International Journal of Agricultural Management and Development
Available online on: www.ijamad.iaurasht.ac.ir
ISSN: 2159-5852 (Print)
ISSN:2159-5860 (Online)
Research Paper

Developing an Appropriate Model for Entrepreneurial Faculty of Agriculture in Iran

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Received: 21 December 2017,
Accepted: 15 October 2018

Abstract

Nowadays, promoting entrepreneurship to train graduates endowed with entrepreneurial traits is considered as one of the new functions of the faculties of agriculture. In this regard, the purpose of this study was to design an appropriate model for entrepreneurial faculty of agriculture in Iran. This study was of descriptive-correlational research type in which a survey method was employed for data collection. The study population comprised all students (N_1=19973) and faculty members (N_2=713) of all faculties of agriculture in Iran's state-run (public) universities of whom 403 students and 344 faculty members were sampled by multi-staged (three-stage) method. The sample size was determined by Krejcie and Morgan's sample size table. The research instrument was a self-designed questionnaire whose face and content validity were confirmed by a panel of experts. The diagnostic validity of the questionnaire in the case of its latent variables was also confirmed using the average variance extracted method ($0.76 \leq AVE \leq 0.87$). Furthermore, its internal consistency ($0.81 \leq \alpha \leq 0.93$) and composite reliability ($0.80 \leq Pc \leq 0.91$) were confirmed using Cronbach's alpha coefficient. The collected data were also analyzed using SPSS22 and LISREL9.1. The results showed a significant relationship between structural, content, and contextual factors and entrepreneurship of faculties of agriculture. Meanwhile, content factors showed the greatest effect (path coefficient = 0.83) on the entrepreneurship of agricultural faculties. According to the findings, the final proposed model was developed with respect to the factors listed in three categories of education, research, and entrepreneurship for the establishment of entrepreneurial faculties of agriculture in Iran.

Keywords:
entrepreneurship model; entrepreneurial faculty; Iran

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INTRODUCTION

As the richest scientific-research centers for generating knowledge and technology, universities have always played a vital role in economic, social, and cultural developments. However, they can be strongly influenced by direct environmental variations. In this respect, two correlated issues can determine the relationship between higher education and the world of work. On the one hand, higher education is moving toward a mass system due to the dependence of the economic process on creative university graduates. On the other hand, the knowledge acquired by students during their educational course quickly becomes obsolete; therefore, higher education needs to consider its own relationship with the world of work as a continuous process (Willame, 2002).

Moreover, the increasing importance of nurturing creative and entrepreneurial human resources as well as the commitment of universities and higher education centers in this regard have drawn the special attention of universities to the concept of entrepreneurship during the last quarter of the twentieth century (Fallah Haghighi et al., 2018b; Hadizadeh-Moghaddam & Rahimi Filabadi, 2005). In this respect, one of the significant issues is how universities become entrepreneurship-oriented and how they perform entrepreneurial practices (Chambers, 1999). Since the early 1980s, more widespread and scientific operations have been launched in this field, and the number of universities involved in teaching entrepreneurship courses has been growing to the extent that entrepreneurship education is now perceived as one of the most critical academic activities, and a majority of great universities around the world design and implement several educational programs for public and private organizations based on local and regional needs as well as interns' profiles. In addition, the governments often support such programs (Hadizadeh-Moghaddam & Rahimi Filabadi, 2005). Assuming universities as a systematic organization accomplishing educational and research missions, universities and higher education systems should increasingly participate in innovation processes and developing technologies (Ibid.). It is crystal clear that faculties of agriculture are not excluded. Entrepreneurship has seriously affected higher agricultural education like other sectors (Fallah Haghighi & Bijani, 2016; Moradi et al., 2011). It was once believed that the expansion of higher agricultural education and training educated human resources in agriculture would lead to the development of agriculture; however, the estimates have revealed that the agricultural sector has not grown with the expected pace although there is no shortage of agricultural graduates. The reality in this respect is that the graduates of higher agricultural education lack the required practical skills and competencies. Accoridngly, these graduates' eagerness to be employed in state-run institutions even with low salaries and payments is a hallmark illustrating this fact. On the other hand, these graduates have little interest in practical and productive activities and, in most cases, regard these activities arduous with low income and even inappropriate for university graduates. In some cases and in order to further avoid practical situations, they continue their education in order to obtain higher degrees and improve their employment opportunities in public sectors. Evidently, this situation requires a careful and in-depth study of the causes for the emergence of such conditions as well as an investigation into the necessary conditions for the development of entrepreneurship in faculties of agriculture. Thus, the purpose of the present study was to design an appropriate model for entrepreneurial faculty of agriculture in Iran. The results of the given study are presented in the following sections. In this regard, this study focused on universities as organizations and entrepreneurship as innovation to improve the efficiency of this organization and eventually convert traditional universities into entrepreneurial ones.

Theoretical background

Entrepreneurship is considered the process of identifying opportunities, innovation to seize the opportunities, and venture to create value (Morris & Lewis, 2002; Nambisan, 2018). In this regard, the main objective of entrepreneurship is to foster self-confident individuals who can grasp opportunities and tend to find independent businesses (Ahmadpour Daryani, 2007; Fallah Haghighi et al., 2018a). Yamada shed light on entrepreneurship from three different approaches: macro-level, middle-level, and micro-level (Yamada, 2002). At the macro-level approach, environmental factors increasing the number of entrepreneurs are identified; the middle-level approach originates from an organizational approach and is founded on organizational development-oriented studies, and the micro-level approach examines the concept of entrepreneurship from psychological and sociological perspectives (Moghimi, 2005). Hence, the dominant approach in studying entrepreneurial faculty of agriculture is the middle-level approach.

