European Online Journal of Natural and Social Sciences 2013;
vol.2, No.3, pp.399-407 ISSN 1805-3602

Investigation of the relationship between dimension of intellectual capital and organization knowledge management (Case study: East Azerbaijan regional hydrology firm)

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Received for publication: 15 May 2013.
Accepted for publication: 08 July 2013.

Abstract

This research was conducted with the aim of investigating the relationship between dimension of intellectual capital and organization knowledge management in East Azerbaijan regional hydrology firm in 2012. The statistical population involves 320 managers, bosses, supervisors and experts of East Azerbaijan regional hydrologic firm. The data were collected by simple random method. The sample volume is 175 individuals based on Morgan table. The data were collected by questionnaires involving Bounties intellectual capital standard and Phyllis knowledge management standard questionnaire. The conceptual validity of the questionnaire was confirmed according to the expert viewpoints and reliability was measured by Cronbach alpha test, whereas Cronbach alpha coefficient and knowledge management questionnaire coefficient were equal. Pearson coefficient test and regression analysis were used in order to test of hypotheses by software SPSS16. The results of the research show that there is a significant relationship between dimensions of intellectual capital variable and knowledge management. The analysis of regression shows that dimensions of intellectual capital impact on knowledge management.

Keywords: Intellectual capital, human capital, structural capital, relational capital, knowledge management.

Introduction

In recent years organizations and firms have begun knowledge trend and new concepts like vocational, knowledge work and knowledge management and knowledge organizations have accelerated this trend. Peter Draker refers to new forms of organizations by application of these concepts that thinking is used instead of hand power. According to this theory in the future those societies could be developed and progressed that have more knowledge (Feghi Farahmand, 2003). Undoubtedly, in twentieth century we encounter with great shift in process of creation of value in the firms. Until recent years creation of value in business has been considered by effective utilization of physical resources. Nowadays, value is achieved incrementally by using human factor technical knowledge and other tangible factors like brand and information system in organizations. Knowledge is introduced as new resource of creation of value and knowledge is defined as intangible properties and intellectual capital (Hamidzadeh, 2001, p.318). Since knowledge is an intangible construct it cannot be measured by financial accountancy traditional scales so it can be said that organization's chief experts use only 20 percent of knowledge in their organizations. Indeed, knowledge based workplace in most of the third world countries requires molding and new name involving intangible factors. In such conditions new field of intellectual capital is considered to contain human capitals, organizational capitals and relational capitals (Bannay, 2008).

Complexity of knowledge concept has led to proposing different viewpoints. Danvenport and Prusack in the article "Principles of knowledge management" defined knowledge as: flexible and

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convertible combination of experiences, values, information and new experiences (Danvenport, & Prusak, 1996).

Nonaka and Huber believe that knowledge involves believe that leads to increase potential of phenomena for efficient actions and decisions. In this definition there are several points: at first, knowledge does not lead to efficiency of actions and decisions, secondly, in this definition, a pheromone can be involved individual, group, organization and even society, thirdly, knowledge is among individuals, so it is differentiated from information and data (Alavi, 2000).

Today, knowledge management is important subject and by application of knowledge management systems the long term competitive benefits can be established. In classification of theories of business decade 1980 has been introduced as decade of quality movement, reengineering and decade 2000 has been introduced as knowledge management. Nowadays, in all organizations movement to knowledge based societies are discussed. By advent of modern technology and its application in differ human life aspects a new paradigm has been considered and human life has been changed. In such conditions, organizations use new management tools and methods for achieve competitive advantages and survival in variable environment. So, knowledge management is considered as a new tendency in the organizations. Indeed, intellectual capital and knowledge is foundation of meritocracy and strategy for better performance. Peter Draker believes that "the secret of organizations success in 20th century is knowledge management". Thus, in organizations of third thousand anniversary knowledge management is necessary and all institutes should implement it. The import role of knowledge management is to accept it as a methodology. knowledge management with attraction of new knowledge in the system in one hand and effective management in other hand could be considered as the important factor in change of an organization (Hales, 2001). Because of closeness to decisions and actions of organization knowledge could improve organization more than data and information and a a result enhance quality of services in general and governmental organization in particular.Since every organization manages human capitals and structure and customer so it can be said that all organizations use knowledge management. According to a complex common method not only relative percentage of intellectual capital is different in organizations but human capital, customer and structural percentage is different (Glichli, 2011). Nonaka has classified knowledge. He introduces it in two categories:

1-Explicit knowledge: this knowledge is objective and it can be expressed officially by systematic language .Nanaka believes that this knowledge is independent on stuff and it is seen in computer information systems, books, organizational documents and etc (Samioties,2001).

