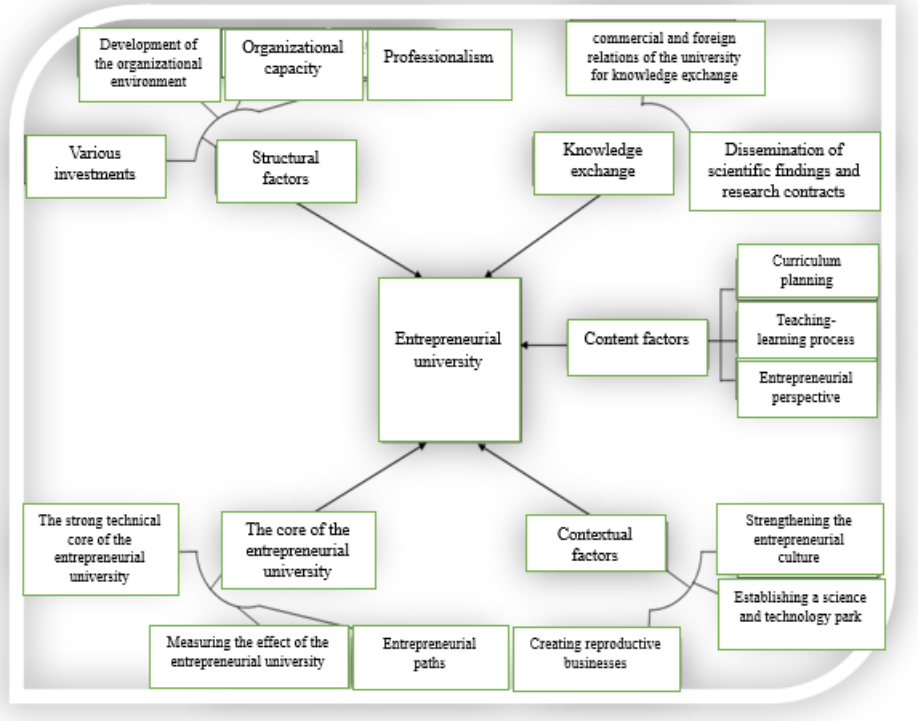

Figure 1: The conceptual model

4 Methodology

This is a survey study in terms of data collection method and applied in terms of objectives. The statistical population includes all the professors, staff, and experts of higher education in South Khorasan Province, whose number is 3894, of which 350 people are selected as a sample through stratified multistage sampling based on the Morgan-Karjesi table. Table 2 shows the population and the sample.

Table 2: The statistical population and sample

Stratum	The number of populations	The number of samples
Professors	1545	139
Staff	2134	192
Experts	215	19
Total	3894	350

The main tools for data collection in this study are researcher-made questionnaires with a five-point Likert scale (1 to 5). The questionnaires are designed according to the literature review and theoretical foundations and include 5 dimensions, 15 components, and 104 items. The dimensions of the questionnaires are structural factors, content factors, contextual factors, the core of the entrepreneurial university, and knowledge exchange, whose face validity is confirmed by 25 experts and the application of several corrections. Furthermore, the divergent validity of the questionnaires is examined and confirmed. The reliability of the questionnaires is checked by calculating Cronbach's alpha, and it is found that Cronbach's alpha is above 0.7 for all 15 components as follows: professionalism (0.72), organizational capacity (0.85), development of the organizational environment (0.74), various investments (0.82), entrepreneurial perspective (0.87), curriculum planning (0.93), the teaching-learning process (0.95), strengthening the entrepreneurial culture (0.94), establishing a science and technology park (0.81), creating reproductive businesses (0.75), the strong technical core of the entrepreneurial university (0.81), measuring the effect of the entrepreneurial university (0.87), entrepreneurial paths (0.88), commercial and foreign relations of the university for knowledge exchange (0.77), and dissemination of scientific findings and research contracts (0.90). Moreover, the total alpha is 0.86, confirming the adequacy of the questions. In the inferential statistics section, skewness and kurtosis are used to check whether the data are normally distributed. The partial least squares-confirmatory factor analysis (PLS-CFA) approach is used

through Smart PLS3 software to check the appropriateness of the measurement tool (questionnaire). Finally, the components are ranked using one-sample t-test and Friedman test in SPSS26.

