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Investigation of the Influence of Human Capital Dimensions, Structural Capital and Relational Capital on Learning and Development of New Products

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ABSTRACT

The present research aims to investigate the influence of human capital, structural capital and relational capital on learning and development of new products. In terms of goal, it is an applied research and in terms of methodology, it is a descriptive correlation. Statistical population of the research included employees of Pakshou Industrial Group. 146 employees were selected as sample size. Questionnaire was used for data collection. Structural equations modeling technique was used for data analysis. The results showed that human capital, structural capital and communication capital had significant influences on organizational learning and also organizational learning has a significantinfluence eon development of new products.

KEYWORDS: human capital, structural capital, relational capital, learning

INTRODUCTION

Businesses have been developed in the present world and it is necessary to identify resources and factors which affect strategies and opportunities in new development. In a globalizing market, products have short life cycles. New technologies cause considerable changes in production and service processes and have developed new products in organizations. In such an environment, identification of factors which play role in increasing competition and value creation is very vital to management. Management and economy experts propose to use to use competitiveknowledge. An increase in paying attention to knowledge in an organization leads to intellectual capital. Intellectual capital is a value which can be converted into profit and it is the sum of ideas, existing structures and useful organizational directions. Organizational learning can also contribute to formation of knowledge within an organization and empower the organization against rapid environmental changes. Therefore, intellectual capital and organizational learning can help an organization with fulfillment of goals which is the very development of market via production of new products (Ghelichli, 2008, p 133). In this chapter, we deal with statement of problem and importance and necessity of research subject.

Intellectual capital is a main factor in achievement of long-term profit and performance in a knowledge-based economy. Companies have found that virtual capitals can be more valuable than real and visual capitals. Nonako states that future society is based upon knowledge in which applied and superior knowledge is the base of economy of countries. In such a society, industries can not only rely on their traditional productions for achieving competitive advantage but also should use knowledge management and intellectual capitals for more integration in internal processes. This trend indicates the importance and necessity of capabilities of organizational learning in order to develop industrial activities. This reality has received a lot of attention in few studies.

Organizational learning is an innovation infrastructure in organizations and this subject relies on empowerment of managers in implementation of organizational learning process. Furthermore, organizational structure and method of implementation of processes and policies adopted in an organization can be effective in improvement of organizational learning in the present organizations. Furthermore, organizational learning process can create innovative thinking in an organization and develop new products in the organization (Roumani and Nwankpa, 2014).

Many studies have been conducted on performance of strategies of product development but many factors which influence new product development still remain unidentified. For instance, some studies have been conducted on the influenceof intellectual capital of new product development but none of them has considered simultaneous influence of intellectual capital and organizational learning. Therefore, the main subject of the present research is to investigate the influence of intellectual capital and organizational learning on performance of new product development in Pakshou Company (Fang, 2009).

In today's volatile world, organizations look for methods for improving effectiveness and efficiency. It is obvious that any kind of improvement in organizations requires many material and spiritual resources. In the new approach to management, intellectual and spiritual capitals are also important besides traditional resources. Intellectual capital is a kind of intangible asset in an organization. Today's economy is based upon intellectual capital and knowledge and information are its elements. These intangible assets are factors other than financial and physical assets which play role in creation of value in an organization and can be controlled by that

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(Ghoraishi and Alavi, 2007). Intellectual capital is made up of three elements: human capital, structural capital and relational capital (Ghelich Li et al, 2006).

Moreover, survival and growth of organizations in the present world involves having ability to respond to variations. Organizations which can emphasize and concentrate on learning can survive. Today, learning is considered as the greatest competitive advantage in new business paradigms (Mirakzadeh et al, 2012). Therefore, acquisition of such an advantage involves emphasizing on organizational assets and capitals but these tangible assets are not physical but intellectual capital can be very important. Moreover, coordination with environmental changes in production organizations requires presentation of new products and sending them to new ever-changing markets. This can lead to new product development strategy in organizations. This is because customers' needs change as technology is developed. Development of a new product is a process which results in organizational responsiveness and flexibility and is in fact an instrument for becoming compatible with environmental changes and empowerment is considered as a stable competitive advantage. Considering the direct influence of new product development on competitive capability and reduction in new product development risk in an organization is a managerial principle and concentration (Nouri and Ibrahimi, 2005).

