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Open innovation: from technology exploitation to creation of superior performance

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Abstract

Purpose – Nowadays, to develop innovative activities in research and development units, it is desirable to rely on the concept of open innovation to take actions towards the identification of external capabilities of an organization and external knowledge acquisition. Therefore, this study aims to evaluate the impact of external technology acquisition (ETA), external technology exploitation (ETE) and culture of innovation (IC) on open innovation (OI) using SEM approach and then examine the amount of the impact of open innovation on organizational performance (OP) and value creation (VC).

Design/methodology/approach – This study was an applied survey in terms of research purpose and data collection method. The statistical population included all companies in Yazd Science and Technology Park (STP). To collect the data, 109 questionnaires were distributed. The content validity of the questionnaire was confirmed by experts' comments, and Cronbach's alpha coefficient was calculated equal to 0.873 for reliability.

Findings – The results indicated, ETA, ETE and IC had significant and positive effects on OI, and OI by itself had a significant and positive impact on OP and VC. However, the hypothesis of the significant and positive effect of VC on OP was rejected.

Originality/value – Considering the importance of innovative activities of companies in STPs and the role of OI in achieving the goals of idea-driven companies, the present study evaluated the effects of factors affecting the fulfillment of OI in companies based in STPs in the Yazd province of Iran.

Keywords Open innovation, Culture of innovation, External technology acquisition, External technology exploitation, Science and technology park (STP)

Paper type Research paper

Introduction

In organizations, research and development (R&D) units play an important role in idea production and design to create new products; as well, in most industries, activities in the course of R&D units are considered as one of the critical assets of an organization to promote competitive position (Van de Vrande *et al.*, 2016). Given the fact that the quality of R&D activities is on the basis of innovation, complexity, and transformation of today's

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business environment; organizations have been forced to direct their actions more towards gaining competitive advantage and innovative activities. Hence, many scholars believe that access to global networks enables organizations not only to increase their level of knowledge but also to develop their own innovative activities (Janeiro *et al.*, 2013; Hogan and Coote, 2014).

Earlier, managers considered innovative activities of an organization as strategic assets and enclosed processes associated with generating ideas within its boundaries. Research studies conducted in the field of organizational innovation suggested that increased global competition, added costs of R&D units of organizations as well as shortened product life cycle have made managers realize that sole reliance on conventional methods of R&D and considering the limited environment of an organization cannot meet the needs of customers in competitive markets (Saebi and Foss, 2015). Accordingly, in recent years, centralized and internal approach to R&D units has lost its popularity in many industries; instead, organizations have been pushed back more towards business processes for the production and development of innovative processes of value creation (Doz and Hamel, 1998).

Innovation is considered as a process that helps the entry of new products and services of an organization to markets and it is one of the most important factors affecting the level of survival and desirability of organizational performance. Open innovation is also a newfound concept that enables managers to have access to external capabilities of an organization in addition to internal ones to develop their own technologies (Sisodiya *et al.*, 2013; Edgeman *et al.*, 2015).

Today, business development does not depend only on internal capacity of an organization, but it relies on the creation of opportunities for identifying new external solutions as well as exploitation of technologies, concepts, and ideas generated in a business context. In regard to this issue, open innovation is a driving force and a stimulant to integrate technology management and innovation management in organizations (Lichtenthaler, 2011) and scholars are able to introduce the ability to acquire external technology and exploit external technology as open innovation strategies (Hung and Chou, 2013; Greco *et al.*, 2016). Adopting open innovation strategies leads current organizational processes to the creation of values as activities associated with open innovation. The power of value acquisition by an organization and subsequently organizational level of performance are also enhanced (Capaldo and Petruzzelli, 2011; Greco *et al.*, 2016). In addition to the necessity to consider open innovation strategies, the realization of innovation needs kind of culture which continually encourages employees to express creative solutions and new ideas. Therefore, culture of innovation contributes to motivating organizational employees towards innovative behavior and participation in innovation programs (Krot and Lewicka, 2012).

Companies located in science and technology parks (STPs) are always looking for innovation and welcome processes which help companies in identifying new areas of research and conducting joint research activities with other companies.

