Study the Impact of the Determinants of Intellectual Capital in the Companies Accepted on Tehran's Stock Exchange in Different Industries

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Abstract

Knowledge is the strongest production engine. Besides as the key of economic resources, perhaps and often knowledge has turned into the only competitive advantage resource. In fact, in many countries of the world knowledge-based business environment requires a new model and nomenclature encompassing the intangible factors of the organization; under this circumstance, the newfound topic of intellectual capital has attracted an ever-increasing attention towards itself. As a part of intellectual capital, human capital is one of the most important resources on which the company relies to improve its effectiveness and performance to be able to obtain competitive advantage. Human capital is the fundament and basal of intellectual capital and the primary element for performing its duties. In order to conduct the research, 8 active industries in the time domain of the research (2004-2012) which is a sample consisting of 89 companies with systematic elimination method has been selected. The statistical method used to implement multiple regressions by utilizing combined least-squares method. To study the role of industry type in the research, we made use of dummy variable and step by step method. Regression results simultaneously show that, obstacles to entry and return on the investment in the intellectual capital have a negative impact on human capital function and relative efficiency, profitability and risk have a positive influence on human capital performance.

Keywords: *intellectual capital, human capital, efficiency, Tehran's stock exchange, type of industry.*

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1. Introduction

In 20th century economy was based on the industry. During this century, each firm and country that possessed more physical assets and tangible capitals was able to produce much more wealth. On the contrary, 21st century is based on knowledge. (Seetharaman et al, 2002). Therefore, capability of knowledge management is the fundamental skill of the organizations. World Bank (p. 20, 1999) has announced that "Knowledge is the strongest production engine". In addition to this, Yousef et al (2005) expressed that "knowledge has transformed into the exclusive competitive advantage resource. (Chen Goh, 2005). Actually the knowledge-based business environment in most of the countries of the world necessitates a new model and nomenclature encompassing the intangible factors of the organization; under this condition, the newfound topic of intellectual capital has attracted an ever-increasing attention towards itself (Bontis, 1998). Thus the present world is being considered as the age of wisdom. Nowadays, endowments and natural and tangible assets are no longer considered as the only key to the prosperity of the societies and organizations , on the contrary enjoyment and making use of intellectual capitals and capital management can be taken into consideration as the secret of success in the turbulent and challenging environment (Abeysekera, 2008). There are some types of the intellectual capital components mentioned in the literature out of which it seems human capital is the most significant part of the present study. As a component of intellectual capital, human capital is one of the most important resources that a firm relies on to improve its effectiveness and performance and to obtain competitive advantage (de Pablos, 2003). Human capital is the basis and fundament of the intellectual capital and primary element for performing its duties. Human capital is related to some factors like staff's knowledge and their ability and skills as well as their behavior in connection with motivational functions that customers are willing to pay for it and firm's profit comes from there. Moreover, employee with such skill and knowledge can surpass all the other staff holding the foremost position. Being placed at the top of the employees encompasses knowledge and skill, if an enlightened employee is not able to serve the company, his/her knowledge and skill can't be activated. Structural capital, innovation capital and customer's capital are all dependent on human capital, so that human capital by means of making change to these three capitals can turn knowledge into market value and through knowledge it can turn immaterial information into tangible and useful outputs and even suitable forms of these three capitals (Chen et al, 2004). Brooking believes that human capital of an organization includes skills, specialties and abilities of solving a problem and styles of leadership (Brooking, 1977).

Bontis et al theorize that human capital is the most important component among the intellectual capital constituents; because human capital is the innovation resource and strategic renovation of the firms that can be obtained through improvement of the human skills (Bontis et al, 2000). According to Smith's opinion, human capital is a collection of knowledge, ability and staff's experiences working in a company that the firm has the authority and control over them for short period of time and temporarily at office hours. But, structural capital is the knowledge and ability available in the company controlled by the firm and will be remained there even after the staff leaves the company (Smith, 1998). In the financial literature, some of the factors that can be considered as determinants in the function of intellectual capital consist of: efficiency, obstacles to entry, and return on investment in intellectual capital, profitability and risk. So, in this research we intend to study the impact of determinants of the intellectual capital in the companies accepted on Tehran's stock exchange.