5 Findings

5.1 Description of the demographic variables

According to the results of demographic analysis of the statistical sample, 283 (80.9%) out of 350 people are male and 67 (19.1%) are female. In terms of education level, 100 people (28.6%) have bachelor's education, 111 people (31.7%) have postgraduate education, 139 people (39.7%) have PhD. People over 50 years old, which includes 44% of the sample, have the highest frequency, and people aged 31 to 40 years, which include 17.1% of the sample, have the lowest frequency. Other samples (about 38.9%) are in the age range of 41-50 years. In terms of work experience, 8% of people have less than 6 years of work experience, 12.6% between 6 to 10 years, 35.1% between 11 to 15 years, and 44.3% more than 15 years. About 12% of the respondents are assistant professors, 11.7% are associate professors, and 16% are full professors. Besides, 54.9% of respondents are university staff and 5.4% are experts.

5.2 Description of the variables

The description of the variables is important because the results are extracted based on the data and indicators of these variables. Since the data of this study have an interval scale, measures of central tendency and measures of dispersion can be used to describe these variables. Figure 2 is presented below according to the significance of the mean obtained for each of these variables. According to the figure, the mean score of all variables is more than 3 (the center of the 5-option scale). So, it can be argued that most people chose points higher than 3. The minimum score of the variables is more than 1, and the maximum is less than 5.

Figure 2: A graphical description of the variables based on the mean scores

5.3 Checking the statistical distribution of the data

The most important action for implementing statistical methods, calculating appropriate test statistics, and making logical inferences is to find out about the distribution of data in order to select appropriate tests. The normal distribution of data in this study is checked using skewness and kurtosis. The absolute value of skewness and kurtosis greater than 3 indicates that the data are not normally distributed. Referring to the above table, the value of skewness and kurtosis of all variables is in the range [-3 and +3], suggesting the normal distribution of the data. On the other hand, the central limit theorem in statistics proves that as the number of statistical samples increases (more than 30), the data will be pushed towards the normal distribution.

Table 3: The results of the test of normal distribution of the data

Variables	**Normality indices**		**Result**
	Skewness	**Kurtosis**	
Professionalism	.006	1.277	Normal
Organizational capacity	-1.018	1.290	Normal
Development of the organizational environment	-.273	-.215	Normal
Various investments	-.606	.368	Normal
Structural factors	-.622	.669	Normal
Entrepreneurial perspective	-.145	-.491	Normal
Curriculum planning	-.622	-.191	Normal
The teaching-learning process	-.458	-.354	Normal
Content factors	-.264	-.259	Normal
Strengthening the entrepreneurial culture	-.764	.907	Normal
Establishing a science and technology park	-.741	.125	Normal
Creating reproductive businesses	-.572	.520	Normal
Contextual factors	-.721	.772	Normal
The strong technical core of the entrepreneurial university	-.175	-.425	Normal
Measuring the effect of the entrepreneurial university	-.728	.105	Normal
Entrepreneurial paths	-.427	.147	Normal
The core of the entrepreneurial university	-.431	.064	Normal
Commercial and foreign relations of the university for knowledge exchange	-.486	.107	Normal
Dissemination of scientific findings and research contracts	-.121	-.500	Normal
Knowledge exchange	-.209	-.067	Normal

5.4 The Results of CFA

After examining the normal distribution of the data, it is time for CFA, where the researcher tries to confirm the hypothesized factor structure, that is, determining whether the data corresponds to a specific factor structure in the hypothesis. CFA is also used to evaluate the validity of the indicators in the questionnaire to determine the necessary alignment between the indicators (questions). The CFA model with standardized path coefficients and loadings can be seen in the figure below.

The yellow boxes in the above figure indicate the items (questions), and the ovals indicate the latent variables. The numbers on the arrows that connect the two latent variables are the coefficients of the standardized path. The numbers inside the latent variables show the coefficients of determination. Factor loading values represent the degree of correlation between the items and the variables. The measurement model of standardized coefficients indicates that there is a significant correlation between the latent variables and their corresponding indicators. The standardized coefficients represent the path coefficients or the standardized factor loadings between the factors and indicators. The CFA model in the state of significant coefficients can be seen in the following figure.