Considering the importance of innovative activities of companies in STPs and also with regard to the role of open innovation in achieving the goals of idea-driven companies, the present study was to evaluate the effects of factors affecting the fulfillment of open innovation in companies based in STPs in the city of Yazd in Iran, considering the importance of applying open innovation strategies (external technology acquisition and external technology exploitation) in the context of an innovative culture.

Literature review

Open innovation

Open innovation paradigm was introduced in 2003 by Chesbrough and led to a wide range of research studies in the field of creativity and innovation (Christiansen *et al.*, 2013;

Tödtling *et al.*, 2011). In recent years; the phenomenon of globalization, increased technological complexities and environmental, strategic and economic changes have led organizations in R&D units to change their focus on closed and traditional innovation and target the concept of open innovation. While traditional innovation paradigms put emphasis on production of ideas within an organization as well as intellectual and mental capabilities of employees, open innovation paradigm states that organizations need to remove the established boundaries in their own contexts and those of other organizations and take advantage of external technological knowledge and resources to create and develop new ideas (Hagedoorn and Zobel, 2015; Del Vecchio *et al.*, 2018). The core of open innovation is based on sharing organizational knowledge with competitors, customers, suppliers and startup organizations (Hagedoorn and Zobel, 2015) and its realization in the organization causes greater and faster access to scientific resources, technical knowledge and ideas, accelerated completion of innovation processes, reduced costs and greater economic value (Saebi and Foss, 2015).

External technology acquisition and external technology exploitation are considered as the principal parts of open innovation processes. Acquisition of external technologies refers to the flow of innovative ideas, and technological knowledge outside the organization refers to organizational innovative system and it is a process by which an organization acquires external technologies to use external knowledge and complete its own business model (Hung and Chou, 2013; Greco *et al.*, 2016). In fact, external technology acquisition authorizes companies to obtain the best existing technologies, reduce time spent on the market, and focus on external technological capabilities in addition to their resources and capacities (Kang *et al.*, 2015). External technology exploitation refers to a process in which innovative ideas and technologies outside an organization are appreciated and ideas within an organization are improved through the analysis of ideas and utilization of external innovative technologies. Thus, organizations can manufacture new products by relying on the technology acquired and gain profitability through its exploitation (Wang *et al.*, 2015).

Culture of innovation

Culture is a set of norms, beliefs, customs, history and behaviors that brings together people with the same expectations, standards, and understanding (Daniel and Klein, 2014). Organizational culture refers to a collection of shared values and beliefs among employees about the existence and mission of the organization as well as why the organization is formed (Hogan and Coote, 2014). When it comes to the issue of innovation, culture can encourage innovation processes and also prevent them (Naranjo-Valencia *et al.*, 2017). When organizational culture supports collaborative activities and encourages individuals to cooperate in-group problem solving, the process of idea production is facilitated. It is also possible that culture structure is not consistent with collaboration and knowledge sharing and prevent emergence of new ideas in the organization (Daniel and Klein, 2014). Implementation of innovation and its realization in an organization requires the development of a culture supporting innovation and also directing people, communications, and business processes of the organization towards creation of innovative ideas for the success of innovation (Tödtling *et al.*, 2011).

Organizational performance and value creation

Reaching superior performance is the ultimate goal of many organizations and despite all changes, the process of improving the performance of organizations is continually going on (Strohmaier *et al.*, 2005). Organizational performance is defined as the final criterion for evaluating organizational output (Walker *et al.*, 2015). It is also one of the characteristics of

superior performance across the organization to create values (Gupta, 2011). Value is also the cost that the customer meets in exchange for economic, technical, social, and service-related benefits of a product. It is also defined as the organization's credibility in the eyes of the customer. Furthermore, value creation is a dynamic process which looks for a series of experiences, perceptions and information exchanged within the network which consequently lead to value creation (Matthyssens *et al.*, 2016). To achieve this, it is clear that environmental conditions, resources and actions are required by which an organization can usually create value and achieve profitability by enhancing its capabilities and achieving outstanding performance (Gupta, 2011). Since in the business environment, value creation is usually measured by profitability and long-term growth, it is necessary to establish organizational infrastructure based on business models and continuous development and production of products and services (Adner and Kapoor, 2010).

