

Full Length Research Paper

Study of the relationship between intellectual capital management and organizational innovation in the banks

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Today, intellectual capital in terms of its nature and its growing importance in innovation is regarded as a competitive advantage and as an indicator of organization economic performance and as a sign of growth and development of a country. Therefore, the goal of this study is to explore the relationship between intellectual capital management and organizational innovation in the branches of Mellli Bank in Iran in 2010 to 2011. The method of the study is descriptive and correlation type. The statistical sample group includes 155 employees of the bank staff in 2011 (according to Kerjciey-Morgan table). The relative classified and random sampling was used. Two standard questionnaires as the research tools were used to explore the relationship between intellectual capital management and organizational innovation. The experts confirmed the validity of the questionnaires. The reliability was assessed by Cronbach's alpha method and the rate for intellectual capital management was 94% and for organizational innovation questionnaire was 93%. For analysis of data, first the demographic indexes of the sample and descriptive indexes of the variables were studied. Then, correlation matrix, statistic indexes of regression, path factors and sufficiency index and sufficiency model were used. The findings for the main hypothesis showed that there is a relationship between intellectual capital management and organizational innovation with 95% reliability. There is also a relationship between parameters of intellectual capital management (relational capital, organizational capital, human capital) and intellectual capital management with 95% reliability. The rate of regression shows that rate of relational capital is higher than the rate of human capital. LISREL output shows no indirect impact of intellectual capital on organizational innovation and occupational and personal factors.

Key words: Intellectual capital management, human capital, structural capital, relational capital, organizational innovation.

INTRODUCTION

Today, because of development of new forms of services and their combination with information technology, importance of intangible resources along with physical and tangible resources are conceivable for organizations (Sengge, 2010; Setayesh and Mostafa, 2009). Therefore,

the concept of wealth source is changed for communities and the change would result in transition in the business atmosphere in the communities (Rostami et al., 2005; Mohammahasan and Toraj, 2009). Because, as the demand for physical resources increases, organization access to the limited resources is also limited and thus, various organizations are attempting to find alternative resources (Guthrie et al., 2007; Petty and Guthrie, 2000).

Economy is based on knowledge in 21st century. As mentioned before, industrial economy prevailed

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previously in the communities. In this economy, the agents of economic wealth production included physical and tangible assets such as land, work force, money and machinery which in combination and with integration created wealth (Flamholtz, 1985).

Knowledge as an agent of production played a minor role in this economy. But, in today's knowledge - based economy, knowledge as an agent of wealth production benefits higher value than other tangible and physical assets (Bontis, 2004; Madhooshi and Asgharnejadmiri, 2009). In the other words, intellectual capitals and specifically, human capitals are regarded as the most important assets of organization, and organization potential achievement depends deeply on their intellectual capabilities (Flamholtz et al., 2002). With growth of knowledge-based economy, intangible assets of companies is regarded as an important agent for maintaining and realizing competitive advantages (Andrissen et al., 2000; Tayles et al., 2002). It indicates that it is essential to care about intellectual assets in an organization. Intellectual capital as a new concept, has been studied world widely since 90's but because it is considered as a valuable resource (Khodavandkar and Khodavandkar, 2009; Mirkamali and Vajih, 2009), increasingly, its growth and development rate is regarded as a development indicator for the developed countries (Ordonez de Pablos, 2005; Stim, 2009).

On the other hand, this intangible asset has been accounted as one of most added-value resources of organizations and a key asset for raising innovation. Therefore, on national and business levels, it is essential to develop and to manage intellectual capital and the move towards knowledge – based economy results in changing industrial economy prevailing paradigm such that one would see the emergence of information and knowledge based economy (Baecker and Philipp, 2008; Ramboll Group, 2007). Simply, intellectual capital may be regarded as a pocket of knowledge and its components include latent and intangible resources, principles, culture, behavior patterns, capabilities, merits, structures, communications, and processes resulting from knowledge. Knowledge is based on conceptions which result in wealth generation through investment in knowledge, information and intellectual capital and experience (Handy, 2009).

