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INVESTIGATING THE RELATIONSHIPBETWEEN INTELLECTUAL CAPITAL AND RETURN ON FINANCIAL CAPITAL OF LISTED COMPANIES IN TEHRAN STOCK EXCHANGE

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ABSTRACT

The present study investigates the relationship between intellectual capital and return on financial capital as one of the performance indices of listed companies in Tehran Stock Exchange. 101 listed companies in Tehran Stock Exchange over the period of 2007-2012 were studied as the target sample. The research was investigated two major hypothesis each examining two other sub-hypotheses. The variables of the study include intellectual capital as independent variable, proportions of return on capital as dependent variable and size of the company as the moderating variable. After collecting the required data, Pulic model and two criteria of ASR and ROE were used for calculating the value of intellectual capital and evaluating the performance, respectively. Hypothesis testing was done through SPSS. The method used in this study was panel data with fixed effects. The obtained results revealed that there is a significant relationship between intellectual capital and return on financial capital as one of the performance indices of listed companies in Tehran Stock Exchange. The findings also indicated that size of a company as a moderating factor influences the relationship between intellectual capital and return on financial capital.

Keywords: *Value Added Of Intellectual Capital, Human Capital, Structural Capital, Physical Capital, Return on Financial Capital*

INTRODUCTION

At the present time by developing knowledge-based economics, intangible assets of companies and their intellectual capitals are keys to reach sustainable competitive advantage and as a result more attention has been increasingly paid to intangible items in different fields including economics, accounting and strategic management. Knowledge is a competitive advantage which has attracted attention in business strategies of organizations so that producing knowledge causes continuous innovation which in turn it leads to creating competitive advantage. Nowadays organizations need to pay attention to knowledge management in order to improve performance and ensure success in business which requires strengthening and focusing on potentials and capacities of human resources so that organizations can react fast to changes in business environment and economic conditions in order to achieve competitive advantage through continuous performance and improvement. In current knowledge-based societies, the employed intellectual capital returns is much more important than the return on financial capital which means that compared to intellectual capitals, the role and importance of financial capital in achieving strong performance and critical competitive advantage has been significantly reduced. Therefore, intellectual capital plays an increasing role in common performance of production factors .

Hence, the present study tries to examine the relationship between intellectual capital and its components with return on financial capital of companies.

THEORETICAL FRAMEWORK

Identifying the concept of intellectual capital and its components has always attracted the attention of researches in different financial and non-financial fields. In recent years different studies have

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been carried out on intellectual capital and they have resulted in different frameworks for defining, categorizing and measuring it. What all researchers agree on is that intellectual capital indicates the intangible value of an organization and all the definitions are based on this principle that intellectual capital is the sum of intangible assets of an organizations including knowledge, part of human capital, structural capital, relational capital organizational capital, internal and external capital (Jafari et al, 2008)

In the most common categorization, intellectual capital is divided into three components of human capital, structural capital and customer capital:

Human capital

Simply, human capital indicates the stock of knowledge of each employee of the organization (Bontis, 2000). Human capital is the starting point of development stages and the source of innovation and origin of insight (Stewart, 1997). Human capital is also the base of intellectual capital and the fundamental element for realization of intellectual capital (Chen, 2005)

Structural capital

Structural capital includes all the stocks of non human knowledge in an organization which includes data bases, organizational charts, strategies, procedures, guidelines for processes and everything which its value is more than its materialistic value for the company (Bontis, 2000)

Customer capital

The main content of customer capital is the employed knowledge in marketing channels of the organization and the relationship with the customer during business .

RESEARCH METHODOLOGY

The present study is an applied study which is categorized as a correlation research. The method of collecting the data on background of the study was library and the required data was extracted from the records of RahavardNovin software and in some cases from internet and electronic archives. Due to the use of audited financial statements, it can be stated that the extracted data from audited financial statements are real and have high validity and reliability. The statistical population of the present study includes all Tehran listed companies due to easy access to their audited financial statements and their shares` return at different dates. Due to a six-year period of the present research (from 2007 to 2012), the target sample of this research was selected from all firms listed in Tehran Stock Exchange for the above -mentioned period of time which had the following characteristics :

1. The companies are listed in the Stock Exchange at least prior to 2007 .

2. The end of fiscal year of the companies is March 29th.

3. The shares of these companies have to be transacted during their fiscal year .

4. Financial statements should be delivered to the Stock Exchange at the end of fiscal year.

5. During the study, the company should not have operating loss in its audited profit-loss account and the remaining should not be negative after the tax on profit-loss account .

Thus, considering the aforementioned limitations, 101 companies were identified as the target sample, all of which have been studied and therefore no sampling was done.

Pearson correlation coefficient and regression analysis were used to analyze the model yearly as well as the combined data, respectively. The inference was based on level of significance and error level. SPSS was used to test the hypotheses and other analyses were done using statistical normality test (Kolmogrov-Smirnov Test) , self-correlation test (Durbin Watson), correlation (correlation coefficient, determination coefficient), regression analysis and testing its coefficients, correlation analysis and testing its coefficients, and significance tests of the employed coefficients .