Today, entrepreneurship is taken into account as one of the most important issues raised in various sectors including agriculture. Changes such as globalization, population growth, developments in agriculture labor market, food security, market competitiveness, agricultural policies, and movement toward commercial market-based agriculture as well as the society's problems including increased unemployment rate and environmental and biodiversity issues are regarded as some of the factors highlighting the necessity of entrepreneurship in agriculture more than ever. In fact, the need for the development of entrepreneurship in the agriculture sector is almost similar to that emphasized in other economic sectors. This means that the development of entrepreneurship is seen as providing the fuel to sustain the competitive advantage (Covin & Sliven, 1996; Drucker, 1985). Moreover, in cases where government support is decreasing and there is a greater tendency toward competition in the market, the most important feature of a successful business is to have constant innovation and creativity through an appropriate combination of available resources (Menzies & Gassie, 1999). Although there is essentially no difference between entrepreneurship in agriculture and entrepreneurship in urban areas and economic sectors, the entrepreneurship inputs needed for cities, industrial zones, and other economic sectors are more easily available in comparison with those required for rural areas and agricultural sector. Furthermore, innovation generated by the agricultural entrepreneur is less generalizable to all agricultural subsectors and it is also specialized (Eskandari, 2005).

In such a condition, training students and graduates of agriculture who have sufficient understanding of the current situation of agriculture in their region and possess practical capabilities for advancing the agricultural sector toward entrepreneurship would have an essential role in achieving this goal, which is also facilitated in the light of providing academic training to students and university graduates who return to their towns and villages across the country after graduation to put their experiences and learning in practice. In fact, a common criticism set against universities is that they have ignored the real world and their research is being conducted in isolated laboratories so that they have almost forgotten the real needs within society (KordeNaeij, 2005). One of the key strategic tools in this regard is the establishment and development of entrepreneurship centers in universities and faculties of agriculture and converting them into entrepreneurial centers of education and research. Certainly, having a holistic and systemic vision combined with strategic thinking on the subject of the entrepreneurial university can present a new horizon for solving this problem.

UNESCO's global outlook of higher education for the 21st century has described the new universities as "a place where entrepreneurial skills in higher education are developed to facilitate the graduates' potentials to become job creators. These universities are also known

as third-generation universities away from the isolated mode and being excluded from society and industry. They have been converted into organizations which are in complete consistency with industry and community, especially to recognize and meet their actual needs (UNESCO, 2004)".

In this regard, it must be noted that the entrepreneurial university with a simultaneous emphasis on knowledge generation and the expansion of the frontiers of human knowledge is also sensitive to educational and research needs as well as specialized context-based consulting services. Through the creation of innovation and ingenious methods of thinking, such a university makes the potential to define, formulate, and resolve the problems independently or as a group to provide the ground for sustainable development (Zabihi & Moghadasi, 2006). Hence, an entrepreneurial university is an innovative risk-taking university nurturing entrepreneurial behaviors (Clark, 1998). It is certain that the university is affected by variables such as technology, culture, and environment that are involved in combining entrepreneurial goals (Ropke, 2003). Within an entrepreneurial university, the missions should be based on three components: 1. Education; 2. Research; and 3. Society (Aussman, 1998). In an entrepreneurial university, education should be research-based and research should be formed based on the needs in a community. One of the significant issues in this field is how universities become entrepreneurs and how they perform entrepreneurial practices. In his study, Chambers (1999) shed light on the process of converting a traditional university into an entrepreneurial one. In this respect, he proposed several solutions as follows: 1. Holding entrepreneurship training courses for different groups; 2. Modifying content curriculum and programs in different disciplines; 3. Conducting educational needs analysis in local production and service industries; 4. Defining and offering a variety of such short-term courses; 5. Aligning academic research with socio-economic needs of a region; 6. Encouraging and supporting innovative projects performed by faculty members and students; 7. Allocating a share of funds to the establishment of development centers and science and technology parks; and 8. Adopting new financing strategies through scientific and research collaboration with production and service centers and institutions (Chambers, 1999). According to Clark (1998), the seven key approaches to entrepreneurship in universities are to have a flexible structure, a solid entrepreneurial culture, continuous interaction with the environment, a common perspective, future-looking strategy, and considering human resources. Below is a review of several empirical studies conducted inside and outside Iran on entrepreneurship in higher education centers.

Quality Assurance Agency (QAA, 2012) has developed a guideline for entrepreneurial universities in Europe. In this guideline, seven key factors, namely leadership and management, organizational and individual capacity, entrepreneurship development in teaching and learning, relationships with the outside of academia to exchange knowledge, higher education entrepreneurship as an international institution, paths to entrepreneurs, and measuring consequences, are identified and introduced.

In this respect, Young and Sexton (1997) found that different characteristics of professors, teachers, and educators could play an important role in improving students' learning performance and their ability to enter the labor market. Gibb (2009) considered the concept of entrepreneurship, employing entrepreneurship to integrate entrepreneurship into all academic activities, creating opportunities to learn entrepreneurship, and attending multidisciplinary knowledge of the necessity to convert the traditional university into an entrepreneurial university. Ropke (2006)believed that academic knowledge only became a productive source when it was associated with entrepreneurship. Audretsch and Phillips (2007) listed some factors affecting the conversion of a university into an

entrepreneurial university at all levels. They included the integration of strategies to support innovation and entrepreneurship in universities' mission, universities' commitment to developing culture and entrepreneurial skills, and the development of entrepreneurship education in universities as well as supporting students who were to establish their own new business while studying.

