

Investigation And Identification of Factors Affecting the Open Innovation and Prioritize These Factors Using Fuzzy Hierarchical Analysis (Case Study: Digikala Online Store)

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Abstract

The need for creativity and innovation in organizations to the extent that some resources would have equated it with the destruction of the organization in the long run. But what is emerging more in innovation, open innovation model, because his company came to realize that really is not all good ideas comes only from within the organization, rather than all the good ideas that are created within the company, has successfully managed. Therefore, this study was conducted to investigate factors affecting the open innovation. The aim of this study is applied and descriptive-correlation procedure. The population studied was Digikala online store is through using Morgan table have been randomly selected 84 patients as determined and by questionnaire were assessed. Pearson correlation coefficient was used to investigate the relationship between independent and dependent variables and to rank the factors affecting the open innovation of Fuzzy Analytic Hierarchy Process (FAHP) is used. The results of variable analysis show those structural factors, communication with customers, a joint venture between the organizations, elite workforce. The use of research and development, application of new technologies that are effective on open innovation and structural factors as the most influential factor on open innovation and the use of research and development, application of new technologies, elite task force, a joint venture between the organization and the relationship with the customer to arrange the next priorities.

Keywords: open innovation, fuzzy hierarchical analysis, creativity, Morgan table

Introduction

In the past, innovation requires reliance on intellectual resources within the organization and trying to develop it and at the same time, prevent the information and use of forces outside of it.

All patents, trade secrets and other valuable intellectual property is strictly protected and Related rights were implemented without any mercy to innovative organizations gain the most value from their innovations (Chsbrv, 1391).

The main characteristic of innovative companies are, spending a considerable amount of revenue in research and development projects, Innovative workforce with higher education and, in some cases, recruiting and hiring part-time specialists abroad, Development of new products and services and constantly improving and reviewing the new strategy, intellectual property and trade idea.

Companies to increase their chances of success in innovation campaign has no choice but to follow more open approach to innovation And combining this approach with an open and transparent business models.

Organizations have realized that they need to find new ways to identify what needs to

expand their expertise and communication networks with individuals and institutions inside and outside the organization.

The company's ability to access new technologies and adapt them to the needs of customers, provide new profitable opportunities for companies.

Internal knowledge that is required for such processes is valuable for companies And to obtain the competitive advantage it is necessary to be protected knowledge in the process of innovation. (Ghazaleh and Bagherinejad, 1391).

The text in front of you, tries to with regard to the role of innovation as the most prominent factor for competitive advantage,check and analyze the Factors affecting the organizational environment that is so effective on open innovation.

The role and importance of creativity and innovation

Individual aspects: Creativity and innovation are driving the growth and prosperity of talent and self-actualization and success factors of personal, occupational and social.

Organizational aspects: Creativity and innovation cause to development of the organization ,production and services; increase the quantity, diversity products and services; increase the quality of products and services and competitive success, Lower costs, reduce waste and save resources, increase work motivation of staff, improve mental health and job satisfaction of employees, improving agent productivity, The success of management and staff; managing growth and development of organization, stimulate the sense of competition; reduction of administrative bureaucracy; Incentives pragmatism, and Provide inputs. (Hashemi, 1393).

Open Innovation:

Open Innovation is a term that was introduced by Henry Chsbrv, although this idea and discussion dates back to the 1960s.

This concept is associated with user innovation, cumulative innovation, business knowledge,distribution innovation.

Open innovation is a paradigm that firms can and should be used from ideas outside the company, as the same as internal ideas in the company's and conduct these ideas to market .oooo

The main theme behind open innovation is that in the world, knowledge distributed widely and companies can not only rely on their own research. But they must be buy or apply processes of license patents from other companies.

In addition, internal inventions not only used on the company, but must be used outside an organization; For example, through licensing or joint ventures.

during the 1960s, henry chesbrough noted that the general pattern of closed innovation has begun to change.

