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ORIGINAL SCIENTIFIC PAPER

Institutional Factors Affecting Academic Entrepreneurship: The Case of University of Tehran

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ABSTRACT *– The role of universities has been highlighted in the social and economic development of communities with the addition of entrepreneurial mission to the educational and research missions of the universities. Thus, the subjects related to the academic entrepreneurship and commercialization of knowledge has recently been taken into consideration by many researchers and politicians in various countries. In Iran, concept of academic entrepreneurship is newly established and is in its initial stages of formation and institutionalization. Considering this gap in the literature, identifying institutional factors which affect academic entrepreneurship in Iran is the main objective of this study. For this purpose, the Institutional Economy theory of North (1990) was used to investigate the formal and informal institutional factors that foster academic entrepreneurship in Iran. In this study a mixed approach was implemented, taking advantage of interviews and a questionnaire to collection the data from the experts involved in academic entrepreneurship activities in University of Tehran. For sampling purposes, the objective judgmental method was used as a non-probability sampling approach. Data collection and analysis continued until theoretical saturation was reached. Then, 41 semi-structured and open interviews were conducted. The quantitative sample size was calculated based on the Cochran's Formula (60 persons). Findings revealed that main formal institutional factors that affect academic entrepreneurship in Iran include as follows: (i) rules, structure and governance of the university, (ii) entrepreneurship and business training programs, (iii) university-industry relationship, (iv) governmental policies and regulations, (v) intellectual property laws, and (vi) educational and research structure of the university while principle informal institutional factors include: (i) method of enforcing rules, (ii) political considerations, (ii) role models and academic reward system, and (iii) academicians' attitudes toward entrepreneurship.*

KEY WORDS: *academic entrepreneurship,institutional factors, University of Tehran*

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Introduction

"Education" and "Research" were the main issues in the mission of universities in the past, but today, with the developments at the global arena and changes between three main operators at national innovative systems (i.e. industry, government and university), the Third Mission also has been delegated to the universities, that is academic entrepreneurship and participating in socio-economic development of the communities (Etzkowitz, 1998: 832; Etzkowitz et al., 2000: 314).

In fact, globalization process has caused universities to have new responsibilities in the social and economic promotion of regions, scientific advantages of market and reduction of public capitals. Therefore, universities should act entrepreneurially and should commercialize results of research activities and finally ought to make new initiatives such as establishing new knowledge-based companies (Guerrero et al, 2006). Generally, universities should be able to establish appropriate links between the university, entrepreneurs and industry (Yusof and Jain, 2007). An entrepreneurial university applies different strategies and new institutional arrangements with the aim of establishing effective cooperation with government and private-sector industries in terms of production and application of technology and technical know-how (Guerrero and Urbano, 2010). Academic entrepreneurship can include all entrepreneurial behaviors of academicians like setting up new companies at the university, setting up research centers with the industry, paving a suitable way for protecting intellectual properties, and licensing of research results carried out at the university (Rothaermel et al., 2007: 2).

Entrepreneurship in Iran's universities started with the approval of Karad Plan in 2006. The vision of this plan is setting up the topmost entrepreneurship centers at the universities of the country to establish a developed and dynamic community comprised of individuals with economic self-sufficiency and high education levels. Although this plan has been successful to some extent at the universities in the field of entrepreneurship education, Iranian universities face new challenges for attaining the envisioned perspective and with the aim of reinstating at the current changeable and developed world (Farsi et al, 2012). Some of these challenges are related to the policy-making level issues, structure of higher educational system and its planning, while some of which are related to the rules and environment, level of resources and inputs, level of processes, performance and outputs (Ne'mati, et al., 2005: 123). Given the vital and key role of academic entrepreneurship in promoting social and economic development and also significance of entrepreneurship status at the higher education system in the country's 20-Year Vision Plan, identifying all dimensions of academic entrepreneurship in the institutional and rooted attitudes seems necessary with the aim of facilitating and promoting activities of academic entrepreneurship. Accordingly, the main issue of this study is: "Which institutional factors affect academic entrepreneurship in Iran?"

Literature review

Institutional approach and academic entrepreneurship

Institution has not been clearly defined and elaborated in the literature. Sometimes, institution refers to organizations (e.g. bank as a financial institution), sometimes to basic rules governing relations between individuals (private ownership institution), and sometimes to an individual or a situation (presidential office) and even to an insignificant thing like contract papers. The environment is a set of fundamental legal, social and political rules that are governed by political and economic activities (Davis and North, 1971). The Institutional Theory emphasizes the key role of institutions on the economic development and is regarded as one of the most appropriate frameworks for analyzing institutional factors that foster academic entrepreneurship and changes in the third generation education systems. The effect of institutions on entrepreneurial and startup activities has been previously analyzed by researchers. According to North's (1990, 1994) views, organizations adapt their strategies and activities to the environmental opportunities and limitations which provide formal and informal institutional frameworks for them (Guerrero and Urbano, 2010). In this respect, there are many researchers who have worked on the relationship between institutions and academic entrepreneurship (Guerrero et al, 2006; Guerrero and Urbano, 2010).

It is now accepted that institutions determine the rules in a community and/or formally saying, those are limitations that have been designed by human beings and form the interactions between them (North, 1990: 1994). Therefore, the institutional texture contributes to economic performance, especially, through encouraging entrepreneurial behaviors and should be described comprehensively (Yusof and Jain, 2007). North (1990) identified two types of institutions: formal institutions (Rules, Institutions and Regulations, etc.) and informal institutions (traditions, approaches and culture, etc.). He also emphasizes that role of institutions in a community in that they decrease uncertainty through creating a stable structure (but not necessarily efficient) in the interactions of individuals (North, 1990).