There must be a significant correlation between the variables and the questions (items) to have validity. The questions will have good explanatory power if the standardized factor loading is higher than 0.4. According to the results of the standardized factor loadings and t-values between the latent variables and 104 related questions, the factor loading of all questions is greater than 0.4, and the t-value and the significance level between the items and their corresponding latent variables are greater than 1.96 and less than the error level of 0.05 in all cases. So, the significant correlation between the items and their corresponding variables is confirmed, and there is no need to remove the items.

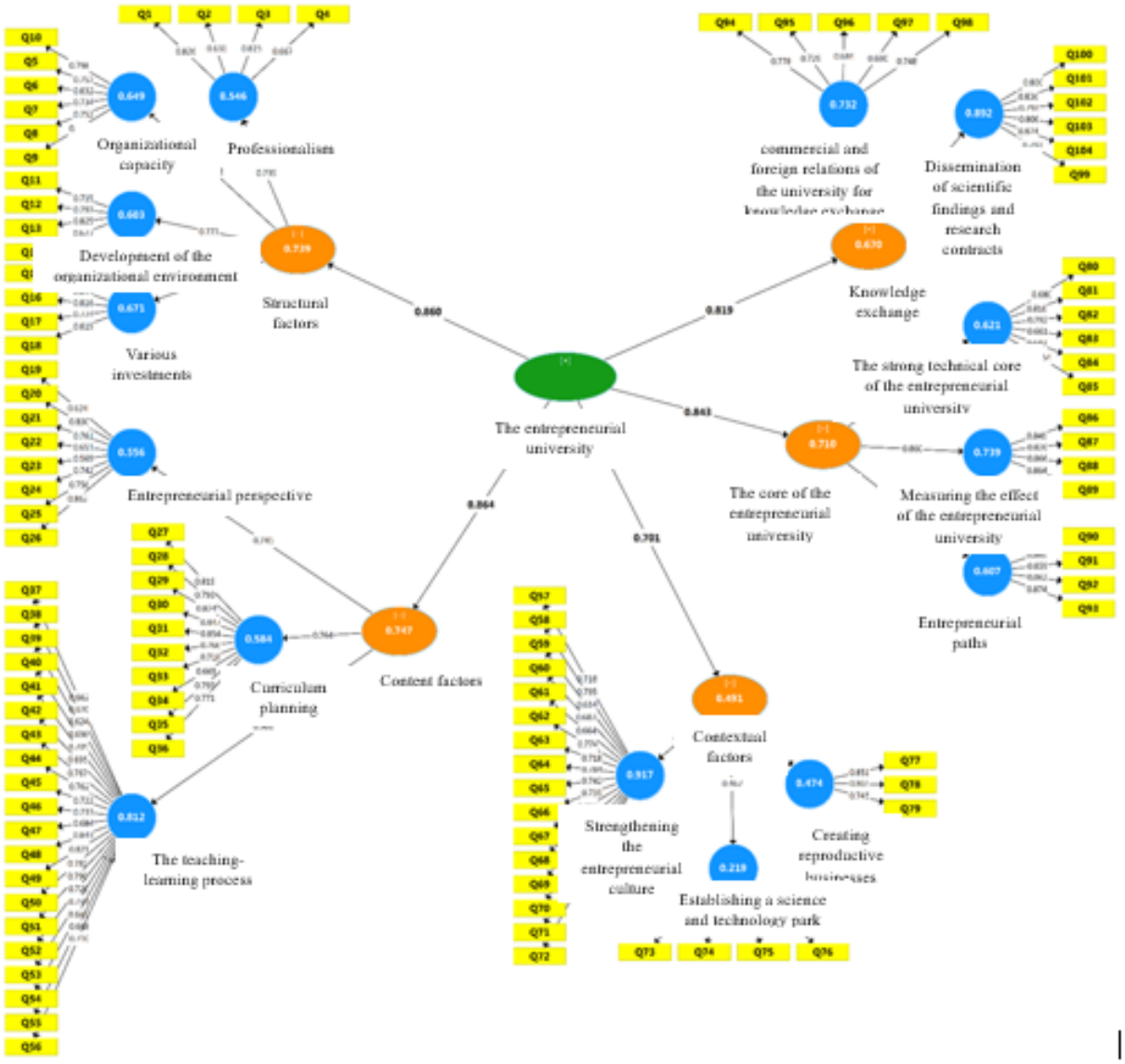

Figure 3: A CFA model with standardized path coefficients

5.5 Explaining the status of the five main factors of entrepreneurial universities in South Khorasan Province

After describing the demographic variables and the main variables with descriptive statistics indicators and determining the type of data distribution, the difference between an assumed and theoretical mean is checked using an independent sample t-test. This assumed or theoretical mean can be a common value, a standard, or an expected value. The number 3, which is the middle of the range of questions 1 to 5, is considered in this study, and the following hypotheses are tested:

***H*0**: The mean score of people for the mentioned variable is 3.

***H*1**: The mean score of people for the mentioned variable is not 3.

Since the questionnaires are scored based on a 5-point Likert scale from 1 to 5, the degree of utility of the variables is evaluated based on the standardized indicators [8] which are listed in the table below.

