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Designing a comprehensive model of entrepreneurial university in the science and technology parks

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Abstract

Purpose – The purpose of this paper is to shed light on the entrepreneurial university and to develop a theoretical framework relating entrepreneurship education in the third generation of universities. Therefore, the future research could be carried out to identify and apply the presented model.

Design/methodology/approach – In terms of objective, this study is considered as an empirical one, and the research methodology is descriptive-correlative type. Sample population consists of 130 knowledge-based firms in the science and technology parks. In total, 100 knowledge-based firms were selected by using a stratified random sampling. The analysis of data obtained from the questionnaires and both descriptive and inferential parts was done through the application of SPSS, structural equation modeling technique and Smart PLS 3 software.

Findings – The results suggested the positive and significant effect of the organizational, individual, institutional, and environmental factors on entrepreneurial university in the science and technology parks.

Practical implications – The application of the research model provides an avenue for the practitioners to design accelerates and creative science and technology parks focussing on the commercialization education, entrepreneurial intuition and marketing to students and innovators.

Social implications – The theoretical framework of the current study offers a different way forward for policy makers in thinking about those factors that may be critical for success of entrepreneurship education. Policy makers, in general can provide infrastructures to launch third generation of universities, entrepreneurial university, for young generation to increase effectiveness of academic education and to provide the prospect of a more business opportunity recognition.

Originality/value – This research contributes to the existing literature in the field of entrepreneurship education. So far, a comprehensive model has been substantially neglected with respect to the entrepreneurial university in the science and technology parks. This new framework can be used to inform thinking and research design in the area of entrepreneurship education to promote entrepreneurial university thought.

Keywords Organizational factors, Entrepreneurial university, Environmental factors, Individual factors, Institutional factors

Paper type Research paper

Introduction

Nowadays, the focus of the Iran's economy is on making the economy independent of oil revenues (Ziyae *et al.*, 2015).To do the national economy must be strengthen by concentrating on modern production methods, knowledge-based firms, and focussing on entrepreneurship (Ziyae and Mobaraki, 2014).The emergence of the new economy has improved the relationship between science, technology, innovation, and economic performance (Papagiannidis *et al.*, 2009). The interaction between the aforementioned factors is necessary in order to gain competitive advantage through innovation in production, accumulation, and distribution of knowledge particularly in the knowledge-based firms (Roberts, 2010). However, due to the change in the nature of universities in the form of knowledge creation, the universities are considered as a crucial phenomenon in the economic development (Etzkowitz and Zhou, 2008). During recent

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decades, fundamental changes and reforms in mission, structure, process, and culture of universities seemed inevitable (Moed, 2006).

Training and coaching of entrepreneurship are among the efforts to develop entrepreneurial culture which result in the commercialization of knowledge, innovation, emergence of academic entrepreneurs, and creation of knowledge-based enterprises (Ziyae and Mobaraki, 2014).

Science and technology parks and accelerator centers are the result of Iran's new strategy to fill the gap between scientific research, university education and industrial innovation (Ziyae *et al.*, 2015). Science and technology parks are a professional and specialized institution that try to promote the level of fundamental innovation and to increase the connection between the companies, commercial centers, and institutions who create knowledge (Niosi, 2006). The science and technology parks act as the bridge between universities and industry and are the best place for technological development. They are created to fulfill two main purposes; first, is to facilitate transferring of academic knowledge to companies and to stimulate development and promotion of new and small high-tech enterprises with new processes and products (Zhou, 2008). The second purpose is to organize the regional economic development (Shane, 2004).

Development of knowledge commercialization and the emergence of academic entrepreneurs should be aggressively strategized in science and technology parks (Powers and McDougall, 2005). Science and technology parks also help the industrial development and technological dynamics of the economic by setting up knowledge-based and technology-based small- and medium-sized enterprises (SMEs) (Perkmann *et al.*, 2013). Science and technology parks are obliged to provide opportunity for SMEs (Ziyae and Mobaraki, 2014).

