

# The Role of Entrepreneurial Universities in Developing Students' Awareness and Improving Post-Graduation Entrepreneurship Circumstances

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Ziba Bahrami<sup>1</sup>, Mohammad Sadegh Ebrahimi<sup>1</sup> ,  
Gholamhossein Khedri<sup>2</sup> and Hossein Azadi<sup>3</sup>

## Abstract

Graduate recruitment is one of the issues that have always been of interest to educational planners in different countries and the educational system of countries is no exception. Today, developed and developing countries have offered entrepreneurship courses to overcome the challenges of job search. In other words, the solution to these problems should be sought in entrepreneurship skills. The main aim of this research is to examine the role of entrepreneurial universities in the development of entrepreneurship in society, which will eventually lead to sustainable development. This study follows a quantitative methodology by using a self-administered questionnaire. This research's statistical population consists of postgraduate and undergraduate students who have finished at least two academic years of study. The KMO coefficient and Bartlett's test were used to establish the questionnaire's content validity, while Cronbach's alpha coefficient was used to check its reliability, revealing that the instruments were consistent at 91%. Descriptive and inferential statistics including frequency, mean, Kruskal test, Mann–Whitney test, Pearson correlation coefficient and regression were used to analyze the data. The findings of the correlation study showed that there is a significant relationship between university entrepreneurship factors and

<sup>1</sup> Rural Development Department, College of Agriculture, Isfahan University of Technology, Isfahan, Iran

<sup>2</sup> Department of Philosophy, Theology and Ethics, Payam Noor University (PNU), Tehran, Iran

<sup>3</sup> Department of Economics and Rural Development, Gembloux Agro-Bio Tech, University of Liège, Gembloux, Belgium

## Corresponding author:

Mohammad Sadegh Ebrahimi, Rural Development Department, College of Agriculture, Isfahan University of Technology, Isfahan 84156-83111, Iran.

E-mail: [Ebrahimi\\_ms@iut.ac.ir](mailto:Ebrahimi_ms@iut.ac.ir)

university-level awareness of entrepreneurial activities. Furthermore, the results of regression analysis showed that the dependent variable of the entrepreneurial awareness of students was dependent on variables such as the characteristics of the entrepreneurial university, parents' income, personal awareness of students and communication channels.

**Keywords**

Entrepreneurship, educational system, innovation, sustainable development

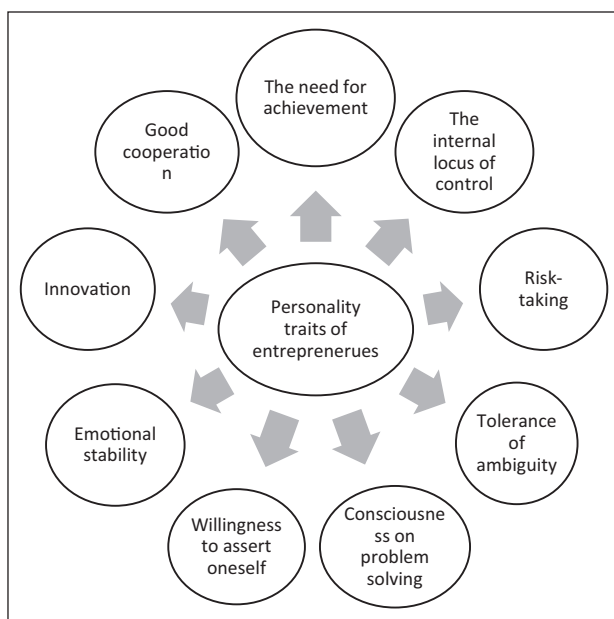
**Introduction**

In the current era, the management of organizations depends on the conditions of the external and internal environment of the organization and changes in both the organization's environment and the structure. These rapid changes imply that organizations can no longer rely on traditional methods to achieve their goals and fulfil their mission. Rapid change, increasing complexity and the higher level of competition have put the lives of organizations at greater risk. Therefore, organizations must constantly offer added benefits with a new combination of resources. Hence the importance of efficient human resources is better understood. In other words, organizations and entrepreneurs will stand out from other competitors (Ansari & Fakor, 2014). Today, competing in a global world is affected by globalization and other processes. In the competition, intangible assets like knowledge and social capital are the keys to an engine of economic growth. A culture of excellence in education is necessary for the potential ability to be truly effective in the field of economic development, but it is not enough to maintain the quality standards for research activities and promote the use of results in the local and global economy (Goudarzvand Cheghini, 2018).

Graduates of educational institutions who enter a new workplace face a rapidly changing environment. Every day, technology and related factors are revolutionizing the work market and creating new jobs (Collins et al., 2004).

Government policies for privatization and downsizing have also reduced public sector employees and, as a result, the unemployment rate is rising. Therefore, introducing a new definition of employment and transition from job search to entrepreneurship is one of the solutions to the problem of graduate unemployment. This issue is especially important for university students who are more self-employed than those without academic education (Zampetakis et al., 2009).