RESEARCH HYPOTHESIS

1- There is a significant relationship between intellectual capital and financial capital of listed companies in Stock Exchange.

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1-1- there is a significant relationship between intellectual capital and ROE index as one of the criteria of financial capital.

1-2- there is a significant relationship between intellectual capital and ASR index as one of the criteria of financial capital.

2- size of the company has a significant relationship with total average of intellectual capital and financial capital of listed companies in Stock Exchange.

2-1- size of the company has a significant relationship with total average of intellectual capital and ROE.

2-2- size of the company has a significant relationship with total average of intellectual capital and ASR.

VARIABLES
The three variables used in this study included independent variables, dependent variables and moderator variables.

Independent variable
In this study ,variable of intellectual capital along with its components, including structural capital, human capital and physical capital were considered as independent variables, and were also calculated based on Pulicmodel (2000),with the following steps:

First step: Determine the value added:
$$VA = P_i + I_i + C_i + D_i + DIV_i + T_i$$

VA: Value-added Enterprises
P_i: Operating Profits
C_i: employee costs
DIV_i: dividends
I_i: interest expense
D_i: depreciation
T_i: tax

Second step: Determine the physical capital efficiency:
Value added to (VA) physical capital used ratio, is called the coefficient of physical capital efficiency, the index is calculated by the following equation.
$$CEE = \frac{VA}{CE}$$

CEE: Physical Capital Efficiency
CE: Capital used is equal to the book value of the company's total assets minus intangible assets.

Third step: Determine the humancapital efficiency:
Humancapital efficiency indicates that for every $ spent on employee costs, how much value add is created.
$$HCE = \frac{VA}{HC}$$

HCE: Human Capital efficiency
HC: Human capital, is the total employee costs

Fourth step: Determine the structural capital efficiency:
This step shows the share of structural capital in the value creation. Structural Capital includes all reservoirs nonhuman knowledge in an organization, including databases, organizational charts, procedures and guidelines. It also gives more value to the organization compared with the physical assets.
$$SCE = \frac{SC}{VA}$$

SCE: Structural Capital Efficiency
SC: Structural Capital

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Fifth step: Determine the value added intellectual coefficient
This index represents the efficiency of creating value, or intellectual abilities of the company.
When this coefficient is greater, the management has used more potential of the company.

$$V AIC = HCE + SCE + CEE$$

VAIC: value added intellectual coefficient
HCE: Human Capital efficiency
SCE: Structural Capital Efficiency
CEE: Physical Capital Efficiency

Pulic Model: Because of its advantages in comparison with other models, this model as the model used in this study intended to measure intellectual capital. Some of the most important of its advantages are as follows:

- Provides a basis for measuring, with fixed standard.
- All the calculated data in the value added intellectual coefficient have been extracted from the audited financial statement of the company, so the calculations can be verified.
- This model is based on two aspects of performance evaluation and value creation resulting from tangible and intangible assets of in the company.

Dependent variable
In this study financial capital as one of the indices of financial performance of a company is considered as the dependent variable. The following criteria were used to calculate financial capital:

ASR= $((P_1-P_0)+D)/P_0$	annual share returns
ROE=OP/TE	return on equity

Moderator variable
One of the Company's internal factors, which affect the financial structure and profitability of companies, is the firm size. In this study, using the logarithm of the book value of assets, the effect of firm size was examined as one moderator variable on the relationship between variables.

$Log(ASSETS)$

ASSETS: book value of assets

Finally, the multiple regression model is used to determine the relationship between intellectual capital efficiency ratio, and each of its components, with earnings predictability.

$Y = \beta_\circ + \beta_1 HCE + \beta_2 SCE + \beta_3 CEE + \beta_4 FSIZE + e_{i_t}$

RESEARCH FINDINGS
Descriptive Statistics
Before testing the research hypotheses, descriptive statistics of the variables were calculated and presented in Table 1. This table contains descriptive statistics for the independent variables, moderator variables and the dependent variable.

The first hypothesis
The first hypothesis: there is a significant relationship between intellectual capital and financial capital of listed companies in Stock Exchange.
The sub-hypotheses are indicated using the following statistical symbols:

$$\begin{cases} H_0 : \beta_1 = \beta_2 = \beta_3 = 0 \\ H_1 : \beta_i \neq 0 \ at \ least \ i = 1,2,3 \end{cases}$$

The obtained results in Table.2 show that correlation coefficient between intellectual capital and proportion of book return of shareholders is 0.889. According to F and T coefficients, and significance number, it can be argued that there is a positive significant relationship between physical and structural capital and ROE and intellectual capital explains 79% of changes in ROE -

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one of the indices of financial capital. Moreover, since efficiency coefficients of intellectual and structural capitals are the highest (0.353, 0.534) in this regression equation, they have more explanation power compared to human capital which has a reverse relationship. Therefore, regarding the results of the first and second sub-hypotheses which results in confirming the former and rejecting the latter plus the information from Fig.1, it can be concluded that H0 is rejected and H1 is accepted. Hence, the first main hypothesis is confirmed i.e. there is a positive relationship between intellectual capital an indices of financial capital.