Today, universities concentrate on the creation of innovational competitive advantage in the world marketplace and try to develop entrepreneurial plans in order to successfully compete for more resources (Perkmann *et al.*, 2013). Currently, "third stream" activities as opposed to first stream (teaching) and second stream (research activities) convert universities to the knowledge silos – a system that reflects a well-established academic structures (Lockett and Wright, 2005).

The universities' activities are currently focussed on developing new curriculum opportunities for students and academic staff to study and engage in entrepreneurship (Perkmann *et al.*, 2013). Working closely with the science and technology parks as the exploitation and commercial units of the knowledge, the universities seek a comprehensive model to facilitate the exploitation of the rich research base and to encourage university spin-outs (Steffensen *et al.*, 2001). The aim of present study is to model the factors affecting entrepreneurial university in the science and technology parks.

Literature review

Entrepreneurship definitions covers a wide range of activities and processes that include innovation, establishing an organization, creating a new idea, identifying opportunities, and risk taking (Ziyae and Mobaraki, 2014). Entrepreneurship can be considered as a process of increasing wealth through innovation and identifying opportunities (Hanny *et al.*, 2011). Today, developed knowledge through universities research programs can be used for commercial purposes in order to generate business and revenue models (Middlehurst, 2004). This idea has led Etzkowitz and Leydesdorff (1999) come up with the term, entrepreneurial university and to describe the universities' role in the modern economic development activities. Over the recent

decades the phenomenon of entrepreneurial university has attracted much attention (Van Looy *et al.*, 2011). O'Shea *et al.* (2004) have expressed entrepreneurial university as the efforts and activities of universities and their industrial partners in order to commercialize the results of researches created inside faculties. Entrepreneurial university is not a one-time occurrence but it is a continuous process consists of a series of events (Van Looy *et al.*, 2003). It is identified as a commercial development beyond the traditional focus on granting intellectual properties (Perkmann *et al.*, 2013). It includes the act of creating productive enterprises from technology and produced knowledge inside the universities (Wright *et al.*, 2007).

The entrepreneurial university

Nowadays, universities are increasingly being called upon to contribute to commercialization, generating new ideas, and economic development (Guerrero and Urbano, 2010). Notably, universities managers implemented rules that provide commercialization incentives for universities by granting them ownership of intellectual property (Hanny *et al.*, 2011). The contribution of universities in the theory building, technology development, and commercialization raises questions about their vision and mission (Henseler and Chin, 2010). Using the "triple helix" theory, it is obvious that universities have embraced economic and social development as a new mission, in addition to their traditional missions of teaching and research (Etzkowitz, 1998). In accepting this new stream, universities are called to become part of a intelligible system that includes industry, government, and innovation (Powers and McDougall, 2005).

Implicit in this view is that universities are seen increasingly to be eager to bridge the worlds of science and technology in an entrepreneurial way by commercializing the technologies that emerge from their research (Shane, 2004). However, by actively engaging in wisdom development, universities are demonstrating a mindset toward academic intelligence in their ability to produce both fundamental knowledge and technology outputs (Van Looy *et al.*, 2011).

Theoretical underpinnings

According to Hanny *et al.* (2011) seven key strategies for universities that are becoming entrepreneurial are: having a flexible structure, having an entrepreneurial culture, continuous interaction with their environment, creating a shared vision, providential strategy, paying attention to human resources (staff), and management support. Chugh (2004) also showed that science and technology parks play a key role in entrepreneurial university and this role is done through engineering a synergistic networks between academics, venture capitalists, and business angles.

Lockett and Wright (2005) provided a framework for entrepreneurial university and suggests four factors effecting the rate of company derivation activities such as: individual characteristics, organizational characteristics, cultural and institutional factors, and external environment.

In another study, Wright *et al.* (2007) in their research have referred to the industry role, commercialization, establishing breakaway enterprises with advanced technology, and penetrating entrepreneurial mindset among universities graduates. They also examined the impact of environmental on the level of activities of university's spin off firms. These factors included wealth creation, access to capital, locus of property right, flexibility of academic markets, and industrial combination of geographical region.

