

An investigation of the effect of IT capabilities on corporate entrepreneurship with emphasis on competitive intensity

*Ali Akbar Taheri**

Master of Management, Strategic Orientation, Islamic Azad University, Dehaghan Branch, Iran.

**Corresponding Author*

Amir Hertamani

Assistant Professor and Faculty Member, Department of Economics, Islamic Azad University of Dehaghan, Iran.

ABSTRACT

The present study is an attempt to investigate the effect of IT capabilities on company entrepreneurship with emphasis on competitive intensity. The study followed a descriptive research method and a correlational research design with structural equations. The statistical population of the present study consisted of the employees of Arman Credit Institution, of which 304 employees participated in the study. They filled the questionnaires of IT capabilities (IT infrastructure, IT integration, IT business alignment, IT management), company entrepreneurship, competitive intensity and innovation performance. The reliability and validity of the instruments were assessed using Cronbach's alpha coefficient, combined reliability and confirmatory analysis, diagnostic validity and divergent validity. The results demonstrated acceptable reliability and validity for the instruments. The correlation and structural equation method with SMARTPLS software were used to analyze the data. The results showed that IT capabilities have a positive and significant effect on company entrepreneurship and company entrepreneurship has a positive and significant effect on innovation performance. Competitive intensity plays a positive moderating role in the relationship between IT capabilities and entrepreneurship in the company.

Keywords: IT Capabilities, Corporate Entrepreneurship, Competitive Intensity

Introduction

Everything is subject to change in today's competitive business environment and the phenomenon of change is the only thing that remains constant. The most important factors in raising the importance of innovation in organizations are rapid changes in technology from various industries that lead to shorter product lifespan, services, and stiff competition. With the creation and development of new capabilities that allow them to perform better, innovative organizations will be more successful in responding to changing environments. Presently, it is no wonder that innovation is mentioned as the most important factor in the sustainable competition of the organization. Hence, many scholars consider innovation as the foundation of today's competitive economy. Many innovation experts acknowledge that only organizations that put

innovation at the core of their operations can achieve long-term success by creating a competitive advantage.

At the present time, innovation helps organizations to overcome the turmoil and uncertainty of the external environment. In today's business, one of the key factors in organizations' long-term success is innovation (especially in dynamic and competitive markets). To survive in the current business environments that are volatile and uncertain, organizations must be able to adapt to growing complexities and rapid and increasing change. In such atmospheres, compared to non-innovative organizations, those with high innovation capacity will be able to respond more quickly to environmental challenges and make better use of new products and market opportunities (Jimenez-Jimenez & Sanzwale, 2010). Innovation is an important and vital issue for individuals, institutions and generally for all societies on account of its intertwined relationship with flexibility and productivity (Drucker, 2014). Kerr and Gagliardi (2003) believe that innovation and creativity are the most important factors in human growth and development in every field, then they also constitute a major factor in the survival of organizations in the current competitive environment (Wang, 2007). Therefore, given its vitality for the organization, it is important to identify the factors affecting innovation. The question is what factors boost the corporate innovation in an organization.

The intensity of competition is one of the variables that have been emphasized in this field. Market conditions shape the essence of competitive intensity and affect the dynamics of the industry. Intensity of competition refers to a case where competition is highly intense due to the large number of competitors in the market and the lack of growth opportunities (Auh & Menguc, 2005). In the absence or lack of competition, the organization may perform well as customers may have to consume the company's products. However, customers have several options with intense competition. Consequently, the intensity of competition has a major impact on the performance of the firms and an organization that is unable to consider its competitors analytically would lose the field to them. The results of the study conducted by Chen et al. (2015) showed that competitive intensity has a moderating role in the relationship between IT capabilities and corporate entrepreneurship.

