Factors Affecting on Research Practices Development regarding Entrepreneurship in Agricultural Higher Education: A Two-Step Approach to Structural Equation Modeling

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Abstract

The purpose of this research was to identify the factors affecting research practices development (RPD) regarding entrepreneurship in agricultural higher education, case study Islamic Azad University, Khouzestan Province, Iran. Faculty members in Islamic Azad University, Khouzestan Province were considered as statistical population. The sample size based on Cochran formula was determined (n=210). Stratified random sampling was used to select faculty members. A researcher-made questionnaire was employed for data collection. Its validity was confirmed by content validity and its total reliability was estimated by Cronbach's alpha as to be 0.81. Data were analyzed using descriptive statistics to describe RPD performance regarding entrepreneurship in agricultural higher education and inferential statistics to analyzing factors affecting on RDP. The results of the factor analysis showed that four factors such as encouraging researchers to research in entrepreneurship (MF1), institutionalization of entrepreneurship in academic research (MF2), establishing proper communication between the university and industry (SF) and creating the necessary rules and infrastructure for the commercialization of knowledge regarding entrepreneurship (LF) were identified as factors affecting the research practices development (RPD) regarding entrepreneurship in agricultural higher education which explained 62.55% of the total variance altogether. The result of the structural equation modeling (SEM) revealed that, it can be seen that the predictive positive effect of MF1 to RDP is supported (β=0.38, t-value=4.86, P<0.001). In addition, MF2 has a positive effect on RDP (β=0.39, t-value=5.08, P<0.001). Also the LF has a positive effect on RDP (β=0.31, t-value=4.05, P<0.001). MF2, SF and LF also have a significant impact on MF1. The findings showed that R^2 for RDP was 0.53. So that, these four construct (MF1, MF2, SF and LF) determinants accounts for 62% of the variance in the RDP.

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INTRODUCTION

Universities in the developed world in contrast to developing countries have an important role of research (Sanyal & Varghese, 2006). Johnston (2007) quoted from UNESCO (2004) identifies two unique opportunities for HEIs to engage in sustainable development. First, "Universities form a link between knowledge generation and transfer of knowledge to society for their entry into the labour market. Such preparation includes education of teachers, who play the most important role in providing education at both primary and secondary levels. Second, they actively contribute to the societal development through outreach and service to society." Recognizing research as an important part of their responsibilities, faculty members of Higher Education Institutions (HEIs) have consistently evidenced research productivity together with other factors that contribute to the process. On the other hand, universities in the developing world have retained strong teaching functions and weak research functions (Sanyal & Varghese, 2006). Cortese (2003) seconds this notion, stating "Higher education institutions bear a profound, moral responsibility to increase the awareness, knowledge, skills, and values needed to create a just and sustainable future. Higher education often plays a critical but often overlooked role in making this vision a reality. It prepares most of the professionals who develop, lead, manage, teach, work in, and influence society's institutions." Thus, HEIs have a critical and tangible role in developing the principles, qualities and awareness not only needed to perpetuate the sustainable development philosophy, but to improve upon its delivery.

Economics all over the world continue to become more integrated into a global economy, which causes new emergent markets and increases pressure for standardization across nations and within nations such as the USA as being a global player in terms of economy. These pressures also play a major role in higher education being manifested in institutions' curricula and requirements to survive in a highly competitive market. Higher education also has the task to develop an educated workforce, which is essential in this globalizing environment. In this sense, the new economy needs a mass of intellectual capital, which 'pressures toward a high level of education for the general citizenry' (Goke, 2005).

Research is one of the principal missions of the university. From the early 1960s, research was viewed as a tool for teaching and was mainly undertaken by foreign professors. In the 1970s and 1980s, the volume of research from universities grew steadily and was increasingly being undertaken by developing countries. In addition, a steady build-up of research capacity was achieved by most developing countries universities in the 1970s. However, in the 1990s, research at developing countries universities started to decline due to lack of funds, among other reasons. Decline in institutional research reduces the ability of universities to acquire and use new knowledge and play an authoritative leadership role with respect to policy issues in various sectors of development. In the 21st century, developing countries universities must put more emphasis on research and make a deliberate effort to facilitate training, engage in research, and disseminate findings. This will help build the much-needed intellectual capacity in research (Eshiwani, 1999). Deuren (2013) revealed that besides teaching and learning, research is a core function of HE, although probably not all HEI will be engaged in actually conducting research (see the next section for explanation). A well developed system for research and knowledge generation "is of increasing importance within the emerging knowledge economy, allowing a country not only to generate new knowledge, but also to engage in scholarly and scientific commerce with other nations" (World Bank, 2012). Ashcroft and Rayner (2011) agree by arguing that "it is important that some universities are able to generate knowledge to provide society and the econ-