Today, with introducing change in type and importance of value creation in administrative operations, intellectual capital is regarded more important than before and as a valuable tool for developing key assets of an organization (Shojayi and Mostafa, 2009). Economy new development originates from knowledge and information (Bose, 2004) and resulted in raising intellectual capital importance as an item of research and economy (Carson et al., 2004; Handy, 2009) and its role and contribution in managerial, technical, social development of economy are investigated. Thus, business companies can understand the importance of their intangible asset management and

they consider development of their brands, shareholders relation, company's reputation and organizational culture as most important resources with permanent commercial advantages. In this economy, ability to create and make use of intangible assets is considered the major merit for the organizations (Afraze and Sedigheh, 2007; Khodavandkar and Khodavandkar, 2009). Organizational knowledge has been considered as competitive advantage and value creation. Therefore, competitive advantage achievement and survival of organization depends on its ability to create knowledge –based assets and store, distribute and apply them (Flostrand, 2006; Flamholtz et al., 2002).

In knowledge-based economy, intellectual capital is used to create value for organization and in the world today, organization success depends on these assets. Today, we witness increasing importance of intellectual capital as an efficient tool for higher competition in organizations (Nonaka and Takeuchi, 1994). In result, business environment is wonderfully changing. In 21st century economy, investment in information, information technology, electronic commerce, software, brands, intellectual rights, investigations and innovations are all intangible assets and intellectual capital (Bontis et al., 1999; Cohen and Kaimenakis, 2007). In the past industrial paradigm, companies operated based on the principle of economy of scarce, that is, the under controlled resources and assets of companies are limited and scarce and when used, they lose their values. But in the age of information and knowledge based economy, this principle does not work. In knowledge based-economy, companies operate based on the principle of economy of abundance, that is, abundant resources and assets are available for companies. These assets are intangible and concentrated more on human resources (Drucker, 1988; Pike and Goran, 2004).

The study shows that most cases of failing when attempting to merge or to acquire were because of inattentiveness to the role and management of intangible assets. In modern history, innovation is regarded as one key agent for success of organizations and one of important elements of higher competitive advantages for organizations. A major part of economic growth of the developed countries is conducted through innovation (Alvesson and Mats, 2004; Batra, 2008).

The past decades as well as current decade investigations and attempts show that the ending years of present decade and the few beginning years of future decade are critical in management field of intellectual capital for many countries and organizations, and managers feel that they can acquire more added values by achieving knowledge elements through innovation in organization and paying attention to human asset (Bontis, 2004).

90's can be regarded as the beginning for wide spread attention to the concept of intellectual capital. Tom Stuart in Fortune Magazine (1991) wrote the article "brain power

and the importance of intellectual capital” for higher level managers as its audiences (McPherson et al., 2001). It has published many articles since about intellectual capital. Many managers search for assessment of their intangible asset cost and try to raise the performance level of organization by making use of these assets suitably.

Kenerick (1990), a famous American economist holds that “in 1929, intangible asset to tangible asset ratio was 30/70. But in 1990, the ratio was 63/37 (Brennan and Connell, 2000). Liu holds that “10 to 15% of all companies market cost is tangible and physical asset and the remaining 85% is intangible asset (Ghelichli, 2009; Monavarian et al., 2006). Therefore, not only do companies have to identify, assess and manage intangible assets but also they need to raise and improve the assets, otherwise, they would be collapse (Cohen and Kaimenakis, 2007). Many studies have been performed on the management of intellectual asset but there have been a few cases about the subject of his paper and the related population.

Bontis (1998) conducted a study about intellectual capital and explored and surveyed models and indicators of intellectual capita in Canada. The study showed that there is a mutual relationship among intellectual capital components and these assets affect on commercial performance (20 to 30%) (Batra, 2008).