Today, developed and developing countries have proposed entrepreneurship to overcome such obstacles. In other words, the solution to overcome the challenges of job search should be sought in entrepreneurship (Figure 1). Entrepreneurship is regarded as a source of flexibility, creativity, job creation for the economy and an exciting chance for people to further their careers (Onstenk, 2003).



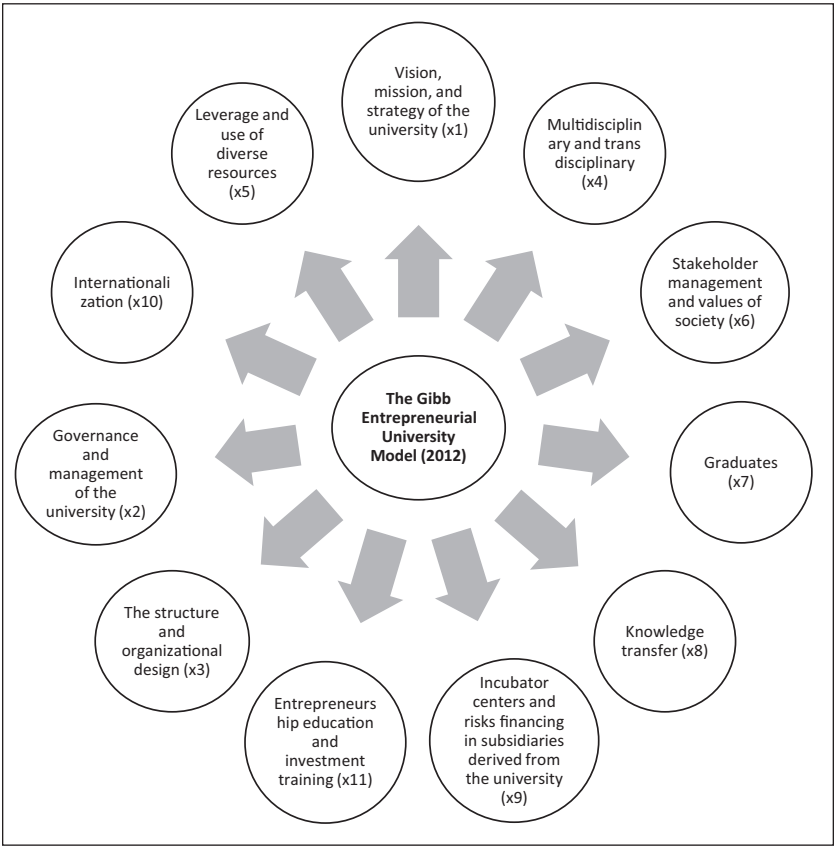
**Figure 1.** Entrepreneurial Personality Traits.

**Source:** The authors.

The word entrepreneur is equivalent to the French word *Entreprendre*, which means ‘undertake’ (equivalent to undertake) translated into English (Yaqubi et al., 2015).

One of the problems of developing countries or even developed countries has been the employment of graduates. This problem leads to unrelated majors from which job seekers have graduated. Additionally, it undermines the efficiency of the educational system that causes the issue. The consequence of this non-compliance is job diversion or unemployment of educated graduates and young people, which causes the internal and external efficiency of the educational system to be questioned (Shariatzadeh et al., 2006).

Several successful examples have recently highlighted the importance of universities in the growth of numerous fields. Globalization and other background processes that organize regional structure have an impact on and change regional competitiveness, thus they demand more attention. The conventional activities of universities must be broadened as a result of growing interaction with society and the economy in modern economic growth. Countries must have a world-class educational culture to fully achieve their economic growth potential, but this is not enough. Maintaining high-quality standards in research endeavours is equally critical, as is encouraging the application of the results in the local economy. Beyond the well-known typologies of universities’ first, second and third



**Figure 2.** The Gibb Entrepreneurial University Model (2012).

**Source:** Gibb (2012).

generations, which describe the aforementioned processes, the concept of universities’ ‘fourth generation’ has emerged in international literature (Figure 2), which illustrates interesting facts to take into account in regard to universities’ economic development activities (Lukovics & Zuti, 2017).

One major way to move toward sustainable development in society is to promote entrepreneurial universities. Based on the above arguments, the research question of this study would be to examine the role of entrepreneurial universities in the development of entrepreneurship in society. This would be achieved by considering various factors determining this capability in universities.

*Theoretical Framework*

Universities used to be known as educational environments, but due to the changes in the macro system, their functions evolved into more

research-based activities as they responded to changing external demands. A new duty was added to a university's prior tasks, and postgraduate education was born out of the development of undergraduate programs. Of course, university entrepreneurship is the second revolution in the university's purpose (Kordinach et al., 2012).

Researchers divide the totality of academic paradigms into three categories:

1. Educational universities,
2. Research universities, and
3. Entrepreneurial universities.

An entrepreneurial university is a university that actively strives to use innovation in businesses and tries to be effective in shaping the future of society (Samadi, 2015).

Higher education systems must meet the current and future needs of society; hence, it seems that the goal of the higher education system is to prepare individuals for acceptable behaviour in society. By training entrepreneurs, the university has a significant role in economics, technology, innovation and technology of research results (Cuervo et al., 2007).