Elsewhere, Guerrero and Urbano (2010) in their study showed nine components involved in entrepreneurial university such as entrepreneurial leadership, entrepreneurial structure, entrepreneurial culture, continuous organizational learning, innovative and creative staff, providing entrepreneurial financing, entrepreneurial marketing, educating about entrepreneurship, and the commercialization of new ideas. Similarly, in another research Perkmann *et al.* (2013) identified the individual, organizational and institutional antecedents as the main factors effecting entrepreneurial university.

Despite the newness of entrepreneurial university researches, reviewing the literature on this subject shows that most of this researches have examined the common characteristics and effecting factors on entrepreneurial university in some general categories as follows.

The first category of the factors affecting entrepreneurial university are organizational factors including: the organizational structure, the physical facilities, the organizational strategy, processes and ways of working, monitoring and evaluation system, the salary and bonus system, financial system and budgets, human resources management system, and information resources management system that have been seen in Thorp and Goldstein' (2010) researches.

The second category, examined individual factors in the form of internal and external factors (e.g. Hanny *et al.*, 2011; Thorp and Goldstein, 2010; Bercovitz and Feldman, 2006). Finally, the third category refers to the researches which examined the factors affecting entrepreneurial university in three dimensions: first, structural factors including all factors, and physical condition of organization; second, underlying factors or external environmental factors and conditions; finally, behavioral factors that refers to human factors and human relationships in the organization (e.g. Hanny *et al.*, 2011). According to the explanatory studies and examination of the present patterns in the organizational entrepreneurship literature, the most appropriate theoretical framework is a four-factor model which was recognized and selected for analysis and recognition of entrepreneurial university variables.

Conceptual framework and hypotheses

The findings of previous research have demonstrated that the combination of all four drivers of entrepreneurial university provides a better prediction for the favorite result. Focussing on the previous studies, Hanny *et al.* (2011) argued that organizational factors (i.e. performance monitoring, research and education system, processes and methods, resources and facilities, salary and bonus system, and organizational strategies) have a significantly greater effect to promote entrepreneurial university. Universities with flexible and agile organizational structure have a high capability to propose and implement innovative ideas for achieving entrepreneurial university (Chugh, 2004). The aforementioned organizational factors form the organizational changes and are able to develop new ways for obtaining the universities goals. Although the demand for creativity and innovation may stimulate stress or frustration inside university structure, a positive psychological capital as a potential to meet the stressful demands, development and implementation of innovative ideas seems to be essential (Sweetman *et al.*, 2010). Therefore, organizational factors include four dimensions of performance monitoring, research and education system, processes and methods, resources and facilities, salary and bonus system, and organizational strategies which have been adapted from Hanny *et al.* (2011). Therefore, the first research hypothesis was formed:

H1. There is a significant and positive relationship between organizational factors and entrepreneurial university in the science and technology parks.

Additionally, individuals (academic and non-academic staff) with high independency self-efficacy, groundbreaking behaviors and risk appetite are able to suggest and implement new ideas to achieve the university goals (Powers and McDougall, 2005). Schulte (2004) and Niosi (2006) demonstrated that independency, self-efficacy, groundbreaking behaviors, and risk appetite are the generator of promoting of entrepreneurial university. In addition, many studies (e.g. Guerrero and Urbano, 2010; Powers and McDougall, 2005; Wright *et al.*, 2007) have identified the positive relationship between the self-efficacy of innovative managers and entrepreneurial university innovative behavior. Therefore, the second research hypothesis was formed:

H2. There is a significant and positive relationship between individual factors and entrepreneurial university in the science and technology parks.

Literature review on entrepreneurial university also revealed that institutional factors (i.e. innovation, supportive culture entrepreneurial and business activities, social values, and social responsibility) effect entrepreneurial university directly. Previous studies (e.g. Etzkowitz and Zhou, 2008) confirmed that institutional factors could be the good predictors for academic innovative behavior and entrepreneurial university. Universities with high institutional attributes can adapt themselves to changes, and always seek for recognition and exploitation of new idea because of their higher capacity to take risks (Van Looy *et al.*, 2011). Therefore, the third research hypothesis was formed:

H3. There is a significant and positive relationship between institutional factors and entrepreneurial university in the science and technology parks.