Bazbiere (2000) performed a study on Turkish industry and concluded that both human asset and relational asset show direct and positive effect on nominal and market values of companies. In addition, there is a strong relationship between human and relational capitals. In 2000, certain studies on identification and assessment of intellectual capital have been performed in many countries such as Denmark, Sweden etc.

Meritem Project was funded by European Commission in 2000. Its long term (10 years) goal was to present guidance in assessment and management of intellectual capital to improve the decision making of managers and shareholders (Abbsali and Atiyeh, 2009).

In 2005, a study was performed in Taiwan ‘s industry of information technology similar to Malaysian study and the relationship between intellectual capital and performance based on certain cause and effect models were explored and Malaysian study results were confirmed. Many studies have been implemented on intellectual capital by organization for cooperation and economical development in European countries such as Netherland, Sweden, Denmark and Ireland since 1982 (Guthrie et al., 2007).

Fetros and Beygi (2010) in their study “comparative study of intellectual capital impact on organizational performance in banking industry in Iran for private and public sectors” stated that intellectual capital is often assumed to be intangible asset which can be used as a resource for providing stable competitive advantage. Intellectual capital components interact mutually and

build up value. Previous studies showed that there is a positive and significant correlation between intellectual capital and organizational performance. The goal of this experiment is to test the findings in Iran and to explore three components of intellectual capital (human asset, structural asset and customer asset) and their interrelations in two zones of banking industry (public and private sectors). The results show that the highest effect originates from human asset, structural asset and customer asset, respectively. While in the private sector, the highest impact originates from human asset, customer asset and structural asset, respectively, except that human asset and customer asset in private sector and structural asset in public asset present more effect (Moammaali and Babak, 2009; Mohammahasan and Toraj, 2009).

Rabi’ei (2009) studied “the impact of intellectual capital on economy in Iran” and noted that:” in this study, the impact of intellectual capital and innovation on economy is explored and a model is devised for economy in Iran and the effect of workforce, physical asset, human asset, research and development and machinery on total import as an technology overflow is studied. The result show that intermediate goods, workforce, human asset physical asset and machinery respectively result in higher output in economy of Iran and he insists on importance of human asset and innovation impact on economy (Chen, 2005; Ghelichli, 2009).

Hemati and Mozafari (2010) in their study: “relationship between intellectual capital and market value and financial performance of nonfinancial companies”, state that: “one of the most important current limits and weaknesses of traditional accounting system is that they do not assess intellectual capital but they include it in financial statements of companies. Due to intellectual capital importance and tendency of companies to assess and report it, this paper explores the relationship between intellectual capital, market value and financial performance of nonfinancial companies, registered in the stock market for 2004 to 2008. The results show that there is a significant relationship between intellectual capital and market value and financial performance of nonfinancial companies (Abbsali and Atiyeh, 2009).

Mikamali and Zohor (2009) studied, “management of intellectual capital as a requirement for organizations in the knowledge centered era” and express that “in the knowledge centered economy and after wide social and economic changes, the success of companies is not limited to their financial and physical achievements but it depends to intangible assets they acquire by means of which they can obtain a permanent competitive advantage. In the new strategic environment, only learning organizations which intend to improve constantly their intellectual capital can proceed because, otherwise, they are not able to survive. However, intellectual capital concept is misunderstood although its importance as a critical source of competitive advantage for companies is