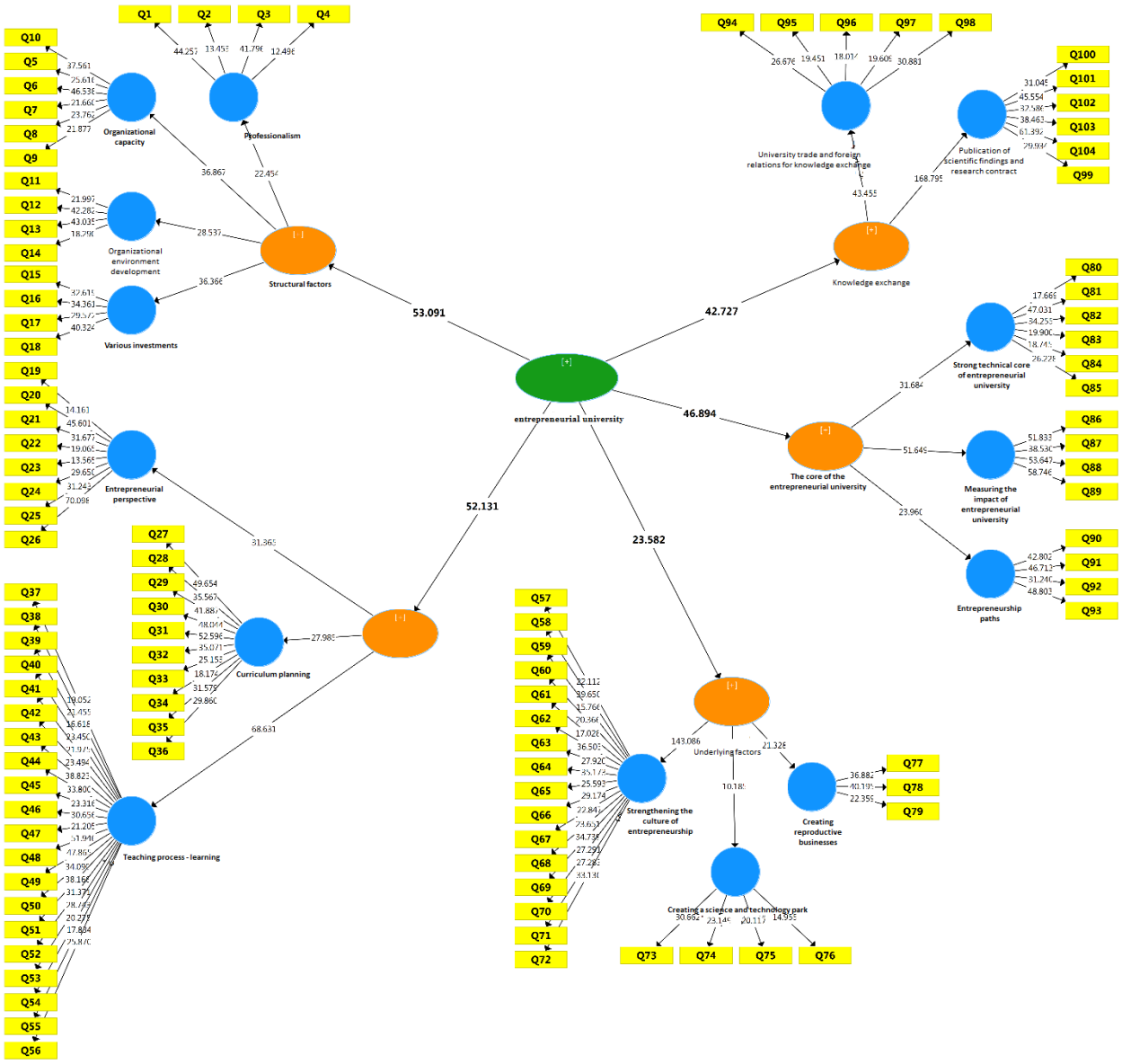

Figure 4: A CFA model with t-values

Table 4: The degree of utility [8]

Totally non-utilizable	Non-utilizable	Partially utilizable	Utilizable	Totally utilizable
1-1.77	1.78-2.55	2.56-3.33	3.34-4.11	4.12–5

5.6 Explaining the status of the structural factors of entrepreneurial universities in South Khorasan Province

The table below shows the results of examining the structural factors of entrepreneurial universities in South Khorasan Province.

According to the above table, the significance level of the test for the structural factors of entrepreneurial universities in South Khorasan Province with a t-value of 18.680 is 0.00 and less than the error level of 5%. So, it can be argued that the state of paying attention to the structural factors of entrepreneurial universities in South Khorasan Province is more than the average level. Similarly, the test results for other main factors show that the significance level of the test is 0.000 and is than the error level of 5%. In this way, the state of paying attention to other main factors, i.e., content factors, contextual factors, the core of the university, and knowledge exchange in entrepreneurial universities

Table 5: The status of the structural factors

Variable	Mean	t-value	Significance level	Mean difference	The 95% confidence interval of the mean difference		Status
					Lower limit	Upper limit	
Structural factors	3.56	18.680	0.00	0.56	0.50	0.62	Utilizable
Content factors	3.53	15.891	0.00	0.53	0.46	0.59	Utilizable
Contextual factors	3.64	20.131	0.00	0.64	0.58	0.70	Utilizable
The core of the university	3.56	16.20	0.00	0.56	0.49	0.62	Utilizable
Knowledge exchange	3.37	9.635	0.00	0.372	0.29	0.44	Utilizable