Research literature shows that IT capabilities have a significant effect on innovation performance (Bharadwaj, 2000; Chen et al., 2015). IT capabilities refer to the company's ability to equip and expand technology-based resources in combination or collaboration with other resources and capabilities (Bharadwaj, 2000). Potentially, they help the company to achieve better results than competitors by reducing costs, increasing profits and other performance resources (Jack et al., 2011). Due to the fact that the structure of IT capability refers to a wide range of IT instruments and relevant services, it is more accurate and useful to conceptualize IT capabilities as a second-order construct (Chen et al., 2015; Bharadwaj, 2000). In this study, we consider IT capabilities as a second-level structure with four dimensions of IT infrastructure flexibility, the integration of information and communication technology, IT business alignment and IT management (Wang et al., 2013). The flexibility of IT infrastructure refers to the degree to which a company's infrastructure is measurable, proportionate, and compatible with corporate systems with multiple business applications (Byrd and Turner, 2001). IT integration refers to the degree to which an IT company is connected to business partners and helps partners to exchange information and communications and build collaborative relationships (Rai & Patnayakuni et al., 2006). Management capabilities refer to the company's ability to effectively implement IT-related activities such as IT project management, system transformation, and IT evaluation and control (Zhang and Sarker, 2008). IT alignment points to the degree to which IT and business operations have compatible relationships. Based on what was mentioned earlier in this research, an attempt was made to answer the questions about the effects of IT capabilities on the company's entrepreneurship by focusing on competitive intensity.

Research Method

The present research has adopted a descriptive survey method. The statistical population of the present study was comprised of the employees of Arman Credit Institution. The total statistical population of the study consists of 1712 participants. According to Cochran's formula, 313 employees working for Arman Credit Institution were selected as sample members through random sampling method. To ensure the return of the questionnaires, 330 questionnaires were distributed of which 315 questionnaires were returned, 11

questionnaires were removed from the analysis for being incomplete and 304 questionnaires were ultimately included in the analysis.

Data collection

Both data collection methods, namely library methods and field methods were employed in this research.

Research instruments

IT Capabilities: A questionnaire was used to measure IT capabilities. The questionnaire is comprised of four dimensions of technology infrastructure (Four items: Bahat et al., 2010), the integration of information and communication technology (Three items: Ray and Tong, 2010), IT business alignment (Six items: Kearns and Leader, 2003) and IT management (Six items: Bharadwaj et al., 1999). Items were measured based on a five-point Likert scale ranging between strongly disagree (1) and strongly agree (5).

Corporate entrepreneurship: The questionnaire developed by Hughes et al. (2009) was used to measure corporate entrepreneurship. This questionnaire consists of 13 items. The questionnaire incorporates three dimensions of new product development (5 items), business audacity (4 items) and self-renewal (4 items). Items were measured on a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5).

Competitive intensity: the questionnaire developed by Jaworski and Kohli (1993) was employed to measure the intensity of competition. This questionnaire consists of three items which were measured on a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5).

Questionnaire reliability

Cronbach's alpha was used to measure the reliability in this study. In addition to Cronbach's alpha coefficient, the hybrid reliability index is used to evaluate the reliability, in which values larger than 0.7 indicate appropriate reliability for each structure.

Table 1: Cronbach's alpha coefficients of research variables

Cronbach's alpha	Variable
0.84	Technology infrastructure flexibility
0.88	Technology integrity
0.86	Business alignment of technology
0.88	Information Technology Management
0.92	Entrepreneurship of the company
0.86	Competitive intensity

Questionnaire validity

Face validity, content validity and construct validity were considered in assessing the validity of instruments.

Data analysis methods

Descriptive and inferential tests were used to analyze the data in this study. The Mean, Standard Deviation and percentage were considered in the descriptive part. Furthermore, the Pearson correlation tests and the partial least squares structural equation modeling (PLS-SEM) were used in the inferential part. Moreover, SPSS and SMARTPLS software were used to analyze the research data.

Results

Investigating the demographic characteristics of the statistical sample

Table 2: Respondents' Frequency by gender

Frequency Percentage	Frequency	Gender Variable
68.09%	207	Male
31.91%	97	Female

Table

Frequency Percentage	Frequency	Education
4.60%	14	Associate's degree
61.18%	186	Bachelor's degree
32.25%	98	MA
1.97%	6	PhD

Research findings suggested that 31.91% of respondents were female and approximately 68.09% of respondents were male. These findings show that 4.60% of respondents had an Associate's degree, 61.18% had a BA, while 32.25% had an MA and 1.97% had a PhD (Table 2).

Investigating the reliability of measuring instruments

The results of confirmatory factor analysis of IT capabilities

Figures A, B, and Table 3 show the results of confirmatory factor analysis for IT capabilities. As observed below, all questions have significant effects on the dimensions of IT capabilities.