omy with relevant solutions that ensure development, address problems at the grassroots level, and contribute to poverty alleviation". The important role of research for economic development is illustrated by Chinese policies that define the core missions of research universities as teaching, research and commercialization of technology (World Bank, 2012).

Academic research in entrepreneurship plays an effective role in solving entrepreneurial problems. There are many barriers to entrepreneurship development that should be investigated in order to eliminate them (Ommani, 2016). According to Clark (1998), entrepreneurship is a behavior which can be taught to others. It should be emphasized that only developing a particular skill through training is not enough to start a business, but improvement of entrepreneurial intention is likewise of great importance. Shiri et al., (2017) in their research showed that to promote the entrepreneurial intention and behavior and hence to reduce the unemployment among educated groups in Iranian higher agricultural education system the planners of higher agricultural education are recommended to be dealing with values, needs and importance of entrepreneurship in entrepreneurship training and education in the higher agricultural education system. Also in the context of the importance of academic research in the field of entrepreneurship development, Khoshmaram et al., (2017), Mitchell et al. (2002) and Wood et al. (2014) research's can be cited.

Education at the university is the foundation of excellence and the development of human life. One of the problems that exist in Iran's higher education system, especially in the agricultural education sector, is that employment and entrepreneurship are less attended in education. The most important barriers to entrepreneurship in higher education in agriculture include: Inappropriate teaching methods, inappropriate educational content and syllabus, poor educational and laboratory equipment and inappropriate

evaluation system (Darmadji, 2016, Yaghoubi, 2010).

Given that the research gap is the missing element in the existing research, and we have to fill with our research approach. According to the study in the context of previous research, it has become clear that the factors affecting research practices development (RPD) regarding entrepreneurship in agricultural higher education in Khuzestan province, so far, has not been investigated. One of the most common questions is: "how is that university administrators are so focused on entrepreneurship?" at this research paper I'm going to attempt to explain that. Hopefully, that will be enough to entice folks to read this, because it's a bit of a long argument.

Agricultural faculty members can play a vital role to dissolve this problem by research and study about entrepreneurial requirements (Talebi & Zare Yekta, 2008). The role of encouraging the researchers to research in entrepreneurship is one of the basic elements to development of entrepreneurial behavior (Roach, 2017). Encouraging individuals through material and spiritual methods has an effective role at this regards. Institutionalization of entrepreneurship in academic research is another requirement for the development and progress of universities in recent years. The efforts that contribute to the institutionalization of the entrepreneurial university model such as collaboration activities at the faculty level, institutional members' awareness of the goals of the university and the government, the active participation of stakeholders, and the monitoring of the coordination of tasks and progress of entrepreneurial undertakings are assumed to be present in the blueprints of universities that are moving toward an entrepreneurial route (Reyes, 2017). Based of literature of review the theoretical framework presents at Figure 1.
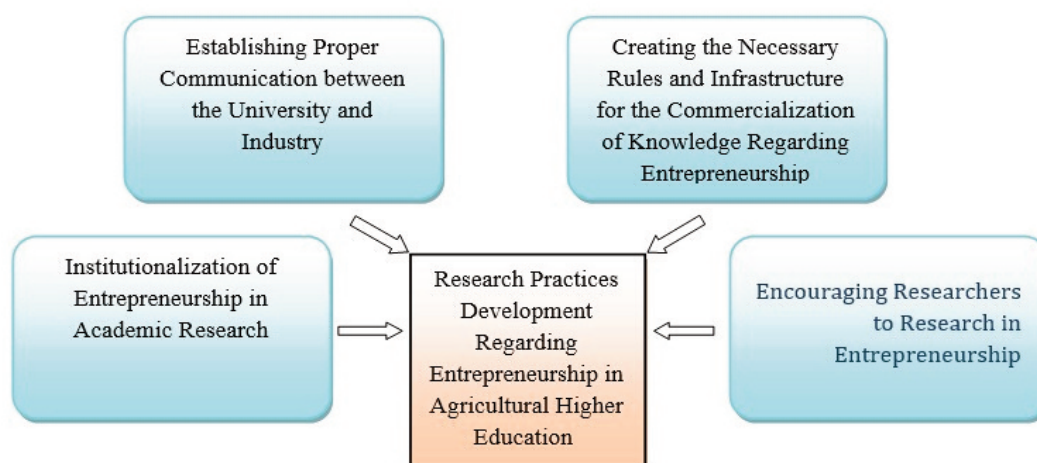
Figure 1. Theoretical Framework of Research