Muske and Stanforth (2000) found that 60% of students in entrepreneurial universities cooperated with production and service centers and had business income. They also claimed that 24% of university students had made attempts to set up their own small industries individually or in group with the support of their universities. In another study, Pãunescu (2007) investigated the possibility of implementing entrepreneurial university model in Romania based on the needs of new university applicants and outputs of universities. Given the context of Romania, the results of this study showed that the implementation of the entrepreneurial university model depended on full cooperation and participation of the scientific community as well as the support of the market and society as a whole (Pãunescu, 2007). Investigating the role of education in promoting a positive attitude toward entrepreneurship, Rasheed (2000) concluded that training could have impacts on modifying entrepreneurial attitudes. Robertson (2008) counted the characteristics of an entrepreneurial university as follows: strong leadership enhancing entrepreneurial capabilities for all students and staff, strong relationship with external stakeholders empowering entrepreneurial activities, income generation from entrepreneurship, using innovative learning methods that foster entrepreneurship activities, facilitating relationships between organizations to develop an effective flow of knowledge among them, and adopting an interdisciplinary approach to education and also guidance to encourage entrepreneurial thinking. In addition, knowledge creation and directing learning in the education process can play a mediating role in entrepreneurship and organizational performance (Karimi & Ahmadpour Daryani, 2017). Entrepreneurial higher education institutions should possess two major features: 1. teachers and administrators should communicate with each other, and 2. teachers and administrators should be in contact with the environment for which they are teaching students (Ibid). Based on the research study conducted in Aalto University in Finland, Markkula and Lappalainen (2009) emphasized the importance of new methods for a better cooperation between university and industry and also described the role of university education in growing entrepreneurs. In order for universities to be entrepreneurs, Shah Hosseini (2004) also came to the conclusion that entrepreneurship nature and its principles should be taught and training needed for acquiring entrepreneurship skills should be presented. Based on the results of his studies at the University of Zenica, Arnaut (2010) proposed some activities for universities to become entrepreneurial ones. The activities consisted of stimulating and encouraging the process of change within university, increasing institutional autonomy, changing the financing system, creating innovation, designing a business-oriented curriculum, as well as introducing updated educational methods and activities aimed at strengthening the relationship between university stakeholders. Besides, Yadollahi Farsi (2005) proposed the requirements for higher education institutions to become entrepreneurs: structural changes, changes in the system and content of educational programs, variations in research system and orientation, a change in members' culture, and promotion of entrepreneurship culture. He also pointed out that higher education institutions, in their movement towards entrepreneurship, should pay close attention to modifying educational programs based on problem-solving, involving entrepreneurship courses in education programs, promoting the entrepreneurship culture among academics, as well as designing and implementing a reward system based on outputs to encourage

academic entrepreneurship (Yadollahi Farsi, 2005). Moreover, Van Looy et al. (2011) examined the effectiveness of 105 European universities and concluded that the activities of spin-off firms had a positive impact on increasing scientific productivity through their relationships with research contracts. Therefore, entrepreneurial trends in universities of different countries have had a positive impact on their economic operations (Van Looy et al., 2011). Additionally, Todorovic et al. (2011) derived four factors including "mobilizing research", "inter-organizational cooperation", "interaction with industry", and "university policies" as the ones influencing entrepreneurial trends in universities.

Fallah Haghighi, and Bijani (2016) emphasized that the establishment of an entrepreneurial university depended upon four factors: "mission and vision", "business relations", "structure", and "curriculum". In this regard, not only understanding the challenges of entrepreneurship in the faculties of agriculture but also removing the entrepreneurship barriers seem to be of utmost importance. In this respect, the most important barriers in Iran include those in the domains of "training", "individual-characteristic", "legal-protection", "facilitations", and "communication" (Fallah Haghighi et al., 2013). On the other hand and from the perspective of agriculture students, providing training associated with entrepreneurship and rewarding new ideas were among the important components in the development of entrepreneurship in Iran's faculties of agriculture (Bijani et al., 2015). The results also indicated a direct and significant relationship between entrepreneurship in faculties of agriculture and structural aspects. Furthermore, organizational components in a faculty of agriculture including the type of "structure", "communication system", "payment system for new ideas" and "innovation in education and research" had been introduced as the major aspects for entrepreneurial faculties of agriculture (Fallah Haghighi et al., 2017).

Finally, and according to the review of the related literature and the given theories, models and patterns, the theoretical framework of the present study was designed (Figure 1). As illustrated in this figure, the components of an entrepreneurial faculty of agriculture were examined in three categories: structural factors (4 indicators), content factors (8 indicators), and contextual factors (4 indicators).

With regard to the study objectives, three main hypotheses and a number of sub-hypotheses were proposed.

Main hypothesis 1: There is a significant relationship between structural factors and an entrepreneurial faculty of agriculture.

Secondary hypotheses: There is a significant relationship between type of organizational structure, organizational communication system, payment system, educational affairs, and entrepreneurship in faculties of agriculture.

Main hypothesis 2: There is a significant relationship between content factors and an entrepreneurial faculty of agriculture.

Secondary hypotheses: There is a significant relationship between academics' entrepreneurial characteristics, academics' attitudes towards entrepreneurship, common vision and prospective strategy, management support, entrepreneurial culture, leadership attitude towards entrepreneurship in faculties, role models, group and collaborative activities, and entrepreneurship in faculties of agriculture.

Main hypothesis 3: There is a significant relationship between contextual factors and an entrepreneurial faculty of agriculture.

Secondary hypotheses: There is a significant relationship between relationships with industry and agriculture, socio-cultural environment, economic environment, political environment, and entrepreneurship in faculties of agriculture.