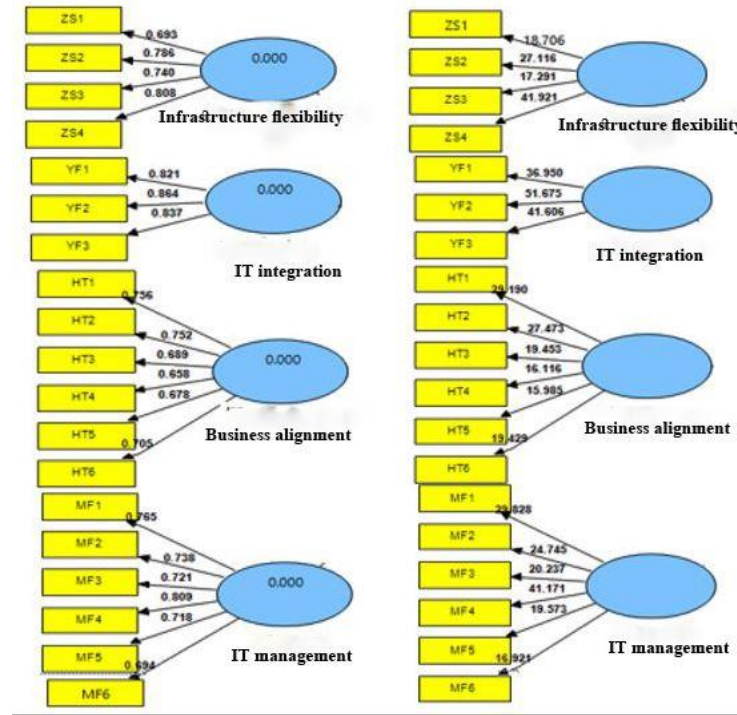


Figure 1: A) Results of confirmatory factor analysis for IT capability, B) *t*-statistic of confirmatory factor analysis for IT capability

Table 3: Combined reliability and mean variance extracted for IT capability

α	AVE	cp	Variable / index
0.84	0.57	0.84	IT infrastructure flexibility
0.88	0.71	0.88	IT Integration
0.86	0.50	0.86	IT Business Alignment
0.88	0.55	0.88	IT Management

The results of confirmatory factor analysis for company entrepreneurship

In Figures 2 (A and B) and Table 4, the results of the confirmatory factor analysis of the company's entrepreneurship are presented. As observed, all the questions have significant loads on the dimensions of the entrepreneurial structure of the company. In addition to new product development, self-renewal and business audacity have significant loads on the company's entrepreneurship. It should be mentioned that such models are called second-order models.