Some researchers in the field of entrepreneurship propose the application of North's view in the analysis of making new investments in the institutional texture (Veciana and Urbano, 2008). Thus, researchers argue that entrepreneurs as leaders and organizers of new venture creation have been influenced by environmental factors (both formal and informal) when dealing with rules and regulations pertinent to the entrepreneurial activities and informal norms that have been resulted from socializing and learning processes and thus have an influence on the educational, social, economic and political norms.

Therefore, considering North's views regarding institutions, based on which institutions can be considered as formal (e.g. political and economic rules) and informal (e.g. norms, values and approaches), institutional factors fostering academic entrepreneurship can be studied in two fields: (i) formal institutional factors, and (ii) informal institutional factors. In this study, research related to the factors stimulating academic entrepreneurship is first studied with the adoption of institutional outlook and then, the research framework and theoretical model are designed and proposed.

Effective institutional factors in academic entrepreneurship

A great number of practical and theoretical studies are carried out with regard to the study of effective factors on academic entrepreneurship (Moray and Clarysse, 2005; Ranga et al, 2003; Guerrero et al, 2006; Rothaermel et al, 2007; Sooreh et al, 2011) which can be studied through the institutional outlook. The most important relevant studies have been analyzed in this section. For instance, Hamilton (2009) divides effective institutional factors on the academic entrepreneurship into two groups: formal institutions which include intellectual property laws and scientific capitals publishing institutes and informal institutions which include trade methods and social norms.

In view of Moray and Clarysse (2005), the determinant institutional factors in knowledge-based entrepreneurial ventures include the reward systems, the entrepreneurial culture of the university, intellectual property policies and organizational structure in general. Wright et al. (2009) introduce managers of university, organizational culture, sub-culture and resources accessible at universities as effective institutional arrangements that stimulate academic entrepreneurship. Moreover, Ranga et al. (2003) have studied entrepreneurial universities and dimensions of knowledge production in a case study in Belgium and identified two groups of institutional factors that result in the promotion of knowledge-based entrepreneurship: regional and national policy factors and university internal factors. Regional policy factors include macro policies related to innovation, bills supporting research and innovation bills. These researchers emphasize external factors of university on the governmental policies and rules. The university internal factors which have been identified by these researchers include variety of financial resources, measures of university lecturers, internal dimensions of research groups and number of active groups.

In the one hand, Ponomariov and Boardman (2009) introduced research and development (R&D) investments, financial procurement of industry, quality of university and in general, patent registering rate at the university as the most important commercializing motivations of the universities at the institutional level. On the other hand, Shane (2004) enumerates three important intra-organizational factors that contribute to knowledge commercialization activities: university policies, performance of responsible institutions in licensing and their relationship with industry, and characteristics of the university. The university policies include as follows: transferring exclusive or non-exclusive licensing, sharing the risks inherent in these licenses, freedom of action of the university faculty and researchers for entering into activities and commissioning businesses based on their research activities, using academic resources for establishing new ventures based on academic knowledge and technology, the manners of sharing the profits obtained from commercialization of technology and financial contributions of the university in commissioning new firms. Performance of the responsible institutions in a study by Shane (2004) includes rate and type of financial resources of these institutes, officials' level of specialty and personnel of these institutions and networks of newly-established companies. In a study by Shane, qualities of the university includes culture of encouraging or obstructing entrepreneurship at the university, existence of entrepreneurial patterns at the university, reliability, validity and the quality of the university, provision of research budget from industries or public and governmental budgets.

Sporn (2001) introduced mission of the university, structure and process, organizational culture, way of management and centralized or decentralized decision making are the most important effective factors in the adaptability of the universities. In a study of procedures of commercialization of research activities by the university faculty, Göktepe-Hultén (2008) classified factors of presence of inventors in patent activities into internal and external factors. In addition, he grouped each of these internal and external factors into enablers and triggers. The triggers (solving a research question, job satisfaction, social and personal rewards, reputation, promotion, personal income and benefits, and job security & alternative career options) and the enablers (scientists' career life cycle, scientific human capital, Industrial experience & diversity of career, Image & confidence, and social capital & networks) in internal factors, and the triggers (new academic culture, social imprinting, scientific discipline & industrial relevance, Industrial funding and resources, and society, culture and location) and enablers (Patent legislation (ownership of patents), TTOs, Third mission, and university strategy & policy) in external factors are considered simultaneously.

Fini et al. (2009) divided reinforcing factors of university faculties for creating a new business into four groups: (i) local context factors, (ii) government support mechanisms (iii) support mechanisms at the university level, and (iv) factors associated with the individual's level. Local context factors refer to the research commercialization opportunity, supportive institutional context, fertile local context, supportive academic environment, accessing technologic know-how, previous investments in the development of market demand technology and contagion effect (imitating others). Support mechanisms at the university level include rules related to patenting, academic patented technology, university investments in stocks, rules related to the academic firms, business plan competitions, technology transfer offices, accessing laboratories and infrastructures, and availability of academic incubators. Factors related to the individual level in this study include obtaining laboratories' equipment, obtaining research grants, attracting prominent university faculty, participating in economic and technological development of the country, participating in boosting employment, personal income, prestige and reputation, new ideas and networks for the applied research.