METHODOLOGY

Research method

The purpose of this research was identifying factor affecting on Research Practices Development (RPD) regarding entrepreneurship in agricultural higher education, case study Islamic Azad University, Khouzestan Province, Iran. In relation to objective, this applied research since the results can be employed by programmer and policy makers. In order to reach precise and reliable data was used quantitative method. The research method was descriptive-correlative. Because this research investigates existed conditions and defines them and there is no possibility to control or manipulate the variables, it is descriptive. Also, because it investigates and analyzes the relations between independent and dependent variables, it is correlative.

Statistical population

The research population consisted of faculty members in Islamic Azad university, Khouzestan Province (N=3000), Iran, which was selected using stratified randomizing sampling method and Cochran formula (n=210). Finally, 207 questionnaires were analyzed.

Variables

The independent variables included Motivational Factors (encouraging researchers to research in entrepreneurship: MF1), management factors (Institutionalization of entrepreneurship in academic research: MF2), Structural Factors (establishing proper communication between the university and industry: SF) and legal factors (creating the necessary rules and infrastructures for the commercialization of knowledge in entrepreneurship: LF). The dependent variable was Research Practices Development (RPD) regarding entrepreneurship. All scale of variables was ordinal. Status of RPD was measured by five statements with a range of five point Likert scale. The scoring of the mentioned range was 1=very low, 2=low, 3=moderate, 4=high, 5=very high. All data were analyzed using the Statistical Package for the Social Sciences, Personal Computer Version (SPSS/PC+). Appropriate statistical procedures for description and inference were used. The alpha level was set apriority at 0.05. Frequency, percent, mean and standard deviation used as descriptive statistics and correlation analysis, Confirmatory Factor Analysis (CFA) and path analysis were used as inferential statistics.

Validity and reliability

The data was gathered through questionnaires. Validity of the instrument was established by a panel of experts consisting of

faculty members of Chamran University. Also a pilot test was conducted to determine the reliability of the survey instrument. In this test, the mentioned questionnaires were given to 30 faculty members. After gaining the data concluded the Cronbach alpha coefficient for all the variables with degree scale of 71%.

RESULTS

Factors Affecting on RPD regarding Entrepreneurship in Agricultural Higher Education

To categorize factors affecting on research practices development regarding entrepreneurship in agricultural higher education, and to determine the variance explained by each factor, an exploratory factor analysis approach was followed. Data revealed that internal coherence of the data was appropriate (KMO =0.879), while and the Bartlett's statistic was significant at the 0.01 level (2781.5). The four commonly used decision rules were applied to identify the factors (Hair et al, 2005): 1) minimum eigenvalue of 1; 2) minimum factor loading of 0.5 for each indicator item; 3) simplicity of factor structure; and 4) exclusion of single item factors. According to Kaiser criteria, there were four factors that their extracted eigenvalues were greater than one. Later, the items were categorized into fore factors by using VARIMAX rotation method (Table 1).

Table 1

Percent of Explained Variance by Factors Affecting on Research Practices Development in Higher Education

Factors	Eigenvalues	Percent
Motivational factors (encouraging researchers to research in entrepreneurship)	11.815	40.12
Management factors (institutionalization of entrepreneurship in academic research)	4.651	10.15
Structural factors (establishing proper communication between the university and industry)	2.871	8.12
Legal factors (creating the necessary rules and infrastructures for the commercialization of knowledge in entrepreneurship)	1.012	4.16

Based on the results of factor analysis the factors were categorized into four main components, which have been named 1) motivational factors (Encouraging researchers to research in entrepreneurship), 2) management factors (Institutionalization of entrepreneurship in academic research), 3) structural factors (Establishing proper communication between the university and industry) and 4) legal factors (Creating the necessary rules and infrastructures for the commercialization of knowledge in entrepreneurship). The obtained results from the factor analysis revealed that the four mentioned factors explained 62.55% of the variation of factors affecting on research practices development in higher education. The first group which is labeled motivational factors had the most Eigen value (11.815). Also, this factor explained 40.12% of the total variances of the variables. The second group, labeled management factors, with Eigen value 4.651 explained 10.15% of the total variances of the variables (Table 2).