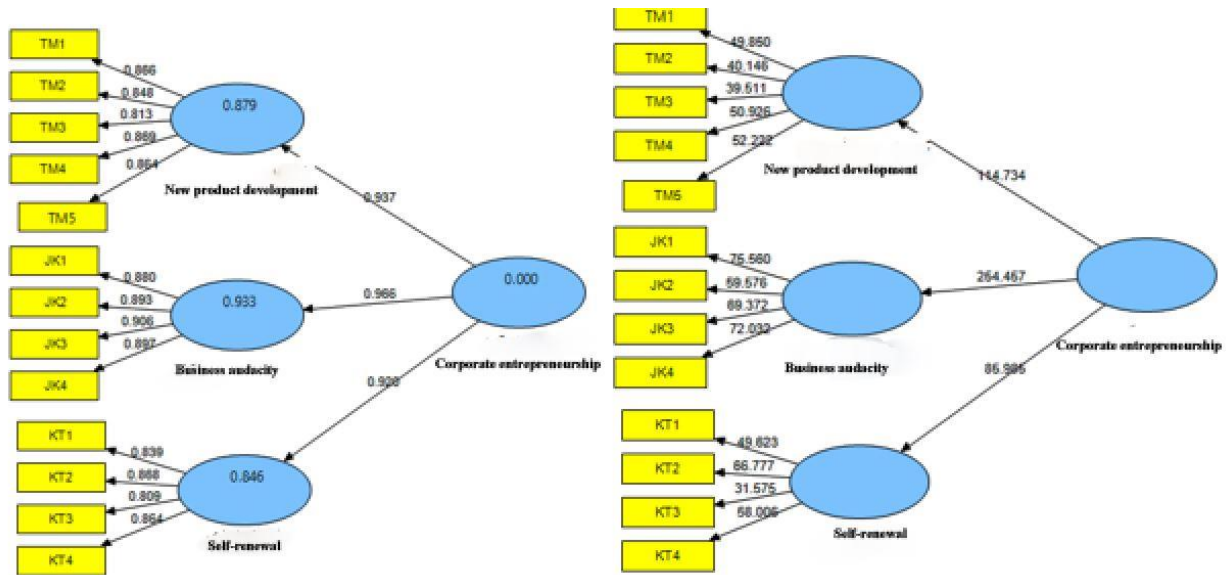


Figure 2: A) Results of confirmatory factor analysis for corporate entrepreneurship, B) *t*-statistic of confirmatory factor analysis for corporate entrepreneurship

Table 4: Factor loads, combined reliability and mean variance extracted for the entrepreneurial dimensions of the company

α	AVE	cp	Variable / Index
0.90	0.73	0.93	New product development
0.92	0.80	0.94	Business audacity
0.87	0.71	0.91	Self-renewal

The results of confirmatory factor analysis for competitive intensity

In Figures 3 (A and B, 10) and Table 5, the results of confirmatory factor analysis of competitive intensity can be seen. As observed, all questions have significant loads on the structure of competitive intensity.

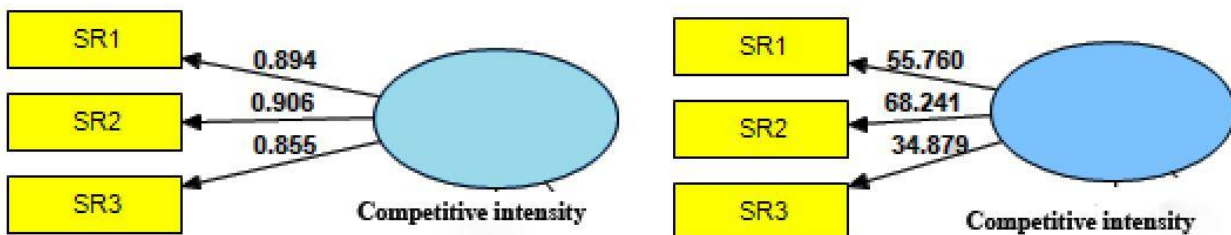


Figure 3: A) Results of confirmatory factor analysis for competitive intensity, B) *t*-statistic of confirmatory factor analysis for competitive intensity

Table 5: Combined reliability and mean variance extracted for competitive intensity

α	AVE	cp	Variable / Index
0.86	0.78	0.91	Competitive Intensity

Investigating the validity of measuring instruments

In Table 6, the cross-sectional load of items on research structures are reported.

Table 4-9: Cross-sectional factor loadings to evaluate the validity of instruments in the research model

AVE	Competitive Intensity	Corporate Entrepreneurship	Management	Alignment	Integration	Infrastructure	Question / Variable
0.57	0.15	0.27	0.48	0.45	0.50	0.69	ZS1
	0.30	0.27	0.49	0.45	0.49	0.79	ZS2
	0.20	0.23	0.37	0.41	0.50	0.74	ZS3
	0.37	0.30	0.53	0.59	0.58	0.81	ZS4
0.71	0.40	0.38	0.47	0.50	0.82	0.57	YF1
	0.44	0.49	0.63	0.55	0.86	0.50	YF2
	0.29	0.40	0.58	0.56	0.84	0.55	YF3
0.50	0.33	0.40	0.48	0.76	0.54	0.53	HT1
	0.26	0.32	0.49	0.75	0.49	0.50	HT2
	0.39	0.35	0.60	0.69	0.49	0.48	HT3
	0.22	0.34	0.50	0.66	0.45	0.41	HT4
0.55	0.31	0.38	0.77	0.55	0.47	0.54	MF1
	0.33	0.40	0.74	0.49	0.43	0.42	MF2
	0.27	0.50	0.72	0.53	0.49	0.46	MF3
	0.39	0.39	0.81	0.51	0.46	0.56	MF4
	0.23	0.39	0.72	0.50	0.47	0.39	MF5
	0.32	0.36	0.69	0.49	0.46	0.37	MF6
0.88	0.37	0.97	0.54	0.50	0.51	0.36	Business Audacity
	0.42	0.93	0.52	0.51	0.46	0.32	Self-renewal
	0.37	0.92	0.48	0.46	0.45	0.32	New Product Development
0.78	0.89	0.34	0.38	0.36	0.40	0.33	SR1
	0.91	0.37	0.38	0.33	0.37	0.27	SR2
	0.85	0.38	0.35	0.37	0.40	0.32	SR3
0.74	0.38	0.56	0.42	0.44	0.40	0.31	AN1
	0.35	0.56	0.41	0.38	0.35	0.30	AN2
	0.42	0.53	0.40	0.39	0.36	0.31	AN3
	0.38	0.52	0.40	0.39	0.36	0.33	AN4