The"organic paradigm" of commercialization of Laperche (2002) introduces key knowledge commercialization factors as follows: rules, technical progress, strategy of university, and economic and entrepreneurial environment. In Laperche's model, the technical progress refers to the research and development costs while economic and entrepreneurial environment refers to the macro-economic indicators. Guerrero et al. (2006) and Guerrero and Urbano (2010) have selected the theory of Institutional Economics and North's study (1990) as the base of their research and have embarked on classifying results and factors identified by formal and informal instructional factors. Guerrero et al (2006) studied formal and informal institutional factors fostering the creation of entrepreneurial universities in Spain. The formal institutional factors identified in this study include structure and governance of the university, academic entrepreneurship structures, entrepreneurship training method and role models, and academic reward system. Incorporating the theory of institutional economics and also the resource-based approach, Guerrero and Urbano (2010) studied effective formal and informal factors in the development of Entrepreneurial University (Guerrero and Urbano, 2010). In addition to the

institutional factors introduced by Guerrero et al (2006), these researchers also considered capacities and internal resources as effective factors in development of entrepreneurial university.

Sooreh et al. (2011) proposed a new framework for entrepreneurial universities in Iran, merging the Input-Process-Output-Outcome (IPOO) model of Salamzadeh et al. (2011) and informal and formal institutional factors proposed by Guerrero et al. (2006) which led to framework with nine building blocks. Then, they measured the importance-performance of each building block to evaluate the entrepreneurial universities in Iran. Their study led to clarification of weaknesses and strengths of Iranian universities in this respect.

The present study is more aligned with the three recent studies mentioned above in terms of objectives and content and is also similar in their methodology i.e. institutional approach. Accordingly, the study was taken into consideration as an initial base for designing the theoretical framework of the research in the next section.

Theoretical framework

In this section, the theoretical framework for this research is presented in order to show the relation between components of the study. Since starting an explorative case study without a theoretical framework is futile, we employed a theoretical framework to enrich the research results, organize interviews, and collect and manage data and avoid any bias in the research (Eisenhardt, 1989). Accordingly, Guerrero et al. (2006) classification with regard to the effective institutional factors in the development of an entrepreneurial university was selected as the base to attain an appropriate theoretical framework. This framework was selected because of its suitable method in adopting and employing the theory of institutional economics in the identification of factors. As a matter of fact, it is assumed that all subjects related to the effective factors in academic entrepreneurship can be studied in subsets of formal and informal institutional factors. Selecting the study by Guerrero et al. (2006) as the base of the research and thorough reviewing of relevant studies, the researchers designed a model, based on which, extant factors in the model will be studied and adjusted at the next stages thanks to the exploratory nature of the research. In designing the research model, based on a study by Guerrero et al. (2006) and the model offered by them, the following six factors were considered as the initial and basic factors: (i) rules, structure and governance of the university, (ii) structures of academic entrepreneurship, (iii) entrepreneurship education programs, (iv) academicians' attitudes toward entrepreneurship, (v) entrepreneurship teaching method, and (vi) role models and academic reward system. Also, based on a study by Hamilton (2009), the factor of intellectual property laws was added to the set of factors and the factor of academic entrepreneurship culture was added to the set of factors according to a study by Sporn (2001). It should be noted that the governmental rules and policies were also added to the set of factors based on a study by Ranga et al. (2003). The factor of university-industry relationship was also added based on a study of Etzkowitz (2002) to the set of factors affecting academic entrepreneurship. Fig. 1 has been accepted as the theoretical framework of the present study. However, the components of this framework had to be adjusted during conducting interviews. We adopted a theoretical framework to avoid the risk of partial understanding when describing the phenomenon.

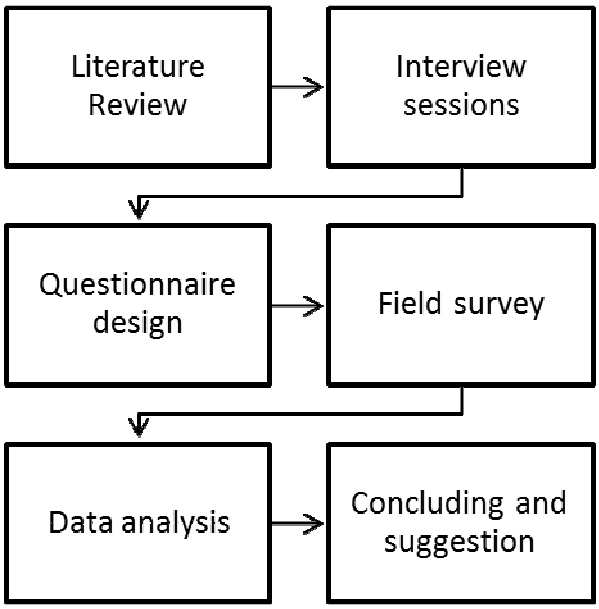
Figure 1. Theoretical Framework of the Research (based on literature)

Institutional factors affecting academic entrepreneurship	
Formal Factors (FF)	Informal Factors (IF)
• Rules, structures, and governance of the university • Governmental rules and policies, • Academic entrepreneurship structures, • Intellectual property laws, • Entrepreneurship education programs, and • University-industry relationship	• Academicians' attitudes toward entrepreneurship, • Teaching methods of entrepreneurship • Role models and academic reward system, and • Entrepreneurial culture

Methodology

The present study discusses both practical and theoretical sides of entrepreneurial universities in Iran. The methodology is both qualitative and quantitative and is known as the exploratory mixed method. In this study, the factors were extracted from the literature review in the first stage. The qualitative method was used for interviewing academic experts to explore these factors and clarify the degree of their importance and/or awareness of other potential factors. Then, at the next stage, a questionnaire was used as the quantitative method to collect the necessary data. At this stage, questionnaires were distributed among the experts involved in academic entrepreneurial activities and the collected data were analyzed by the factor analysis method. Finally, institutional factors affecting academic entrepreneurship in Iran were identified. These stages are illustrated in Fig. 2.