Structural equation modeling

Structural Equation Modeling (SEM) was used to test for the direct, indirect and mediating effects of the MF_1, MF_2, SF and LF variables in the prediction of RPD. According to Hair et al. (2010), it is appropriate to adopt a two-step approach for SEM: first, assessment

of the measurement model; second, assessment of the structural model. The results of confirmatory factor analysis showed (Table 3) the initial measurement model to provide an acceptable fit for the data (X^2=489.19; X^2/df =1.82; GFI=0.86; TLI=0.94; CFI =0.93; IFI=0.95; RMSEA=0.077). Therefore, the measurement model provided a reasonable fit (Table 4). Thus, the hypothesized model with five factors was judged suitable for the SEM.

Table 2

Factors Affecting on Research Practices Development in Higher Education by Factor Loading

Factors	Items	Factor loading
Motivational Factors (encouraging researchers to research in entrepreneurship): MF_1	Motivate researchers about entrepreneurship	0.576
	Ethics in research in entrepreneurship	0.756
	Supporting new ideas about entrepreneurship	0.565
	Lack of parochialism toward researcher	0.634
	Adequate financial support	0.639
	The establishment of the research center	0.676
Management factors (iInstitutionalization of entrepreneurship in academic research): MF_2	Identifying research priorities in entrepreneurship	0.812
	Strategic programs in entrepreneurship	0.865
	Holding research workshops in entrepreneurship	0.564
	Increase interaction between researchers	0.547
	Workshop on rules and regulations	0.653
	Qualified people at the head of research	0.659
Structural factors (establishing proper communication between the university and industry): SF	Identify industry needs for business and employment	0.789
	Establishing joint meetings between industry and university in the field of entrepreneurship	0.799
	Create a incubators about entrepreneurship	0.876
	Assignment of industrial sector research to university	0.767
	Creating digital libraries at the university	0.876
	The establishment of scientific journals about entrepreneurship	0.665
	Create scientific associations about entrepreneurship	0.767
Legal factors (creating the necessary rules and infrastructures for the commercialization of knowledge in entrepreneurship): LF	Elimination of cumbersome rules	0.667
	Remove inappropriate directive	0.789
	Policymaking in entrepreneurship Research	0.777
	Commercialization of entrepreneurship Research	0.559

Table 3

Summary of Goodness of Fit Indices for the Measurement Model

Fit indices	X^2	P	X^2/df	GFI	CFI	TLI	IFI	RMSEA
Value in study	489.19	0.000	1.82	0.86	0.93	0.94	0.95	0.077
Suggest value	-	>0.05	<3	>0.80	>0.90	>0.90	>0.90	<0.08

Convergent validity

A first condition for convergent validity is that the standardized factor loadings should all be significant (t-value>1.96) with a value of more than 0.50 (Hair et al, 2010). The results in Table 4 show the t-value for the factor loadings to all exceed 7.15 (*P*<0.01) and the standardized factor loading to all have values greater than 0.547. This shows good convergent validity for the constructs (MF_1, MF_2, SF, LF and RPD) of this study.

Construct Reliability (CR): For the composite or construct reliability to be adequate, a value of CR= 0.70 or higher is recommended (Nunnally & Bernstein, 1994). As shown in Table 4, all of the constructs had construct reliabilities which were greater than the recommended 0.70. The results also show the AVE estimate for all of the constructs to be above or close to the recommended threshold of 0.50 (Fornell & Larcker, 1981). This shows good composite or construct reliability for the constructs of this study.