Finally, environmental factors (i.e. rules, entrepreneurial marketing, and supporting atmosphere) create more positive viewpoints and better visions about the future academic circumstances. Moreover, optimists show more endurance optimism directly affects academician and employees' creativity and innovation (Rego *et al.*, 2012). Jafri (2012) also found out a positive relationship between environmental factors and entrepreneurial university. Therefore, the fourth research hypothesis was formed:

H4. There is a significant and positive relationship between environmental factors and entrepreneurial university in the science and technology parks.

Based on the aforementioned discussed literature, the research conceptual model is shown in the Figure 1.

Methodology

The purpose of this study is considered as an empirical one in terms of objective, and its research methodology is descriptive-correlative type. More specifically, structural equation modeling (SEM) was used for data analysis. In the present research data collection has been done through a questionnaire. The population includes 130 managers and employees working in the knowledge-based firms in the science and technology parks of University of Tehran. Among those people, 100 individuals were selected based on using Cochran formula and through stratified random sampling method (Formula 1).

Formula 1. Cochran Formula:

$$n = \frac{N \times Z\alpha^2/2 \times P(1-P)}{\varepsilon^2(N-1)+Z\alpha^2/2 \times P(1-P)} = \frac{456 \times 1.96^2 \times 0.5 \times 0.5}{0.05^2 \times (456-1)+1.96^2 \times 0.5 \times 0.5} = 210$$

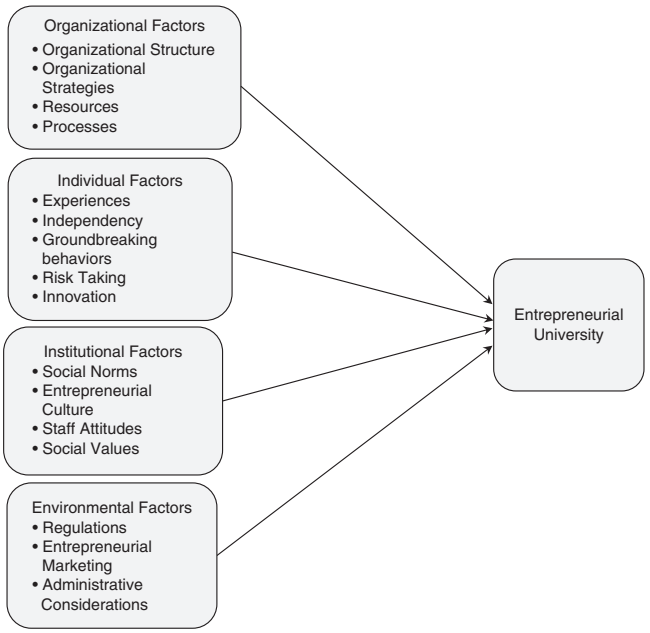

Figure 1.
The research conceptual model

Two standardized questionnaires (i.e. Roberts, 2010 questionnaire on entrepreneurial university and Steffensen *et al.*, 2001 questionnaire on drivers factors) were used to collect data for this research through five Likert type scale. Reliability was measured through two criteria of Cronbach's α and composite reliability (CR). Validity was also measured by convergent and divergent validity. While convergent validity controls if the correlation between a construct and the questions of that construct is adequate (Hulland, 1999), divergent validity compares the correlation between a construct and the questions of that construct with the correlation of that construct with other constructs (Hulland, 1999). Table I shows these amounts.

Analysis tools in this paper include: frequency for demographics, mean, and standard deviation for descriptive statistics of the indicators and Pearson coefficient for correlation of the indicators; which all of them were done through SPSS 20. In addition, SEM for testing the research hypotheses were done by Smart PLS 3 software.