in South Khorasan Province is at a favourable level.

5.7 Ranking of the indicators of the entrepreneur university in South Khorasan Province

In this section, the factors are ranked according to their importance. Table 1 presents the results of ranking the factors using the Friedman test.

Table 6: The final results of ranking the factors

Variables	Mean rank	Rank
Contextual factors	3.36	1
Structural factors	3.19	2
The core of the entrepreneurial university	3.08	3
Content factors	3	4
Knowledge exchange	2.37	5

According to Figure 5 and Table 6, the contextual factors have the highest priority and knowledge exchange the lowest. The order of importance of the factors is as follows:

1. Contextual factors;
2. Structural factors;
3. The core of the entrepreneurial university;
4. Content factors;
5. Knowledge exchange

6 Discussion and conclusions

Institutions of higher education have been adapting for decades to reflect the changing environments in which they operate and seek success. In this regard, entrepreneurial universities consider various concepts such as creativity, commercialization, new investment, and employment and can be seen as organizational responses to the challenges and pressures of the external environment. The traditional role of universities has today shifted from focusing on education and research to active participation in regional economic development. This has caused entrepreneurship to be assigned to universities as the third mission in addition to education and research (the two previous missions of universities), taking into account global developments and changes in the relationships of the three main actors in national innovation systems (industry, government, and university).