### *Types of Entrepreneurships*

1. Independent entrepreneurship: The process that an entrepreneur goes through to carry out entrepreneurial activities independently.
2. Organizational entrepreneurship: The process that an entrepreneur goes through to achieve entrepreneurial activities in an organization.
3. Entrepreneurial organization: It is a process that the organization goes through so that all its employees can play the role of entrepreneurs. In other words, the organization provides a platform for individuals to play the role of entrepreneurs (AhmadPourdariani & Azizi, 2013).

In terms of their functions, there are five sorts of universities now available. First, there is the academic university, which is primarily concerned with students' education. Second, there is the traditional university, which combines research and teaching. Third, there is the social university, which actively participates in the discussion and settlement of society's issues. The fourth type of institution is the business university, which conducts teaching and research and development activities based on commercial criteria. Fifth, there is the entrepreneurial university, which plays a significant role in the social setting in which it functions. Universities should have a third important societal goal in addition to fundamental teaching and research responsibilities: fostering entrepreneurial ideas or collaborating with other regional system actors on development projects (Bezanilla et al., 2020). Universities may play a key part in these initiatives since they are close to the market and have a solid awareness of the many trends that emerge (Culkin, 2016). In today's digital world, universities are increasingly becoming champions for economic and social advancement (Arnaut, 2010).

### ***Entrepreneurial University***

An entrepreneurial university has an appealing and representative notion of a university that generates relevant possibilities, cultures and surroundings to stimulate and welcome student and graduate entrepreneurship (Gibb, 2002a, 2002b, 2012).

Clark (1998) offers two definitions of an entrepreneurial university. In the first definition, Clark believes that an entrepreneurial university is a university that actively strives to innovate in businesses and strives to be effective in shaping the future of society. In the second definition, Clark states that an entrepreneurial university shows innovative, risk-taking and entrepreneurial behaviour (Clark, 1998).

### ***Entrepreneurship Education***

Entrepreneurship education emphasizes the characteristics, capabilities and skills that individuals must be equipped with to start, grow and manage a business (Gibb, 2002a, 2002b).

One of the most important approaches in entrepreneurship development is the personality traits approach, which is formed with the assumption that to nurture and increase entrepreneurs in society, a number of personality traits in individuals should be strengthened. In this approach, to spread entrepreneurship in society, one should either look for people who have entrepreneurial personality traits in society or develop entrepreneurial personality traits in people through education and counselling (Mir-Aghaei & Mirzaei, 2012).

Researchers such as Kordinach et al. (2012), Mir-Aghaei and Mirzaei (2012), Zali et al. (2007), Zhou and Xu (2012) and Sánchez (2011) emphasize the importance of entrepreneurial personality traits such as the following: risk-taking, the internal locus of control, the need for achievement, good cooperation, innovation, emotional stability, willingness to assert oneself, consciousness on problem-solving and tolerance of ambiguity.

### ***University as an Entrepreneurial Organization***

An entrepreneurial university is a hub for employment creation. These facilities assist entrepreneurs. This assistance includes educational, financial and marketing assistance.

As a result, entrepreneurs have access to libraries, laboratories and so on. Such universities provide opportunities for investors to set up new business centres. They also work with them to anticipate problems and take advantage of opportunities, and thus, gain valuable experiences in finance and marketing. In these collections, students must learn a set of knowledge and entrepreneurial management together and start working in the field of industry with the necessary facilities provided by the university (Safarzadeh et al., 2009).

Numerous researchers have investigated the efficiency of universities and have published the results of their research, such as Clark (1998, 2000, 2004), Spender (2000), Etzkowitz (2000), Etzkowitz et al. (2004), Etzkowitz and Zhou (2008), Rothaermel et al. (2007) and Gibb (2002a, 2002b, 2012). The chosen model in this study is the Gibb (2012) model. The following section depicts various entrepreneurial university models.

#### *Clark Entrepreneurial University Model*

Based on the concepts of Clark's model, an entrepreneurial university is an organization that adapts to environmental changes. Universities, on the path to the transformation towards adaptation to the external environment and becoming an entrepreneurial universities, should follow five basic components, which according to Clark University Entrepreneur Model are as follows:

1. Creating a strong leadership core.
2. Expanding structural boundaries (such as establishing a technology transfer office) and establishing mechanisms to interact with the environment outside the university (i.e., industry and region).
3. Incorporating diversity in financial resources.
4. Building a strong academic background.
5. Creating an integrated entrepreneurial culture in the whole university institute.

#### *Etzkowitz Entrepreneurial University Model*

The Etzkowitz University Entrepreneur Model can be explained as an interconnected set of features. There are five very important traits for innovation and in the optimal form of an entrepreneurial university, these elements are in balance. These features include:

1. Knowledge investment: Knowledge investment, in his opinion, is the basis of social and economic growth and enhances the role of the university in society.
2. Solidarity: An entrepreneurial university works closely with business and government, and it is not an ivory tower separated from the rest of society.
3. An entrepreneurial university is a reasonably self-contained university that is associated with several other universities.
4. Connected organizational forms: Resolving the tensions between independence attributes motivates hybrid organizational forms to have both characteristics at the same time.
5. Reflexivity (institutional modernization) refers to the ongoing reconstruction of the university's internal structure in light of industry and government developments.