Figure 2. Research Design



The in-person interviews involved three groups of individuals bearing interest in commercialization namely, professors experienced in commercialization of university research in the Engineering Faculty of the University of Tehran, scholarly professors in university entrepreneurship and commercialization of research, and managers & policy makers in Small Business Development Center (SBDC) of university of Tehran. The selection criteria were: (i) ten years of experience at the minimum for the experienced professors, (ii) scientific publications related to commercialization of university research and entrepreneurship for the scholarly professors, and (iii) two years of experience at the minimum for the managers and policy makers in SBDC. For sampling purposes, the objective judgmental method was used which is considered as one of the non-probability sampling methods. The sampling and interviews continued until the analysis and investigation process reached theoretical saturation. Therefore, 41 semi-structured and open interviews were conducted. The length of the interviews ranged from 30 minutes to 60 minutes, with a previous contextualization about the research. The quantitative sample size was calculated based on the Cochran's Formula (60 persons). Totally, more than 70 questionnaires were distributed to reach 60 sound ones.

In the qualitative section, the judgmental sampling method has been used up to the saturation level for selecting the university faculty members, managers and informed experts with the aim of collecting information for the quantitative dimensions of the research while in the quantitative section, the simple randomized sampling method has been used with the aim of selecting individuals for the collection of data for the quantitative dimensions of the research.

Validity and reliability of research tool

Based on the research by Eisenhardt (1989), three techniques were used for the purpose of increasing the validity and reliability of the qualitative data. First, the answer guessing technique was used to avoid the respondent's deviation from the topic of discussion when answering open-ended questions. Afterwards, the interviewees were ensured about their anonymity and confidentiality of the answers so as to increase the accuracy of answers and statements. It should be noted that, each interviewee was informed in advance about the purpose of the research. Internal stability or consistency was also determined through the Cranach's Alpha test of reliability. Accordingly, after the distribution of questionnaires among experts and collecting the necessary data, finally, a number of 60 questionnaires were eligible for study. A reliability value of 0.87 was obtained for the questionnaire in the SPSS software.

Findings and results

Qualitative phase

In this study, interviewees were requested to answer the following main questions:

(i) In case of fulfilling an entrepreneurial activity, please explain the nature of your activity and mention details and relevant challenges.
(ii) In your opinion, which factors influence the academic entrepreneurial activities in Iran?

Table 1. Final Coding Table from Results of Interviews

	Second phase coding	First phase coding	Interviewee Code
Formal Institutional Factors	Governmental policies and rules	• Financial support • Expert system • Governmental laws	I5,I14,I11,I12,I15,I19,I21, I23, I7,I9,I18,I21,I24, ,I10,I13,I25,I26,I6, ,I20,I8, ,I22 I29,I27,I30,I31,I32,I34,I37,I38,I36,I40,I41
	Marketing structure	• Marketing skill • Communication networks with the market	I1,I5,I7,I14 I23, ,I6,I10,I12,I17,I18 I2 ,I14,I25,I9,I16,I30,I33,I34,I38
	Rules, structures and governance of the university	• University rules • University processes and procedures • Organizational structure of the university	I3,I9,I14,I23,I24,I27,I28,I29,I32 I34,I35,I36,I37,I38,I41
	Academic entrepreneurship structures	• SBDC structure • Structure of Science & Technology Park and Incubators	I6,I21,I22, ,I10,I14,I23,I9,I17,I20,I24,I25,I26,I36
	Entrepreneurship education programs	• Entrepreneurship education • Business management skill	I3,I13,I17,I18,I24,I26 ,I25,I1,I2,I5,I6,I22,I31,I37,I39,I40
	university– industry Relationship	• Adaptation of academic projects and requirements of industry • Shared vision of university and industry	I10,I15,I16,I22 ,I24,I4,I13,I6,I11,I23 I26,I29,I30,I31,I36,I37,I41,I32,I38
	University research structure	• Transparent research procedures and strategy • Research evaluation system	I3,I5,I8,I14,I19,I22 ,I30,I32,I33,I35,I36,I39,I40
	Intellectual property laws	• Transparency of intellectual property laws • Editing intellectual property laws	I1,I17,I15,I18, I23,I6,I13,I15 ,I24 I27,I30,I31,I33,I41