In this way, the establishment of entrepreneurial universities with a higher mission than traditional universities that only seek education and research becomes more important every day. Subsequently, identifying the obstacles to the establishment of these universities in Iran and the main and sub-components and indicators of the model of the indigenous entrepreneurial university in Iran to achieve development is very sensitive and highly important for

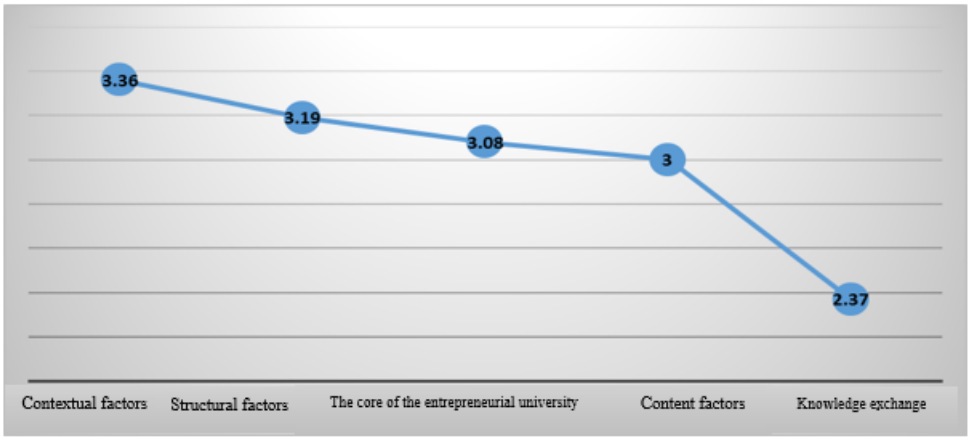

Figure 5: A graphical comparison of the importance of the factors by the mean rank

study and investigation. Accordingly, this study is conducted to identify and rank the important indicators of an entrepreneurial university. The findings of the study are in line with the findings of [9, 6, 32, 5, 28].

According to the literature review and survey of professors, staff, and experts of higher education in South Khorasan Province, 5 dimensions, 15 components, and 104 indicators were identified as the factors affecting the entrepreneurial university and presented in the form of a model of the entrepreneurial university. The results of the analysis of the five main indicators according to the Friedman test show that there is a difference between the mean factors (structural factors, content factors, contextual factors, the core of the university, and knowledge exchange). Thus, it can be argued that the studied factors are differently important. According to the results of the ranking, the contextual factors have the highest priority and knowledge exchange the lowest. The order of the importance of the factors indicates that contextual factors, structural factors, the core of the entrepreneurial university, content factors, and knowledge exchange are the most important factors, respectively. Besides, these 5 main factors have sub-factors of professionalism, organizational capacity, development of the organizational environment, various investments, entrepreneurial perspective, curriculum planning, the teaching-learning process, strengthening the entrepreneurial culture, establishing a science and technology park, creating business productivity, and the strong technical core of the entrepreneurial university, which measure the effect of the entrepreneurial university, entrepreneurial paths, and commercial and foreign relations of the university for knowledge exchange and dissemination of scientific findings and research contracts.

References

[1] Gh. Abdollahzadeh and M. Sharifzadeh, *Integrating sustainability into entrepreneurship process; explaining concept, necessity and requirement of sustainability driven entrepreneurship and enterprise*, J. Entrepreneur. Agricul.**1** (2014), no. 3, 39–63. [In Persian]

[2] R. Agarwal and S.K. Shah, *Knowledge sources of entrepreneurship: Firm formation by academic, user and employee innovators*, Res. Policy **43** (2014), no. 7, 1109–1133.

[3] H. A. Aghajani and J. Keivanfar, *Explaining the characteristics of the third-generation university (the entrepreneurial university) (Case study: University of Mazandaran)*, Entrepr. Univ. Conf. Knowledge-Based Industry, Babolsar, Iran, 2014. [In Persian]

[4] M.A Alizadeh, A. Badiazadeh, S. Hosseini, H. Saeednia, and A. Abu Torab, *Explaining the role of culture in creating an entrepreneurial university*, Cultur. Commun. Stud. **51** (2017), no 14, 227–248. [In Persian]

[5] A.A. Amin Bidokhti, R. Mohammadi, and M. Rahimi, *Designing the quality assurance model of the entrepreneurial university in Iranian academic system*, J. Educ. Measur. Eval. Stud. **8** (2018), no. 22, 227–263. [In Persian]

[6] E.A. Aranha and N.P. Garcia, *Dimensions of a metamodel of an entrepreneurial university*, Afr. J. Bus. Manag. **8** (2014), no. 10, 336–349.