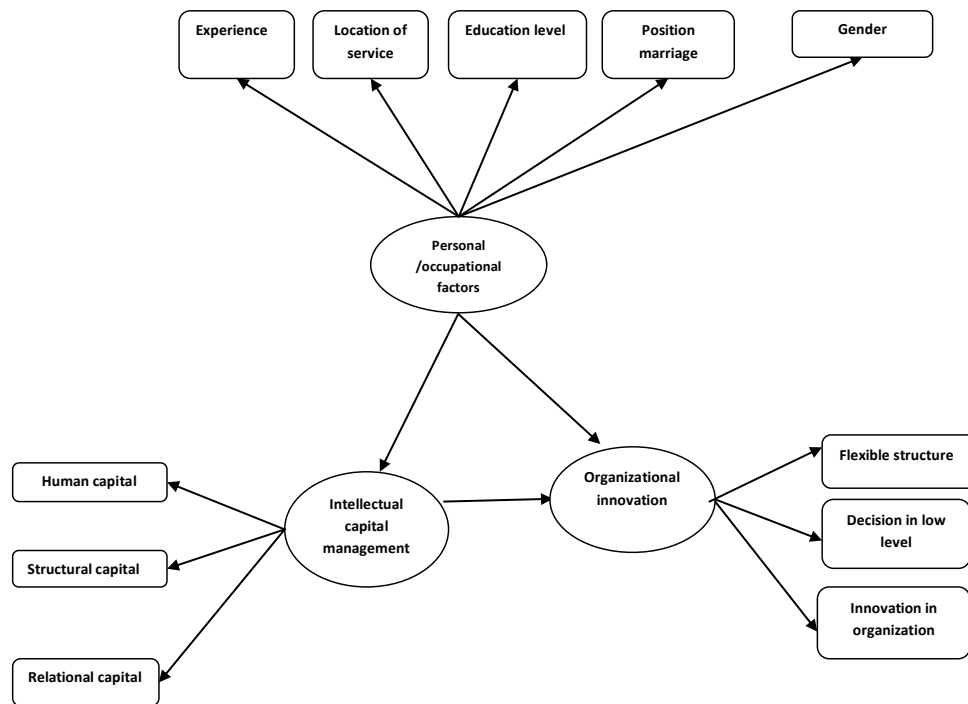


Figure 1. General framework of the study.

increasing constantly. But the management of intellectual capital help the managers creates,raises control and maintains competitive advantage as a strong and unconquerable source (Bose, 2004, Huang et al., 2007). Monavarian (2006) in his study concluded that there is a significant relationship between intellectual capital components and organizational performance (Monavarian et al., 2006). It is noteworthy that the purpose of this paper was to explore the improvement of intellectual capital in organization level in order to develop innovation which is regarded as a priority in the organization. According to the preceding discussion, the general framework of the paper is illustrated in Figure 1.

RESEARCH METHODOLOGY

The research is applied type and its surveying and the data is explored after they had occurred based on cause and effect field inference using library resources.

Statistical population, sample and sampling method

The study was performed on all official and temporary employees of Melli Bank, classified as managerial and non managerial levels who were working in its branches (260) out of whom the sample (155) was selected randomly based on Kergsy–Morgan Table. The investigator coordinated with the research manager as properly. After receiving the permit and implementing coordination, the investigator introduced herself to the employees and the data of the

study was collected. First the amount of sample was determined for each class randomly and then the questionnaires were distributed. The respondent replied the questionnaire while the investigator was present and then the replies were collected.

Tools

Questionnaire was used as the tool. Standard questionnaire for intellectual capital: The validity was confirmed and reliability was achieved using 94% Cronbach alpha, containing 44 questions in three dimensions (human capital, relational capital, and structural capital).

Standard questionnaire for organizational innovation: The validity was confirmed and its reliability was achieved using 93% Cronbach alpha, containing 20 questions.

Validity and reliability evaluation

Validity

Standard questionnaires of intellectual capital and organizational innovation were given to management practitioners and scholars and their suggestions were applied in the questionnaires.

Reliability

The reliability was achieved by using Cronbach alpha and SPSS software for three dimensions of intellectual capital (94%), organizational innovation (93%), relational capital (88%), structural

Table 1. The questionnaires content reliability.

S/N	Questions/hypotheses	Reliability
1	Intellectual capital	94.0
2	Human capital	81.0
3	Structural capital	84.0
4	Relational capital	88.0
5	Organizational innovation	93.0

Table 2. Correlation coefficient for intellectual capital and organizational innovation.