Table I.
Convergent validity, divergent validity, composite reliability, and Cronbach's α

Measure	Cronbach's α	Composite reliability	Convergent validity	Divergent validity	Number of items	Scale
Criterion	Above 0.7	Above 0.7	Above 0.4	–	–	–
Organizational	0.78	0.875	0.53	0.794	4	Interval
Individual	0.7	0.86	0.42	0.788	4	Interval
Institutional	0.76	0.776	0.67	750	4	Interval
Environmental	0.87	0.801	0.6	0.834	4	Interval
Entrepreneurial university	0.81	0.877	0.56	0.799	5	Interval

Findings

The results in descriptive statistics part of the study show that 72 percent of the participants are male and 28 percent are female. In terms of age, most of the participants are in the range of 31-40. Regarding education, most participants (60 percent) hold the PhD degree. Descriptive statistics for the samples are shown in Table II.

The SEM approach is particularly suitable for measuring and estimating a theoretical model with linear relations between variables, which may be either observable or directly unobservable. SEM enables an explicit modeling of the measurement error for the observable variables and avoids potential bias, thus allowing constructing unobservable variables. In the current study, partial least square (PLS) variance-based SEM has been utilized due to analyze and the epistemic view of data. First, none of the independent and dependent variables was absolutely measureable. Further, rather than aiming for producing the covariance matrix as close as possible to the theoretical model, the aim has been set as analyzing the degree of cooperative entrepreneurship. In such a situation, the variance-based PLS approach seems suitable (Fornell and Larcker, 1981). The analysis and interpretation of data process covariance structure analysis and SEM software with Smart PLS 3 software which is followed.

Measurement model

The proposed conceptual model in the current study has been developed based on the theoretical foundations and it has been analyzed by SEM. Figure 2 shows the measurement model in the state of estimation of standardized coefficients. Loading factor and path coefficients can be estimated according to the model in the state of estimation of standardized coefficients. Based on the loading factor, the index of the highest loading factor has the greater proportion in the measurement of the related variable and the index of the lower loading factor has the smaller proportion. Determination index also has been shown in this model.

Figure 3, also, shows the research model in a significant state of coefficients (t-value). This model, in fact, tests all the measurement equations (loading factor) and the path coefficients using t-statistics.

Based on the results obtained by Figure 3, a significant weight in the confidence level of 99 percent for three dimensions is established: organizational, individual, and environmental (t-statistics out of the intervals of 2.58 to −2.58) and institutional dimension in confidence level was of 95 percent significant (t-statistics out of the interval of 1.96 to −1.96) and could have a significant loading factor. To check the

Variable	Levels	Abundance	Variable	Levels	Abundance
Sex	Man	72	Experience	3-5 years	29
	Woman	28		5-10 years	21
				Over 10 years	50
Age	20-30 years	27	Education	Bachelor	18
	31-40 years	40		Master	22
	Over 41	33		PhD	60