Research background

The importance of open innovation in the success of organizations in recent years has led researchers to conduct research studies in terms of identification of the factors affecting open innovation and evaluate the impact of open innovation and its related processes on different organizational dimensions (Knoke *et al.*, 2017; Igartua *et al.*, 2010; Spencer, 2012; Munsch, 2009; Chaston, 2013; Holgersson and Granstrand, 2017). Huang and Chou in their study on the effect of open innovation on corporate performance considered the impact of the dimension of external technology acquisition and exploitation of the external technology of open innovation on performance. This study was conducted considering investment in internal R&D units as a moderator aimed at examining the moderating effect of market confusion on the impact of open innovation on company performance as well as shortcomings and gaps in this respect. The study showed how open innovation can be used to strengthen the performance of Taiwanese high-tech companies (Hung and Chou, 2013). In a study investigating the relationship between external open innovation and financial performance of R&D projects by drawing open innovation practices, management, and performance of 489 R&D projects in a multi-national company in Europe. The results of the study showed that R&D projects with the participation of open innovation in two mentioned dimensions were associated with better financial performance and governed by appropriate means (Du *et al.*, 2014).

Also, Walker *et al.* tried to integrate the findings of a series of studies to examine the relationship between innovation management and organizational performance. The results of this study indicated that innovation and its management had significant and positive impacts on organizational performance (Walker *et al.*, 2015).

Nowadays, scholars consider the integration of organization's internal resources with external knowledge and capabilities as one of the most important factors in achieving organizational innovation (Saebi and Foss, 2015). Wang *et al.* made an attempt to examine the effect of resource and external knowledge acquisition on organizational innovative measures and subsequently organizational performance. The results of this study indicated that developed channels for the acquisition of external resources can add to the level of efficiency of open innovation in an organization and consequently gain organizational superior performance (Wang *et al.*, 2015).

Hogan and Coote to use Skin's model and examine the relationship between organizational culture, innovation, and organizational performance. The results of the study showed that the higher the trends of organizational culture to values, norms and pro-innovation beliefs; the more the innovative practices by the organization and the more improved the organizational performance (Hogan and Coote, 2014). Parveen *et al.* studied the

linear relationship between corporate culture and open innovation considering the mediating role of commitment. The results of this study revealed that culture especially pro-innovation culture was positively related to open innovation (Parveen *et al.*, 2015).

Schiuma *et al.* in their study entitled "Managing knowledge processes for value creation" stated that effective utilization and management of knowledge resources were the fundamentals of development for the successful abilities of targeted organization and dynamics linking knowledge processes with value creation had an impact on organizational performance (Schiuma *et al.*, 2012). Daniel and Klein examined the role of innovation in creating value for R&D units in one of the industries in Australia. The results of this study showed that the development of innovation in an organization could promote various aspects of value creation (Daniel and Klein, 2014).

Research methodology

The present study was applied and descriptive in terms of the research purpose. Considering the data collection method, the present study was in the form of a field research type (survey). As questionnaires are used to collect the required data in surveys, the study questionnaire was developed by reviewing scientific research papers and utilization of the comments of academics and managers of STPs and the related items were designed to measure each variable of the study. The content validity and reliability of the questionnaire were confirmed based on experts' opinions and using Cronbach's alpha equal to 0.873, respectively. The statistical population of this study included all companies operating in STPs in the city of Yazd in Iran, comprised of 179 companies during the study. As a sample, the survey questionnaire was distributed among 109 companies engaged in R&D (in the working areas of bio-technology, information and communication technology, management and consultancy, industry and mining, electronics, robotics, etc.) and out of which 96 questionnaires were returned.