Sig.	0.0005
Pearson correlation	0.80

Table 3. Correlation coefficient for human capital management and organizational innovation.

Sig.	0.0005
Pearson correlation	0.74

Table 4. Correlation coefficient for structural capital management and organizational innovation.

Sig.	0.0005
Pearson correlation	0.79

capital (84%) and human capital (81%). Descriptive method was used to measure frequencies, means, percentages and standard deviants. The hypotheses were tested by variance analysis and Pearson correlation test to identify the relationship between the variants. The Cronbach alpha retest procedure (on 25 employees) was used for evaluation of each defined structure of questionnaire reliability (Table 1).

FINDINGS

H1: There is a significant relationship between intellectual capital and tendency to organizational innovation.

The Pearson correlation coefficient was used to provide a reply to this hypothesis and the result is shown in Table 2. Table 2 shows that the correlation between intellectual capital and organizational innovation is $r = 0.80$ with 0.0005 level of significance. So, the main hypothesis is confirmed, that is, there is a significant relationship between intellectual capital management and organizational innovation.

H_{1a}: There is a significant relationship between human capital management and tendency to organizational innovation in the branches of Mellli Bank in Khorasan.

Table 3 shows that the correlation between human capital and organizational innovation is $r = 0.74$ with 0.0005 level of significance. So, the first minor hypothesis

is confirmed, that is, there is a significant relationship between human capital management and organizational innovation.

H_{1b}: There is a significant relationship between structural capital management and tendency to organizational innovation.

Table 4 shows that the correlation between structural capital and organizational innovation is $r = 0.79$ with 0.0005 level of significance. So, the second minor hypothesis is confirmed, that is, there is a significant relationship between structural capital management and organizational innovation.

H_{1b}: There is a significant relationship between relational capital management and tendency to organizational innovation.

Table 5 shows that the correlation between relational capital and organizational innovation is $r = 0.73$ with 0.0005 level of significance. So, the second minor hypothesis is confirmed, that is, there is a significant relationship between relational capital management and organizational innovation.

H_{1c}: Human capital management rather than relational capital presents more roles in tendency to organizational innovation.

Table 5. Correlation coefficient for relational capital management and organizational innovation.

Sig	0.0005
Pearson correlation	0.73

Table 6. Regression models in brief: analysis of variance and statistical data of regression for organizational innovation relating to relational and human capitals.

Model	variant	B	SEB	β	t	Sig	F	R	R ²	Adj R ²
1	Relational capital	1.01	0.09	0.74	10.76	0.0005	115.85**	0.73	0.54	0.54
2	Relational capital	0.58	0.13	0.43	4.34	0.0005	76.20**	0.78	0.61	0.60
	Human capital	0.72	0.17	0.41	4.16	0.0005				

**All rates of F are significant at P = 0.01.

This hypothesis is explored by step by step regression and Table 6 shows more regression coefficient for relational capital than human capital (B = 0.43, B = 0.41, respectively). So, the fourth hypothesis is rejected, that is relational asset management presents more role in tendency to organizational innovation of employees.

H2: Occupational and personal factors through intellectual capital indirectly impact on organizational innovation.

Unidirectional variance analysis was used to explore the impact of occupational and personal factors on intellectual capital management and organizational innovation. Endogenous and exogenous variants and their indicators added to the structural model. The parameters of the model were estimated using magnified max method. The output model result of measurement and structural equations are shown in Figure 1. First, the hypothesis was analyzed using structural equations. The correlation matrix of all variants is presented in Table 7 because the correlation is the basis of cause and effect inference for providing a general pattern.