Table II.
Descriptive statistics

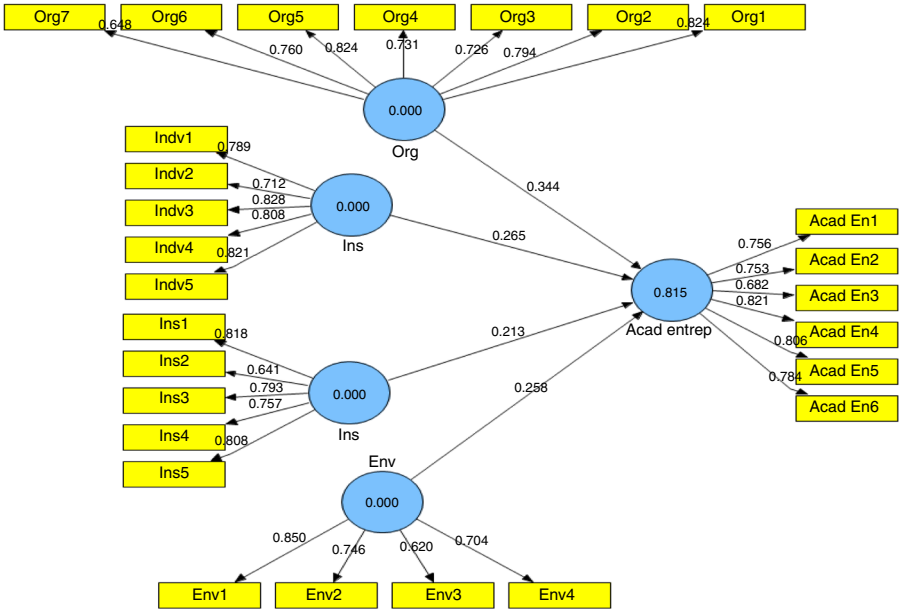

Figure 2.
Model of the estimated coefficients

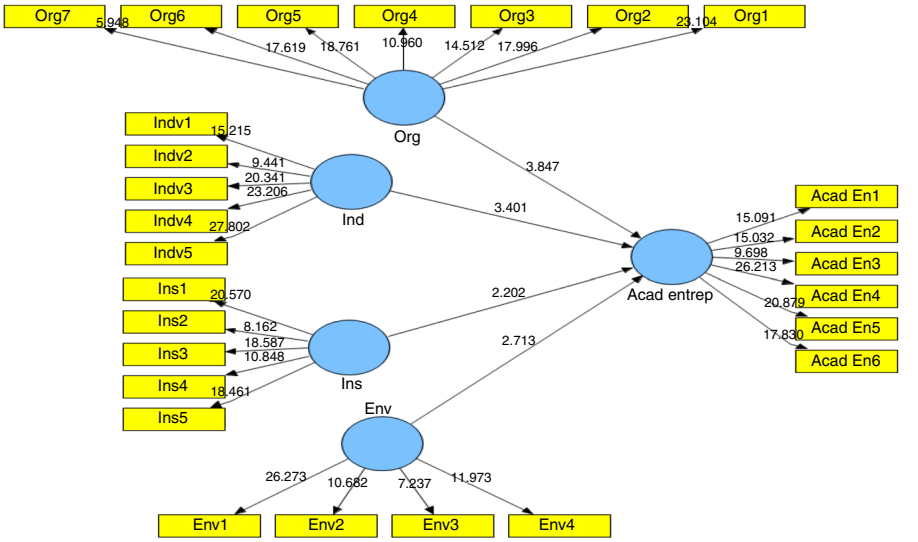

Figure 3.
The research model in the significant state of the path coefficients

reliability of the measurement model and reliability item evaluation have been used from five ways as follows:

(1) Cronbach α

Cronbach α is considered as classic criteria for evaluation and appropriate measures for evaluating the internal in the measurement model. This measure shows the correlation between the structure and its related indicators.

Higher values of 0.7 markers would be acceptable reliability (Fornell and Larcker, 1981). As can be seen in Table III Cronbach α values are greater than 0.7 for model structures and models of measurement have required reliability.

(2) Combine reliability

Smart PLS software uses more modern standard called combine reliability (Fornell and Larcker, 1981). The reliability of structures calculated not only as an absolute but also according to their structural correlation with each other.

If the value for CR is greater than 0.7 for each structure, it has shown of suitable reliability for measurement model (Henseler and Chin, 2010). As it is seen in Table III CR structures values is above 0.7 and reliability of measure models is approved.

(3) The narrative validity of convergence

The second measure, which is used to measure model in PLS is a measure of the average variance extracted (AVE). Which shows the level of correlation of a structure with itself indexes. AVE value is accepted above 0.5 (Fornell and larcker, 1981). As it shows in Table III, AVE is greater than 0.5 for all model structures and reliability of model is verified for measurements.

(4) Cross-loading method

All questions in endogenous and exogenous latent constructs, factor load shares more with its own structure compared to other structures which this suggests divergent narrative of suitable for the research model (Henseler and Chin, 2010).