Development of new products in Pakshou Company has always received a lot of attention by its managers. Moreover, this company has a good potential of human force and structural capitals. Organizational learning for improvement of employees' skills and aimed at developing new products can be an important subject of study. Furthermore, it seems that organizational learning which is the very organizational capability for coping with environmental changes involves acquisition of organizationalintellectual capitals and such a kind of process can result in development of new product in organization and acquisition of competitive advantage (Li et al, 2013). Therefore, the present research investigates relationship between intellectual capital and organizational learning and finally the role of organizational learning in development of new product will be explained. Considering the above discussion and necessity for development of new products in order to acquire competitive advantage in internal and international markets is a response to the following basic question:

Whether intellectual capital and organizational learning process can result in development of new products or not?

Intellectual capital

Intellectual capital has always been an ambiguous concept and many definitions have been presented for it. Many people tend to use phrases like assets or performance stimulants instead of it and substitute the word intellectual with other words like intangible, knowledge-based or non-financial. Some professions (financial accounting and legal professions) also provide differentdefinitions like non-financial fixed assets which do not have physical existence. Stewart believes that intellectual capital is a collection of knowledge, information, intellectual assets, experience, competition and organizational learning which can be used for wealth creation. In fact, intellectual capital embraces all employees, organizational knowledge and its abilities for creation of added value and results in competitive benefits (Ghelich li et al, 2008).

Benetis (2000) defined intellectual capital as a collection of intangible assets (resources, abilities and competition) which are obtained from organizational performance and value creation. Edvinson and Malon defined intellectual capital as information and knowledge used for working for creation of value. Benites and Haland (2002) defined intellectual capital as:Intellectual capital is a store of knowledge which exists in an organization within a particular time section. In this definition, relationship between intellectual capital and organizational learning has been considered. Intellectual capital is an asset which measures an organization's ability to create wealth. This asset does not have an objective and physical nature and is considered as an intangible asset which has been acquired via application of assets which are related to human resources, organizational performance and outside-organizational relations. All these features cause value creation inside an organization and this value cannot be purchased becauseit is a completely internal phenomenon (Rose and Barrons, 2005).

Table 1.Definitions for intellectual capital

definitions	date	authors
It is an economic value which is created by two sets of intangible assets: organizational capital and human capital	2000	**OECD**
Special corporate resources which are necessary for creation of value.	2000	**nonaka**
Intangible assets are valuable non-physical intangible assets which are created by unique organizational plans and human resources.	2001	**Lief**
It is a collection of knowledge assets which create added value for key beneficiaries and allow the organization to promote its competitive position. These assets include human assets, relational assets, cultural assets and daily activities, intellectual assets and physical assets.	2001	**maroshioma**
Intangible assets include human capitals like talents and skills and knowledge. Information capitals include databases, information systems and technological infrastructures of human capital like leadership style culture and ability to share knowledge.	2004	**Kaplan and Norton**
Intangible assets are non-financial constant assets which are not material but their nature can be identified and controlled by legal rights and protective rights.	2004	**I A S B**
Intellectual capitals can be measured by concepts like human capital, relational capital and structural capitals.	2009	**Fang**

Different types of intellectual capital

Intellectual capital is classified into three categories:

1. human capital-individuals who are resources for innovation and invention;

Two: structural capital-an instrument for division and transfer of knowledge;

Three: relational capital-which refers to relations which create value in commerce;

Intellectual capital is created by interaction among elements of human capital, structure .(Ghelichliet al, 2009). Human capital cannot create difference unless it is accompanied by two other elements each of which will be explained and described.

Human capital

Human capital indicates the store of knowledge among individual in an organization. Bentis believes that human capital is like a resource for innovation and strategic recreation and is very important. Ross et al (1997) believe that employees create intellectual capital via competency in attitude and intellectual agility. They believe that competency includes individuals' skills and education. Attitude includes employees' behavioral element and enables an individual's intellectual agility to change procedures and thinking about solving problems innovatively. Bruking believes that human assets of an organization include skills, expertise, problem-solving ability and leadership styles (Ross, Dragonetti and Edvnson, 1997). Chen et al (2004) believe that human capital refers to factors like employees' knowledge, skill, capabilities and attitudes which results in improvement of performance of attraction of customers and increasing companies' profits. If employees are not employed well in an organization,skills in their minds cannot be activated or be turned into market value (Chen and Xie, 2004). Although employees are very important in a learning organization, they are not owned by the organization but the question is that whether the new knowledge created by employees belongs to the organization or not? For instance, a software programmer of a company programs in the weekends at his home. Whether the programs are still the company's?