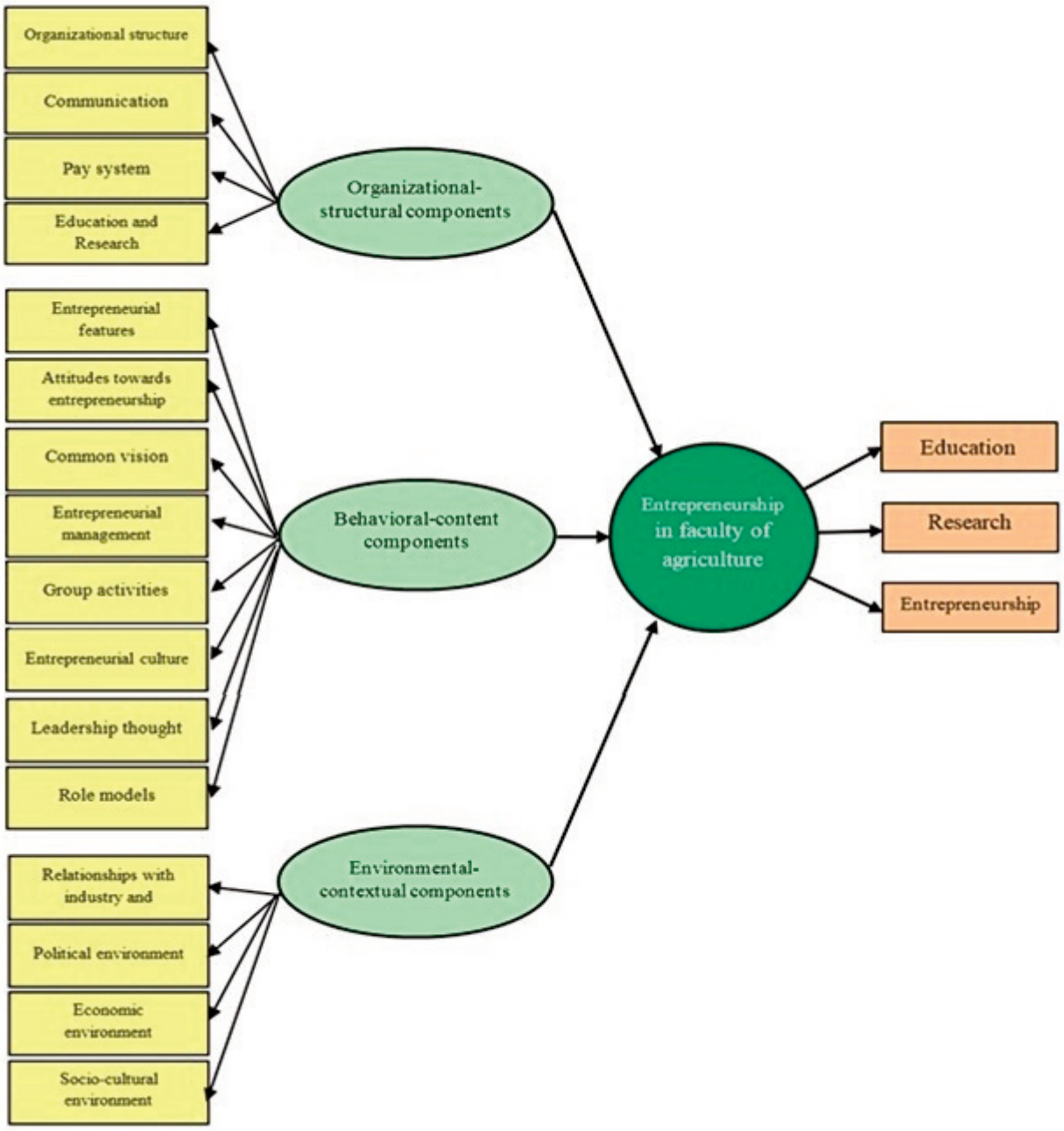

Figure 1. Theoretical framework of the study

METHODOLOGY

With respect to the nature of the present study, this applied research study was a field study in terms of degree and amount of control over the variables. Also, it was a descriptive-correlational study in terms of data collection and analysis and a cross-sectional study in terms of time. A survey method was also employed to collect the data. The research instrument was a researcher-designed questionnaire. In this respect, the latent variables of the present study, indicators reflecting them, and their measurement methods were presented in Table 1. The study population consisted of all students (N_1 =19973) and faculty members (N_2 =713) in all faculties of agriculture in Iran's state-run universities of whom 403 students and 344 faculty members were sampled by multi-staged (three-stage) technique. The sample size was determined by Krejcie and Morgan's sample size table (Krejcie & Morgan, 1970). The sample selection was performed in three stages. The first stage involved selecting Iran's Centers of Excellence

(Table 2). The second stage was devoted to the selection of two faculties of agriculture from each center using cluster sampling method. Finally, and in the third stage, the stratified random sampling method was used in which education groups of agriculture were considered as classes. Table 2 shows the faculties selected for the study, population size, and sample size.

Table 1
Latent Variables and their Relevant Indicators

Latent variables	Observed variables	Number of items*
Entrepreneurial Faculty of Agriculture (University entrepreneurship in an agricultural context)	Education	5
	Research	3
	Entrepreneurship	3
Structural Factors	Organizational structure	12
	Organizational communication system	4
	Pay system	3
	Educational affairs	5
Content Factors	Common vision and future-looking strategy	3
	Management support	4
	Academics' entrepreneurial characteristics	17
	Academics' attitudes towards entrepreneurship	20
	Entrepreneurial culture	4
	Leadership attitude towards entrepreneurship in faculties	5
	Role models	3
	Group and collaborative activities	3
Contextual factors	Relationships with industry and agriculture	3
	Socio-cultural environment	3
	Economic environment	4
	Political environment	3

*Measurement in a five-point Likert-type scale (1 = strongly low, 2 = low, 3 = average, 4 = high 5 = strongly high)

To determine the validity of the questionnaire, it was submitted to a number of faculty members of the Pardis Faculty of Agriculture and Entrepreneurship at the University of Tehran. The final version of the questionnaire was developed after collecting their comments and making the required revisions. To measure the reliability of the given scale, Cronbach's alpha coefficient was used, and it showed the reliability of the questionnaire. In addition, composite reliability and diagnostic validity were estimated for each variable and the results were illustrated in Table 3. In addition, the diagnostic validity was assessed using the Average Variance Extracted (AVE) statsitic. This coefficient shows what percentage of the studied structure is influenced by its variables. Researchers have also proposed that this index should be higher than 0.5 to be accepted. According to the results presented in Table 3, the diagnostic validity values obtained for all latent variables were higher than 0.5.