Conceptual model of research

Given the importance of innovation activities by companies located in STPs as well as the role of open innovation in achieving the goals of idea-driven companies and R&D units as well as studies in the field of open innovation, the conceptual model of the present study was illustrated in Figure 1:

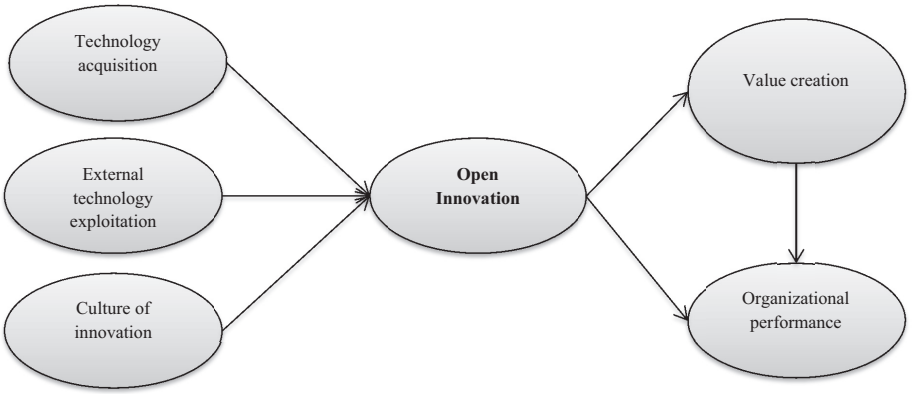

Figure 1.
Conceptual model of the study

H1. External technology acquisition has a significant and positive effect on open innovation.

H2. External technology exploitation has a significant and positive effect on open innovation.

H3. Culture of innovation has a significant and positive effect on open innovation.

H4. Open innovation has a significant and positive effect on value creation.

H5. Open innovation has a significant and positive effect on organizational performance.

H6. Value creation has a significant and positive effect on organizational performance.

Stages of research implementation

To address and examine the research hypotheses, the following stages in Figure 2 were used:

The SEM is a statistical method that is based on the establishment of multiple regression, composition and integration of path analysis and factor analysis which can be used to analyze complex relationships between one or more independent variables and one or more dependent ones (Kaynak *et al.*, 2015). The SEM using partial least squares (PLS) is also very popular and it is considered as a new generation of statistical methods in social sciences and management. This technique provides for the simultaneous study of relationships between latent variables and measures (observable variables). Two models are tested in the PLS models: external and internal models. External or outer models are similar to confirmatory factor analysis and internal or inner models are identical to path analysis in the SEMs, respectively. Therefore, it is necessary to provide the inner model which indicates the relationship between latent variables of the study following outer model testing. Inner model can be used to evaluate the research hypothesis of the model (Schubring *et al.*, 2016; Kaufmann and Gaeckler, 2015).

Data analysis

In the methodology of the SEM, it is essential to determine the validity of the construct under study to measure whether the selected indicators for the measurement of given constructs were accurate or not. The optimal level of factor loadings for indicators was equal to 0.4 or higher (Hulland, 1999) and suggested a broadly acceptable reliability for the measurement model. If the factor loading was an index lower than 0.4, the index must be removed. Table I shows the validity of the initial stage.

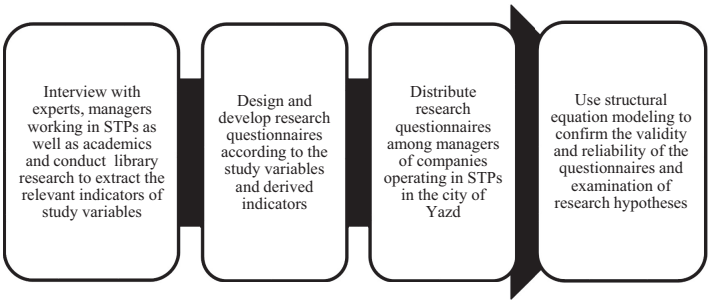

Figure 2.
Stages of research implementation

Variable	Questions	Construct validity
External technology acquisition	Question 1	0.60
	Question 2	0.79
	Question 3	0.82
	Question 4	0.70
Access to external technology	Question 5	0.73
	Question 6	0.45
	Question 7	0.50
	Question 8	0.43
	Question 9	0.69
Value creation	Question 10	0.67
	Question 11	0.70
	Question 12	0.68
	Question 13	0.60
	Question 14	0.65
	Question 15	0.69
Culture of innovation	Question 16	0.74
	Question 17	0.77
	Question 18	0.65
	Question 19	0.50
	Question 20	0.83
	Question 21	0.70
	Question 22	0.36
	Question 23	0.51
Organizational performance	Question 24	0.62
	Question 25	0.66
	Question 26	0.30
	Question 27	0.52
	Question 28	0.60
	Question 29	0.57
	Question 30	0.61

