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Evaluating role of efficiency on relationship between intellectual capital and value of listed companies in Tehran Stock Exchange

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ABSTRACT

This study investigates the role of efficiency on relationship between intellectual capital and value of listed companies in Tehran Stock Exchange. Considering the spatial and temporal domain, study's statistical sample consisted of firms accepted in Tehran stock exchange from 29-12-2005 until 29-12-2011 and thus the statistical sample in this study is equal to 115 firms. To study the relationship between variables of this study, human capital, employed capital and structural capital (independent variable) and firm market value (dependent variable) was considered, and the relationship between these variables were examined together. In this way, a hypothesis was formulated and the relevant data were collected. To analyze the research data and estimate the models in this study, combined data approach has been used. And based on research results, the efficiency of employed capital utilization and human capital affect the firm market value. On the other, the efficiency of structural capital utilization doesn't affect the firm market value.

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INTRODUCTION

One of the most important issues that exist in traditional accounting systems is lack of measurements and firms intellectual capital. Most of these systems have been neglected about the role and growing importance of intellectual property and knowledge in new age organizations and they're unable to measure the true value of intangible assets in their calculations (salehnejad, 2010). Evaluation and taking into account of true value of intangible assets and knowledge in the financial Statements are so scant, and hence the tendency of firms to identify the true value of intangible assets and knowledge in financial statements are further enhanced (Anvari *et al*, 2002). Development of human societies depends on developed people, particularly in their management and to attain creative and dynamic organization, we must rely on knowledge management. Knowledge management and related domains of it emphasize this fact that achieving continuous competitive advantage in the meaning of global modern economic depends on capacity and ability of firms to develop and proper use of resources based on organization's knowledge (Ziaeiy *et al*, 2012). Knowledge of firms and institutes (intellectual capital) are important than those they have (monetary capital) and the most important competitive advantage of organizations is their ability to handle knowledge and their major capital is the knowledge that they access to it.

On the other hand, world today passed the industrial economy and get into knowledge-based economy. Knowledge-based economy is economy in which production and exploitation from knowledge play a key role in the process of creating wealth. One of the distinctive features of knowledge-based economy is enormous flow of investment in human capital and information and communication technology (Namazi *et al*, 2007). New knowledge economy offers unlimited resources in a potentially way because human capacity to create knowledge is unlimited. Non tangible assets and intellectual capital are rapidly supplementing physical assets. Intellectual capital means the total capital stock or ownership right of a knowledge-based that firm owns it. In other words, the purpose of intellectual capital is to use knowledge resource in firms developing (Edvinsson *et al*, 2007). Because of this, it needs to determine the main resources and function and knowledge stimulus by managers of organizations in the third millennium A.D. in which intellectual capital (not financial) is the main infrastructure of dynamic and future success for the knowledge economy of the firms, Because advanced understanding and applying the intellectual capital help firms to become more operative, effective, efficient and innovative. Moreover, firms competitive success depend less on strategic allocation of physical and financial resources and depend more on strategic management of intellectual capital (Hansen *et al*, 2005).

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First Nick Bountis in 1998 divided the intellectual capital into three categories: human, structural and customer capital. But he in 2000 changed this classification as human capital, structural capital and communication capital and assets or immaterial ownership, he classified human capital that includes employees' personal knowledge and this knowledge can be implicit and inner and has been used by a person self exclusively.

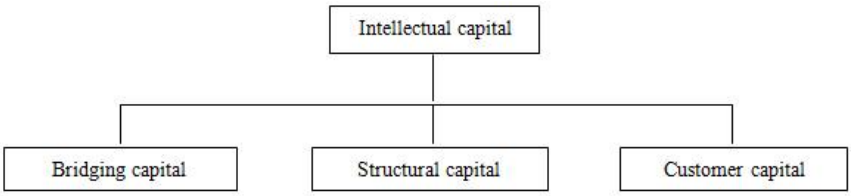

Fig. 1: Intellectual capital constituents of viewpoint of Bountis *et al* (2000).