The last column of Table 3 lists the Cronbach's alpha coefficients obtained for different sectors in the guideline testing phase. With regard to the shortcomings of the Cronbach's alpha test (e.g. assuming the same value for all the questions of a structure), it is better to consider composite reliability. In addition, since the values of Pc for all the latent variables were greater than 0.6; it can be concluded that the studied indicators were of accepted reliability.

Table 2
The Country's Centers of Excellence and Selected Faculties of Agriculture

Scientific region science	Iran's provinces	Universities with Faculty of Agriculture	Selected faculties of agriculture	Students		Faculty members	
				N1	n1	N2	n2
First region	Tehran, Alborz, Zanjan, Semnan, Qazvin, Qom, Golestan, Gilan, Mazandaran, Markazi	Tehran, Tarbiat Modares, Shahed, Zanjan, Shahrood University of Technology, Gorgan University of Agricultural Sciences and Natural Resources, Gilan, Sari University of Agricultural Sciences and Natural Resources, Arak	Karaj Pardis Faculties of Agriculture, (5 faculties) and Abouryhan Pardis Faculties (2 faculties)	3624	75	194	90
			University of Guilan, Faculty of Agriculture	1620	31	81	36
			Total	5244	106	275	126
Second region	North Khorasan, Razavi Khorasan, South Khorasan, Kerman, Sistan and Baluchestan	Ferdowsi University of Mashhad, Birjand, Shahid Bahonar University of Kerman, Rafsanjan Vali-e-Asr University, Sistan and Baluchestan (Saravan), Zabul	Ferdowsi University of Mashhad, Faculty of Agriculture	2327	44	102	45
			Shahid Bahonar University of Kerman, Faculty of Agriculture	2700	51	30	31
			Total	5027	95	141	76
Third region	East Azerbaijan, West Azerbaijan, Ardebil, Kurdistan, Kermanshah, Hamedan	Tabriz, Maragheh, Orumiyeh, Mohaghegh Ardabili University, Kurdistan, Razi University of Kermanshah, Buali Sina University of Hamedan, Malayer	Razi University of Kermanshah, Faculty of Agriculture	1764	33	47	21
			Kurdistan University, Faculty of Agriculture	1189	23	33	15
			Total	2953	56	80	36
Fourth region	Isfahan, Yazd, Chaharmahal and Bakhtiari, Lorestan, Ilam, Khuzestan	Isfahan University of Technology, Shahre Kord, Lorestan, Ilam, Shahid Chamran University of Ahvaz, Ramin University of Agricultural Sciences and Natural Resources	Lorestan University, Faculty of Agriculture	2521	48	38	18
			Ramin University of Agricultural Sciences and Natural Resources (three faculties)	1445	30	57	27
			Total	3966	78	95	45
Fifth region	Fars, Bushehr, Kohgiluyeh and Boyer-Ahmad, Hormozgan	Shiraz, Khalij Fars University of Bushehr, Yasouj	Shiraz University, Faculty of Agriculture	2389	48	108	49
			Khalij Fars University of Bushehr, Faculty of Agriculture	394	20	14	12
			Total	2783	68	122	61
			Sum	19973	403	713	344

(Source: MSRT, 2014)

Table 3
Composite Reliability, Diagnostic Validity and Cronbach's Alpha Coefficient for the Latent Variables of the Model

Latent variable	Composite reliability (P_c) $0.6<P_c$	Diagnostic validity (AVE) 0.5<AVE	Cronbach's alpha coefficient
Academic entrepreneurship in the field of agriculture	0.80	0.76	0.81
Structural dimension	0.89	0.84	0.93
Content dimension	0.91	0.87	0.93
Contextual dimension	0.89	0.83	0.91

RESULTS AND DISCUSSION

To analyze the conceptual model, structural equation modeling and LISREL9.1 were used, and also the Maximum Likelihood (ML) method was employed to estimate the model parameters. Given the fact that the LISREL models make use of abbreviations, these abbreviations were listed in Table 4.

Table 4
Abbreviations of the Components and Indicators Used in LISREL Models

No.	Component	Index	Abbreviation
1	University entrepreneurship in an agricultural context	Education	Edu
2		Research	Res
3		Entrepreneurship	Ent
4	Structural dimension	Organic organizational structure	Stru1
5		Mental and easy organizational communication system	Stru2
6		Entrepreneurial system in pay and bonus	Stru3
7		Innovator in educational affairs	Stru4
8	Content dimension	Academics' personal entrepreneurial characteristics	Con1
9		Academics' attitudes towards entrepreneurship	Con2
10		Common vision and future-looking strategy	Con3
11		Entrepreneurial management	Con4
12		Team work (group and collaborative activities)	Con5
13		Entrepreneurial culture at faculty	Con6
14		Entrepreneurial leadership	Con7
15		Role models	Con8
16	Contextual dimension	Relationships with industry and agriculture	Tex1
17		Entrepreneurial political environment	Tex2
18		Entrepreneurial economic environment	Tex3
19		Entrepreneurial socio-cultural environment	Tex4

Following the implementation of the first model in LISREL, fit indices were studied and compared with an optimal limit. Since some of these indices were not estimated to be appropriate, the model was modified to achieve stable estimates of changes, concerning the point that the highest amount of decrease in the chi-square value and then changes in other fit parameters were of priority to keep revising the model.

Figure 2 represented the final version of the study model. It should be noted that modifying the model to achieve an acceptable fit, in addition to establishing new relationships between different indices, led to the removal of the major indicator "role models" that was

related to the content components. Removing this indicator and establishing the proposed connections, the model became appropriate and acceptable and thus the reliability of the estimated parameters in the modified model was confirmed.