Table I.
Construct validity of questionnaire structure

The PLS output in state of standardized coefficients (factor loadings) after removal of question 4 was shown in Figure 3.

Reliability of model

- *Cronbach's alpha coefficient*: internal consistency indicates correlation between a construct and its corresponding index. Cronbach's alpha is a factor whose values higher than 0.7 are accepted (Cronbach, 1951); and
- *Composite reliability*: composite reliability of the SEM is regarded as a better measure of Cronbach's alpha (Vinzi *et al.*, 2010) due to equal importance to all the indicators of each construct in calculating Cronbach's alpha coefficient and in contrast greater importance to indicators with higher factor loadings in calculating composite reliability which result in more actual and accurate standards of composite reliability values of constructs compared with Cronbach's alpha. According to the obtained values, composite reliability was located at a very desirable level (above 0.7). Table II showed values of these coefficients for each construct in PLS software.

Validity of internal (inner) model

- *Convergent validity*: it is the average variance extracted (AVE) used to validate convergence which shows high correlation of the indices of a construct compared

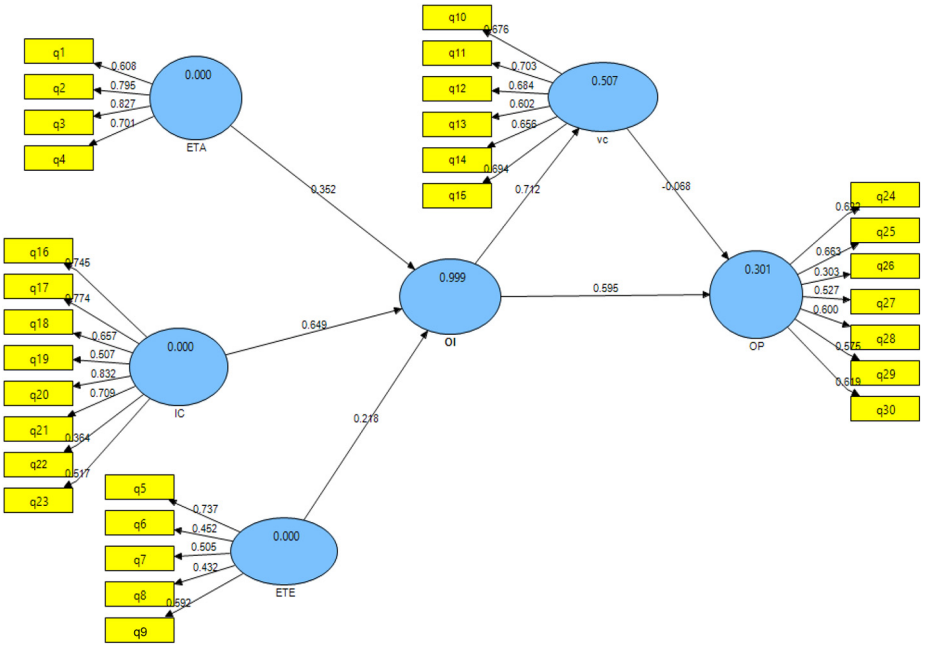

Figure 3.
PLS software output in the state of standardized coefficients

Variables	Acquisition of foreign technology	Access to foreign technology	Innovation culture	Value creation	Open innovation	Organizational performance
Number of indicators	4	5	8	6	17	7
Composite reliability	0.82	0.68	0.85	0.82	0.85	0.76
Cronbach's alpha	71	0.43	0.79	0.75	0.82	0.63
Average variance extracted	0.54	0.3	0.42	0.44	0.27	0.32
Coefficient of determination	–	–	–	0.44	0.99	0.32

Table II.
Cronbach's alpha coefficients and composite reliability

with the correlation of other construct indicators. Based on Fornell–Larcker method, the value of this index varies from zero to one and values higher than 0.5 are accepted. The AVE of both dependent and independent variables and each construct are shown in Table III and the convergent validity is accepted according to the values obtained.