Table 7 shows that there is a significant correlation between intellectual capital management and organizational innovation. The correlation rate for human capital and relational capital ($p < 0.01$, $r = 0.79$) is more than correlation rate for structural capital ($p < 0.01$, $r = 0.76$). After reconsidering the correlation coefficients, factor analysis confirmed the best indicators of latent variants of personal and occupational factors, intellectual capital management and organizational innovation based on the data. The confirmative factor analysis showed that gender, married or unmarried, education level, location of service and experience imposed most factorial bearing on personal and occupational factors. Therefore, they were selected as indicators. Human capital, structural capital and relational capital had suitable factorial bearing on intellectual capital management and as latent indicators were added to the model.

The measurement model standard coefficients in Figure 2 show that rates are mostly high, especially, for indicators of intellectual capital and organizational innovation. The lowest indicators belong to gender ($\lambda = 0.02$) and education level ($\lambda = 0.03$) and the highest indicators are for relational capital and intellectual capital management ($\lambda = 0.89$). Table 8 shows direct and indirect impacts of coefficients and the total coefficient. Table 8 shows that indirect impact of occupational and personal factors on organizational innovation is insignificant (-0.02). Therefore, the second main hypothesis is rejected, that is, impact of occupational and personal factors on organizational innovation is not applied through intellectual capital management.

DISCUSSION

According to the findings, there is a positive and significant relationship between parameters of intellectual capital (relational, structural and human capitals) and organizational innovation in the statistical population. The result seems to be similar to the previous studies (Bontis, 2004; Sanchez, 2000; Wang, 2005; Kenan, 2004; Chatezggel, 2003; Hajikarimi and Bathayi, 2010). So, it is clear that intellectual capital is formed by combination, interaction and integrity of three types of capitals (human, structural and relational capitals). It implies that people both generate and retain knowledge (human capital). This knowledge is improved through interrelation among them (structural capital) and it is imported out of the organization and an intra relation with outside world is also improved (relational capital). The total organized knowledge is constantly flowing through these three types of capitals. Raising the human value and human capital, work process improvement and higher structural capital and customer satisfaction, commercial brand credit enhancement and reaction quickly to changes and in result, to increase structural capital, all depend to capability of organization to create, develop and apply innovation as the fourth parameter of intellectual capital.

Table 7. Correlation matrix for the variants.

Variable	Human asset	Relational asset	Structural asset	Intellectual asset	Organizational innovation
Human capital	1				
Relational capital	0.74**	1			
Structural capital	0.79**	0.76**	1		
Intellectual capital	0.90**	0.93**	0.92**	1	
Organizational capital	0.74**	0.73**	0.79**	0.80**	1