2.   Background of the Research

Rudez & Mihalic studied the impact of intellectual capital components on the financial performance in hospitality industry in Slovenia. The results of this research indicated that firstly there is a meaningful relation between the intellectual capital components and financial performance in this industry and this is indicative of the influence of intellectual capital on the function of the firms. Secondly, the results also signify the coefficient of the strong impact of the connective capital on financial performance of the companies in comparison with other intellectual capital components. The research by Bontis in Canada and the researches' conducted by Bontis et al in Malaysia showed that there is a positive correlation between intellectual capital components (human, structural & customer) and performance of the industries.

Regardless of the type of industry, human intellectual makes influence on the performance of the company. There is a positive relation between structural capital and financial performance. The importance of the intellectual capital is that market value and the firms' stocks are not only dependent on the tangible assets, but also it is dependent on the intangible assets such as intellectual capital. Chen Goh measured the intellectual capital within the Banks in Malaysia. This study showed that, however the Bank of Hong Kong possesses less amount of physical capital rather than the Bank of "Mei", but due to the fact that it had the highest coefficient of intellectual capital was recognized as the most efficient domestic Bank. Chin Chen et al analyzed the relation between intellectual capital and the value of stock market and financial performance of the stock companies in Taiwan. They applied Palik's model of the intellectual capital value added as the measurement criterion of intellectual capital showing it by performing the regression model,

higher intellectual capital of the firms improves the financial performance and increases the value of the firms' stock market.

Pew Tan H et al reviewed the relation between intellectual capital and financial performance on Singapore's stock exchange based on three financial indexes like (dividend of per share, rate of return of the stock holders' salary and rate of annual return). The results proved that there is a positive connection between intellectual capital and financial performance indicators and also there is a meaningful difference between intellectual capital coefficients in various industries. Likewise, Kamath demonstrated that among the intellectual capital components human capital has had a great impact on profitability, efficiency and value of the pharmaceutical companies in India. There is a relation between the intellectual capital elements and these elements make influence on the performance of firms' business. In 2008 Magdi El-Bannanye studied the factors making impact on the intellectual capital function in the Banks and conducted a case study on the Banks in the United Kingdom of Great Britain. The results indicate that Information Technology Systems, barriers to entry and return on investment in intellectual capital have a negative impact on human capital performance and relative efficiency of the Bank, Bank profitability and Bank risk have a positive influence on human capital performance . The research performed by Ghelich Lee et al showed that human and structural capital both have a positive impact on the improvement of competitive advantage of the two car manufacturing companies in the Iranian Market. But, such an impact wasn't observed in regard with relational capital. The results of this research demonstrated that intellectual capital elements of these two companies listed below according to priority: human capital, structural capital and relational capital.

3.   Research Hypotheses

First hypothesis: There is a meaningful relation between efficiency and performance of the intellectual capital in the companies accepted on Tehran's Stock Exchange.

Second hypothesis: There is a meaningful relation between the obstacles to entry and intellectual capital performance in the companies accepted on Tehran's Stock Exchange.

Third hypothesis: There is a significant connection between the rate of return on investment and function of capital in the companies accepted on Tehran's Stock Exchange.

Fourth hypothesis: There is a meaningful relation between profitability and intellectual capital performance in the companies accepted on Tehran's Stock Exchange.

Fifth hypothesis: There is a meaningful relation between risk and intellectual capital performance in the companies accepted on Tehran's Stock Exchange.

Sixth hypothesis: Considering the type of industry, there is a significant difference between efficiency, obstacles to entry, return on investment, profitability and risk with intellectual capital.

4. Methodology

The method used in this research is correlation research method because its goal is to explain the intended relation of financial ratios and capital expenditure. From the viewpoint of objective, this is an applied research because we intend to find a solution to the problems posed in this applied research. Compilation of the required data belonged to stock exchange derived from Novin Rahavard software and Eviews software used to analyze the data and to extract inferential statistics. Then by making use of cross-sectional data and time series and presenting multiple regression models with partial least squares (PLS) method performed in the current research. In the end, step by step multiple regression method used to study the impact of the industries.

4.1 Population And Statistical Sample

The companies accepted on Tehran's Stock Exchange were selected as community or population. The statistical sample was selected and reviewed from among statistical population of a sample group. Judgmental sampling method has been applied (systematic elimination) to take the samples. Consequently, 89 companies were chosen.