Stewart (1997), presented their classification as human capital, structural capital, customer capital. In this classification, in fact the human capital is employees' knowledge of an organization that is the most important asset of the organization. Intention of the structural capital is the knowledge embedded information technology and all royalties, plans and brands. Intention of customer capital is market information that has been used to attract and retain customers; this classification is somewhat similar to Bonntis' primary classification. Ross *et al* (1997), knows intellectual capital consisted of three structural capital, human capital and customer capital. Souybay in 1997 offers a conceptual framework of intellectual capital, based on this framework intellectual capital will be divided into three subsections of internal structure, external structure and competence of staff. Edvinsoun and Malone (1997), in their own value of Eskandya design have provided intellectual capital consisted of two components: human capital and structural capital.

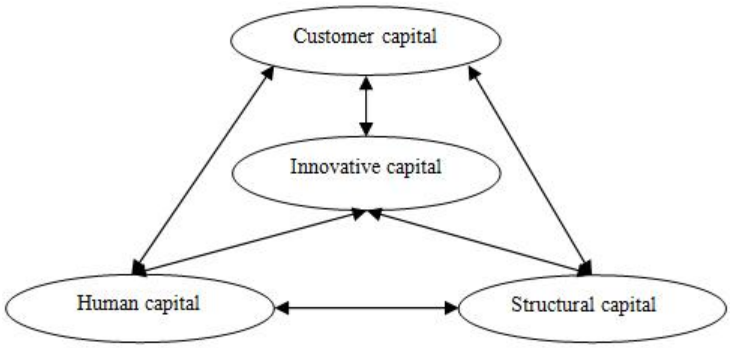

Fig. 2: structure of intellectual capital from viewpoint of Chen *et al* (2004).

In this classification of Chen *et al* (2004), intention of human capital that indeed is the basis of human capital is knowledge, skills and employees' abilities and employees' attitudes about business. From their viewpoint, indeed human capital is that can transform knowledge to market value by means of three other components of capital namely know capital of structure, customer and innovation. In a study entitled "Performance measuring metrics based on value and intellectual capital", Shamlou (2013), concluded that in all of studied firms, there is a significant relationship between intellectual capital and metrics based on performance, no matter what an industrial sector they belong. Abbasi and Sedghi (2013), also studied the effect of each intellectual capital elements performance on firm financial indicator in Tehran stock exchange. The results show that firms with high intellectual capital have better financial performance. Salehnejad (2013), examines the relationship between intellectual capital and firm performance in a research. The results have shown that human capital and structural capital from the three indicators of intellectual capital have significant relationship with systematic risk performance indexes (β) while communication capital (costumer) doesn't have meaningful relation with this performance index. Hasas Yeganeh *et al* (2011), studied the effect of intellectual capital components on pharmaceutical firm's financial performance listed in Tehran stock exchange during the period of 2006 until 2010. The results show that, there is a meaningful relationship between intellectual capital and firms financial performance metrics indicators. On the other hand, the research findings can be concluded that between the components of intellectual capital, the efficiency of used capital is the most effective one. Jouzarian (2012), studied the role of human capital on Iran economic growth and investigated it for both short-term and long-term using Distributed Lag Model. The results indicate a positive and significant effect of human

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capital on Iran economic growth in both short-term and long-term and also the effects of long-term are more than short-term. Tellianing and colleagues (2011), studied the pressure of 150 firms listed in Malaysia stock exchange on five industries. Results showed that about 72.6 % of the firms, disclose their intellectual capital in firm annual report. Butini and Al Zobay (2011), examined the effect of intellectual capital on competitive advantage in Jordan commercial banks. They expressed that structural and human capitals have positive and significant influence on competitive advantage. Shekina and Berjes (2012), checked the relationship between intellectual capital quality and organization performance in Russia and European countries. Results indicated that there is a positive and meaningful relationship between intellectual capital quality and organization performance.

Methodology:

The research hypothesis:

- Efficient in the employed capital utilization impacts on the firm's market value.
- Efficient in the human capital utilization impacts on the firm's market value.
- Efficiency in the structural capital utilization impacts on the firm's market value.