_Increased displacement of skilled workers, trained and experienced engineers and scientists that makes harder for firms to Control proprietary ideas and expertise every day.

_development of Venture capital and its increasing importance as an alternative to the allocated resources to R&D by large firms Which contributed to funding for the formation of new companies and their efforts to commercialize great ideas that come out of research by firms.

_ Make a choice and use virgin technologies from outside the organization.

_Increase access to powerful partners to outsource research

_Enhance the quality of university research

_ Dissemination of knowledge throughout the world

_Shorten the distance, facilitating communications and virtual cooperation through the development of information technology

_Increasing product market competition among companies

_Changes in the nature of innovation In addition to the technological innovation, commercial and institutional innovations, that can be manifested in new business models and In profitability are also important. This factors cause to damage the cycle that keeps innovation alive (Moshiri, 1390).

In fact, the locus of innovation migrate in industries that tend to open innovation, beyond the borders of large firm's R&D's research centers.

Chsbraw and crave suggest that what is emerging more in innovation, is open innovation model, Because companies recognize themselves That really is not all good ideas comes only from within the organization And not all the good ideas that are created within the company are marketed successfully only relying on company's Known market channels. (Jacobides and Billinger, 2006).

Innovation can not just happen in the research and development department within the company, For example, can be purchased by firms from other partners or occur in the interaction between companies and the environment.

This leads to projects that affect in how to manage and process understanding. Clearly, the problem that arises from this is that when an innovative activity to be shared between a large number of activists, just not enough cooperation model hierarchy, but also requires cooperation with other mechanisms as well. Where external knowledge and activate it, a large part of the process up, a company needs to adapt to a changing innovation process innovation activity indicators (same). Open innovation intended use of the inward and outward flow of technical knowledge to accelerate internal innovation processes and expand the markets for external use of innovation. Open innovation leads to greater interaction among practitioners, such as firms, network and market their suppliers and customers. The specific application of open innovation in the industry and market, many other structures organization can easily implement and enforce the principles of open innovation. Open innovation are equally linked to production and service companies and research and innovation should not be limited to small and medium companies that are engaged in the research and development activities; it should be implemented in companies and organizations of all sizes. The main motivations are usually open innovation market-related purposes. It targets the most important driving force for companies in sacrificing their investments, partnership and collaboration with other companies with the consumer in the process of innovation. Most small and medium enterprises from a wide array of methods to meet the needs of customers and survive in

a competitive market uses. Corporate renewal and re-engineering business enterprise, is the second most important motivation for open innovation (Hashemi, 2014).

Benefits of Open Innovation

Open innovation provides many benefits to companies active in this field, including reducing the cost of research and development, potential improvement in development productivity, customer participation in the development process, increasing accuracy for market research and target customers, synergies between internal and external innovation and the potential for multi-level marketing (Parhizgar et al., 2013).

Disadvantages of open innovation

Implement a model of open innovation is naturally a number of risks and challenges; including the possibility of disclosing information that there is no intention to share it, the potential loss of their competitive advantage, organizations. Thus revealing their intellectual property, the increasing complexity of innovative control and regulation and how participants in a project and need to develop a tool for identification and composition of external innovation (ibid.).

Open innovation models

1. Platform Products

This approach includes development and product introductions are complete, in order to provide a framework to access, customization and exploitation. It aims to develop product features to increase product value for all parties involved.

2. Ideas match

This model consists of a system that implements and runs through successful strategies to reward, encourage competition. This method is inexpensive for organizations to access data in a wealth of new ideas, while also helping to provide deeper insight into customers' needs.

3. Immersion in the client

This technique involves close cooperation and extensive customer through his hosting or through interaction with the staff. In this way, organizations use customer data and customer participation in the product design and development process.

4. Design and collaborative product development

As of platform products, the organization works with its partners in the development of products. The difference between these methods is the first in a framework for cooperation in the field as well as the development of the host organization, control and supervision will be necessary in this field. This method will allow the organization to monitor and control more and makes production more quickly will reduce the cost of product development is at the same time.