**p ≤ 0.01, *p ≤ 0.05.

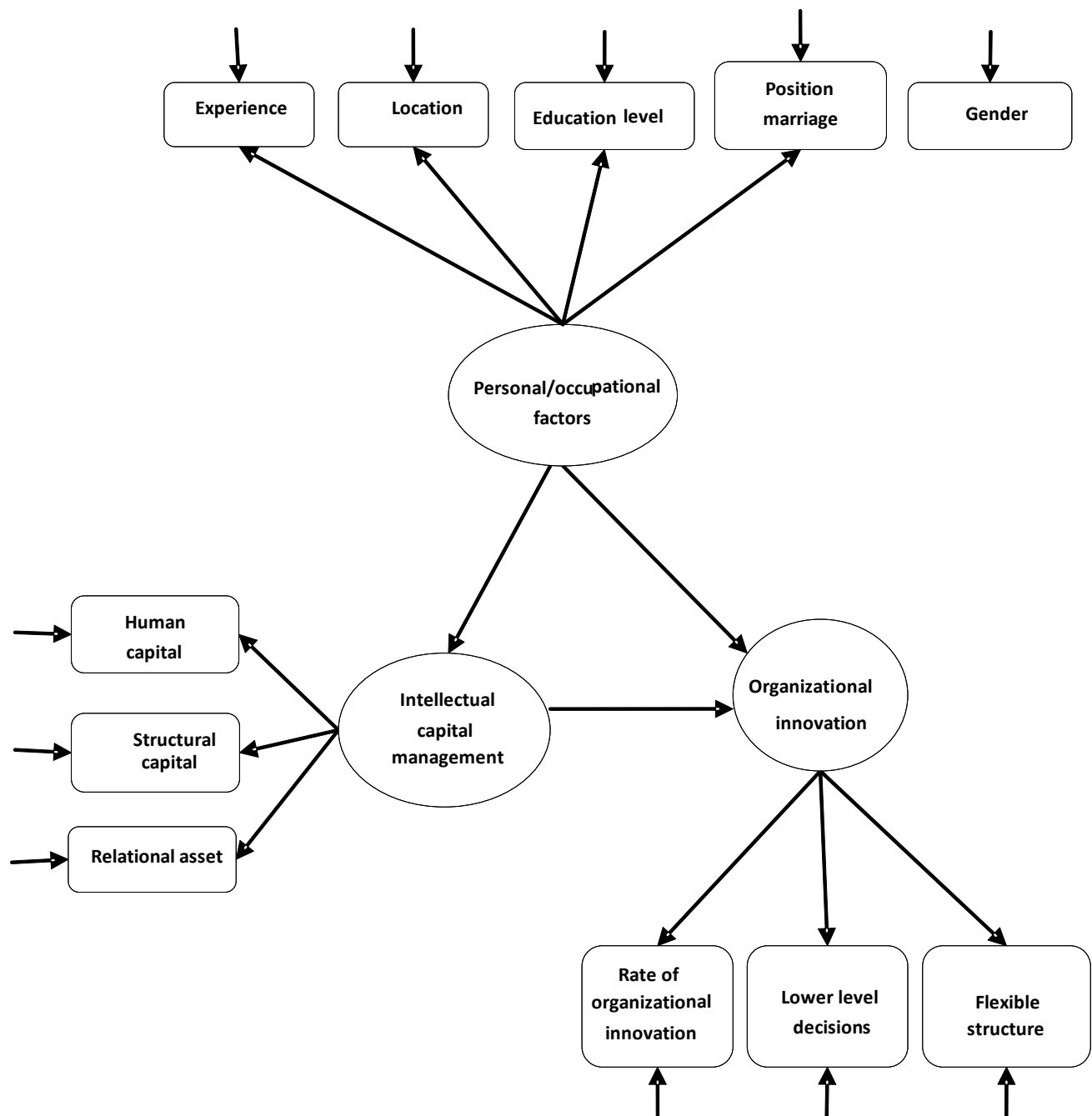


Figure 2. The fit-of-goodness model for relationship between personal and occupational factors and intellectual capital.

Table 8. Direct and indirect and total impacts of occupational and personal factors, intellectual capital management and organizational innovation.

Factors	Indirect impact standard parameter	Total impact standard
By personal and occupational factors on intellectual capital management	*	-0.02
By personal and occupational factors on organizational innovation	0.02 *	0.07 0.84**

**p ≤ 0.01, *p ≤ 0.05.

Connecting organization innovation capability with higher human capitals, improvement of structural processes and extended relation with outside stakeholders would lead to creation of dynamic channels of innovation and optimal exploitation of organization potential intellectual capital. To leave the era of information management and to enter the era of knowledge management requires optimal intellectual capital management, which is realized through production and constant exploitation of organizational knowledge. Production of knowledge without innovation is actually impossible, so focusing on the innovation as an important item while considering other parameters of intellectual capital would result in a knowledge centered and dynamic environment and convenient flowing of knowledge in organization business processes. Knowledge easy flowing and sharing accounts for a more favorable output for managers and employees of organization and would lead to more efficiency and efficacy for them and more satisfaction for all internal and external stakeholders of organization. The aforementioned studies and the current study are aligned.

The findings of the study did not confirm the more role of intellectual capital than relational capital on organizational innovation.

In the past, theorists and investigators have implemented many studies to identify angles and dimensions of human asset concept and its evaluation trends. In result, the concept has been developed as one of basic elements of business and human capital evaluation models.