Human capital has made organizations to rely highly on employees' knowledge and skills for creation of income and growth and improvement of productivity. Many benefits can be achieved on human capital. Using this information, human resources can be allocated more effectively and skill gaps and human resource abilities gaps can be identified easily. Moreover, human capital facilitates preparation of more comprehensive information for potential investors. Traditionally, most organizations consider the money they spend on human resources as a cost in their financial statements and not as an investment. Furthermore, Bruking believes that human asset of an organization includes skills, expertise, problem-solving ability and leadership style. as quoted from Anvari and Rostami (2003), Stewart believes that although employees are main assets of a learning organization but they are not property of the organization because still it is discussed that whether the knowledge created by employees belongs to the organization or not? For instance, a software programmer of a company programs in the weekends at his home. Whether the programs are still the company's?human capital has made organizations to rely highly on their employees' knowledge and skills for creation of income and growth and also improvement of productivity (Anvari and Rostami, 2003).

Structural capital in general, human capitals return to their homes at nights. Managers hold the responsibility to make knowledge assets which do not return to their homes at nights! This can be done via structural capital which includes technologies, distribution of data networks, processes and organization. Structural capital creates an environment by which knowledge is created and gets prepared to enter market (Sveiby, 1997). Creation of knowledge bank allows for re-using knowledge. Structural capita of an organization must create a map and guide for intellectual capital assets. For instance, where we should look for knowledge or who has the best skills? Only organizational knowledge must be used as a guide. It is a knowledge which is directly related to main organizational strategies. This knowledge must result in better performance. If you look for something, you will face a mass of insignificant data which require to be sorted in order to find the intended target. Structural capital includes all non-human knowledge stores in an organization which embrace databases, organizational charts, executive directions for processes, strategies and generally whatever its value for the organization is greater than its material value. Bruking (2004) believes that structural capita includes infrastructural assets like technology, processes and working methods and also includes intellectual assets like technical knowledge, commercial brands and registration and use right. Moreover, Stewart believes that structural capital means knowledge existing in IT, registration and usage right, designs and brands. From Bentis' viewpoint, if an organization has weak working systems and procedures, intellectual capital will not achieve its maximum potential ability while organizations with strong structural capitals have supportive cultures which allow for doing new tasks, get defeated and learn from experiences. Furthermore, Chen et al (2004) believe that structural capital can help support employees with implementation of optimal intellectual performance and organizational business performance. Structural capital is a function of human capital too. Therefore, structural capital and human capital have interactions with each other and help organizations with using customers' capital (Mojtahedzadeh et al, 2010).

Relational capital

The core point of relational capital is knowledge stored in marketing paths and relationships with customers. Customer capital indicates potential ability of an organization as a result of external intangible assets. Although the term customer capital was first introduced by Hubert Saint Enj but new definitions referred to it as relational capital which includes knowledge existing in all relationships which an organization establishes with customers, competitors, suppliers and commercial associations and government. Moreover, Roos et al believed that relational capital includes relations with internal and external organizational beneficiaries (Roos et al, 1997). Furthermore, Chen et al classified customer capital into marketing capability, market intensity and customer loyalty. This approach emphasizes mainly on the role of services and its impacts on causal relations between employees' satisfaction, customer satisfaction and customers'loyalty and financial performance (Chen, 2004). Fornell found that customer satisfaction can maintain business relationship. Flexibility reduces a product's price and increases its reliability. Further, other studies showed that customers' loyalty can be predicted via measurement of employees' loyalty. Studies provide more evidence on the importance of customer capital as a key section of intellectual capital. In general, customer capital which plays the role of a bridge and mediator in the process of intellectual capital plays an important role in conversion of intellectual capital into market value and therefore business performance. Market value or business performance of an organization cannot be implemented without customer capital. Therefore, customer capital growth depends on supporting human capital and structural capital (Mirkamali and Zahouri, 2008).