5. Innovation networks

Similarly Ideas match is an organization of a network of partners in the design process by providing an incentive bonuses in the form used. The difference relates to the fact that a network of partners in order to develop solutions to identified problems used (Vaezi, 2010).

History Research

Rychvald and Sclar (2006), a comprehensive innovation model zinnovation, in particular in relation to the services provided. Comprehensive innovation management model based view of the market and resource-based view of the company through the integration of environment and internal capabilities and resources combined. This model focuses on the process of innovation and affecting four areas: customers, competitors, employees and systems. Assuming this model, the customer reduces market uncertainty and the major challenge in this way, anticipate the future needs of customers and turn these needs into products and services offered to the market. In this regard, customer interaction and integration in the innovation process is inevitable. Gassmann and Ankl study (2005) Factors that affect the implementation and dissemination of open innovation models to identify. According to this model, innovation management of various aspects of external factors such as the economy, science, innovation, and the country is different historical periods. Knowledge intensity used for product development, the need to integrate knowledge determines the external surplus. Nargesi et al (2014) conducted to identify factors affecting the implementation of open innovation. Therefore, the main factors affecting the open innovation in both internal factors (Structure and process, financial and staff) and external factors (competitor collaboration, communication with customers, agents of political / legal connection with the university) have been considered. The results of this study, using path analysis and PLS were analyzed. The results showed that all four fields of internal and external factors would contribute to the implementation of open innovation.

Lindagay and Kawasaki (2010) with a model for assessing national innovation system, certain categories of national innovation indicators that allow quantitative and statistical analyzes provided. In this model, national innovation index into three categories of input parameters, interface parameters and output indicators were classified. In this model, the inputs, labor and capital, the mediators also include the accumulation of macro capabilities of science and technology, size in terms of economic and human capital or wealth, and finally exits, solutions, knowledge and productivity. Wang et al (2012) in an article that examines the impact of open innovation on national systems have stated that the use of external knowledge. There is basic research, it promote technologies developed markets, strengthen internal communications, inter-agency joint venture, high-quality workforce and the expansion of education, inter-organizational networks, investment in research and development and the use of retired staff could have important roles in the development of open innovation. Hedrick (2010) conducted a study that concluded in the energy sector and the open innovation occurs when all ideas from inside and outside the organization with each other shared as well as organizations associated with universities, consultants and analysts. They were of the opinion that the initial ideas for innovation are open source technology transfer and potential partners for cooperation in this field are essential.

In a study by Zhang and Bell (2010), as an open innovation model for innovation in business process telecommunication operators in China, the authors concluded the use of smart and talented people within the organization, the use of external and internal research and development department, create believe that the necessity to research. Development for innovation from the beginning there is an issue, creating a better business model to reach the market for the first time in the making, using internal and external ideas that benefit from others in the process of innovation or buy intellectual property of others when the progress in our business. It can help us achieve open innovation in organizations. Darbandi and Khorshidi (2009) in a study examine the open innovation approach and its role in the development of their innovation. It stated that the use of outsourcing, the use of new technologies and technology transfer, use of external resources within the organization and in partnership with other organizations and get their ideas, changes in organizational culture that is opposed to the foreign partner in the organization, the organization can be effective on the adoption of open innovation. Open bar should be noted that the need to employ all the people who need them. As well as the need have the best and greatest idea but also efficient use of internal and external ideas.

Hypotheses

To achieve the goal in this research study, the hypothesis is put forward as follows:

- Structural factors effect on open innovation
- How to communicate with customers on open innovation impact
- Joint venture between open innovation and organizational impact
- Elite workforce in the organization of open innovation impact
- Use of open innovation research & development on impact
- Use of new technologies on open innovation impact

Research methodology

The method set of rules, tools and methods for the reliable and systematic reality check, discover and achieve a solution to the problem is unknown. Adopt scientific method is the only way to achieve acceptable scientific achievements (Khaki, 1999). In general, there are different methods of investigation such as causal research methods, correlation, ex post facto, descriptive, historical and case. Each of these different methods is used. Generally, the methods of research can be made according to two criteria: a) purpose of research, b) data collection divided. This research, applied research, and the importance degree and extent of control variables, you know, in terms of data collection, survey and data analysis is descriptive in terms of style.