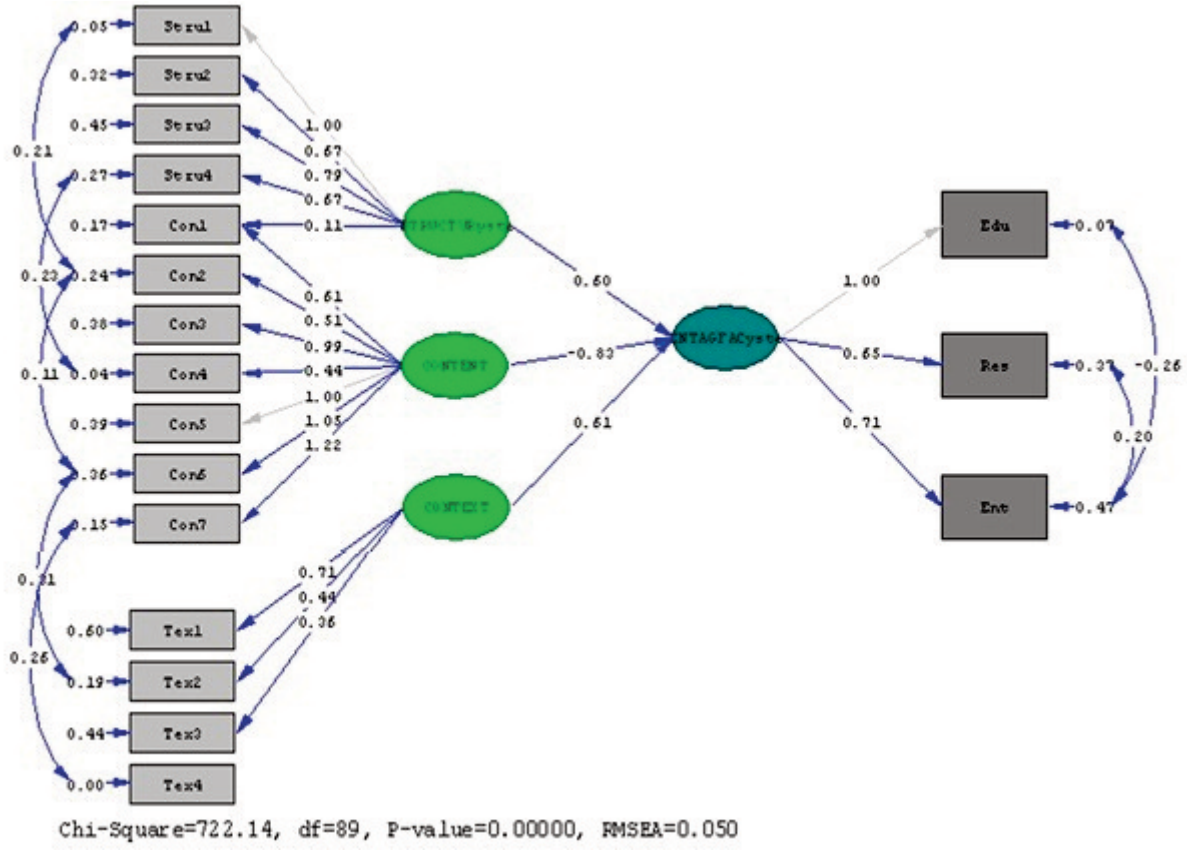

Figure 2. Modified final model

The fit assessment of the model took place in three stages: 1. fit assessment of the model in whole; 2. fit assessment of the measurement sector of the model; and 3. fit assessment of the structure sector of the model. To evaluate the fit of the model as a whole, several fit features were utilized as shown in Table 5. To assess the fit of the measurement sector of the model, the relationship between the latent variables and the observed ones was examined. This aimed at determining the validity or reliability, or confidence and reliability of the measurements (Kalantari, 2009). To check the validity or reliability of the model, the significance level and the values of the paths between each of the latent variables as well as their related indicators were required to be examined.

To this end, a confirmatory factor analysis (CFA) was employed to test the hypothesis examining the representativeness of structural indicators for the structure or latent variables and the extent of such representativeness. The results of this analysis are presented in the form of a standardized parameter, t-value, standard error, and R^2 in Table 6. In this respect, the results of the confirmatory factor analysis were significant for all the indicators and latent traits except for "role models" (t-value<1.96) indicating the appropriateness of the measurement model used in the present study and the point that the indicators used to measure the latent traits were in an acceptable agreement with the factorial structure and theoretical foundation. The square of the coefficient of multiple correlations (R^2) can be also used to assess the reliability of the study indicators showing the contribution of each indicator explained by the related latent variable.

In order to evaluate the model structure, the internal and external relationships between latent variables were examined. At this stage, it was to identify or reject the theoretical relationships between variables at the conceptual model formulation stage (Kalantari, 2009). The correlation matrix of endogenous and exogenous structures is presented in Table 7. The values revealed a significant correlation between the studied latent variables.

Table 5
Fit indices of the Final Model

Index	Acceptable value	Reported value
Chi-Square	-	772.14 (df=89)
Root Mean Square Residual (RMR)	Less than .08	0.051
Goodness Of Fit Index (GFI)	Greater than .9	0.96
Adjusted Goodness Of Fit Index (AGFI)	Greater than .9	0.91
Normed Fit Index (NFI)	Greater than .9	0.93
Non-Normed Fit Index) NNFI(	Greater than .9	0.93
Incremental Fit Index (IFI)	Greater than .9	0.95
Comparative Fit Index (CFI)	Greater than .9	0.96
Relative Fit Index (RFI)	Greater than .9	0.91
Root Mean Square Error of Approximation (RMSEA)	Less than .08	0.050