Today, human capital is regarded as a collection of individual capabilities, knowledge and skills of employees and managers in the perspective of organization which is directly affected by their training rate for developing knowledge, skill and experience (Batra, 2008; Kannan and Aulbur, 2004). The preceding definition clarifies that human capital concept is much extended. As mentioned, beyond the individual pattern of human capital, it depends on knowledge sharing approach and trends and processes of establishing knowledge in the organization (Baecker and Philipp, 2008). Human capital prevailing concept stems from lack of alternatives for knowledge, learning, innovation, creativity and capabilities and these concepts must be established strictly on logic of

competition and context and environment in organization operations.

Also, according to the second main hypothesis, the mediatory (indirect) role of intellectual capital between personal and occupational factors and organizational innovation was not confirmed. Metzger and Sarno (2001) studied the relative effects of intellectual and human capitals on women achievement in Australian banking industry where most workers are female. But they found that less than 6% of executive and high level managers are women. The quality and quantity analysis was performed to answer to the question whether there is a relationship between intellectual capital management and gender or not. Quantity analysis showed that women rather men achievement in banking industry is due to human capital or personal experience. In equal situation and in spite of structural pitfalls, human asset helps women job achievement in banking industry. Certain impediments such as lack of instructor, constant training, flexible work hours and gender discrimination are obvious impediments for women who work.

RESEARCH LIMITATIONS

No doubt, any hard work requires tools and enough accuracy including investigation. So, research may encounter with certain limitations although it benefits from high accuracy:

1. Lack of library resources in the public libraries. So, author supplied them from other cities and they would not be available every time and everywhere.
2. The sample group members were not available to the researcher every time because of certain regulations and their hard work.
3. Loss of similar investigations in other organizations.
4. The problem of longevity between the branches of the bank in different cities.

SUGGESTIONS

Given the results from main hypothesis and the other minor ones, followings are suggested to investigators: It

is suggested to the interested researchers to perform similar studies in other organizations and administrations. The same study can be implemented with other communities such as students and entrepreneurs to achieve an extended result about intellectual capital and organizational innovation relationship.

Intellectual capital and organizational innovation relationship can be explored along with other properties such as culture, global economy, to make potent, business, knowledge management, learning environment and so on.

According the findings in relation to each hypothesis of this study, followings are suggested:

1. The main hypothesis was confirmed, that is, there is a significant relationship between intellectual capital and tendency to organizational innovation. So, it is suggested to take enough care when recruiting and selecting the most capable and knowledgeable managers who can bring innovation into the organization by using official and non official training to improve intellectual capital. It must be emphasized that improvement is a category which is related to whole organization.
2. The first minor hypothesis was confirmed, that is, there is a significant relationship between human capital management and tendency to organizational innovation. So, it is suggested to help managers get the capability to manage human capital and to test and to treat the members of the organization and the employees based on their competence.
3. The second minor hypothesis was confirmed, that is, there is a significant relationship between structural capital management and tendency to organizational innovation. So, it is suggested to evaluate all non human resources (databases, organizational charts, processes, procedures) more important than physical assets.
4. Given the results from the third minor hypothesis and importance of relational capital for improving tendency to organizational innovation, it is indicated that managers must be capable to make high relations with the stakeholders (customers, partners, suppliers and shareholders...) through marketing and relational channels.
5. The fourth minor hypothesis was not confirmed. It means that more impact of human capital management rather than relational capital on tendency to organizational innovation is rejected. So, it is suggested to take particular care for relational capital and customer centered approaches as well as for skills of employees and their knowledge and competence in order to raise the innovation in human asset.
6. Given the rejection of the second main hypothesis (intellectual capital can mediate the indirect effect of personal and occupational factors on organizational innovation), it is suggested to managers to take care for personal and occupational factors (education level, location of service and so on). By taking care for these factors, human force would receive the essential training

and the expected result would be achieved by investment in it.

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