Based on Tables 6, all items have the highest factor load on their own structure and the minimum distance between the factor loads related to their own structure is more than 0.1, which shows that the research constructs have a good divergence validity. The results derived from the second criterion investigation are reported in Table 4-10.

Table 7: Correlation matrix and Root Mean of extracted variance for each research variables

6	5	4	3	2	1	Variable
					0.75	1. Technology infrastructure flexibility
				0.84	0.72**	2. Technology integration
			0.71	0.74**	0.61**	3. Technology business alignment
		0.74	0.62**	0.67**	0.61**	4. Information Technology Management
	0.94	** 0.54**	0.52**	0.50**	0.35**	5. Entrepreneurship of the company
0.88	0.41**	0.41**	0.39**	0.45**	0.34**	6. Competitive intensity

* p <0.05, ** p <0.01

Based on Table 7, the Root Mean of the extracted variance of all research variables is greater than their correlation with other variables. Therefore, the second criterion for examining the divergent validity of research variables is confirmed. Moreover, the numbers below the diameter of the correlation matrix have been reported to investigate the relationship between the variables. As observed, the correlation coefficient of all variables is positive and significant.

The descriptive indices of measured variables

In this section, we present the descriptive indices of research variables. Table 8 presents these indices.

Table 8: Descriptive indices of research variables

SD	M	Variable
0.81	3.47	Technology Infrastructure Flexibility
0.91	3.07	Technology Integration
0.76	3.11	Business alignment of technology
0.83	2.87	Information Technology Management
0.95	2.79	Entrepreneurship of the company
1.03	2.89	Competitive intensity

Structural model test

To predict the performance of innovation, the conceptual model proposed through the method of structural equation modeling and the partial least squares were used to estimate the model. Testing the structural model of the research and hypotheses in the PLS method is accomplished by examining the path coefficients (factor loadings) and R^2 values. Furthermore, the Bootstrap Method (with 500 subsamples) was used to calculate the values of t -statistic and determine the significance of path coefficients. Path coefficients are used to determine the contribution of all predictor variables in explaining the variance of the criterion variable and the values of R^2 indicate the variance of the criterion variable as explained by the predictor variables. In addition, the Stone and Giser Q^2 coefficient was used to evaluate the ability to predict dependent variables based on independent variables. The positive values of this coefficient indicate the ability in prediction.

Table 9 shows t -statistic values for the research paths. Values above ± 1.96 to ± 2.58 are significant at 0.05 level and t -statistic values above ± 2.58 are significant at 0.01 level. The estimate of the coefficients and variance of research variables has also been reported.

Table 9: Explained path coefficients and variance

Determined Variance	Coefficients	Variables
0.35	0.47**	The Entrepreneurship of the company based on: IT capabilities
-	0.19** -0.033	The moderating role of competitive intensity in the relationship between: IT Capabilities * Company Entrepreneurship Organizational Entrepreneurship * Organizational Innovation
-	0.25**(5.89)	The mediating role of organizational entrepreneurship in the relationship between technology capabilities and organizational innovation

* p <0.05, ** p <0.01

In Table 9, the asterisks among the research variables indicate the moderating role. Technology capabilities have a positive and significant effect on the company’s entrepreneurship. Competitive intensity has a negative moderating role in the relationship between technology capabilities and corporate entrepreneurship. Moreover, company entrepreneurship has a mediating role in the relationship between information technology capabilities and performance.

Table 10 shows the validity of commonality and redundancy of research variables. As shown in the table, all the values of commonality validity are positive, which indicates the appropriate and acceptable quality of the present research model.