Community sample

In each study, the study population is a population that the researcher wants to study about the characters, variable pay it. In this study, statistical population is included Digikala online store employees. If the sample size is not large in population, total population will be studying, but if the population size is large, representative sample and then select and finally, the results of which will be extended to the entire population. In this study, the sample size was determined using Morgan table and then we will proceed to elect the members of simple random sampling.

Tests and statistical techniques

In this study, descriptive statistics used to analyze the data. The SPSS software to analyze the data from the questionnaires will be used. The researcher is seeking a five-item Likert scale questionnaire constructed with closed questions as to gather quantitative data used. In this research statistics, the Kolmogorov - Smirnov normality of variables are used to check for normality of variables and Pearson's correlation coefficient to examine the relationship between independent and dependent variables will be used. In addition, to rank the

variables of Fuzzy Analytic Hierarchy Process (FAHP) will be used. This study, 16 SPSS software to analyze the data obtained from the questionnaires will be used.

Reliability or reliability test

In order to establish the reliability of the measurement tool and there are several different techniques to measure the internal consistency is one of them. The internal consistency with Cronbach's alpha coefficient measuring instrument can be measured. The coefficient for the questionnaire that was used for this study is as follows;

Table 1. Factors to test reliability Cronbach's alpha

Factor	Assessment tool	Cronbach's alpha
Structural factors	5 point Likert	0.855
Communication with clients	5 point Likert	0.768
A joint venture between Enterprise	5 point Likert	0.841
Elite Labor	5 point Likert	0.912
The use of research and development unit	5 point Likert	0.897
The use of new technologies	5 point Likert	0.798

As shown in Table (1) is determined according to Cronbach's alpha coefficient obtained for the entire questionnaire. Moreover, for each section of questions that are related to certain factors, reliability in total and per segment is at an acceptable level. The Cronbach's alpha coefficient obtained for all of them is higher than 0.7.

Normality of Data

To test data normalization Kolmogorov - Smirnov is used. This simple test, a nonparametric method determines the statistical distribution of the data assimilation. The output of the test statistic Z on the table that if it is less than 0.05, it indicates that selective distribution may not be suitable for data and vice versa.

Table 2. Kolmogorov - Smirnov data normalization

	Structural factors	communication with clients	Joint ventures	Elite Labor	The use of R & D	New Technology application
N	84	84	84	84	84	84
Mean	2.45	2.74	3.21	3.15	2.84	3.40
Std. Deviation	0.78	0.69	0.71	0.84	0.75	0.82
Absolute	0.091	0.085	0.087	0.089	0.102	0.086
Positive	0.074	0.082	0.061	0.081	0.089	0.08
Negative	-0.084	-0.074	-0.083	-0.064	-0.075	-0.058
Kolmogorov-Smirnov Z	1.547	1.154	1.562	1.143	1.254	1.186
Asymp. Sig. (2-tailed)	0.085	0.124	0.073	0.241	0.094	0.142

Function test shows a significant level of all variables is greater than 0.05, therefore, the null hypothesis, the hypothesis is confirmed normal distribution of research data.