#### *Rothaermel et al.'s Entrepreneurial University Model*

They investigated the aspects of university organizational systems that help or impede the commercialization of academic discoveries. The standing of the

university, its location, the culture that rules the institution, the intermediates in the university, the university’s experience in this sector, the function specified for the university, and the university’s identity are some of these features. Other studies have focused on the qualities and function of professors, as well as the nature of the technology being commercialized, in addition to organizational structure. The aforementioned components are the elements within the institution that have an impact on entrepreneurship. However, studies have discovered that external factors, such as legislation and regulations, the situation of the environmental business and geographical circumstances have an impact on the university entrepreneurship process. The following elements have been examined as influencing factors in this respect: The existence of formal programs, partnership agreements, research assistance, licensing, activities related to marketing, commercial output quality (licenses and patents), involvement in research collaborations, growth centres and parks.

*Gibb University Entrepreneur Model*

The Gibb Entrepreneurial University Model (2012) has 11 components as follows:

- 1. Vision, mission and strategy of the university;
- 2. Governance and management of the university;
- 3. The structure and organizational design;
- 4. Multidisciplinary and Transdisciplinary;
- 5. Leverage and use of diverse resources;
- 6. Stakeholder management and values of society;
- 7. Graduates;
- 8. Knowledge transfer;
- 9. Incubator centres and risks financing in subsidiaries derived from the university;
- 10. Internationalization; and finally,
- 11. Entrepreneurship education and investment training.

In this study, after reviewing relevant findings on entrepreneurial university models, the Gabe model (2012) has been used as a theoretical model in this study. Table 1 compares the Gabe University of Entrepreneurship model with other models introduced in this study.

**Table 1.** Comparison of the Gibb Entrepreneurial University Model with Other Models.

Models	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11
Gibb	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Clark						✓	✓	✓	✓		
Etzkowitz		✓	✓						✓		
Rothaermel et al.		✓	✓				✓	✓	✓		

**Source:** The authors.



## Case Studies

Maki (2007) examined the role of the university in entrepreneurship development. Findings indicate that creating entrepreneurial thinking among university graduates has been effective in developing entrepreneurship. Furthermore, specialized and practical training in the field of entrepreneurship and its development have a great impact on the improvement of entrepreneurship. This study showed that entrepreneurship opportunities in the university were very effective in creating facilities for the development of professional and entrepreneurial skills. Another finding of the study was that conventional academic education can strengthen entrepreneurial motivation and readiness for a job (Maki, 2007).

According to McArdle et al. (2007), there is a positive association between several characteristics and variables and university graduates' employment in the labour market. These factors consist of self-reliance and self-confidence, job awareness, social support, social networking support, job search efforts and having capital (McArdle et al., 2007).

Hosseini et al. (2008) found that the university can facilitate the emergence of entrepreneurship by identifying and applying environmental, economic, cultural and technological factors that characterize globalization and by providing suitable employment for university graduates in their research; entrepreneurship education in the new millennium (infrastructure for employment of higher education graduates) (Hosseini et al., 2008).

Pawlowski (2009) looked into the function of tertiary education institutions in a globalizing world, as well as the state of higher education in Poland (Pawlowski, 2009).

Adejimola and Olufunmilayo (2009) in their research entitled 'Entrepreneurship Culture among Nigerian University Students' stated that research and innovation are essential tools for entrepreneurship development. Entrepreneurs regularly monitor windows of opportunity. Research and strategic planning are necessary for the results of operations to be successful (Adejimola & Olufunmilayo, 2009).

Nilchian and Kasaei (2012) evaluated the entrepreneurial characteristics of Iranian higher education graduates. The results showed that individual factors have a significant relationship with entrepreneurial characteristics, and students' gender and their field of study affect their entrepreneurial characteristics. Furthermore, participating in entrepreneurship-related training classes promotes entrepreneurial characteristics (Nilchian & Kasaei, 2012).

Zhou and Xu (2012) in their study entitled 'An Overview of Entrepreneurship Education in China' concluded that entrepreneurship education in China is still in its infancy and China lags behind the global entrepreneurship monitoring (GEM) standards in entrepreneurship education (Zhou & Xu, 2012).

At the University of Sheffield, Ketikidis et al. (2012) performed research to develop an academic entrepreneurial model for international higher education institutions. Effective management and operations structure, delivering distributed training, entrepreneurship and inventive spirit and globalization as the strategic spirit and core were all incorporated in the research's final model. They also

discovered that strategic entrepreneurial reforms in higher education are facilitated by the university's organizational structure and entrepreneurial culture throughout the academic year (65).