Informal Institutional Factors	Procedure of enforcing laws	• Observing standard criteria and work conscience	$I_7, I_8, I_9, I_{21}, I_5, I_{24}, I_{13}, I_{21}$
		• Simplicity and clearness of processes and procedures	$I_{14}, I_{19}, I_{11}, , I_{16}, I_{18}, I_{12}, I_{23}$ $, I_{22}, I_2, I_6, I_{15}, I_{27}, I_{29}, I_{35}, I_{36}$
		• Motivation of state-run sector	I_{33}, I_{38}, I_{37}
	Academicians' attitudes toward entrepreneurship	• Mental image from business environment	$I_6, I_9, I_{15}, I_{16}, I_{26}, I_8, I_{21}, I_{23}$
		• Academic entrepreneurship perspective	$I_3, I_{10}, I_{11}, I_{20}, I_5, I_{22}, I_{25}, I_4$ $I_{28}, I_{29}, I_{30}, I_{31}, I_{35}, I_{36}, I_{38}$
	Role models and academic reward system	• Effectiveness from experience of others	$I_9, I_{15}, I_6, I_{16}, I_{20}, I_{23}, I_3, I_5, I_{10}$
		• Academic reward system	$, I_{14}, I_{18}, I_{21}, I_8, I_{17}, I_{24}, I_1, I_{33}, I_{37}, I_{39}, I_{41}$
	Political considerations	• International political relations	
		• Foreign political-trade relations	$I_4, I_5, I_7, I_{16}, I_{19}, I_{10}, I_{25}$
		• Election campaign	$I_{22}, I_{23}, I_{12}, I_{18}, I_{26}, I_{28}, I_{32}, I_{41}$
		• Stability of state-run managers	
	Quality of educational system	• Presenting applied education	$I_{13}, I_{17}, I_{18}, I_{24}, I_{29}, I_{30}$
		• Quality-oriented education system	$, I_{31}, I_{32}, I_{34}, I_{35}, I_{37}, I_{39}, I_{40}$

(iii) How these factors affect all stages of academic entrepreneurship?

To thoroughly examine the interviewees' responses, the researcher attempted to use coding of verbal statements of the interviewees and also to identify and extract institutional factors affecting academic entrepreneurship. The matrix structure of the data analysis and the data on institutional factors affecting academic entrepreneurship in Iran– which have been extracted from transcripts of interviews thanks to the North's model (1990) of institutions (formal and informal institutional division)– are shown in two groups of formal and informal institutional factors in Table 1.

Generally, the analysis of the interviews has produced five new institutional factors (marketing structure, procedure of enforcing laws, political considerations, quality of the education system and research structure of the university) that have been ignored in the literature. Marketing structure and university research structure were identified as formal institutional factors while the procedure of enforcing laws, political considerations and quality of the education systems were recognized as informal instructional factors in the qualitative analysis section. Also, institutional factors like how entrepreneurship is thought and academic entrepreneurial culture, which has been extracted from the literature, were regarded as insignificant in view of the interviewees and were somewhat ignored by them.

Quantitative phase

Factor analysis of data was done for the 15 factors using the key factors technique. The data were put to the Varimax Rotation Analysis and finally, KMO9 Test result was equal to 0.74. The results obtained from KMO (Kaiser-Meyer-Olkin) and Bartlett's Tests were significant at the 0.05 significance level. This indicates the proportion degree of data for the implementation of factor analysis. The total variance clarified by the factor analysis is also equal to 89% which is valid. KMO and Bartlett's Tests Table, communalities rate table, and also Rotated component Matrix are illustrated in the appendix section. The results of factor analysis are shown in Table 4.

Table 2. Results of Factor Analysis

Results of Factor Analysis after Varimax Rotation			
Institutional Factors Affecting Academic Entrepreneurship	Variance	Percentage of total clarified variance	Cumulative percentage of variance
Rules and structure and governance of the university	7.325	18.375	18.375
Procedure of enforcing laws	5.837	14.592	32.969
Entrepreneurship and business education programs	4.804	12.015	44.984
University – industry relationship	4.343	10.875	55.859
Governmental policies and rules	3.167	7.915	63.138
Political considerations	3.055	7.637	71.411
Role models and academic reward system	2.671	5.174	76.505
Academicians' attitudes toward entrepreneurship	1.905	4.362	80.947
Intellectual property laws	1.832	4.586	85.533
Education – research structure of the university	1.641	4.102	89.635

The factor analysis divided indicators into 10 factors. The indicators for each factor are explained in this section. It has been tried that coding be done without losing the conceptual accuracy of the factors. The codes and contents of the 10 factors are as follows:

Factor of rules, structure and governance of the university: the factor analysis placed six factors in the first factor, including the mission of the university, formulating intellectual property laws, university rules, university organizational structure, independency of the university from government (internal decision makings), independency of the university from government (in financial terms), mission of university and rules of university. Focusing on these six indicators, we can understand that these indicators are primarily related to the rules, structure and governance of the university. Moreover, the indicators which have been classified directly as the subset of factors extracted from the literature, the indicator of formulating intellectual property laws has also been included in this factor. This indicator requires formulating a strong intellectual property system in executing and following up results of entrepreneurial activities.

Procedure of Enforcing Laws Factor: Standard criterion and work conscience and incentive system of public sector has been included in one factor. These indicators have been grouped in a factor along with the indicators like processes and procedures, stability of governmental managers, SBDC structure, structure of Science and Technology Park and Incubator.

Since these indicators have a very close relation with the rules and regulations governing the office and state-run sector activities and also have a very significant effect on how and with what quality the rules are implemented, title of procedure of enforcing laws was reinstated for this factor.

The third factor, coded as "business and entrepreneurship education programs", was considered with five indicators. Indicators of business management skills and entrepreneurship education were initially included in the subset of entrepreneurship education programs. In this regard, indicators of marketing skill from the marketing structure factor and presenting applied education from the quality of education system and also indicator of entrepreneurial applied education from the factor of entrepreneurship education system were placed in this factor. In general, these factors have a general relationship with each other and thus, can be considered consistent. Since these indicators are primarily included in the field of entrepreneurship education, this factor was coded the business and entrepreneurship education programs.