Correlation of variables

According to the normality of the data used Pearson correlation test. The purpose of this test determines the relationship and correlation between independent and dependent variables. The results are as follows:

Table 3. Pearson correlation test

	Structural factors	communication with clients	Joint ventures	Elite Labor	The use of R & D	New Technology application
Structural factors	1	0.248**	0.351**	0.641**	0.457**	0.627**
		0.001	0.000	0.000	0.004	0.000
communication with clients		1	0.528**	0.632**	0.745**	0.547**
			0.000	0.000	0.002	0.000
Joint ventures			1	0.529**	0.412**	0.318**
				0.000	0.000	0.000
Elite Labor				1	0.365**	0.524**
					0.001	0.000
The use of R & D					1	0.634**
						0.000
New Technology application						1

** . Correlation is significant at the 0.01 level (2-tailed).

Given that a significant level has been calculated for all variables Pearson test is less than 0.05, the null hypothesis is rejected. So variables are significant at a confidence level of 99% has a positive relationship.

Prioritize factors and variables approved by FAHP

At this stage, paired comparisons questionnaire in order to prioritize the factors and variables, prepares and 10 experts who they believe was used in the previous step was distributed. Verbal comments by respondents about the factors and variables into triangular fuzzy numbers are different ways those interactive scales to determine the weight of the variables in Table (4):

Table 4. words scale to express the importance of measures (Nepal et al., 2010)

Reverse of triangular fuzzy numbers	Triangular fuzzy numbers	words scale for the importance of measures
(1,1,1)	(1,1,1)	Just Equal
$(\frac{2}{3}, 1, 2)$	$(\frac{1}{2}, 1, \frac{3}{2})$	Equally Important
$(\frac{1}{2}, \frac{2}{3}, 1)$	$(1, \frac{3}{2}, 2)$	Weakly more important

$(\frac{2}{5}, \frac{1}{2}, \frac{2}{3})$	$(\frac{3}{2}, 2, \frac{5}{2})$	Strongly more Important
$(\frac{1}{3}, \frac{2}{5}, \frac{1}{2})$	$(2, \frac{5}{2}, 3)$	Very Strongly more Important

Calculate the weight vector in matrix of pairwise comparisons

To calculate the weights of each of the elements in the matrix of pairwise comparisons, analysis change has been developed. Due to this, the geometric mean of triangular fuzzy matrix comments experts (10 questionnaires) in conjunction with the factors affecting open innovation, integration matrix experts in the table (5), respectively.

Table 5. Matrix gathering expert opinions on the factors affecting the open innovation

New Technology application	The use of R & D	Elite Labor	Joint ventures	communication with clients	Structural factors	Criteria
(0.8 1.2 1.6)	(0.5 0.7 0.9)	(0.8 1.1 1.7)	(1.4 1.8 2.4)	(0.7 1 1.5)	(1 1 1)	Structural factors
(1.1 1.5 1.9)	(0.8 1.1 1.4)	(0.7 1 1.3)	(0.6 0.7 0.9)	(1 1 1)	(1.2 2.6 2)	communication with clients
(0.5 0.7 0.9)	(0.7 1 1.4)	(1.1 1.5 1.9)	(1 1 1)	(0.7 1 1.3)	(0.6 0.7 0.9)	Joint ventures
(1.2 2.6 2.1)	(0.8 1.1 1.6)	(1 1 1)	(1.3 1.7 2.3)	(0.7 0.9 1.2)	(1.3 1.7 2.2)	Elite Labor
(0.7 0.9 1.2)	(1 1 1)	(0.7 1 1.3)	(0.8 1 1.4)	(1.1 1.4 1.7)	(1.3 1.7 2.1)	The use of R & D
(1 1 1)	(0.5 0.6 0.8)	(1.5 0.6 0.8)	(0.6 0.8 1.2)	(0.4 0.6 0.8)	(0.4 0.5 0.7)	New Technology application

Then we calculate the amount of each component expansion phase supplies:

$$[\sum \sum M_{ij}]^{-1} = (40.253, 51.930, 67.223)^{-1} = (0.015, 0.019, 0.025)$$

$$SC_1 = (0.064, 0.105, 0.172)$$

$$SC_2 = (0.096, 0.162, 0.270)$$

$$SC_3 = (0.063, 0.100, 0.167)$$

$$SC_4 = (0.111, 0.186, 0.309)$$

$$SC_5 = (0.103, 0.172, 0.287)$$

$$SC_6 = (0.070, 0.115, 0.198)$$

After obtaining the expansion phase supplies, the possibility for any possible binary mode in the table (6) and at least the possibility of calculating each of these factors to obtain the gravimetric factors than other factors in the table (7) is achieved.