Table 6
Standardized Values and Significance Level of Research Indices

Component	Index	Standardized parameter	t-value	Standard error	R^2
Entrepreneurial Faculty of Agriculture	Education	0.95	---	---	0.93
	Research	0.63	22.92	0.028	0.54
	Entrepreneurship	0.62	24.83	0.029	0.61
Structural factors	Organizational structure	0.95	---	---	0.90
	Organizational communication system	0.64	22.24	0.030	0.71
	Pay system	0.64	22.81	0.035	0.71
	Educational affairs	0.67	22.40	0.030	0.44
Content factors	Personal characteristics	0.51	16.64	0.024	0.34
	Academics' attitudes towards entrepreneurship	0.65	8.34	0.036	0.46
	Common vision and future-looking strategy	0.63	17.18	0.057	0.39
	Supportive management towards entrepreneurship	0.96	21.08	0.068	0.93
	Entrepreneurial culture	0.63	---	---	0.40
	Leadership thinking approach	0.66	18.66	0.056	0.43
	Group and collaborative activities	0.85	20.60	0.059	0.72
	Role models	0.06	0.34	0.033	0.063
Contextual factors	Relationships with industry and agriculture	0.93	---	---	0.88
	Political environment	0.59	19.36	0.036	0.55
	Economic environment	0.61	22.62	0.020	0.56
	Socio-cultural environment	0.39	11.77	0.030	0.62

Table 7
Correlation Matrix for the Latent Internal and External Variables of the Research

Component	Entrepreneurial Faculty of Agriculture	Structural factors	Content factors	Contextual factors
Entrepreneurial Faculty of Agriculture	1			
Structural factors	0.966	1		
Content factors	0.784	0.658	1	
Contextual factors	0.722	0.984	0.683	1

Table 8 presents the coefficients for the effects of structures on each other along with their significant values. The results suggested that the hypothetical relationships assumed between latent variables in the model were confirmed. T-values presented in Table 8 were above 1.96, suggesting that the estimated parameters were significant.

Table 8
Coefficient of Impact for Structures on Each Other and Their Level of Significance

Path	Path coefficient	t-value	P-value
Structural factors ⟶ Entrepreneurial Faculty of Agriculture	0.60	15.15	0.001
Content factors ⟶ Entrepreneurial Faculty of Agriculture	0.83	11.68	0.001
Contextual factors ⟶ Entrepreneurial Faculty of Agriculture	0.61	16.61	0.001

CONCLUSION AND RECOMMENDATIONS

According to the findings, it is possible to investigate the research hypotheses and develop an appropriate model for an entrepreneurial Faculty of Agriculture in Iran.

Main hypothesis 1: Given the error level of 0.01, it can be claimed that there is a significant and positive relationship between structural factors and an entrepreneurial faculty of agriculture. The path coefficient (0.06) as well as the t-value buttressed this claim.

Secondary hypotheses: There is a significant and positive relationship between type of organizational structure (significant path coefficient (0.95) and t-value), the fluidity of organizational communication system (significant path coefficient (0.64) and t-value) consistent with the findings of Yadollahi Farsi (2005), and Fallah Haghighi and Bijani (2016), payment system (significant path coefficient (0.64) and t-value) in line with the results obtained by Yadollahi Farsi (2005), and Fallah Haghighi et al. (2017), educational affairs (significant path coefficient (0.67) and t-value) in agreement with Rasheed (2000), Yadollahi Farsi (2005), Audretsch and Phillips (2007), Fallah Haghighi et al. (2017), and Karimi and Ahmadpour Daryani (2017) and entrepreneurship in faculties of agriculture.

Main hypothesis 2: Considering the error level of 0.01, it can be stated that there is a significant and positive relationship between content factors and an entrepreneurial faculty of agriculture. The path coefficient (0.83) and t-value supported this claim.

Secondary hypotheses: There is a significant and positive relationship between academics' entrepreneurial characteristics (significant path coefficient (0.51) and t-value) in line with the results of Fallah Haghighi and Bijani (2016), academics' attitudes toward entrepreneurship (significant path coefficient (0.65) and t-value) consistent with Young and Sexton (1997), and Fallah Haghighi and Bijani (2016),

common vision and prospective strategy (significant path coefficient (0.63) and t-value) in agreement with Gibb (2009), and Ropke (2006), management support (significant path coefficient (0.96) and t-value) in line with Yadollahi Farsi (2005), and Audretsch and Phillips (2007), entrepreneurial culture (significant path coefficient (0.63) and t-value) in agreement with Shah Hosseini (2004), and Audretsch and Phillips (2007), leadership attitude towards entrepreneurship in faculties (significant path coefficient (0.66) and t-value) consistent with Robertson (2008), group and collaborative activities (significant path coefficient (0.85) and t-value) in line with Robertson (2008) and entrepreneurship in faculties of agriculture in Iran. However, no significant relationship was observed between role models within entrepreneurship in faculties of agriculture in Iran.

Main hypothesis 3: With an error level of 0.01, there is a significant and positive relationship between contextual factors and an entrepreneurial faculty of agriculture. The obtained path coefficient (0.61) and t-value proved this claim.

Secondary hypotheses: There is a significant and positive relationship between industry and agriculture (significant path coefficient (0.93) and t-value) in line with Muske and Stanforth (2000), Păunescu (2007), Robertson (2008), Markkula and Lappalainen (2009), Todorovic et al. (2011), and Fallah Haghighi et al. (2017), political environment (significant path coefficient (0.59) and t-value) in agreement with Arnaut (2010), economic environment (significant path coefficient (0.61) and t-value) consistent with Arnaut (2010) and Van Looy et al. (2011), socio-cultural environment (significant path coefficient (0.39) and t-value) in line with Shah Hosseini (2004), Audretsch and Phillips (2007), and Arnaut (2010) and entrepreneurship in faculties of agriculture.