Statistical population and sample:

The current study population includes all of the listed firms in Tehran stock exchange. Sampling in this study is purposive one. Thus, from all firms available at each stage, those who don't have following conditions will omit, and finally, all remaining firms will be selected for the test.

- Firms should be continued working in a fiscal year.
- Statistical sample doesn't include intermediary investment and financial firms.
- The firms those end their fiscal year at the end of March in each year.
- The firms weren't experienced loss during the studied period.
- They were accepted in Tehran stock exchange to select a homogenous sample before 2005 and included in exchanging stock since the beginning of 2005.
- Their transactions weren't experienced interrupting during 2005-2011 and they should be active in those years and their lag length shouldn't be more than three month.

Table 1: Selecting procedure of study's statistical sample.

The total number of firms listed in Tehran stock exchange at the end of 1390	486	
Presumption:		
The number of firms get into stock exchange after 1384	(44)	
The number of firms that haven't been active in stock exchange or have been omitted During the realm of 1384-1390	(106)	
The number of firms that have changed their fiscal year during the realm of 1384-1390, or their fiscal year doesn't end at the end of March	(46)	
The number of firms which their information wasn't available for studying	(84)	
The number of firms involved in intermediary investment and financial firms	(38)	
The number of population firms		164

Finally, 164 firms were qualified to participate in population, after the mentioned processes. Furthermore, the minimum amount of sample was analyzed to test the hypotheses by using the Cochran's sampling formula that was presented below. The result is shown below:

By putting the numbers in the sampling formula, we have:

$$n = \frac{N Z^2 pq}{Nd^2 + Z^2 pq}$$

$$n = \frac{164 \times (1.96)^2 \times 0.5 \times 0.5}{164 \times (0.05)^2 + (1.96)^2 \times 0.5 \times 0.5} \approx 115$$

Table 2: Statistical sample used in the study according to industry.

R	Industry	Number of sample
1	Mining	8
2	Variety of drinking and food products	14
3	Vehicle and parts manufacturing	21
4	Making metal products	7
5	Other non-metallic mineral products	19
6	Basic metals	11
7	Electrical machinery and apparatus	6
8	Machinery and equipments	7
9	Chemical products	22
The total number of selected sample		115

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Measure research variables:

To determine intellectual capital, in this study, value added intellectual coefficient model of Palyk (2000) is used. Palyk suggested that, when value added intellectual coefficient is high, the efficiency of obtained value added is better than total firm's resources. This model has five phases.

The first phase: Determining value added:

VA= OUT – IN

In which:

VA = firm Value Added

OUT = total income from sailing of goods and services

IN = total cost of materials, components and services purchased

Due to active role of human resources in value creation process, in this model, salary and wages costs aren't included in input factors. Therefore, cost of employees shouldn't be considered as an expense but as an investment. Value added can be calculated through the information in annual reports, as follow:

VA= OP+ EC+D+A

In which:

OP = Operational Profit

EC = Employees Cost

D = Depreciation of tangible assets

A = expiration date (Amortization of intangible assets)

The second phase: Determining capital employed efficiency:

To provide a full picture of resources effectiveness create value, in this model, it's necessary to consider the efficiency of physical and also financial capital. This effectiveness is obtained from the following equation:

$$CEE = \frac{VA}{CE}$$

In which:

CEE = Capital Employed Efficiency

CE = Capital Employed that equals to firm business value of fix assets excluding intangible assets.

The third phase: Determining human capital efficiency:

According to this model, all staff costs are considered as human capital. So, we have:

$$HCE = \frac{VA}{HC}$$

In which:

HCE = Human Capital Efficiency

HC = Human Capital that equals to total costs of firm's salary and wages.