Rahmanian et al. (2015) found a positive and significant relationship between students' entrepreneurial ability and characteristics such as educational, organizational and entrepreneurial elements. The results of multiple regression also showed that the variables of educational, organizational and moral factors are the most important factors affecting the entrepreneurial ability of students (Rahmanian et al., 2015).

Khuong and An (2016) in their research in Vietnam stated that motivational factors affect entrepreneurial goals. The results of this study showed the important effects of research factors on students' entrepreneurial goals (Khuong & An, 2016).

Lukovics and Zuti (2017) examined the changing roles of universities in the twenty-first century, focusing on 'fourth generation' universities. The purpose of this study was to examine and organize the active and passive actions of universities that improve a region's competitiveness (Lukovics & Zuti, 2017).

Turkmen and Nowruzi (2017) in their research examined the general status of entrepreneurial university indicators based on the Gibb model (2012) at the University of Tehran. The findings revealed that an entrepreneurial university has the following characteristics: vision components, university mission and strategy, governance and administration, organizational structure and plan, power of influence and use of various resources, management of stakeholders and community values, learners' knowledge, multidisciplinary and interdisciplinary, knowledge transfer, growth centre and risk financing in university-derived companies (Turkmen & Nowruzi, 2017).

Goudarzvand Chegini (2018) examined and presented the components of fourth-generation universities and their role in the local and global economy. The results showed that higher education is towards professionalism and university is a valuable source of knowledge in creating economic growth through public awareness as well as relationships and networking between different parts of the mission and transfer of tasks (Goudarzvand Chegini, 2018).

Mostafaei et al. (2019) used a grounded theory method to verify an entrepreneurial university model. The qualitative results indicated 201 ideas, 21 categories and 6 primary classes organized into a paradigmatic model with causative circumstances, core categories, context conditions, intervening conditions, strategies and consequences (Mostafaei et al., 2019).

Bezanilla et al. (2020) examined the aspects that have an impact on the development of entrepreneurial universities. Environmental variables at universities had just a slight effect on internal factors, according to the study. Internal resources were shown to be moderately or highly associated with university entrepreneurship-related activities. All of the entrepreneurial metrics examined were related to entrepreneurial cues in the university's mission, strategy, norms and procedures. Despite the fact that management team support and organizational design were not among the most significant aspects, they were positively linked with research and training processes, which appeared to be

strongly related to all aspects of the entrepreneurial university's development, particularly the university's mission and strategy. The findings showed how the components involved in establishing an entrepreneurial university are interdependent. This will help colleges create rules that are more entrepreneurial-friendly (Bezanilla et al., 2020).

## Methodology

In terms of purpose, the current study is an applied research project, and in terms of data collection, it is a descriptive-survey project (Sarmad et al., 2014). This is a sort of field study in which the researcher is present to gather data in the intended locations. This study's statistical population is Isfahan University of Technology students (IUT). IUT is one of the first national institutions, and the International University Rankings have placed it among the top Asian universities. The world universities rankings in 2022 revealed that IUT is ranked 801–1,000 in World University Rankings, 201–250 in Young University Rankings and 177 in Asia University Rankings.<sup>1</sup> IUT comprises 14 faculties and departments, with over 11,000 students and 600 faculty members, and provides three disciplines: engineering, basic sciences, agriculture and natural resources, at the BSc, MSc and PhD levels. At IUT, the College of Agriculture has eleven departments, nine engineering departments, three basic science departments, one natural resources department with three divisions, seven research centres and several research groups.

According to the main aim of this research, which was to compare the entrepreneurship of students in three fields of engineering, basic sciences and agriculture, in the present study, four faculties (Mathematical Sciences, Industrial Engineering, Agriculture and Chemical Engineering) were randomly selected and studied.

## Sampling

Stratified sampling with the proportionate assignment was employed in this investigation. The sample size was also determined using Cochran's formula, which is one of the most extensively used methods for estimating sample size.

Equation (1): Cochran's formula

$$n = \frac{\frac{Z^2 pq}{d^2}}{1 + \frac{1}{N} \left[ \frac{Z^2 pq}{d^2} - 1 \right]}$$

As shown in Table 2, 20.8% of the students of the Faculty of Mathematics, 20.8% of the Faculty of Industrial Engineering, 20.8% of the Faculty of Chemical Engineering and 37.5% of the Faculty of Agriculture were selected as the sample of the present study.

**Table 2.** Statistical Sample of the Present Study.

Faculty	Frequency	%	Cumulative %
Mathematical Sciences	50	20.83	20.83
Industrial Engineering	50	20.83	41.66
Agriculture	90	37.51	79.17
Chemical Engineering	50	20.83	100

**Source:** The authors.

**Table 3.** Classification of Questionnaire Questions.

Classification	Number of Questions
Entrepreneurial awareness through communication channels	8
Students' entrepreneurial awareness	5
Awareness of the entrepreneurial activities of the faculty	10
Psychological characteristics of students	38
Characteristics of an entrepreneurial university	49

**Source:** The authors.

**Table 4.** Cronbach's Alpha Coefficient for Questionnaire Elements.

Components	Number of Variables	Cronbach's Alpha Coefficient
Entrepreneurial awareness through communication channels	8	0.790
Students' entrepreneurial awareness	5	0.721
Awareness of the entrepreneurial activities of the faculty	10	0.805
Psychological characteristics of students	38	0.745
Characteristics of an entrepreneurial university	49	0.820

**Source:** The authors.

In this study, the data collection method in field studies is a questionnaire that was developed and implemented in accordance with the study's objectives and the indicators included in the entrepreneurial university model. The questionnaire was used after the preliminary test to ensure its reliability and validity.