- *Divergent validity*: The relationship between a construct with other indices compared with the relationship between this construct and other constructs in the PLS software are shown by Fornell–Larcker matrix. In this method, only first-order latent variables were entered into the matrix. The closer the numbers make greater correlation and the relationship between two variables.

The numbers obtained based on Fornell–Larcker method indicated the values of construct correlations with each other. Such values are listed in Table III. Values on the diagonal axis

were the matrix of squared root of the AVE for each variable. According to the matrix, root of the first-order variables from the correlation between them was high and showed divergent validity as well as goodness of fit for the measurement model.

Evaluation of SEM (internal or inner model)

Evaluation of SEM is conducted through the factors as follows:

- *Z significance coefficients*: Z method and *t*-values can be used to calculate the significant paths of the model. The path between variables should be a value greater than 1.96 to verify the accuracy of the path as well as the significance of all the questions at a 0.95 confidence level. T-values showed the accuracy of the relationships, but the severity of the relationship between constructs cannot be compared with such values. After drawing the conceptual model and the initial PLS analysis, the conceptual model for the state of standardized coefficients was illustrated in Figure 4.
- *Coefficient of determination (R2)*: The coefficient of determination reflects the impact of endogenous variable on a dependent and exogenous variable. It is

Table III.
Divergent validity

Variables	External technology acquisition	Access to foreign technology	Culture of innovation	Value creation	Open innovation	Organizational performance
External technology acquisition	1	–	–	–	–	–
Access to foreign technology	0.64	1	–	–	–	–
Culture of innovation	0.46	0.33	1	–	–	–
Value creation	0.79	0.66	0.88	1	–	–
Open innovation	0.58	0.51	0.33	0.54	0.54	–
Organizational performance	0.40	0.36	0.74	0.71	0.71	1

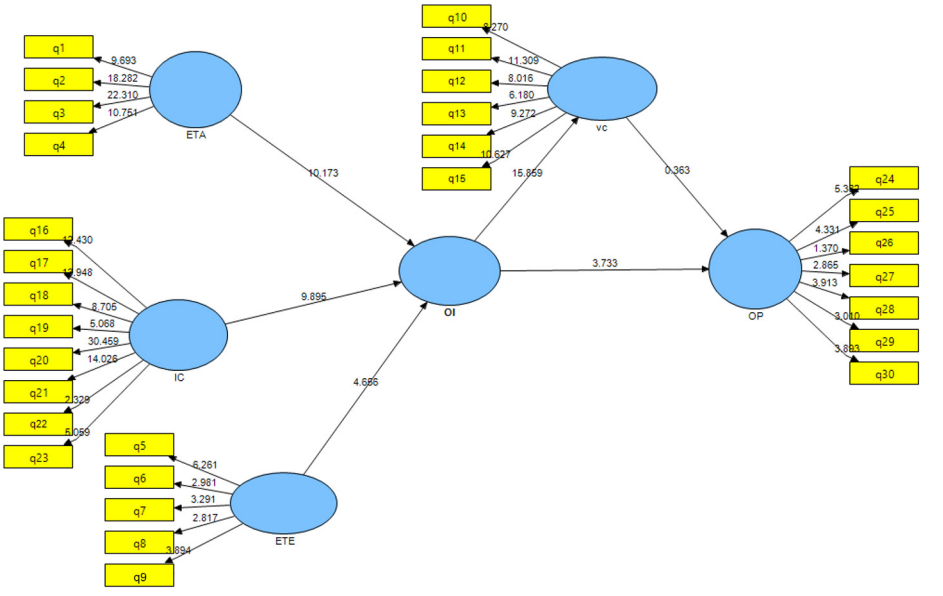

Figure 4.
Conceptual model of study in the state of standardized coefficients (*t*-values)