Discriminant validity: According to Fornell and Larcker (1981), if the square root of the AVE estimate for each construct is greater than the correlation between that and all of the other constructs in the model, then discriminant validity is demonstrated. As shown in Table 5, the square root of each AVE is greater than its correlations with the other constructs. This means that the indicators have more in common with the construct that they are associated with the other constructs. Thus, discriminant validity has been demonstrated for the constructs (RPD, MF_1, MF_2, SF, LF) in the measurement model.

Table 4

Results of Confirmatory Factor Analysis For the Measurement Model

Constructs	Indictors	Standardized factor loading	t- value	CR	AVE
MF_1	MF_{11}	0.576	8.34**	0.89	0.561
	MF_{12}	0.756	13.48**		
	MF_{13}	0.565	8.12**		
	MF_{14}	0.634	10.39**		
	MF_{15}	0.639	10.45**		
	MF_{16}	0.676	11.32**		
MF_2	MF_{21}	0.812	14.23**	0.92	0.589
	MF_{22}	0.865	15.12**		
	MF_{23}	0.564	9.42**		
	MF_{24}	0.547	8.16**		
	MF_{25}	0.653	11.71**		
	MF_{216}	0.659	11.89**		
SF	SF_1	0.789	12.24**	0.86	0.612
	SF_2	0.799	12.76**		
	SF_3	0.876	15.59**		
	SF_4	0.767	14.13**		
	SF_5	0.876	16.71**		
	SF_6	0.665	12.38**		
	SF_7	0.767	14.85**		
LF	LF_1	0.667	12.37**	0.91	0.592
	LF_2	0.789	13.12**		
	LF_3	0.777	12.98**		
	LF_4	0.559	7.15**		

**P<0.01

Table 5
Means, SD and Correlations with Square Roots of the AVE

	Mean	**SD**	**1**	**2**	**3**	**4**	**5**
1-RPD	4.35	1.21	0.85[a]				
2-MF_1	4.28	1.18	0.66	0.91[a]			
3-MF_2	4.12	1.34	0.61	0.72	0.83[a]		
4-SF	4.38	1.39	0.59	0.69	0.59	0.75[a]	
5-LF	3.99	1.42	0.62	0.59	0.61	0.70	0.88[a]

[**]$P<0.01$
[a] The square roots of AVE estimates

Assessment of the structural model

Once a satisfactory measurement model was obtained, the second step, involving SEM, was to test the structural model. The structural model includes the hypothesized relationships among constructs (RPD, MF_1, MF_2, SF, LF) in the research model. The overall goodness of fit statistics showed that the structural model fits the data well (Table 4). Having assessed the fit indices for the measurement model and the structural model, the estimated coefficients of the causal relationships among constructs were examined (Figure 2).

From Table 6 and Figure 1, it can be seen that the predictive positive effect of MF1 to RDP is supported (β=0.38, t-value=4.86, $P<0.001$). In addition, that is the MF2 has a positive effect on RDP (β=0.39, t-value=5.08, p<0.001). Also the LF has a positive effect on RDP (β=0.31, t-value=4.05, $P<0.001$). MF2, SF

and LF also have a significant impact on MF1. The findings showed that R^2 for RDP was 0.53. So that, these four construct (MF1, MF2, SF and LF) determinants accounts for 62% of the variance in the RDP. This results has been emphasized in other studies, including the studies by Carr and Carr and Seqeira (2007), Fayolle et al. (2006), Sadeghi & Malekinia, (2011), Ommani (2016). Based on the results, encouraging researchers to research in entrepreneurship, institutionalization of entrepreneurship in academic research, establishing proper communication between the university and industry and creating the necessary rules and infrastructure for the commercialization of knowledge regarding entrepreneurship have an effective role on research practices development (RPD) regarding entrepreneurship in agricultural higher education.
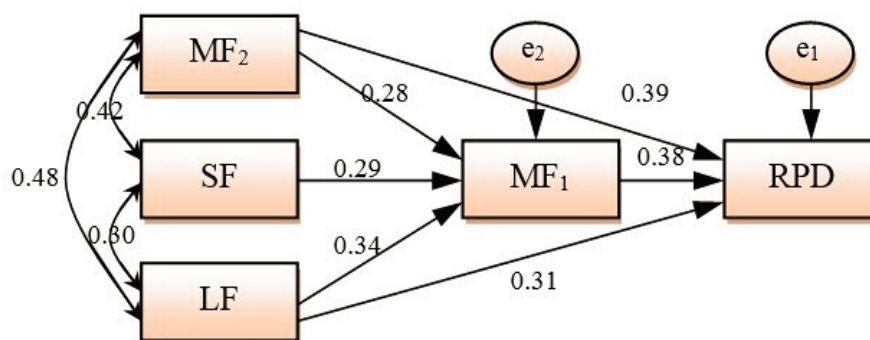