The forth factor coded as "University-industry relationship" include the following indicators: agreement of university projects and industry needs, entrepreneurial interests and experiences of university faculty, shared vision of university and industry (common objectives), shared vision of university and industry (scientific synchronization) and communication networks with the market. Due to the existence of primary indicators of university-industry factor and its relevant indicators, as were added to them in factor analysis, this factor was coded as the "university-industry relationship". In addition to the three primary indicators of factor of industry and university relation, other indicators which had a high correlation with this factor were loaded onto this factor. Indicator of entrepreneurial interests and experiences of university faculty has been included in this factor for having appropriate communication links with this factor. Moreover, the marketing

communication networks indicator can also be of paramount importance for the university in terms of creating a specific process and procedure for transferring outcomes of the university to the market and including it in this factor can also show its high correlation. The primary indicators of the factor of governmental policies and rules, as the fifth factor, were included wholly in the final factor and no change was done to it. This factor was placed at the fifth rank with having the same four primary indexes in terms of significance. With its three indicators, the political considerations factor was included in one subset. From among four indicators, which had been considered initially for the political considerations factor, the factor analysis approved three indicators for the same factor and included only one factor coded as "stability of governmental managers" in the other factor coded as "procedure of enforcing Laws". In explanation of this indicator, posing the following subject seems necessary: "As being placed at the sixth rank, political considerations factor is regarded as an informal institutional factor which plays an important and effective role in governmental policymaking procedure."

Having the indicators of political considerations, this factor took the same name of 'primary factor'. Primary indicators of role models and academic reward system formed the seventh factor under codes of the role models and academic reward system by being included in tandem with each other along with the indicator of academic entrepreneurial vision in terms of significance. This factor is posed as informal institutional factor affecting academic entrepreneurship. The majority of the factors which have received low ranks among the final 10 factors have been comprised of three indicators and statistically, that is the least necessary number of indicators for a factor in the factor analysis. So, the factors which have been placed at the end of formal and informal institutional factors' list are less consistent and significant than the institutional factors placed at the upper part of list. Subsequently, the last three factors which are comprised of three indicators will be explained. The eighth factor coded as "Academicians' attitudes toward entrepreneurship is an informal institutional factor which has the following indicators: mental image of business environment (in economic terms), mental image of business environment (in terms of ethical issues), and cultural values with relation to entrepreneurship in one subset. The factor coded as "Formal Institutional Factor of Intellectual Property Laws" was placed at the ninth rank with the indicators of transparency of intellectual property laws, simplicity and transparency of processes and procedures, and intellectual property laws evaluation process. Finally, formal institutional factor of "education and research structure of the university" was placed at the tenth rank with the indicators of transparent research strategy and procedures, research evaluation system and quality-oriented procedure in the education system.

Discussion and conclusion

In this study, 10 factors were extracted from the literature review within the framework of formal and informal institutional factors for the purpose of determining the institutional factors affecting academic entrepreneurship. Thus, Guerrero et al (2006) model was chosen as a base, details of which were explained and discussed earlier.

Following the extraction of effective institutional factors from the literature, they were submitted to the academic experts. Having extracted the effective institutional factors from the literature, the identified factors were presented to academic experts. Doing this, and

including the interviews in the methodology were for the purpose of complementing and adding new potential factors which were achieved by interviewing the academic experts. After interviewing the academic experts, other factors viz. "marketing structure, procedures of enforcing laws, political considerations, and quality of the education system and research structure of the university" were added to the initial model. All in all, 15 factors were studied and presented to the relevant experts in the form of 41 indicators of those factors within the framework of a questionnaire. Factor analysis was carried out after executing processes related to designing questionnaire, testing validity and reliability of the tests, sending questionnaire and receiving relevant data. The factor analysis divided the indicators into 10 factors. formal institutional rules, structure and governance of the university, informal institutional factor concerning enforcement of laws, formal institutional factor of entrepreneurship and business education programs, formal institutional factor of university-industry relationship, formal institutional factor of governmental policies and rules, informal institutional factor of political considerations, informal institutional factor of role models and academic reward system, informal institutional factor of academicians' attitudes toward entrepreneurship, formal institutional factor of intellectual property laws, formal institutional factor of research-education structure of the university. These factors are illustrated in Fig. 3 as the research's ultimate model.

Figure 3: Model of institutional factors affecting academic entrepreneurship (Self elaborated)

Institutional factors affecting academic entrepreneurship	
Formal Factors (FF)	**Informal Factors (IF)**
• Governmental policies and rules • Marketing structure • Rules, structures and governance of the university • Academic entrepreneurship structures • Entrepreneurship education programs • university– industry Relationship • University research structure • Intellectual property laws	• Procedure of enforcing laws • Academicians' attitudes toward entrepreneurship • Role models and academic reward system • Political considerations • Quality of educational system

Generally, it can be said that each of the identified factors, if invigorated and strengthened, can create a motivation for entering academic entrepreneurial activities and also can be useful as an enabling and supporting factor to promote and facilitate the academic entrepreneurship process. Under such circumstances, output and efficiency of academic entrepreneurial activities will also be appropriate. In case of weakness of each of the mentioned factors, these factors will operate as an obstacle at all stages (input, output and process) of academic entrepreneurship and will also impede the academic entrepreneurship activities.

While comparing the present study with the previous studies, mentioning this point seems necessary that a great number of theoretical and experimental studies are found with

relation to the research on factors affecting academic entrepreneurship (Moray and Clarysse, 2005; Rothaermel et al, 2007; Guerrero et al, 2006; Ranga et al, 2003; Salamzadeh et al, 2011; Sooreh et al, 2011; Guerrero et al, 2013). But most studies have dealt with the subject in a classified form. Also, only few studies have used the institutional approach for studying institutional factors affecting academic entrepreneurship. Yusof and Jain (2007) introduce the institutional factors, which most researchers have focused on including institutional policy, higher education policy, triple spiral model, national and socioeconomic development policies. The similarity between the previous research and the current study is the identification of most of the factors under study.