2-Tactic knowledge: this knowledge is abstract and access to it is difficult. The knowledge that resources and content is implicit and unstructured (Lee, & Choi, 2002).This knowledge is acquired by experience and practical learning and it is not codified. This knowledge is unwritten that indicates stuff experience and skill level. Poolani defines it as: "we know more than what we say" (Moshabaki, & Zarei, 2003).

Today progressing field of intellectual capital is an excitable subject matter for researchers and organizational managers. Intellectual capital has been conceptualized by different fields. For example, accountants are interested in measuring it in balance sheet. Technologists try to codify it in informational systems, sociologists tend to balance power with it, psychologists try to expand minds, human resources mangers tend to calculate investment output by intellectual capital and educational and development experts want to use it in human resources development plans (Glichli, 2010, pp.30-31). Intellectual capital is an implicit and complex concept that it can produce new resources base and lead to competition in case of exploitation. In other hand, intellectual capital is effort to effective use of knowledge (final product) against information (primary material) (Bonties, 1996).

Different definitions have been proposed for intellectual capital but it has been defined to convergent in concept so that researchers on intellectual capital have consensuses on three main constructs: human capital, structural and organizational capital, customer or relational capital.

Human capital indicates an organization stuff knowledge (Bonties, 2000) and it offers the best solutions of individuals knowledge as a collective knowledge (Bonties, 1998). Human capital as intellectual capital refers to factors like knowledge, skill, capability and concern of stuff that lead to efficiency improvement and benefit in the agency and

this knowledge is mind of stuff; so that their mind contain knowledge and skill. According to Ross stuff create intellectual agility by their attitudes and competency. Competency involves individual skills and studies while attitude involves stuff work behavior element. Intellectual agility leads to change in tendencies and thinking on new solutions. Stuff competency is hard part of human capital and it contains knowledge, skills and talents(knowledge and skill are important). Structural capital refers to current business trend of an organization and explicitly it can be classified by as organizational culture, learning and operational process and information systems. Organizational culture consists of values, beliefs and criteria accepted by all stuff. Yudent (2000) defines organizational capital as institutionalized knowledge belongs to an organization that saved in data base, directions and etc. Roos and *et al.* (1997) believe that structural capital involves all non humanistic knowledge resources in an organization that contains data bases, organizational graphs, process executive directions, strategies and executive plans and programs that its value is higher than its material value. Brooking (1996) believes that structural capital involves foundational properties like technologies, process and working methods and intellectual properties like technical knowledge, brand and patent. According to Stwart (1997) structural capital involves information technology knowledge, patent, designs and brands (Glichkhani, 2010). Customer capital indicates potential capability of an organization due to external intangible factors. The main issue in customer capital is knowledge in marketing channels and relationship with customers. This term was proposed by Hubert but new definition expand into relational capital involving knowledge in all relationships among organization, customer, competitors, suppliers, commercial associations or government (Bountis, 1999).

In general customer capital acts like bridge in intellectual capital process and it is determinant factor in converting of intellectual capital into market value and as a result it is organization business. Organizational efficiency is not obtained without relational capital. So relational capital depends on human capital and structural capital support (Chen *et al.*, 2004).The relationship between intellectual capital and knowledge management plays an important role in an organization and both of them complement each other due to overlay function. Level of overlay depends on organizational plans and priorities.Knowledge management plays an important role in development and utilization of intellectual capital and it emphasizes on facilitation and management of knowledge based activities in order to produce knowledge oriented environment for progress of intercultural capital. Organizations should consider their external priorities and integrate their goals in management of intellectual capital with efficiency mechanisms required for knowledge process management.

Glichli (2010) studied on intellectual capital, social capital and competitive benefits in organization and showed that there is a relationship among knowledge strategy, intellectual capital, social capital, human resources management and organizational culture and it creates competitive advantages. Shoaei (2010) investigated organizational factors and management strategy in Tabriz technical and occupational education organization and showed that there is a relationship among organizational structure knowledge production strategy and knowledge transfer strategy and also in organizational culture, knowledge production and knowledge transfer strategy.

According to passing of industrial era and entering to Meta industrial era organizations should prepare context for development. One of these contexts is utilization of capabilities that indicates necessity of knowledge management system. Thus considering intellectual capital as a main factor is important in development of organizational knowledge development. At first, knowledge management was based on information systems then it changed toward development of intellectual capitals management. By analysis of knowledge and importance of its characteristics in organizational performance it can be found that knowledge and up to date information is necessary in survival of organizations. This issue is considered particularly in evaluation of knowledge change trend in the society. It is concluded that today Meta industrial society is information society that forceful technology is replaced with knowledge based technology (Hairharan, 2008).

The aim of this article is to investigate the relationship between dimension of intellectual capital and knowledge management and also the effect of intellectual capital in organization knowledge management.