[7] B. Audretsch and M. Belitski, *Three-ring entrepreneurial university: Iin search of a new business model*, Stud.

Higher Educ. **46** (2021), no. 5, 977–987.

[8] A. Bazargan, Y. Hejazi, and F. Es'haghi, *The Process of Conducting Internal Evaluation in Universities' Educational Departments*, Tehran, Douran Publications, 2006. [In Persian]

[9] N. Behzadi, S.M. Razavi, and S.R. Hosseini, *Designing a conceptual model for an entrepreneurial university using corporate entrepreneurship approach*, J. Entrepreneur. Dev. **7**, (2014), no. 4, 697-713. [In Persian]

[10] M. J. Bezanilla A. García-Olalla, J. Paños-Castro, and A. Arruti, *Developing the entrepreneurial university: Factors of influence*, Sustainability **12** (2020), no. 3, 842.

[11] G. Bruton, S. Khavul, D. Siegel, and M. Wright, *New financial alternatives in seeding entrepreneurship: Microfinance, crowdfunding, and peer-to-peer innovations*, Entrepreneurship Theory and Practice **39** (2019), no. 1, 9–26.

[12] H. Corona, *The norms of entrepreneurial science: Cognitive effects of the new university industry linkages*, Res. Policy **27** (2006), 823–833.

[13] H. Etzkowitz, *The evolution of the entrepreneurial university*, Int. J. Technol. Glob. **1** (2004), no. 1, 64–77.

[14] H. Etzkowitz and L. Leydesdorff, *The dynamics of innovation: From National Systems and "Mode 2" to a Triple Helix of university -industry–government relations*, Res. Policy **29** (2000), no. 2, 109–123.

[15] D. Fernandez-Nogueira, A. Arruti, L. Markuerkiaga, and N. Sáenz, *The entrepreneurial university: A selection of good practices*, J. Entrepreneur. Educ. **21** (2018), no. 3, 1–17.

[16] S. Ghanati, A. Kordnaeij, and H.M. Yazdani, *Investigating the status of entrepreneurial organizational culture in Tehran University*, J. Entrepreneur. Dev. **3** (2010), no. 10, 115–133. [In Persian]

[17] A. Gibb, *Exploring the synergistic potential in entrepreneurial university development: towards the building of a strategic framework*, Ann. Innov. Entrepreneur. **3** (2012), no. 1, 16742.

[18] M. Guerrero and D. Urbano, *The development of an entrepreneurial university*, J. Technol. Transfer **37** (2012), no. 1, 43–74.

[19] M. Guerrero, D. Urbano, and A. Salamzadeh, *Entrepreneurial transformation in the Middle East: Experiences from Tehran Universities*, Technics Technol. Educ. Manag. **10** (2015), no. 4, 533–537.

[20] M. Guerrero, D. Urbano, J.A. Cunningham, and E. Gajon, *Determinants of graduates' start-ups creation across a multi-campus entrepreneurial university: The case of monterrey institute of technology and higher education*, J. Small Bus. Manag. **56** (2018), no. 1, 150–178.

[21] J. Hewitt-Taylor, V. Heaslip, and N. Rowe, *Applying research to practice: Exploring the barriers*, Br. J. Nurs. **21** (2012), 356–359.

[22] E.H. Jimoh, *Bank loan officers' perception of the characteristics of men, women and successful entrepreneurs*, J. Bus. Ventur.**3** (2012), 249–258.

[23] P. Ketikidis, Y. Ververidis, and P. Kefalas, *An entrepreneurial model for internationalisation of higher education: The case of city college, an international faculty of The University of Sheffield*, Proc. Conf. Entrepr. Univer., 2012.