(5) Method of Fornell and Larcker

As shown in Table IV can be seen, AVE root variable for entrepreneurial intention is greater than amount of correlation between the indexes and other structures. As a result of the level of AVE for this structure is greater in model than shared variance between these structures and other structures (the square of correlation coefficient

Characteristics	AVE	Composite reliability	Cronbach's α
Organizational	0.605039	0.820333	0.85555
Individual	0.581582	0.819565	0.825478
Institutional	0.672190	0.808741	0.832567
Environmental	0.558128	0.812545	0.867452
Entrepreneurial university	0.657291	0.812456	0.8452645

Table III. AVE, composite reliability, and Cronbach's α

	Organizational	Individual	Institutional	Environmental[a]	Entrepreneurial university[a]
Organizational	0.732345	–	–	–	–
Individual	0.498148	0.812132	–	–	–
Institutional	0.423456	0.802211	0.723239	–	–
Environmental	0.565411	0.797676	0.777208	0.458898	–
Entrepreneurial university	0.667172	0.748554	0.738061	0.913904	0.545280

Note: [a] < 0.01

Table IV. Fornell and Larcker test results

between structures) this subject is evidence of divergent narrative suitable for this variable model. With little indulgence, this thread is true about variable entrepreneurship education also hence divergent narrative of the model is confirmed.

Hypotheses testing

The significance level in Smart PLS 3 software is equal or more than 1.96, which shows that the hypotheses are significant. Research hypotheses would be supported if the score becomes above 1.96. In addition, according to (Henseler and Chin, 2010), the coefficient must become equal or above 0.30 which is the ideal score for the indicator. Based on standards, the hypotheses test results and PLS hypothesized models are presented in Table V.

General model validation

To address the measurement of the model, Smart PLS 3 software, calculates loads of items and the variance of residuals. In the structural level, it also, calculates the path coefficients, correlation between latent variables, explained variance, and the AVE of the latent variables. The *t*-statistics is calculated using the cross-cutting method or personal accomplishment. The proper model fitting is achieved when the path coefficient is significant, the explained variance is acceptable, and internal consistency is higher than 0.05 for each construct. Acceptable values of loading factor also show the proper model fitting (Table VI). Moreover, goodness of fit testing (GOF) is the index for checking the model fitting to predict endogenous variables. Three values, 0.01, 0.25, 0.36 are identified as the weak, medium, and strong values of GOF (Formula 2), respectively.

Table V.
Direct effects, *t*-statistics, and the results of research hypothesis

Hypotheses	The relationship	Sig level (*t*)	Coefficient (*B*)	Results
H1	There is a significant and positive relationship between organizational factors and entrepreneurial university in the science and technology parks	3.84	0.455	Positive and significant effect
H2	There is a significant and positive relationship between individual factors and entrepreneurial university in the science and technology parks	3.4	0.26	Positive and significant effect
H3	There is a significant and positive relationship between institutional factors and entrepreneurial university in the science and technology parks	2.2	0.21	Positive and significant effect
H4	There is a significant and positive relationship between environmental factors and entrepreneurial university in the science and technology parks	2.71	0.25	Positive and significant effect

Table VI.
Common values

Dimensions	Organizational	Individual	Institutional	Environmental	Entrepreneurial university	Mean
Commonalities	0.7381	0.6983	0.6871	0.6399	0.5902	0.67

Formula 2. GOF Index:

$$\text{GOF} = \sqrt{\overline{\text{communalities}} \times \overline{R^2}} = \sqrt{0.670 \times 0.815} = 0.739 \quad (2)$$

Since the calculated values of GOF are greater than 0.36, it shows the proper model fitting, also all the path coefficients are significant and explained variance is acceptable and internal consistency of constructs is higher than 0.05.

Discussions

To implement the functions of EU, paying attention to the vital factors and strengthening them can significantly affect the success of entrepreneurship in higher education system. In this regard, the driver factors were extracted according to the EU literature and hypotheses were developed based on the previous studies. All four factors including: organizational, individual, institutional, and environmental, affect EU in the Knowledge-based companies in the science and technology parks of university of Tehran. In other words, academic managers should pay attention to the aforementioned factors as variables which are effective in improving entrepreneurial university.

This study aimed to investigate the effect of organizational, individual, institutional, and environmental factors on entrepreneurial university. Results of the current study showed that organizational, individual, institutional, and environmental factors have a significant and positive effect on entrepreneurial university. This is in the line with the findings of Zhou (2008), Gibb (2012), Hanny *et al.* (2011), Van Looy *et al.* (2011), Shane (2004), and Chugh, (2004).