Table 6. degrees of feasibility for each binary mode may open determinants of innovation

$sc_1 \geq sc_2 = 0.567$	$sc_2 \geq sc_1 = 1$	$sc_3 \geq sc_1 = 0.959$	$sc_4 \geq sc_1 = 1$	$sc_5 \geq sc_1 = 1$	$sc_6 \geq sc_1 = 1$
$sc_1 \geq sc_3 = 1$	$sc_2 \geq sc_3 = 1$	$sc_3 \geq sc_2 = 0.535$	$sc_4 \geq sc_2 = 1$	$sc_5 \geq sc_2 = 1$	$sc_6 \geq sc_2 = 0.685$
$sc_1 \geq sc_4 = 0.428$	$sc_2 \geq sc_4 = 0.869$	$sc_3 \geq sc_4 = 0.398$	$sc_4 \geq sc_3 = 1$	$sc_5 \geq sc_3 = 1$	$sc_6 \geq sc_3 = 1$

$sc_1 \geq sc_5$ = 0.504	$sc_2 \geq sc_5$ = 0.942	$sc_3 \geq sc_5$ = 0.472	$sc_4 \geq sc_5 = 1$	$sc_5 \geq sc_4$ = 0.928	$sc_6 \geq sc_4$ = 0.552
$sc_1 \geq sc_6$ = 0.904	$sc_2 \geq sc_6 = 1$	$sc_3 \geq sc_6$ = 0.866	$sc_4 \geq sc_6 = 1$	$sc_5 \geq sc_6 = 1$	$sc_6 \geq sc_5$ = 0.625
$sc_1 \geq sc_7$ = 0.591	$sc_2 \geq sc_7 = 1$	$sc_3 \geq sc_7$ = 0.559	$sc_4 \geq sc_7 = 1$	$sc_5 \geq sc_7 = 1$	$sc_6 \geq sc_7$ = 0.705

Table 7. The importance of effective open innovation

New Technology application	The use of R & D	Elite Labor	Joint ventures	communication with clients	Structural factors	Factors
0.682	0.842	0.782	0.627	0.583	0.934	minimum Degree of feasibility
0.153	0.189	0.176	0.141	0.131	0.210	The final weight

Conclusion

Innovation provides fuel of economy. This means that any organization provided jobs to be created if the context of innovation and technology transfer will be operating. Full of change and innovation very important organizations today to compete with rival firms and has evolved stay in the cycle, because innovation as a critical factor organizations in order to create value and sustainable competitive advantage in today's changing and complex environment. In fact, we can say that in today's knowledge-changing environment, innovative organization can only maintain its existence and the needs of customers, and stakeholders respond as soon as possible. Open innovation paradigm that assumes that firms can and should of foreign ideas and paths to market, as well as internal and external use. In this paradigm becomes more permeable boundaries between an enterprise and its environment and innovation can flow easily inside and outside the firm. Structural factors, communication with customers, a joint venture between the corporate elite workforce, the use of research and development, application of new technologies, including the most basic factors affecting the development of innovation in organizations today that

according to them the necessary fields for the development of innovation in these organizations provided. Explanation design model that includes all the factors affecting the development of innovation in organizations, the need for such an organization was not original as it is a theoretical vacuum. In this study, an attempt is made to check the dimensions, factors and factors affecting the development of open innovation, effectiveness and priority of each dimension assessed. The results show that each of the six groups of structure, communication with customers, a joint venture between corporate elite workforce, the research and development unit were effective utilization of new technologies on open innovation and structural factors. As the most influential factors on innovation open and use of research and development, the use of new technologies, an elite task force, a joint venture between the organization and the relationship with the customer to arrange are the next priorities.

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