[24] M. Khalili Khezrabadi and M. Hassani, *The impact of entrepreneurship education and entrepreneurial social identity on entrepreneurial intention of university students; The mediating role of entrepreneurial self-efficacy*, Educ. Manag. Entrepreneur. **1** (2023), no. 1, 1–18.

[25] D. Kiakojouri, H. Azad and M. Azad, *Academic Entrepreneurship Education and Its Role in the Creation and Development of Knowledge-Based SMEs*, National Conference on Entrepreneurship and Management of Knowledge-Based Businesses, Mazandaran, Iran, 2012.

[26] M. Klofsten, A. Fayolle, M. Guerrero, S. Mian, D. Urbano, and M. Wright, *The entrepreneurial university as driver for economic growth and social change-Key strategic challenges*, Technol. Forecast. Soc. Change **141** (2019), no. 3, 149–158.

[27] A. Kordnaeij, P. Ahmadi, Z. Ghorbani, and N. Niakan, *Investigation of the characteristics of entrepreneurial university of Tarbiat Modares University*, J. Entrepreneur. Dev. **3** (2002), no. 5, 47–64.

[28] D. Maad and X. Zhang, *Creating Entrepreneurial Universities: Insights from a New University Business School*, Glasgow, Scotland, 2015.

[29] H. Matlay, *Researching entrepreneurship and education: what is entrepreneurship education and does it matter?*, Educ. Train. **48** (2015), no. 8/9, 704–718.

[30] L.K. Moreiel, *Defining and measuring entrepreneurial universities: A study in Iranian context using importance performance analysis and TOPSIS technique*, Glob. Bus. Manag. Res.: Int. J. **3** (1962), no. 2, 182–199.

[31] R. Nourouzi, *Different linkages between universities and biomedical industries in Japan and the US*, Present. NATO Adv. Res. Workshop, Ind. Stimul. Technol. Transfer, Warsaw-Bialystok, 2013, pp. 23–26.

[32] M. Safarian Navakhi, A. Babelan, M. Moeinikia, and A. Rezaei Sharif, *Qualitative study: Identification of entrepreneurial university components*, Educ. Dev. Jundishapur **10** (2019), no. 1, 155–161. [In Persian]

[33] H. Samadi Mirkolaei, H.A. Aghajani, and H. Samadi Mirkolaei, *Evaluation of indexes of entrepreneurial university with an emphasis on fuzzy inference in university of Mazandaran*, J. Entrepreneur. Dev. **7** (2014), no. 2, 369–388. [In Persian]

[34] B. Scott, *Building adaptive universities: Emerging organizational forms based on experiences of European and us universities*, Tertiary Educ. Manag. **7** (1998), no. 2, 121–134.

[35] S.E. Seydaei, E. Bahari, and A. Zarei, *Investigating the employment and unemployment situation in Iran during 2000-2010*, Quart. J. Dev. Strategy **12** (2013), no. 25, 37–45. [In Persian]

[36] D.S. Siegel and M. Wright, *Academic entrepreneurship: Time for a rethink?*, Br. J. Manag. **26** (2015), no. 4, 582–595.

[37] H.E. Skun, C. Popescu S.¸Sahin, D. Samaraz, A. Tabak, and B. Akkaya, *Entrepreneurial university concept review from the perspective of academicians: A mixed method research analysis*, Sustainability **14** (2022), no. 16, 10110.

[38] Sh. Tofighi, E. Teymourzadeh, and Gh. Ghanizadeh, *Academic entrepreneurship in a medical university: A system dynamics approach*, Int. Rev. **1** (2017), no. 2, 58–72.

[39] R.L. Vail, N. Dimitriadi, J.V. Gavidia, C. Schlaegel, S. Delanoe, I. Alvarado, X. He, S. Buame, and B. Wolf, *Entrepreneurial intent: A twelve-country evaluation of Ajzen model of planned behavior*, Int. J. Entrepr. Behav. Res. **16** (2005), no. 1, 35–57.

[40] J. Yadollahi Farsi, N. Imanipour, and A. Salamzadeh, *Entrepreneurial university conceptualization: Case of developing countries*, Glob. Bus. Manag. Res.: Int. J. **4** (2012), no. 2, 193–204.