Table 1: Descriptive statistics

Type of variable	variable	Mean	Median	Standard deviation(SD)	Skewness
Dependent	return on capital	38.385	19.14	72.56	1.75
Independent	HCE	7.111	2.74	15.41	4.23
	CEE	0.361	0.326	0.19	1.38
	SCE	0.64	0.635	0.19	0.16
Moderator	SIZE	5.505	5.47	0.69	0.21

Table 2: Results from testing the first hypothesis

Confirmed hypothesis	Sig	T statistic	Durbin Watson	F statistic	Determination coefficient	Correlation coefficient	Human capital	Structural capital	Physical capital		Dependent variable	Hypothesis testing
H0	0.000	-3.846	1.523	10.781	0.079	0.280	0.042	0.113	0.197	Pearson coefficient	ASR	Second hypothesis
							0.343	0.011	0.000	(sig)		
	$ASR_{it} = -102/49 + 98/33CEE_{it} + \varepsilon i$									Regression equation		
H1	0.000	-11.723	1.997	473.01	0.791	0.889	0.074	0.432	0.696	Pearson coefficient	ROE	First hypothesis
							0.095	0.000	0.000	(sig))		
	$ROE_{it} = -0/236 - 0/001HCE_{it} + 0/35SCE_{it} + 0/53CEE_{it} + \varepsilon i$									Regression equation		

The second hypothesis
The second hypothesis: size of the company has a significant relationship with total average of intellectual capital and financial capital of listed companies in Stock Exchange.
The sub-hypotheses are indicated using the following statistical symbols:

$$\begin{cases} H_0 : \beta_1 = \beta_2 = 0 \\ H_1 : \beta_i \neq 0 \quad i = 1,2 \end{cases}$$

Table 3: Correlation coefficient of testing the second hypothesis

ASR	ROE	
0.168	0.202	Pearson coefficient
0.00	0.00	(sig) Level of significance
511	511	number

Based on the statistical results of Table.3 and the value (sig≤ 0.05), there is a significant relationship between size of the company and financial capital `s indices. Therefore it can be inferred that there is a positive significant relationship between size of the company and intellectual capital factors in multiple regression model.

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Finally, the effect of company size on the relationship between intellectual capital and indices of financial capital was investigated through examining variable coefficients of company size. As shown in Tables 4, the relationship between ASR and size of the company is significant. Sig. statistic of t- Test also verifies this relationship. Hence, size of the company is influential in explaining the relationship between intellectual capital and ASR. However, the obtained results revealed that the relationship between ROE model and size of the company is not significant. So size of the company is not influential in elaborating the relationship between intellectual capital and ROE. Investigating the direction of coefficients of intellectual capital in the given equation indicates a positive and aligned effect on the amount of intellectual capital and ASR that companies enjoy.

Table 4: analyzing coefficients of regression equation of the second hypothesis

Direction of relations		T statistic		β coefficient of company size	Determination coefficient	Correlation coefficient	Index of financial performance
Return on capital	Intellectual capital	sig	Fsize				
Is not significant		0.247	1.159	-	0.791	0.889	ROE
$ROE_{it} = -0/236 - 0/001 HCE_{it} + 0/35 SCE_{it} + 0/53 CEE_{it}$						Elaborated regression model	
+	+	0.001	3.212	16.27	0.079	0.280	ASR
$ASR_{it} = -102/49 + 16/27 Fsize_{it} + 98/33 CEE_{it}$						Elaborated regression model	

CONCLUSION
According to the obtained results, it can be concluded that there is a significant positive relationship between components of intellectual capital and indices of financial capital at the given significant level. Components of intellectual capital have the highest correlation and relationship with capital-based indices as indices of financial performance. Effect of size of the company on intellectual capital and financial capital is significant. It should be noted that, unlike developed countries, in developing countries valuing local markets has developed more with an increase in physical capital than intellectual capital and it is less dependent on intellectual capital as a performance strategy. One of the reasons is that this group is still dependent on the commerce and processing of natural resources as a fundamental growth strategy and Iran`s Stock Market is no exception. Therefore, the direction of intellectual capital in components of intellectual capital has the most coefficients.

Suggestion for further research
The subsequent recommendations are presented hoping that other researchers would find them interesting enough to pursue in the future.
1. It is recommended to investigate the effect of type of the industry as a moderating variable and compare the results with the results of the present study.
2. It is recommended to rank the listed companies in Stock Exchange based on indices of intellectual family so that investors can use this model in their decision model for optimal allocation of resources.
3. It is recommended to study the effect of intellectual capital on risk.
4. It is also suggested to examine intellectual capital through combined financial and non-financial models.

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