According to what was mentioned, the final approved version of the study model is depicted in Figure 3. Since the model was developed assuming all the categories of academic entrepreneurship and with respect to the components of an entrepreneurial faculty of agriculture based on regional data, it can be used for planning by policy-makers and authorities. Furthermore, given the fact that the data were collected from different faculties of agriculture across Iran with different conditions and non-similar geographical distribution and also according to the comments of faculty members and university students as the most important constituents of human resources, the model was a reliable and comprehensive one which could be generalized with great implementation.

According to the proposed model (Figure 3) and the results of three hypotheses of the study, the following suggestions can be drawn for the establishment of an entrepreneurial faculty in the field of higher agricultural education.

- Efforts to facilitate the establishment of organizational communication in the educational and research system of agricultural faculties;
- Support and encouragement of innovative activities among students and faculty members, especially with changes in the educational system and salary system;
- Creating a positive attitude and culture of entrepreneurship (as an appropriate entrepreneurial ecosystem) in the faculties of agriculture;
- Considering entrepreneurship as a priority in strategic planning of agricultural faculties;
- Emphasis of the agricultural education system on the entrepreneurship in faculties of agriculture and the establishment of a supportive and encouraging system in the Ministry of Science, Research and Technology (MSRT) for successful faculties in this regard;
- Efforts to create appropriate mechanisms to encourage and support teamwork and entrepreneurial co-operations in agricultural education and research affairs;
- Establishing an effective and mutually beneficial relationship with the community, industry and agriculture through faculties of agriculture, and

- Effective communication between faculties of agriculture and the use of each other's potential in strengthening entrepreneurial spirit in the agricultural education system.

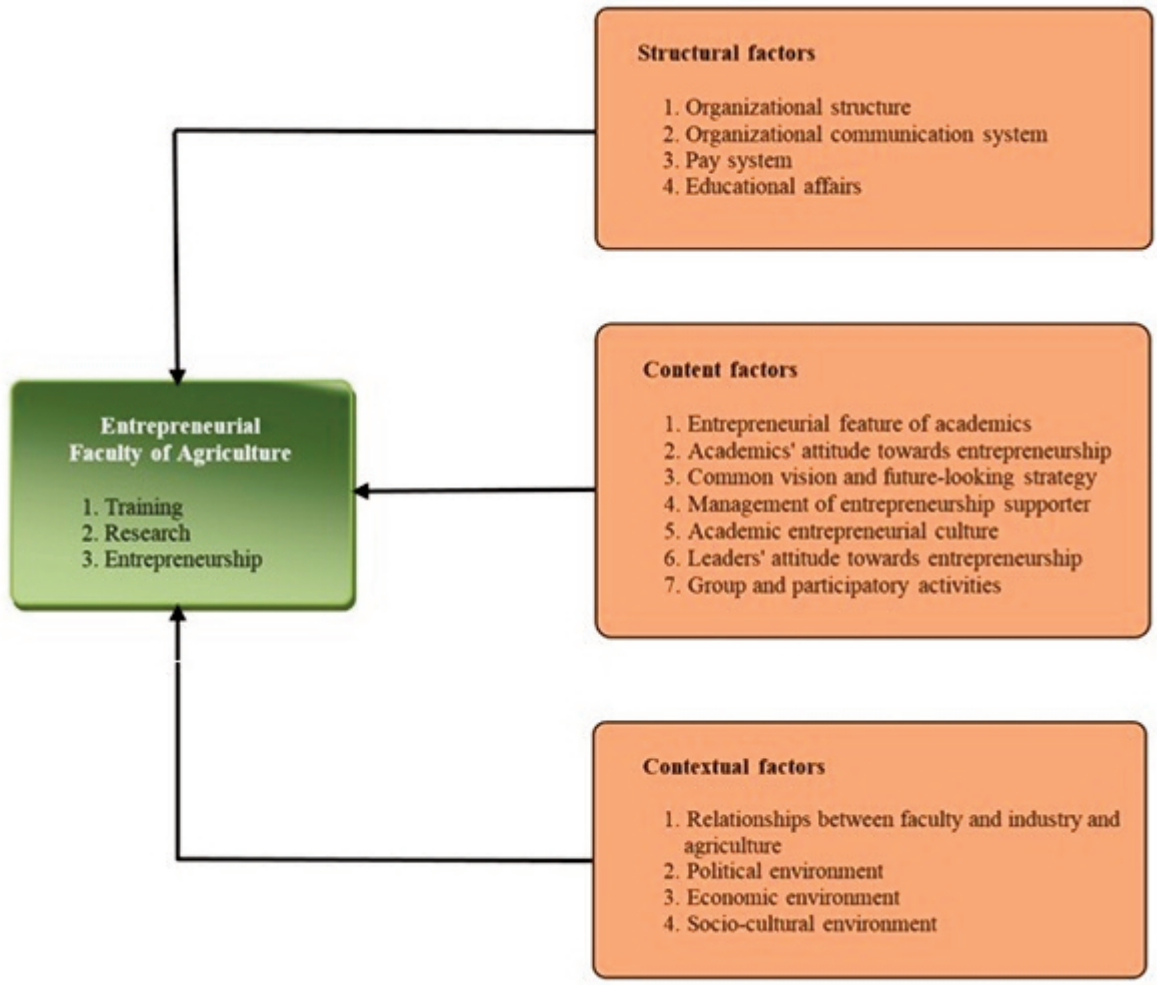

Figure 3. Research final model

ACKNOWLEDGEMENTS

The authors hereby express their special gratitude to all the respondents who completed the questionnaires with great patience as well as the surveyors and interviewers who did their best in the collection of required data.

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How to cite this article:
Fallah Haghighi, N., Bijani, M., Rezvanfar, A. & Valizadeh, N. (2018). Developing an Appropriate Model for Entrepreneurial Faculty of Agriculture in Iran. *International Journal of Agricultural Management and Development, 8*(4), 501-518.
URL: http://ijamad.iaurasht.ac.ir/article_543724_862c132b8f3272953ff118b0a0c34f29.pdf