It should be noted that most factors identified in the previous studies have been identified and approved in this study, as well. Moreover, comprehensive reviewing of the literature and familiarity with the institutional discussions greatly helped the researcher in conducting interviews and doing the qualitative and quantitative analyses and also designing the questionnaire and hence the accuracy of the contents and results of the research. Accuracy and precision in the identification of all institutional factors affecting the academic entrepreneurship and vastness of identified factors and sub-branches affecting academic entrepreneurship due to the native and local situation of a country is the distinguishing aspect of the present study in relation with the previous studies. The new factors identified in this study, which had been fallen into oblivion in previous studies, are as follows: procedures of enforcing laws and political considerations which have been identified as informal institutional factors affecting academic entrepreneurship and education-research structure which has been identified as formal institutional factor affecting academic entrepreneurship. As mentioned previously, native and local situation of the country has been very effective in presenting new results. For example, procedures of enforcing laws and/or political considerations in many countries may not be considered as an effective institutional factor in academic entrepreneurship but thanks to the present institutional structure in Iran, these factors especially the factor of procedures of enforcing laws plays an important role in facilitating and promoting academic entrepreneurial activities.

Policy implications

Given the findings and results obtained from the study and identifying and ranking institutional factors affecting academic entrepreneurship in Iran, the following practical suggestions are recommended for the policymakers in the science and technology field and policymakers in the field of industry and entrepreneurship and also managers and policymakers at the universities:

(i) According to the results of this study, the factor entitled "Rules, Structure and Governance of the University" was identified as the most important formal institutional factor affecting academic entrepreneurship. Many researchers (Guerrero et al, 2006: Guerrero and Urbano, 2010: Clark, 1998: Sporn, 2001, Salamzadeh et al, 2011) have put special emphasis on this factor. Different organizational arrangements at the universities can result in different tendencies toward getting involved in commercialization of results of universities' fundamental research activities (Farsi et al, 2011; Tanha et al, 2011). If the university adopts professional bureaucracy, comprised of traditional boundaries and

structures at its organizational structure, commercialization tendencies of the university can be assumed limited. Certainly, the universities which reorganize their activities merely based on disciplinary lines, they have partial strategic objectives for being involved in commercialization of results of researches. (Debackere and Veugelers, 2005, 329) With due observance to the significance of this subject, universities are recommended to take giant stride towards improvement of structure, process and way of governance of the university and move towards decentralized decision making to facilitate and promote entrepreneurial activities at the university. Also, clear-cut definition of entrepreneurship mission for the university and induction of this contemplation to the university lecturers and students for changing their approach and attitude to the entrepreneurship subject is of paramount importance.

(ii) Factor of entrepreneurship and business education programs was the other important formal institutional factor identified in this study (Results of the Factor Analysis). Evidence shows that scientists have almost partial resources and market knowledge. Some market information is necessary for the university faculty and researchers with the aim of identifying commercial value of new knowledge and also participating in technology transfer activities (Vohora et al., 2004). So, entrepreneurship skills training seem necessary at the university. The studies carried out with relation to the effects of entrepreneurship education and entrepreneurial activity indicates a positive effect for entrepreneurship trainings (Urbano et al, 2005; Charley and Libecap, 2003). Most of interviewees have also pointed to the lack of business skills as an important obstacle for being involved in entrepreneurial activities. Thus, managers and officials of the Education Ministry are recommended to plan entrepreneurial training programs from the basic levels of education and officials of the Science Ministry and managers of the universities should also pay attention to this issue and commission entrepreneurial education programs for university students as mandatory curricula at the universities. It is also suggested that practical programs be designed in the field of entrepreneurship to increase the capacities of the faculty.

(iii) In this study, the factor of "procedures of enforcing laws" has been identified as the most important informal institutional factor affecting academic entrepreneurship (Results of Factor Analysis). This subject is of paramount importance which can affect all other formal and informal factors. This factor has been emphasized by the interviewees at the qualitative stage when conducting interviews. Failure in enforcing laws and/or incorrect enforcement will lead to an unhealthy environment and formation of rent-seeking and destructive entrepreneurship. Undoubtedly, the government is considered as an important influential factor for the creation of a healthy entrepreneurship environment, based on which, the government should be held responsible for policy making, coordinating and implementing policies. If advantages of getting involved in illegal entrepreneurial activities exceed costs, entrepreneurs show more tendencies toward destructive entrepreneurship which is detrimental to the economic development. In contrast, if there are motivations for implementing productive entrepreneurship then it will become widespread. In each of two cases, entrepreneurs evaluate existing incentives at the environment both in legal terms (formal rules of North) and in terms of cultural values and common norms (informal rules of North) (Baumol, 1993). In view of most interviewed entrepreneurs, appropriate macro

policies have been adopted in national level. There are many approvals and rules in line with helping entrepreneurs and new companies but these policies, rules and approvals have remained unchanged in macro level and have not been pierced into the mid and executive layers of the business environment. Practically, these policies have not been executed due to the optional performance and/or weakness of managers and staff of executive organizations at all and/or have not been executed accurately. Generally, there is not any supervision on accurate fulfilling and executing macro policies of the government in line with helping entrepreneurs. Adhered to criteria and work conscience, simplicity and clearness of processes and procedures and motivation of public sector are regarded as three important factors in appropriate enforcing rules in view of interviewees. So, government is recommended to plan on the mentioned three factors with the aim of executing the approved rules in the best form possible. In this line, the following strategies are proposed: establishing a powerful supervisory system for preventing illegal communications, rent-seeking and nepotism in the governmental sector, involving government employees of related departments in commercialization and its profits for creating motivation, and more facilitation of procedures and processes related to the commercialization at the university and relevant organizations