Considering the above discussion, the research conceptual model is extracted from Fang et al (2009) and depicts relationship between organizational intellectual capital and organizational learning and new product development. This model is as follows:

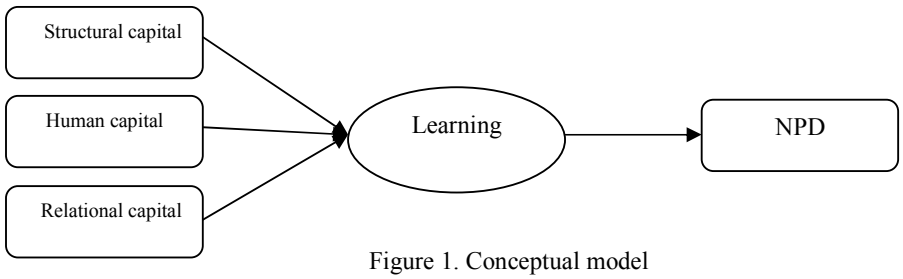

Figure 1. Conceptual model

Research hypotheses

H1: structural capitals have a direct influence on organizational learning.
H2: human capital has a direct influence on organizational learning.
H3: relational capital has a direct influence organizational learning.
H4: organizational learning has a direct influence on product development.

RESEARCH METHODOLOGY

The present research is an applied study. In terms of data collection, it is a descriptive study. Furthermore, in terms of data analysis, it is a correlation study which was conducted by means of structural equations modeling.

Statistical population and sample

Statistical population of the research included all employees of Pakshou Industrial Group. Investigations showed that all employees of the group were 220 people in number. Therefore, Morgan Table was used for determination of sample size. Sample size was equal 140 people.

Data gathering instrument

Questionnaire was used for data analysis. Five-point Likert scale was used as measurement scale from "completely disagree" to "completely agree". After questionnaire preparation, 20 questionnaires were distributed as test among employees of Pakshou Industrial Group. Cronbach's alpha was used for investigation of reliability. The results showed that Cronbach's alpha coefficients were above 0.7 for all variables and total questionnaire (the calculated Cronbach's alpha for all variables and total questionnaire have been presented in table 2.). Moreover, content validity of the questionnaire was verified by experts. Therefore, the questionnaire had enough reliability and validity to be distributed among sample members.

Table 2.reliabilitycoefficients for questionnaire

variables	questions	Reliability coefficients of dimensions
Structural capital	1 to 4	0.79
Human capital	5 to 10	0.73
Relational capital	11 to 14	0.83
Organizational learning	15-18	0.73
NPD	19-22	0.79
Total questionnaire	22 questions	0.86

Considering the fact that some questionnaires mightbe incomplete, 150 questionnaires were distributed randomly. 146 questionnaires were complete and were used for analysis.
Respondents' demographic information has been presented in table 3.

Table 3: demographic information of respondents

variable	dimensions
gender	Male=67.9%, female=32.1%
Age	Younger than 25: 10.6%, 25-30 years old: 35.5%, 31-40 years old: 31.2%, 41-50 years old: 17%, and 51 and above: 5.7%
education	High school degree and below: 10%, associate's degree: 21%, bachelor degree: 51% and master and above: 18%

Research hypotheses test

Structural equations modeling technique was used for hypotheses analysis. This is a statistical modeling technique and embraces path analysis and its main concentration is on latent variables which are defined by means of measurable indices.
In structural model we try to validate relationships between latent variables which have been extracted considering data. LISREL software (version 8.8) was used for modeling.
The important point in structural equations modeling is that the model should be fit enough for investigation of relationship among variables. This can be obtained via fit indices provided in the final output of LISREL. Table 5 depicts fit indices.

Table 5: model fit indices

indices	Allowable limit	Numbers calculated
Kai-squared over df	/df<3 χ^2	1.94
P value	<0.05p value	0.0000
(RMSEA)Root mean square error approximation	0.08<RMSEA	0.081
(GFI)Goodness of fit index	Above 0.9	0.91
(CFI)Comparative fit index	Above 0.9	0.93
(NFI)Normalized fit ndexi	Above 0.9	0.92

As it can be seen in table 5, all fit indices (except for RMSEA=0.81) are in allowable range and this indicates fitness of model: Kai-squared=1.94, p=0.000, fit index=0.91, comparative fit index=0.93, normalized fit index=0.92.
In order to test research hypotheses, we used the results of LISREL software in two states of standard model (figure 2) and significance model (figure 3).