The questionnaire developed based on the general principles of questionnaire preparation can be seen in Table 3.

In this research, Cronbach's alpha method was used to determine the reliability of the instrument (Table 4). Cronbach's alpha for the whole questionnaire was 0.810 (Equation (2) was used to calculate Cronbach's alpha). The characteristics of the students in the statistical sample of the study are presented as described in Table 5.

Equation (2):

$$a = \frac{k}{k-1} \left[ 1 - \frac{\sum_{i=1}^k s_i^2}{\sigma^2} \right]$$

**Table 5.** Description of the Characteristics of Students.

Variables	Frequency	%	Cumulative %
Gender			
Female	122	50.8	50.8
Male	118	49.2	100
Total	240	100	–
Marital status			
Married	29	87.9	87.9
Single	211	12.1	100
Total	240	100	–
Grade			
BSc	112	46.7	46.7
MSc	82	34.2	80.9
PhD	46	19.2	100
Total	240	100	–
Main job of parents			
Employee	70	29.2	29.2
Manual worker	7	3.0	32.2
Farmer	6	2.5	34.7
Services-commercial	77	32.1	66.8
Retired	64	26.7	93.5
Other	16	7.5	100
Total	240	100	–
Family size			
3≥	42	18	18
4–6	184	76.6	94.6
>7	13	5.4	100
Total	240	100	–

**Source:** The authors.

## Result and Data Analysis

Students were asked about their employment status, starting a business or collaborating on the size of a business as an important component of entrepreneurial awareness, and the results showed that only about 18% of students were employed or experienced in starting a business, and 30% of them worked with others to start a business. Table 6 shows the employment and job characteristics of students.

Another variable that was evaluated in the study was entrepreneurial awareness through communication channels (VL = very low, L = low, M = medium, H = high and VH = very high) and the results showed that the student's point of view and social networks have had the highest impact on entrepreneurial awareness (Table 7).

**Table 6.** Job Characteristics of Students.

Variables	Frequency	%	Cumulative %
Occupational status			
Employed	43	17.9	17.9
Unemployed	197	82.1	100
Total	240	100	–
Business startup			
Yes	42	17.5	17.5
No	198	82.5	100
Total	240	100	–
Collaborate in creating a business			
Yes	72	30	30
No	168	70	100
Total	240	100	–

**Source:** The authors.

**Table 7.** Entrepreneurial Awareness Through Communication Channels.

Rank	Item	Mean	SD	Cv
5	TV	2.490	1.139	0.457
6	Radio	1.550	0.747	0.482
7	Journal	2.210	1.079	0.488
8	Newspaper	2.120	1.138	0.536
1	Social networks	3.730	0.966	0.258
2	Family and friends	3.650	1.008	0.276
4	Books	2.970	1.210	0.407
3	Formal training (Academic education)	3.230	1.185	0.366

**Source:** The authors.

The psychological characteristics of the students were also examined (VL = very low, L = low, M = medium, H = high and VH = very high), which can be seen in Table 8. The results showed that in terms of the characteristics of entrepreneurial psychology, students are at the desired level.

The best feature of component student entrepreneurship psychology is the need to progress with nearly 85% good and very good. The entrepreneurial awareness variable of the faculty was also examined and the research results showed that from the student's point of view, this variable has been evaluated at a low and inappropriate level (Table 9).

The characteristics of the entrepreneurial university were examined based on the Gibb (2012) model and the results showed that from the student's point of view, the university has not been able to provide suitable graduates to create effective entrepreneurship in society based on the entrepreneurial university

**Table 8.** The Psychological Characteristics of the Students.

Psychological Characteristics	5-point Likert Scale				
	VL%	L%	M%	H%	VH%
Risk-taking	0.0	2.1	21.7	60.4	15.8
Internal locus of control	0.0	5.0	16.7	46.7	31.7
Need of achievement	0.0	1.3	14.2	52.5	32.1
Good cooperation	0.0	5.8	28.1	50.7	14.1
Innovation	0.4	1.7	21.3	61.3	15.4
Emotional stability	0.4	5.0	30.8	50	13.8
Willingness to assert oneself	0.0	1.3	2.9	32.9	62.9
Consciousness on problem solving	0.0	5.8	26.7	50.8	16.7
Tolerance of ambiguity	0.0	1.3	17.5	61.7	19.6

**Source:** The authors.

**Table 9.** Entrepreneurial Awareness Through College Activities.

Entrepreneurial Awareness College's Activities	5-point Likert Scale				
	VL%	L%	M%	H%	VH%
	2.1	41.3	47.5	8.8	0.4

**Source:** The authors.

model. Furthermore, from the student's point of view, the university has the most advantages in the index of the structure and organizational design for the implementation of the entrepreneurial university based on the Gibb (2012) model.