List	Factor loading	Z path value	Components	Test result
1	0.35	10.17	Significant and positive effect of external technology acquisition on open innovation	Confirmed
2	0.21	4.68	Significant and positive effect of access to foreign technology on open innovation	Confirmed
3	0.64	9.89	Significant and positive effect of culture of innovation on open innovation	Confirmed
4	0.71	15.85	Significant and positive effect of value creation on open innovation	Confirmed
5	0.59	3.73	Significant and positive effect of open innovation on organizational performance	Confirmed
6	−0.06	0.36	Significant and positive effect of organizational performance on value creation	Rejected

Table IV.
Results of testing hypotheses

calculated only for the dependent variable. Some experts evaluated values closer to 0.67 at a desirable level, and the values closer to 0.33 and 0.190 at normal and weak levels, respectively. In the present study, the values obtained revealed the desirability of the GoF for the SEM.

Overall GoF for the research model

The measure of GoF is related to overall SEMs. By this measure, researchers can control the overall GoF for the overall model of their studies following the evaluation of GoF for the measurement section and the construct of the model. Vetselz *et al.* (2009) introduced three values of 0.01, 0.25, and 0.36 as the weak, medium, and strong values for the GoF. The overall GoF of the model was calculated by the following formula (R^2 = 0.44 and *commmunalities* was equivalent to 0.4). The number obtained showed that the model had a very strong GoF:

$$\sqrt{\bar{R}^{2}} \times \overline{commmunalities} = 0.42$$

Results of hypothesis testing

Research hypotheses were studied and tested. This section consisted of two parts: A) examination of Z significance coefficients associated with hypotheses: if the significance coefficients were higher than 1.96, they indicated significance and proper explanation of the variables. According to the results, all the t significance coefficients were greater than 1.96 which revealed the significance of all questions and relationships between the variables at a 0.95 confidence level. B) Examination of standardized path coefficients of hypotheses: such coefficients between dependent and independent variables indicated what percentage of changes in the dependent variable can be explained by the independent variable.

Conclusion and recommendation

In recent years, intensified competitive environment has made organizations to do innovation activities to survive and gain competitive advantage more than the past and also strengthen their R&D units to improve organizational performance. Therefore, it is obvious that, utilization of facilities within organizations is not sufficient to develop innovative activities and it is better to take measures through reliance on the concept of open

innovation to identify capabilities outside the organization and acquire external technology. Accordingly, the present study aimed at using the SEM approach to evaluate the impact of components such as external technology acquisition, external technology exploitation, and culture of innovation on open innovation and then examine the amount of the impact of open innovation on organizational performance and value creation. The statistical population of the study included all companies operating in STPs in the city of Yazd and they received 109 questionnaires. It should be noted that the content validity of the questionnaire was confirmed by experts' comments and its reliability was calculated by Cronbach's alpha coefficient equal to 0.873.

The results showed significant (t-values = 3.73) and positive (path coefficient = 0.59) correlation between the effect of open innovation on organizational performance in Yazd STPs, but this hypothesis was rejected in terms of the positive and significant impact of open innovation factors on value creation according to the results of hypothesis testing. Moreover, the results of overall GoF for the model demonstrated that the conceptual model of study had the desirable GoF (GoF = 0.42).

In terms of testing the first hypothesis, the significant and positive effect of external technology acquisition on open innovation was investigated. The path coefficient obtained for this hypothesis was 0.35 which revealed a positive effect between these two factors which was significant at 95 per cent level according to the t-statistic of 10.17. The test results of this hypothesis were consistent with the findings of studies by Saebi and Foss (2015). Also, the study of (Cui *et al.*, 2015) shows that firms can strengthen their internal innovation for commercialization and learn new ways to exploit knowledge and innovation, through search, acquisition and integration of foreign technology or knowledge with its own R & D activities.