The findings suggested that organizational factors affect entrepreneurial university in the science and technology parks of University of Tehran. Thus, it can be said that if the organizational structure of universities be flexible and able to respond to changes in their environment, it can be a great help to the university to become entrepreneurial and innovative. This structure avoids the reworking, disagreement, attrition, and dissipation of forces. This is what is happening at University of Tehran because flexible structure allows students, faculties, and staff to work closely with science and technology park. Other factors that influence entrepreneurial university are university facilities and resources such as financial resources, human resources, authorities, and facilities available for the staff. For example financial support for who that have new ideas and commercial approach to research can be noted. Salary and bonus system is another case that plays a significant role in the entrepreneurial university because they have been always a motivational stimulus.

Organizational factors are considered as another factors affecting entrepreneurial university. In this regard, faculty of entrepreneurship at University of Tehran must adopt entrepreneurial strategies and run accelerator centers to nurture the novel ideas. In addition to all that has been said already, the University of Tehran puts priority on other strategies such as: the rapid progress of knowledge and technology at the university, increasing the educational level of students, interaction with firms, and increasing the familiarity of practitioners with entrepreneurship phenomenon.

In the current study individual factors are considered as variables which effect on entrepreneurial university in the science and technology parks of University of Tehran.

According to this in the science and technology parks, by training commercialization and entrepreneurship, the students become familiar with some

behaviors and concepts such as groundbreaking actions, opportunism, flexibility, innovation and creativity, risk taking, and independence.

The third hypothesis findings suggested that institutional factors affect entrepreneurial university in the science and technology parks of University of Tehran. It should be noted that values and social norms as two vital dimensions of institutional factors play a vital role in promoting entrepreneurial university.

The last hypothesis findings suggest that environmental factors affect entrepreneurial university in the science and technology parks of University of Tehran. This factor perhaps is the most important factor affecting entrepreneurial university because government plays a key role in the presented models of the interaction between university and industry. These roles include supporting and financing of the university, entrepreneurial marketing, governmental laws, regulations, and considerations.

Conclusion

The results of the current research show that university-industry collaboration are best attained by the presence of science and technology parks and accelerator centers where the ideas generate and commercialize. It is recommended for providing a suitable platform for knowledge development of the country that the authorities should be seriously consider the institutional and environmental factors in their future plans. This is the only way that to lunch the entrepreneurial university to establish the knowledge base companies and create business intelligence for reaching to sustainable development. Other proposed strategy is to develop comprehensive market-oriented business plans through entrepreneurial university inside the science and technology parks. In addition, the current study suggest to use business angles as the main efficient resources in the universities.

The theoretical framework of the current study offers a different way forward for policy makers in thinking about those factors that may be critical for success of entrepreneurship education. Policy makers, in general can provide infrastructures to launch third generation of universities, entrepreneurial university, for young generation to increase effectiveness of academic education and to provide the prospect of a more business opportunity recognition. In addition, the application of the research model provides an avenue for the practitioners to design accelerates and creative science and technology parks focussing on the commercialization education, entrepreneurial intuition and marketing to students and innovators.

Next scientific researchers can study the role of other variables such as entrepreneurial marketing and entrepreneurial processes as a moderator in the relation between organizational, individual, institutional, and environmental factors and entrepreneurial university. Alternatively, other driving variables that impact on the promotion of entrepreneurial university should be identified and their role and models should be examined. As well as comparative studies with other countries in the process of creating entrepreneurial university, next researches can be down on gap analysis and training model differences. Another avenue for further research is to examine the total effects of determinants of entrepreneurial university (i.e. organizational, individual, institutional, and environmental factors) on entrepreneurial university.

Research limitations

There are several limitations associated with this research that must be taken into consideration. First, the results of the current study are context specific and should be

viewed carefully when extended to other environments. This raises an issue of generalizability of the study results. Second, the cross-sectional data used in the study does not allow for causal interpretation. Therefore, longitudinal study may provide better reliable results fin the researches.

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