Table 10: The validity of the commonality and redundancy of variables

CV- Commuality	CV- Redundancy	Research variables
0.574	-	Technology Infrastructure Flexibility
0.707	-	Technology Integrity
0.500	-	Business Alignment of Technology
0.550	-	Information Technology Management
0.885	0.199	Entrepreneurship of the company
0.783	-	Competitive Intensity

Goodness of fit for the structural model

Finally, to show the validity of the findings from the research model, the goodness of fit indices from the structural equation models and the method of partial least squares were used.

There are some methods used to examine the validity of the model in PLS. These methods, called cross-validation encompass the CV Commonality Index and the CV Redundancy Index. The commonality index measures the quality of the measurement model of each block. The redundancy index that is also known as Q² Stone and Giser measures the quality of the structural model for each endogenous block by considering the measurement model. The positive values of these indices demonstrate the appropriate and acceptable quality of measurement and structural model. As seen in Table 13-4, the positive values of commonality validity and redundancy validity indicate the appropriate and acceptable quality of measurement and structural model for all variables in the present study.

In addition to the above indices, the GOF index is the general model for the goodness of fit in PLS and it can be used to examine the validity or quality of the PLS model in general. This index also acts as the “goodness of fit” indices in the LISREL model and falls between zero and one, wherein values close to one indicate the appropriate quality of the model (Ringel, 2006). This index examines the general predictive capability of the model and shows whether the tested model has been successful in predicting endogenous latent variables (Seyed Abbaszadeh et al., 2012). In the present study, GOF was 0.50 for the tested model of the absolute “goodness of fit” index and the value obtained for this fitness index indicates the appropriate GOF of the test model.

Testing the research hypotheses

Table 11: Testing the research hypotheses

Hypothesis Rejection	Confirmation of Hypothesis	Hypotheses
-	Confirmed	IT capabilities affect the entrepreneurship of the company.
-	Confirmed	Competitive intensity plays a moderating role in the relationship between IT capabilities and the entrepreneurship of the company.

Conclusion

Innovation is a permanent and planned procedure boosting the company’s strength and competitive advantage by reducing the costs, reducing the price of products, better and higher quality, greater efficiency and effectiveness of goods and services. Broadly speaking, it increases the revenues and establishes the reputation of an organization. Organizational innovation refers to the development or adoption of an idea or behavior that is new to the whole organization in a business operation. It refers to the creation of value from new technologies or new administrative activities in terms of new products and processes (Jimenez-Jimenez, 2008).

In this study, the effect of IT capabilities on company entrepreneurship was investigated with emphasis on the intensity of competition. The results showed that IT capabilities have a positive and significant effect on company entrepreneurship. Therefore, IT capabilities lead to enhanced corporate entrepreneurship. As regards this particular finding, it can be asserted that the company’s entrepreneurship can be boosted if the organization can access information about the status and progress of relevant sciences and technologies, if the organization has the ability to produce advanced technological processes, if the organization has the ability to absorb new technologies and useful innovations, if the organization has the ability to attract and retain its qualified scientific and technical staff, if the organization has the ability to master, produce or absorb key and basic business technologies, and if the organization is efficient in initiating programs for the internal development of technologies or competencies to attract effective suppliers and customers or receive technologies from research and development centers. In line with this finding, Zahra (2012) has asserted that technology is one of the main contributory factors for companies in progressive movements towards entrepreneurship that can be a key idea for change. These changes demand a redefinition of business and organizational concepts while designing and deploying innovative new systems.

Another finding of the study was that competitive intensity has a moderating role in the relationship between IT capabilities and the company’s entrepreneurship. Hence, as competitive intensity increases, the impact of IT capabilities on the company's entrepreneurship increases as well. To elaborate on this finding, it can be said that if there are many struggles for promotion in the industries, any product or service offered by a competitor in the market can be easily copied by other banks and the price of competition is characteristic of the market in banking industry that increases the impact of IT capabilities on company’s entrepreneurship.

By comparing these results with those of previous studies, it can be concluded that these findings corroborate the results of the research performed by Nahid et al. (2013), Feyz, Zarei and Karimi (2013), Taheri, Shayan Jahromi and Torabi (2010), Ebrahimpour et al. (2011), Taheri et al. (2010), Chen et al. (2015), Wang et al. (2013), Bolivar-Ramos et al. (2012) and Zhao (2005).