(iv) university-industry relationship has been identified as the other important formal institutional factor in this study (Results of Factor Analysis). Universities are in dire need of permanent resources and capital. The activities like research contracts, granting license and spin offs can follow long-term income for the universities. Units should able be to establish constructive relation between university and industry and should link them appropriately. These units should also create efficient and constructive relationships between different beneficiaries at the university and industry. Generally, the activities occurred between university and industry can be classified into three groups: (i) Activities related to the education and business activities, (ii) Activities related to the laboratory services, for example: research centers with appropriate infrastructures like laboratories, equipment and human resources, etc. which, many businesses lack, (iii) Consultation services which the university faculty provide for businesses, and to transfer of results of studies to the businesses through means such as making research contracts, rewarding and establishing technology-based firms (Gassol, 2007). Therefore, the relationship between university and industry seems necessary and is profitable for the two sides, results of which can lead to the promotion of academic entrepreneurship processes. For a better relationship of the university and industry in the country, it is proposed that common objectives for the university and industry be defined in line with the development vision of the country. Also, it is proposed that common specialized meetings and sessions be held between the university and industry for exchanging views and identifying common problems as well as introducing capabilities of the university to the industry for taking advantage of constructive viewpoints of academicians. Moreover, it is proposed that the amount of import in some capable industries be limited so as to facilitate the cooperation between the industry and university.

Future directions

The results of the present study particularly evince a need to investigate the challenges in the intellectual property laws and their effect on academic entrepreneurship. Because, whereas, it was expected that this factor i.e. intellectual property laws be recognized as a very important and effective factor in academic entrepreneurship in the country, it was among the least important factors coming one to last. It seems that lack of motivation and involvement of the university faculty at the commercialization stage and weak performance of information service centers related to the intellectual property can be regarded as the most important reasons of the said issue. Also intellectual property laws at the universities have many ambiguities at the practical and enforcing stage. Since supporting ownership of intellectual properties is a key factor in facilitation of technology transfer and creation of motivation for commercializing results of studies, clarifying effects of intellectual property laws on the academic entrepreneurship in the future studies will be very helpful. In the present study, identifying and ranking institutional factors affecting the academic entrepreneurship was discussed. The role and effect of each one of the factors identified in the academic entrepreneurship can be studied at the next studies. Also, the present study has discussed the institutional factors affecting academic entrepreneurship activities and has not studied its various stages including input, processes and output of academic entrepreneurship concept, separately. The future studies can concentrate on the factors affecting the entrance of academicians to the academic entrepreneurship activities, factors affecting academic entrepreneurship process and/or factors affecting the success of academic entrepreneurs.

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Institucionalni faktori koji utiču na akademsko preduzetništvo: analiza studije slučaja Univerziteta u Teheranu

***REZIME** – Univerziteti imaju istaknutu ulogu u društvenom i privrednom razvoju zajednice, s dodatkom njihove preduzetničke i istraživačke misije. U skladu s tim, akademsko preduzetničko znanje i komercijalizacija tog znanja su od nedavno postali predmet interesovanja naučnika i političara u mnogim zemljama. Koncept akademskog preduzetništva je tek odnedavno ustanovljen u Iranu,tako da se nalazi još u svojim početnim fazama nastajanja i institucionalizacije. S obzirom na tu prazninu u literaturi, rad identifikuje institucionalne činioce koji utiču na akademsko preduzetništvo u Iranu,što je glavni cilj ove studije. U tu svrhu, korišćena je u radu teorija institucionalne ekonomije koju je postavio naučnik Sever (1990), s ciljem da se istraže formalni i neformalni institucionalni činioci koji podstiču akademsko preduzetništvo u Iranu. U ovoj studiji, implementiran je mešoviti pristup istraživanja ,tj. iskorišćeni su intervjui i upitnici za prikupljanje podataka od strane stručnjaka koji sudeluju u akademskim preduzetničkim aktivnostima na Univerzitetu u Teheranu. Vršena je selekcija uzorka u nekoliko koraka do objektivne procene. Kvantitativna veličina uzorka je izračunata na*

temelju Cochranove formule (60 osoba). Rezultati istraživanja su pokazali da su glavni formalni institucionalni faktori, koji su imali uticaja na akademsko preduzetništvo u Iranu, ogledaju u: (i) pravilima, strukturi i upravljanju Univerzitetom, (i) preduzetništvu i poslovnim programima obuke, (iii) vezi između Univerziteta i industrije, (iv) vladine politike i propisa, (v) zakona o intelektualnom vlasništvu, i (vi) obrazovnoj i istraživačkoj strukturi Univerziteta, dok se principi neformalnih institucionalnih činilaca odnose na: (i) način sprovođenja pravila, (ii) političkih razloga, (ii) „role" modela i sistema akademskog nagradjivanja, i (iii) akadermskih stavova prema preduzetništvu.

***KLJUČNE REČI**: akademsko preduzetništvo, institucionalni činioci, Univerzitet u Teheranu*

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