Methodology

This research is applied according to subject matter and goals and it is correlation due to re-

search method. The field study was conducted in this research. The statistical population involves 320 mangers, bosses, supervisors and experts in six sector east Azerbaijan regional hydraulic organizations. Simple random sampling method was used for determination of sample member. The sample volume was determined 175 individuals according to Kersiji and Morgan table. In order to obtain theoretical principle and research literature texts, theses and articles and in other words library method were employed and the data were collected and also hypotheses were tested by field study method. The data were collected by intellectual capital standard questionnaire based on Bounties viewpoint and knowledge management quetionnar based on Behat model. According to this fact that standard questionnaires have been used in this research and they have been applied in similar domestic and foreign researches so their validity was confirmed. In this research for measuring reliability Cronbach alpha test was used. Table (1) indicates the questionnaires alpha coefficients.

Table 1. Cronbach alpha coefficients.

variable	Cronbach alpha coefficients
Intellectual capital	0.96
Human capital	0.852
Structural capital	0.854
Relational capital	0.929
Knowledge management	0.91

According to the table alpha coefficient is higher than 0.7 and it indicates good overlay. Pearson correlation and one variable linear regression were used for test of hypotheses.

Results

Before statistical test it is necessary to assure normal distribution of the data for selection of appropriate test method. For doing so Kolmogorov Smirnov test was used. In test of normal distribution of the data the null hypothesis is that data distribution follows normal distribution and contrary hypothesis is vice verse. According to table (2) the significant level of all data is higher than 0.05, so it can be said that the data have been distributed normally. Thus parametric statistics can be employed for test of hypotheses.

Table 2. Kolmogorov Smirnov test.

variable	Kolmogorov Smirnov Z	sig.
Human capital	1.024	0.245
Structural capital	1.463	0.280
Relational capital	1.188	0.119
Intellectual capital	0.837	0.486
Knowledge management	0.980	0.292

Secondary hypothesis test (1): human capital impacts on organization knowledge management.

Table (3) shows Pearson correlation coefficient between human capital and knowledge management. According to the table, significance level is lower than 0.01 and its value equals zero and hypothesis of correlation relationship between human capital and knowledge management is confirmed and it equals 0.725, so in error level of 0.0 it can be said that there is a relationship between human capital and knowledge management.

Table 3. Coefficients between human capital and knowledge management.

		human capital	knowledge management
human capital	Pearson Correlation	1	.725**
	Sig. (2-tailed)		.000
	N	175	175
knowledge management	Pearson Correlation	.725**	1
	Sig. (2-tailed)	.000	
	N	175	175

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

Secondary hypothesis (2): structural capital impacts on organization knowledge management.

Table (4) shows Pearson correlation coefficient between structure capital and knowledge management. According to the table, significance level is lower than 0.01 and its value equals zero and hypothesis of correlation relationship between structural capital and knowledge management is confirmed and it equals 0.768, so in error level of 0.01 it can be said that there is a correlation between structural capital and knowledge management.

Table 4. Coefficients between structure capital and knowledge management.

		structural capital	knowledge management
structural capital	Pearson Correlation	1	.768**
	Sig. (2-tailed)		.000
	N	175	175
knowledge management	Pearson Correlation	.768**	1
	Sig. (2-tailed)	.000	
	N	175	175

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

Secondary hypothesis (3): relational capital impacts on organization knowledge management.

Table (5) shows Pearson correlation coefficient between relational capital and knowledge management. According to the table(5), significance level is lower than 0.01 and its value equals zero and hypothesis of correlation relationship between relational capital and knowledge management is confirmed and it equals 0.640, so in error level of 0.01 it can be said that there is a correlation between relational capital and knowledge management.

Tablel 5. Coefficients between relational capital and knowledge management.

		relational capital	knowledge management
relational capital	Pearson Correlation	1	.640**
	Sig. (2-tailed)		.000
	N	175	175
knowledge management	Pearson Correlation	.640**	1
	Sig. (2-tailed)	.000	
	N	175	175

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

Main hypothesis: intellectual capital impacts on organization knowledge management development.

Table (6) shows Pearson correlation coefficient between intellectual capital and knowledge management. According to the table(6), significance level is lower than 0.05 and its value equals zero and hypothesis of correlation relationship between intellectual capital and knowledge management is confirmed and it equals 0.763, so in error level of 0.01 it can be said that there is a correlation between intellectual capital and knowledge management.

Table 6. Coefficients between intellectual capital and knowledge management.

		intellectual capital	knowledge management
intellectual capital	Pearson Correlation	1	.763**
	Sig. (2-tailed)		.000
	N	175	175
knowledge management	Pearson Correlation	.763**	1
	Sig. (2-tailed)	.000	
	N	175	175

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

Table (7) shows correlation coefficient between dimensions of intellectual capital and knowledge management in simple linear regression model. As it is seen in table (7), there is correlation coefficient of 0.895 between intellectual capital and knowledge management and intellectual capital could predict 0.800 percent of knowledge management variance and according to this fact that Durbin Watson coefficient is 1.611 in range between 1.5 and 2.5 so hypothesis of error independence is accepted and it is possible to use regression model.