In a research study, Nahid et al. (2013) examined the effect of organizational entrepreneurship atmosphere on innovation. The results showed that managerial support, the flexibility of organizational boundaries, availability of time, rewards and employee empowerment might affect innovation; however, work independence has no effect on innovation in the Institute of Islamic Culture and Thought. Nonetheless, it was ultimately concluded that the organizational entrepreneurship atmosphere has a general and significant effect on the organizational innovation of the Institute of Islamic Culture and Thought. In another study, Feyz, Zarei and Karimi (2013) investigated the impact of information and communication technology on organizational entrepreneurship in small and medium enterprises (a survey of small and medium enterprises in Semnan Industrial Park). The results of the assessment of mean values regarding the

statistical population showed that information and communication technology has a significant impact on organizational entrepreneurship as well as the dimensions of job creation, process innovation, risk-taking, self-renewal and aggressive competition in small and medium-sized companies Semnan Industrial Park. However, it has been effective in terms of innovation in products, services and pioneering. In a study conducted by Taheri, Shayan Jahromi and Torabi (2010), the relationship between organizational entrepreneurship and creativity was investigated in technical and professional organizations in Gachsaran. The results demonstrated that there exists a significant positive correlation between organizational entrepreneurship and creativity. There is also a significant positive correlation between the dimensions of organizational entrepreneurship and creativity. Ebrahimpour et al. (2011) investigated the relationship between organizational entrepreneurship and business performance of Tabriz Petrochemical Company. The results showed that there is a positive and significant relationship between the components of organizational entrepreneurship including innovation, risk-taking, leadership and aggressive competition and business performance. Taheri et al. (2010) examined the relationship between organizational dimensions and innovation in enterprises. They found that there is a significant relationship between organizational entrepreneurship and innovation.

Based on the research findings, it is suggested that the managers and officials of Arman Credit Institution increase the organization's ability to obtain information about the status and progress of relevant sciences and technologies and provide the necessary facilities for the production of advanced technology processes. The staff and managers should be encouraged to absorb new technologies and beneficial innovations, provide the necessary support, plan to attract and retain qualified scientific and technical staff, and develop their own R&D centers to enhance technology competencies and increase the company's entrepreneurship.

References

- [1] Drucker, P. (2014). *Innovation and entrepreneurship*. Routledge.
- [2] Wang, Y., Chen, Y., Nevo, S., Jin, J., Tang, G., & Chow, W. (2013). IT Capabilities and Innovation Performance: The Mediating Role of Market Orientation. *Communications of the Association for Information Systems*, 33(1), 9.
- [3] Auh, S., & Menguc, B. (2005b). Top management team diversity and innovativeness: The moderating role of interfunctional coordination. *Industrial Marketing Management*, 34(3), 249–261.
- [4] Bharadwaj, A. S. (2000). A resource-based perspective on information technology capability and firm performance: an empirical investigation. *MIS quarterly*, 169-196.
- [5] Chen, Y., Wang, Y., Nevo, S., Benitez-Amado, J., & Kou, G. (2015). IT capabilities and product innovation performance: The roles of corporate entrepreneurship and competitive intensity. *Information & Management*, 1-15.
- [6] Byrd, T. A., & Turner, D. E. (2001). An exploratory examination of the relationship between flexible IT infrastructure and competitive advantage. *Information & Management*, 39(1), 41-52.
- [7] Rai, A., Patnayakuni, R., & Seth, N. (2006). Firm performance impacts of digitally enabled supply chain integration capabilities. *MIS quarterly*, 225-246.
- [8] Jimenez-Jimenez, Daniel et al(2008). Fostering Innovation: The role of market orientation and organizational learning. *European Journal of Innovation Management*, 11(3), pp. 389-412.
- [9] Zahra, S. A. (2012). Organizational learning and entrepreneurship in family firms: Exploring the moderating effect of ownership and cohesion. *Small business economics*, 38(1), 51-65.
- [10] Zhang, M., Sarker, S., & Sarker, S. (2008). Unpacking the effect of IT capability on the performance of export-focused SMEs: a report from China. *Information Systems Journal*, 18(4), 357-380.