Source:

The average entrepreneurial knowledge among students is as follows: mathematics (74.86), industrial engineering (78.08), chemical engineering (77.83) and agriculture (76.45). The average entrepreneurial awareness of students in different faculties is depicted in Table 10.

The results of the Kruskal–Wallis test in Table 11 show that (based on sig = 0.498) there is no significant difference between students' entrepreneurial knowledge in different faculties of the university, so it can be concluded that the level of knowledge of students in different faculties of the university although changes, but these changes are not significantly different.

The results of correlation analysis showed that students' psychological characteristics have a positive and significant effect on the entrepreneurial awareness of students. Furthermore, the results of the correlation analysis showed that having entrepreneurial characteristics in the university has a positive and significant effect on creating and developing students' entrepreneurial awareness (Table 12).

The Mann–Whitney *U* test results show that according to sig = 0.105 and sig = 0.216, there is no significant difference between students' entrepreneurial awareness considering gender and marital status. However, the results showed

**Table 10.** The Characteristics of an Entrepreneurial University Based on the Gibb (2012) Model.

Entrepreneurial University Based on Gibb (2012)	5-point Likert Scale				
	VL%	L%	M%	H%	VH%
Vision, mission and strategy of the university	6.3	29.6	39.6	22.1	2.5
Governance and management of the university	0.4	25.8	56.3	14.6	2.9
The structure and organizational design	0.0	22.3	41.2	33.4	3.1
Multidisciplinary and transdisciplinary	0.0	30.0	47.1	19.2	3.8
Leverage and use of diverse resources	0.0	37.5	41.7	17.5	3.3
Stakeholder management and values of society	0.0	29.2	45.4	21.7	3.8
Graduates	9.6	36.7	43.3	8.8	1.7
Knowledge transfer	5.8	14.6	60.4	16.3	2.9
Incubator centres and risks financing in subsidiaries derived from university	4.2	29.2	46.7	17.5	2.5
Internationalization	0.0	22.5	42.1	27.5	7.9

**Source:** The authors.

**Table 11.** The Kruskal Wallis Test of the Average Entrepreneurial Awareness of Students in Different Colleges.

The Entrepreneurial Awareness	Ranking Mean	df	Kruskal Wallis	Sig
Mathematical sciences	110.34	3	2.373	0.498
Industrial engineering	129.10			
Agriculture	117.77			
Chemical engineering	129.59			

**Source:** The authors.

**Table 12.** Correlation Test to Investigate the Relationships Between Variables.

Dependent Variable	Independent Variables	R	Sig
Entrepreneurial awareness of students	Psychological characteristics	0.213**	0.001
	Entrepreneurial activities of colleges	0.051	0.436
	Characteristics of the entrepreneurial university	0.432**	0.000
	Family size	0.140*	0.030

**Source:** The authors.

that at the 95% level, there is a significant relationship between students' employment and their level of entrepreneurial awareness (Table 13).

The factors impacting students' entrepreneurial awareness were investigated using regression analysis. The pupils' entrepreneurial awareness was investigated using multiple regression analysis. Multiple correlation coefficients were found to have a value of 0.583 (Table 14). The value of the adjusted coefficient of determination is equal to 0.296, which means that the predictive (independent)



**Table 13.** The Mann–Whitney *U* Test Results.

The Entrepreneurial Awareness	Mann–Whitney <i>U</i> Test	Wilcoxon Signed-Rank Test	Z	Sig
Gender	6,326.500	13,347.500	–1.623	0.105
Marital status	2,625.500	24,992.500	–1.237	0.216
Occupational status	3,266.000	22,769.000	–2.351	0.019

**Source:** The authors.

**Table 14.** Summary of the Regression Model.

Model	R	R-square	R-square Adj	SEE
Enter	0.583	0.339	0.296	0.17234

**Source:** The authors.

**Table 15.** Summary of the Regression Model.

Model	TS	df	MS	F	Sig
Regression	2.946	14	0.210	7.085	0.000
Residual	6.683	225	0.030		
Total	9.629	239			

**Source:** The authors.

variables of the model were able to predict 30% of the variance of the dependent variable. In other words, 30% of the variance of the entrepreneurial awareness variable is due to the predictor variables (the characteristics of an entrepreneurial university, communication channels, students' employment status, etc.).

ANOVA results of analysis evaluate the significance of the whole model. Since the significance level is less than 0.05, the model is significant. The significance of the analysis of the variance test (value *F*) indicates that the predictor variables were able to significantly predict the changes of the dependent variable (Table 15).

By comparing the standardized coefficients of the characteristics of an entrepreneurial university (0.435), academic education (0.209), effective communication channel (journal) (0.132) and psychological characteristics (0.127), we can see that the entrepreneurial university characteristics have the greatest impact on the dependent variable (Table 16).