Figure 2. Path Model with Standardized Factor Loadings

Table 6
The Effects of MF1, MF2, SF and LF on RDP

Determinant	Outcome	Path coefficient	t-value	R²
MF1	RDP	0.38	4.32**	0.62
MF2	RDP	0.39	4.46**	
MF2	MF1	0.28	3.21**	
SF	MF1	0.29	3.16**	
LF	RDP	0.31	3.56**	
LF	MF1	0.34	3.87**	

** $P<0.01$

DISCUSSION

This research was conducted to investigate the factor affecting on research practices development regarding entrepreneurship in agricultural higher education, case study Islamic Azad University, Khouzestan Province, Iran. The findings of the study of relationships between research variables reveal important points in order to achieve the research objectives. According to the first hypothesis, motivational factors (encouraging researchers to research on entrepreneurship: MF1) had a positive and significant relationship with the research practices development regarding entrepreneurship at 1% level. This relationship has been emphasized in other studies, including the studies by Sadeghi & Malekinia (2011), Carr and Seqeira (2007), and Fayolle et al. (2006). Entrepreneurial intention and motivational factors are the first step and an important part of entrepreneurial process (Sadeghi & Malekinia, 2011). A positive and significant relationship was also found between Management Factors (institutionalization of entrepreneurship in academic research: MF2) and research practices development regarding entrepreneurship that is consistent with the results of Ommani (2016). The results of this study also showed a positive and significant relationship between Structural Factors (Establishing proper communication between the university and industry: SF) and research practices development regarding entrepreneurship.

Graduate students show greater interest in entrepreneurship in countries with favorable researches and infrastructure in entrepreneurship. However, in the countries without a supportive environment for entrepreneurship, students try to find a secure job in the government (Masoomi et al., 2016). Also, A positive and significant relationship was found between Legal Factors (Creating the necessary rules and infrastructures for the commercialization of knowledge in entrepreneurship: LF) and research practices development regarding entrepreneurship that is consistent with the results of Ommani (2016). Based on the results of factor analysis the factors were categorized into four main components, which have been the factor analysis revealed that the four mentioned factors explained 62.55% of the variation of factors affecting on research practices development in higher education. The first group which is labeled MF1 had the most Eigen value (11.815). Also, this factor explained 40.12% of the total variances of the variables. The second group, labeled MF2, with Eigen value 4.651 explained 10.15% of the total variances of the variables.

CONCLUSION

The findings revealed that the encouraging researchers to research on entrepreneurship had a positive and significant relationship with the research practices development regarding entrepreneurship at 1% level. There-

fore, it is imperative that provide encouraging conditions for researchers. The necessary financial facilities and amenities are to be provided and researcher must be respected. Based on the results the management factors affected on research practices development regarding entrepreneurship. The institutionalization of entrepreneurship is undeniably a good thing for the members of the research institute, as it implies the legitimization of particular research topics and research practices; the emergence of norms for developing and publishing this research; and the creation of structures that provide employment opportunities and a conducive environment for pursuing research (Fayolle et al., 2018). Also concluded the establishing proper communication between the university and industry was affected on research practices development regarding entrepreneurship. An effective communications framework can help bridge the gap be-tween outcome and impact. It is important to have two-way knowledge transfer between the university researchers and the industry's project manager, as well as between the project manager and others in the industry. In addition, the project manager should keep groups inside the company abreast of progress on the research collaboration, and inform the university team of ideas from the company regarding potential linkages to other company activities (Pertuzé et al., 2010). In addition a positive and significant relationship was found between creating the necessary rules and infrastructures for the commercialization of knowledge about entrepreneurship and research practices development regarding entrepreneurship. Nadirkhanlou et al (2012) believed that the adopting incentive policies in royalty sharing for faculties is most important from the perspective of academic entrepreneurship and knowledge commercialization experts, and financial support, creating the necessary structures and faculty freedom are placed in the next priorities, respectively.

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