4.2 Test Of Research Hypotheses

For the first to fifth hypothesis, we used combined data regression in the fixed-effect method. With regard to the related subject matters mentioned in the previous discussions, in this section efforts have been made to explain the results obtained from the test of each of the hypotheses. To perform the regression, it was necessary to choose a proper method with regard to the theoretical and hypothetical topics. As it was expressed, in total there are wide varieties of methods to estimate a model with the combined data which are classified into the following 2 groups: A-Estimation of the model assuming the width of the source equality for all sections such as (countries, companies). B-Assessment of the model assuming the difference in the width from the source for sections of the different (companies) using fixed-effect and random method. Now, at

first we should use Lymer's Test to guarantee and make sure which of the above-mentioned methods are much more efficient than others.

The result obtained from execution of this test is described as follows:

As it can be seen ,statistical amount of the calculated meaningful level equals 0,0000 (less than 5%) and therefore H_0 hypothesis is rejected and rejection of the hypothesis 0 means that width from the sources is different for sections (companies) and making use of OLS method is incompatible and inefficient and for this reason , the results of the combined model should be taken into consideration . In the second step, in order to specify that it is possible to estimate the model by using fixed-effect method or the random effects of Hausman's test. As it has already been mentioned, this test will study the following assumptions:

Compatibility of the estimations of random effect: H_0

 Compatibility of the estimations of fixed effect: H_1

The meaningful level calculated out of this test equals 0.0000 (less than 5%). Therefore, hypothesis H_0 is declined and the result is that the best type of assessment would be the fixed-effect method.

(sig)Significance level	T Statistic	Non-standardized coefficients		Model components
		Standard Error	(ß)	
0.000	9.55E+16	3.87E-17	3.692255	c
0.000	5.46E+15	2.92E-21	1.59E-05	efficiency
0.000	-3.17+14	1.05E-19	-3.33E-05	obstacles
0.000	-9.31E+14	-2.00E-16	-0.185992	Return on investment
0.000	6.75E+14	8.20E-17	0.055359	Rate of return on assets
0.000	1.73E+15	5.25E-20	9.11E-05	Risk
0.000	1.74E+14	4.33E-18	0.755413	AR(1)

Table No.1 Regression Model Coefficients Of The Combined Data Using The Fixed Effects Method

Durbin Watson Statistic	Lymer's Test (probability)	Hausman's Test	Significance level (sig)	F statistic	Determination coefficient (R)2	Modified coefficient
2.161047	0.0000	0.0000	0.0000	1935.647	0.604511	0.618507

Table 2: Test Of Total Model Significance

Table 1 shows the results of estimation of model 1 of the research. On the account of using cross-sectional data, generalized least square method has been utilized to obviate the incongruence variance. As it can be seen , t statistic calculation and values s of reliability level of 95 % in table No.3 indicates that all the variables like (efficiency , obstacles to entry , return on investment , rate of return on assets , risk) have a meaningful relation with intellectual capital (dependent variable) . Furthermore, variables such as (efficiency, obstacles to entry, return on investment have a direct relation with intellectual capital (dependent variable). Other variables including (rate of return on assets, risk) have a reverse relation with intellectual capital (dependent variable). On the other hand, Durbin Watson statistic has been calculated for the model of regression model which indicates 2.16. Since this digit is placed between (2.5, 1.5), proves the absence of correlation in the components of regression model of the above-mentioned model .The value of coefficient of model determination shows that in total around 0.618507 % of the changes made to the dependent variable can be explained by the independent and meaningful variables in this model which is indicative of the high power of the model in describing the behavior of dependent variable. Since the probability level of the F statistic equals (0/000), simultaneously it demonstrates that the afore-mentioned regression model to 99% reliability is correct and whole of the regression is meaningful.

5.   Sixth Hypothesis

For the sixth hypothesis we have made use of multiple regression and dummy variable. Multiple regression with the use of dummy variable (dummy)

As previously mentioned, one of the assumptions of this research is to study influence of independent variables on dependent variable in numerous industries. In order to observe simultaneous impacts of all the accounting variables described in the entire industries, we applied multiple regression model utilizing dummy variable. In this regard, to enforce the effect of industry (qualitative variable) making use of dummy variable in a multiple regression model, the

relation between independent and dependent variable will be studied. In order to implement the effect of industry in the model, we will use dummy variable associated with industry. In making use of dummy variable, we define each of the qualitative variables in the form of one variable with the value of 0 and 1. Thus, we consider n – 1 dummy variable for the regression. Here n denotes number of the industries.