The positive and significant impact of External technology exploitation on open innovation was studied in the second hypothesis. The path coefficient for this hypothesis was 0.21 which indicated a positive impact between these two factors and given the t-statistic of 4.68, this positive relationship was significant at 95 per cent level. It should be noted that no direct studies had been conducted in this area composed of open innovation factors considered in the present study.

In terms of testing *H3*, the significant and positive impact of culture of open innovation on open innovation was investigated. The path coefficient for *H3* was 0.64 which showed a positive impact between these two factors that was significant at 95 per cent level according to the t-statistic of 9.89. The test results of *H3* were in line with the findings obtained by Hogan and Coote (2014).

The significant and positive impact of open innovation on value creation was investigated in *H4*. The path coefficient obtained for *H4* was 0.71 which indicated a positive impact between these two factors and this positive relationship was significant at 95 per cent level according to the t-statistic of 15.85. The test results of *H4* were in agreement with the findings by Daniel and Klein (2014). According to confirmation of *H4*, Hung and Chou (2013) demonstrated that if the company has access to external innovating knowledge and internal ideas, it can create value for its customers and earn a competitive advantage for its products and services.

In terms of testing *H5*, the significant and positive effect of open innovation on organizational performance was examined. The path coefficient for *H5* was 0.59 which showed a positive impact between these two factors. According to the t-statistic of 3.73, this positive relationship was significant at 95 per cent level. The test results of *H5* were consistent with the findings obtained by Dou *et al.* (2014), Walker *et al.* (2015), and Hung and Chu (2013).

The significant and positive impact of value creation on organizational performance was explored in *H6*. The path coefficient obtained for *H6* was −0.06 and the t-statistic was equal to 0.36. In general, *H6* was rejected.

According to the results obtained from this study, identifying external technologies, developing external communications, expanding research and building the foreign industrial co-workers' networks by using open innovation has a direct effect on business area and can direct organizations to reach excellence performance.

It was suggested that organizations with technology as their fundamental component should make attempts to consider open innovation. External technology acquisition from competitors allows organizations to recognize external knowledge and promote their innovative activities scientifically. Furthermore, open innovation can be applied within an organization when technologies of external environment are identified and used for existing products and services of the company. Open innovation can be also supported by an organization when infrastructures of culture of innovation are formed by employees within the organization and there are not obstacles and conflicting interests by the organization. In other words, culture of innovation can play a facilitating role in open innovation. Given that companies interact with each other in different areas in a general atmosphere in STPs; it was recommended in the present study that each company should take actions in terms of acquisition of external knowledge and technology in line with the vision of open innovation based on collaboration rather than competition. Researchers in this study suggested that considering the companies operating together in STPs, apart from the competition of the companies and their knowledge of each other, and their cooperation in search of acquisition of external knowledge and technology from an international perspective, the process of the impact of open innovation on organizational performance can be accelerated. However, culture of innovation as a significant factor affecting open innovation is of the fundamentals considered by organizational managers separately, i.e. it is necessary to establish spaces and centers such as thinking rooms to provide more innovation and better grounds for open innovation in knowledge-driven companies. This can help in the exchange of comments between the members and different groups and encourage them to have consensus and innovation and facilitate more interactions and collaboration between individuals which can by itself lead to superior performance between companies located in STPs. Considering that the companies operating in STP are seeking to develop innovative and technological activities, it is suggested that, based on the results of the present study, the innovation system is established in STP area. The innovation system can be built on open innovation, facilitating the interaction of active companies and speed up the exchange of ideas between firms. In addition to the establishment of a network of internal co-operation, there will also be widespread communication among foreign partners in the companies. Also, the required foundation for the flow of the internal and external processes of open innovation will be built.

The present study faced limitations including the low frequency of research studies associated with the field of study as well as the resistance of some companies to handle the required data in terms of the state of organizational performance and their levels of success in value creation. Therefore, researchers were recommended to develop the model presented in this study taking into account the views of competitive advantage (resource-based and industry-driven perspectives) in future studies and examine the impact of the processes associated with open innovation on the level of success of companies in acquiring competitive advantage. It is desirable to examine the model presented in this study in different periods and in STPs in other provinces in Iran as well as businesses with a R&D nature.

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