## Discussion

The findings revealed that the students at Isfahan University of Technology had suitable and acceptable psychological traits. In other words, Isfahan University of Technology students have positive psychological traits, indicating one of the important strengths in achieving the university's business aims. This means that students have the readiness and capacity to carry out entrepreneurial activities and strengthen and develop their entrepreneurial awareness.

**Table 16.** Influential Factors on the Students' Entrepreneurial Awareness.

Variable	B	Std. Error	Beta	t	Sig
(Constant)	3.576	0.153	0.435	22.666	0.000
Characteristics of an entrepreneurial university	0.007	0.001	0.435	7.461	0.000
Academic education	0.035	0.011	0.209	3.182	0.002
Journal	0.026	0.012	0.132	2.012	0.045
Psychological characteristics	0.019	0.015	0.127	1.940	0.050

**Source:** The authors.

According to the regression coefficient, the regression line equation could be written as:

$$Y = 3.576 + 0.007 x_1 + 0.035 x_2 + 0.026 x_3 + 0.019 x_4$$

x1: Characteristics of an entrepreneurial university;

x2: Awareness of the entrepreneurial activities of the faculty (Academic education);

x3: Entrepreneurial awareness through communication channels (journal);

x4: Psychological characteristics.

The findings revealed that there is a link between the features of entrepreneurial university characteristics and the level of entrepreneurial knowledge among students. To put it another way, this effect is the overall strategies of the university, especially the insights, missions and goals adopted in the upstream documents that can be effective in developing students' entrepreneurial awareness.

The average index of entrepreneurial university characteristics at the university level according to the surveys was 49%, which indicates the average status of this index at the university level. Also the amount of each of the components of this index such as knowledge transfer, growth centres, risk financing in companies, public value and stakeholder participation, vision, mission and strategy of the university, learning or multidisciplinary and extracurricular courses, regardless of Educators, entrepreneurship. Education and investment training was observed at the intermediate level of the university. This means that the activities of the university are in line with the entrepreneurial direction of the university. This indicates that despite the desire and capacity among students to experience entrepreneurship, they have little or no opportunity to develop their entrepreneurial skills on campus because the programs focus more on the theoretical transfer of entrepreneurial knowledge than the practical aspects.

The research findings also showed that starting a business or collaborating in creating a business by students has not spread much. Although this issue may not be due to the weak business environment in developed countries, it is not unrelated to the policies governing the university environment and points to the need to take alternative approaches and move towards the components of the entrepreneurial university.

### Conclusion

This research fills the previous research gap by providing a comprehensive investigation of the factors determining the characteristics of an entrepreneurial

university. Based on the results of the present study, it is suggested that the university, in addition to its traditional role, also assumes the role of partner. That is, in addition to education, training of students and human resources, conducting research and production of science and knowledge in setting up knowledge-based companies (growth centres, science and technology parks, university-based companies, or academic firms). The university should also, through innovations and new initiatives in the university environment, mobility and exchange of faculty and students with universities and countries around the world, be involved in the creation and development of linguistic programs to embrace student diversity and try to become an international institution.

### *Limitations of the Study*

Our study has a few limitations. Since we have collected our data from one technical university, our results may not shed light on the variations in the involvement of other non-technical universities. A follow-up study in other universities/countries would be able to rectify whether these factors contribute to the development of entrepreneurship in society. Another limitation is that our research only considered four independent variables, so more research should be done by taking into account various other factors which could be important in the role of entrepreneurial universities.

### *Practical Implications*

This study has a few implications for managers and policymakers. First, the managers of the universities should promote academic educational activities that are related to entrepreneurship. In addition, the psychological characteristics of students should be trained to embrace entrepreneurship. For policy implications, the policymakers should design and implement the entrepreneurial elements in the higher education system so that the students are informed and trained throughout their studies.

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## Note

1. The Times Rankings (<https://www.timeshighereducation.com/world-university-rankings/isfahan-university-technology>); US News Rankings (<https://www.usnews.com/education/best-global-universities/isfahan-university-of-technology-502590>) and Round University Ranking (RUR) (<https://roundranking.com/ranking/world-university-rankings.html#world-2022>).

## ORCID iD

Mohammad Sadegh Ebrahimi  <https://orcid.org/0000-0003-3193-9726>

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### Authors' Bio-sketch

**Ziba Bahrami** is a Postgraduate Student of rural development in Isfahan University of Technology (IUT) in Iran. One of her favorite research topics was research on the role of entrepreneurial universities in developing students' awareness.

**Mohammad Sadegh Ebrahimi** is a Senior Lecturer in development at the Isfahan University of Technology (IUT) of rural development, sociology and social research in the Iran. His research interests are social theory and social capital. In particular, he examines how social transformation and innovation change in social capital, education and institutions.

**Gholamhossein Khedri** is a Senior Lecturer in philosophy, theology and ethics at Payam Noor University (PNU) in Iran. His research interests are education and philosophy.

**Hossein Azadi** is a Senior Researcher in the Department of Geography of Ghent University (Belgium) and the Department of Economics and Rural Development at the University of Liège (Belgium).