Table 7. Model Summary[b].

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.895[a]	.800	.797	.25886	1.611

a. Predictors: (Constant), human capital, structural capital, relational capital
b. Dependent Variable: knowledge management

Table (8) depicts simple linear regression analysis of variance for knowledge management. According to the table (8) significant level is lower than 0.05, so analysis of variance confirms reliability of regression analysis.

Table 8. ANOVA[b]

Model	Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	45.959	3	15.320	228.624	.000[a]
	Residual	11.458	171	.067		
	Total	57.417	174			

a. Predictors: (Constant), human capital, structural capital, relational capital
b. Dependent Variable: knowledge management

Table (9) shows standard and nonstandard regression coefficients for effect of intellectual capital on knowledge management. According to the table (9) intellectual capital with Beta coefficient of

0.467 could predict knowledge management. So by accepting the hypothesis it can be said that dimension of intellectual capital impact on organization knowledge management.

Table 9. Coefficients[a].

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.467	.194		2.405	.017
human capital		.418	.096	.354	4.374	.000
structural capital		.523	.080	.601	6.494	.000
relational capital		.383	.031	0.567	12.212	.000

a. Dependent Variable: knowledge management

Regression equation is as follow:
x_1= human capital
x_2=structural capital
x_3=relational capital
$Y=0.467+0.418\ x_1+0.523\ x_2+0.383x_3$

Conclusions and Discussion

Correlation tests show that there is a direct correlation of 0.725 between human capital variables and knowledge management and relational capital and knowledge management equals to 0.640. Also, the analysis of variance shows that there is a direct correlation of 0.795 between intellectual capital and knowledge management and %63.1 of knowledge management change is influenced by model variables. The regression coefficients show that structural capital has more effect and then human capital and relational capital on knowledge management.

Generally speaking activity in a knowledge based environment in most of the countries requires a new model and brand that involve intangible properties. In this condition "intellectual capital" has been gained attention. Success of organizations depends on knowledge properties, intellectual capital and creative and systemic capabilities more than physical resources. In general, intellectual capital is defined as creation of value by intelligence and mind. Knowledge management could be defined as part of management process that emphasizes on systematic analysis, planning, collection, production, development, saving and use of knowledge and it tries to help to substantiation of organization goals by using human capital, structural and relational capital. In knowledge management cycle knowledge acquirement refers to identification of internal and external knowledge. In this relation, human capital plays an import role in internal knowledge and relational capital plays a main role in external knowledge. Since knowledge is important in organizational performance it should be preserved. Thus, knowledge registration refers to organization and retrieval of knowledge and structural capital is effective in registration and saving of knowledge. Information communication processes facilitate knowledge transfer in different levels and it emphasizes on different states of knowledge transfer, intellectual capital activities in human, structural and relational capitals .All knowledge cycles involve socializations, externalization, combination, internalization and they emphasize on interactions. Knowledge production begins from personal level and it expands to organizational levels and human and structural capitals help to these processes and combination of new methods depend on innovation of groups and organizations. In this step, an organizational memory is created in order to learn successful and unsuccessful experiences. In this stage intellectual capital by emphasis on structural capital particularly information technology could integrate knowledge use. In general intellectual capital as knowledge properties by emphasis on human, structural and relational capitals play an important role in expansion of organization knowledge acquirement, registration, production, transfer and use.

Propositions

Concerning to the research followings propositions is offered to East Azerbaijan regional hydrology firm:

- Attention to justice in support of creativities and rewards based on performance
- Scientific empowerment and sustainable development of human capitals
- Prioritization of intellectual capital constructs based on present and future strategic goals.
- More emphasize on stuff attitude during employment of the applicant according to plans.
- Operating knowledge management activities based on intellectual capital activities.
- Attention to feelings and tendencies and expectation of the stuff.
- Establishment and expansion of knowledge culture for facilitation of knowledge management processes.
- The firm has considered long term motivational view points and participation in knowledge as important factor in evaluation and rewarding system.
- Use of appropriate indices of knowledge management efficiency for evaluation of the firm knowledge management activities.
- Offering documental information are considered as background for progress and Development by intranet networks
- Holding session for indicating successful experiences

Future research propositions

- Investigation the relationship between intellectual capital and strategic management.
- Effect of intellectual capital constructs in knowledge management.
- Investigation the relationship among intellectual capital constructs in knowledge management.
- Investigation of the quantitative and qualitative styles and methods in intellectual capital investment in an organization.

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