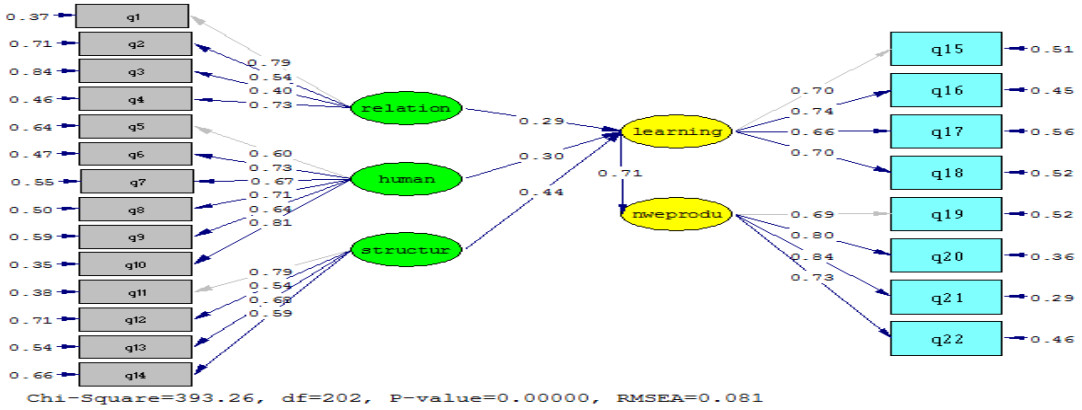

Figure 2.research model in standard state

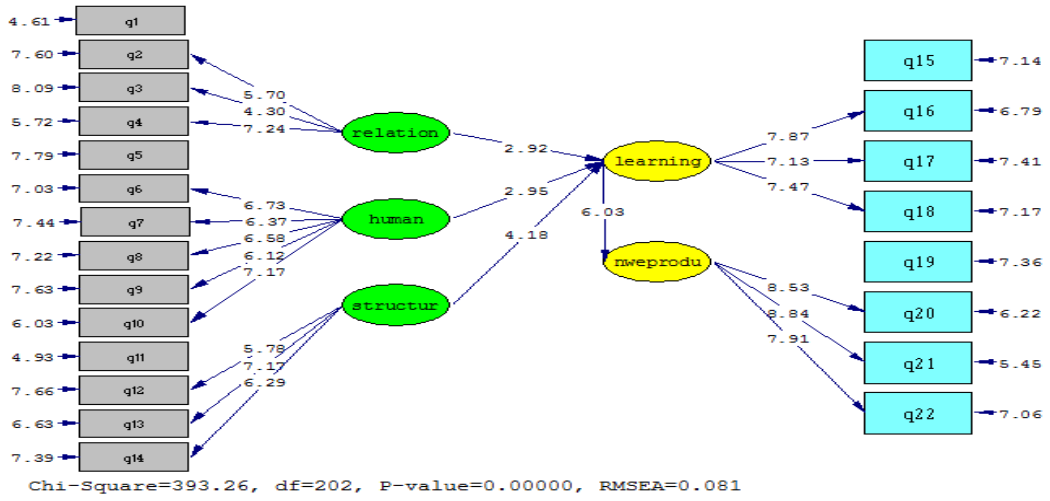

Figure 3: research model in significance state

Considering research models in significance state and standard state we can present research hypotheses in table 6.

Table 6: results of research hypotheses test

hypotheses	Path coefficient (standard)	Significance number(T)	result
H_2 :relational capital has a direct impact on organizational learning.	0.29	2.92	supported
H_1 : human capital has a direct impact on organizational learning.	0.30	2.96	supported
H_3 : structural capital has a direct impact on organizational learning.	0.44	4.18	supported
H_4 :organizational learning has an influence on NPD.	0.71	6.03	supported

Considering the fact that certainty level is 95% for hypotheses test, all hypotheses which have significance numbers (T) outside +1.96 and -1.96 are acceptable. According to our analysis and table 6, all hypotheses are accepted. Structural capital with a factor loading equal to 0.44 had the greatest impact on organizational learning. After structural capital, human capital with a factor loading equal to 0.30 and relational capital with a factor loading equal to 0.29 influenced organizational learning. Organizational learning with a factor loading equal to 0.71 hadthe greatest impact on new product development.

Conclusion

In this section we deal with all research hypotheses. The following studies were obtained in analyses:

- The present research shows that there is a relationship between human capital and organizational learning. Therefore, it seems that organizational learning can be increased in an organization by human capital development. Howang and Hiva (2007)investigated relationship between intellectual capital and performance in Taiwanese engineering consultancy companies. The population included 25 consultancy companies in construction industry in Taiwan. The results showed that there is a positive correlation between three elements of intellectual capital and commercial performance. The greatest correlation belongs to human capital and after that belongs to customer capital (relational capital). Further, there was a positive correlation between three elements of intellectual capital (human, structural and customer). This subject supports the results of the research.
- The results showed that there is a relationship between structural capital and organizational learning. Therefore, it seems that attention to improvement of structural capital elements like organizational directions, current procedures in an organization can contribute to organizational learning. Fang (2009) also showed also that there is a relationship between structural capital and organizational learning. Therefore, it seems that the results of the present research are reliable.
- The results showed that there is a relationship between relational capital and organizational learning. Therefore, it can be said that organizational learning can be improved by relational capital elements like relationship with customers, beneficiaries and distribution factors. Weig (2002) believes that factors like knowledge creation, innovation and knowledge sharing help develop intellectual capital in an organization and intellectual capitals are created by an effective knowledge management. Furthermore, he showed that intellectual capital helps with improving organizational learning. Therefore, it can be said that elements of intellectual capital (human, structural and relational capital)

have relationship with organizational learning. Therefore, it seems that the results of the present research are acceptable.

- The present research showed that organizational learning has a positive influence on new product development. In this regard, Yan et al (2013) investigate relationship between organizational learning and new product development. They investigated managerial skills as a mediating variable in relationship with organizational learning and new product development. They showed that not only organizational learning has relationship with new product development, but also managers' skills increasethe intensity of this relationship. Further, Nonako (1995) found that companies' successfulness relies on innovation, creativity and technology. Moreover, organizational learning is an important resource for creativity and competitive advantage. Organizational learning results in development of knowledge in an organization and these resultsin new product development. Therefore, the results of the present research seem to be logical.

REFERENCES

Alavi, Ali, Ghoreishi, Rouhollah; a model for measurement of intellectual capital in Iranian organizations, number 150, management thought, first year, number 2, autumn and winter 2007, pp: 127-150.

Anvari, Ali Asghar, Rostami, Muhamamd Reza, evaluation of models and methods for measurement and valuation of intellectual capital in companies, accounting and auditing evaluations, journal of Tehran University, Management Faculty, year 10, number 34, 2003, pp: 51-75.

Chen, J., Zhu, Z. and Xie, H.Y. (2004), "Measuring Intellectual Capital: A NewModel and Empirical Study", *Journal of Intellectual Capital*, Vol.5, No.1.pp 195-212.

Fang, Wenchang ,Ya-Hui Hsu (2009), Intellectual capital and new product development performance: The mediating role of organizational learning capability, Technological Forecasting & Social Change 76,pp 664- 677.

Ghelichli, Behrooz, Mushabbaki, Asghar (2006). The role of social capital in creation of intellectual capital in an organization: an investigation of The Two Automotive Companies (SAIPA and Iran Khodro), management knowledge quarterly, number 75, pp: 125-147.

Mojtahedzdeh, Vida; Alavitabari, SeyeydHosein; Mehdizadeh, Mehrnaz; relationship between intellectual capital and performance of insurance industry from managers' viewpoints, accounting and auditing investigations, journal of Management faculty of Tehran University, number 60, summer 2010, pp: 109-119.

Mir kamali, Muhamamd; Zohuri, vajiheh; management of intellectual capital is a necessity for organizations in knowledge-based organizations, management message, number 28, autumn 2008, pp: 81-105.

MirakZadeh, Ali Asghar; Shiri, Nematollah; Allah Veisi, Muhmmad; karami, Roya; the role of social capital in organizational learning in Agricultural Jihad Organization, economic studies and development of Iranian agriculture, second period, number 3, 2012, pp: 447-459.

Nouri, Siamak; Ibrahimi, Masih; knowledge management is an instrument for product innovation, tomorrow's management, autumn and winter 2005.

Rose and Barrons , (2005) The Effect of Disclosing Intellectual Capital(The Core Asset for theThird Millennium Economic entities) on the Internal and External Finacial Statements, Users,2005,

Roos, J., Roos, G., Dragonetti, N.C. and Edvinsson, L.(1997) Intellectual Capital: Navigating in the NewBusiness Landscape, Macmillan, Houndmills, Basingtoke, pp 34-77.

Sveiby, K.E. (1997), "The Intangible Assets Monitor", *Journal of HumanResource Costing and Accounting*, Vol.2, No.1.pp 212-331.

YamanRoumani, Joseph Nwankpa (2014), Understanding the link between organizational learning capability and ERP system usage: An empirical examination, Computers in Human Behavior 33, 224–234.

Yuan Li, ZelongWei, JieZhao, ChenluZhang, YiLiu (2013), Ambidextrous organizational learning, environmental munificence and new product performance: Moderating effect of managerial ties in China, Y. Lietal. Int.J. Production Economics14695–105 97.