As a result considering the number of industries (8 industries), 7 dummy variables is required for each model. Dummy variable of the industries is described as follows:

Ind1 =
If the industry No.1 equals 1
If industry No.1 doesn't equal 0
Ind2=

If the industry No.2 equals 1
If the industry No.2 doesn't equal 0
And ….

$$Ind_7 =$$

If the industry No.7 is equal to 1

If the industry No.7 is not equal to 2

The most widely used method for modeling is stepwise variable selection approach. In this method the independent variables in each step enters the model with regard to their correlation level with dependent variable. In this case, at first an independent variable with the highest coefficient enters the model, the correlation coefficient obtained from the model should reach the limit enabling us to reject the zero hypothesis. In each step after entering the model, all the variables which have moved into the model and not considered as a meaningful predictor will be eliminated from the model. Thus the variables that their importance is decreased on the account of the addition of other variables will get out of the model. The process of variable entry into model is stopped when all the significant variables move into the model and no other variable is remained to cause a meaningful increase occur in the correlation coefficient. According to the stepwise approach, 15 steps are required to be taken to reach the main model and input all the effective variables into the model. In order to check the significance of the stepwise regression, firstly it is necessary to

analyze the significance of the entire model using ANOVA test. The test results included in Table.3 are summarized as follows:

Model		Sum of squares	Degree of freedom	F statistic	significance level
	Regression	10/177	15	21/802	0/000
	remainder	8/993	289		
	total	19/170	304		

Table.3 ANOVA Test

Considering table 3 significance level of (0.000) is less than 0/01, thus assumption of zero is declined and model is meaningful at the level of 99%. Therefore, there is a significant relation between the independent variables of this model and intellectual capital. Now after putting the significant variables in order in the stepwise regression method, the ultimate model and the variables relevant to the significant variables are being arranged and regulated in detail in accordance with table 4. According to table 4 per one unit of the change made to efficiency ratio , the greatest impact of the oil by-products and chemical products of the pharmaceutical industries group and the group of machinery and related components manufacturing made on intellectual capital are respectively 0/864 ,4/779 and 0/578 . Per one unit of the change made to the investment obstacles had the maximum influence of the group of cement production, group of machinery and related components manufacturing on intellectual capital successively with the rate of 0/467 and 0/467.

(sig)Significance level	T Statistic	Non-standardized coefficients		Model components	Model
		Standard Error	(ß)		
0/063	-2/121	0/046	-0/052		
0/000	9/248	0/517	-4/779	X1d6	
0/008	-2/653	0/001	-0/003	Hassit	
0.000	5/185	0/308	1/598	X3d2	
0/000	7/880	0/507	0/448	X2d5	
0/000	3/807	222	-0/846	X1d4	
0/000	6/552	0/088	-0/578	X1ds	
0/000	4/103	0/238	0/976	X4d7	
0/000	4/113	0/114	0/467	X2d2	
0/000	3/703	0/053	0/198	D1	
0/017	2/408	0/035	0/085	X5d7	

Table 4: Stepwise Regression Model Coefficients

Therefore, in order to determine the effect of dummy variable of the industry type, the final model is described as follows:

$$Y_i = -0/052 - 4/779X1d6 - 0/003, \text{HASSit} + 1/598 \times X3d2 - 0/448x2d5 - 0/846x1d4 - 0/578x1d5$$
$$+ 0/976X4d7 - 0/467x2d2 + 0/198d1 + 0/0470R + 0/085X5d7$$

description	symbol	description	symbol
Group of basic metals	D1	Width from source	c
Cement group	D2	Ratio of fixed assets/total investment	X1
Group for manufacturing machines and communication means ,electrical appliances and transportation means	D3	Ratio of long term debts /share holders' equity	X2
Group of pharmaceutical industry	D4	Ratio of tax/net profit before tax deficit	X3
Group of machinery and related parts industries	D5	Ratio of accumulated loss and profit and deposits/ total investment	X4
Group of chemical products industries	D6	Ratio of net growth of the fixed assets	X5
		Group of food products , sugar and sugar cube	D7

Table: Description

6. Conclusion

Regression results simultaneously show that entry obstacles and return on investment in intellectual capital make negative impact on human capital performance and relational efficiency of the Bank, Bank profitability and Bank risk make positive influence on human capital performance. Likewise, in this research efficiency has the maximum effect on intellectual capital and a significant difference exists between the intellectual capital coefficients in many industries.

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