The fourth phase: Determining structural capital efficiency:

Structural capital is calculated as follow:

SC = VA – HC

In which:

SC = Structural Capital

Structural Capital Efficiency (SCE) can be calculated through following equation:

ICE = HCE +SCE

In which:

ICE = Intellectual Capital Efficiency

The fifth phase: Determining value added intellectual coefficient:

The last phase is about determining value added intellectual coefficient that calculated as follow:

VAIC = ICE + CEE = HCE + SCE + CEE

In which:

VAIC = this coefficient shows value creation efficiency or firm's intellectual ability. Greater coefficient reflects that the manager has better used firm potential. Also, earning ratio per share represents firm's interest earned by common stocks in a specified period and for calculating it, we should divide the interest to common shareholders from weighted average of common stocks numbers. Any preferred stocks should be excluded from net interest to obtain the interest of common shareholders.

$$EPS = \frac{CSNI}{WANCS}$$

In which:

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EPS = Earnings Per Share
CSNI = Common Shareholders Net Interest
WANCS = Weighted Average Number of Common Shares

The research model:

To study the relationship between dependent, independent and controlled variables of research hypothesis, regression function will be used:

$$P_{i,t} + 3 = \beta_0 + \beta_1 BVPS_{i,t} + \beta_2 EPS_{i,t} * TAPS_{i,t} + \beta_3 HCEPS_{i,t} + \beta_4 SCEPS_{i,t} + \varepsilon_{i,t}$$

So that, "P" denotes share value of (i-n) firm in a time of t+3. β_0 represents width from source. BVPS is the Book Value Per share and EPS is the Earning Per Share. TAPS is the Total Asset Per share.

Results:

The results of descriptive statistics of research variables:

Table 3: Descriptive statistics of research variables.

Variable	Views	Mean	Median	Maximum	Minimum	Standard deviation
MV	115	12.619	12.425	17.512	8.898	1.450
HCI	115	2.184	1.767	27.052	-1.045	1.624
EPS	115	5.695	1.813	59.449	-21.405	10.283
BV	115	12.226	5.768	85.458	0.030	16.207
CEE	115	0.415	0.379	2.534	-0.109	0.232
SCE	115	0.480	0.439	16.231	-1.456	0.750
TAA	115	43.471	16.715	518.922	1.044	73.873

Correlation Analysis:

Table 4: Correlation coefficients between dependent, independent and controlled variables of research hypothesis.

	BW	CEE	EPS	HCE	MV	SCE	TAA
BW	1	0.032	0.411	0.352	0.307	0.081	0.571
CEE		1	0.078	-0.041	0.070	-0.077	-0.021
EPS			1	0.263	0.320	0.059	0.588
HCE				1	0.279	0.127	0.173
MV					1	0.067	0.176
SCE						1	0.030
TAA							1

As shown in the tables above, correlation coefficient between research variables represents lack of high dependence to each other.

Evaluating normal distribution of dependent variable:

H_0:Data for dependent variable follows a normal distribution

H_1:Data for dependent variable doesnt follows a normal distribution

Accept or reject the assumption of data normality is depends on obtained value of p-value. If the value obtained is less than 0.05, surely 95% of data normality assumption will be rejected. But if the value obtained is more than 0.05, the null hypothesis assumption of data normality can't be rejected with 95% confidence. Therefore, 95% of these variables certainly will have normally distributed.

Table 5: Results of Kolmogorov-Smirnov test.

Year	2005	2006	2007	2008	2009	2010	2011
Test statistics	0/944	0/934	1/294	1/001	0/489	0/733	0/653
P-value	0/335	0/347	0/070	0/269	0/970	0/655	0/788

The level of significant for Kolmogorov-Smirnov statistics, as it can be seen in Table 5, is more than 5%. So, the null hypothesis isn't rejected; it means that, data for dependent variables follow a normal distribution.

The results of Lymer F test:

Lymer diagnostic F test to select between combined data models or panel data models with fix effects was done by Eviews software before fitting the model. The results are given in Table 6.

Table 6: The results of Lymer F test.

X	Statistics	Significant level
Period F	1.162	0.322

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As shown in Table 6, the results are obtained according to significant level and also, due to the 5% acceptable of significant level, the results have suggested, the hypothesis H_0 is accepted, thus, the combined data model is preferable. Therefore, the combined data model is used to fit the model. The results of research model statistics test are given in table 7, (Details of Lymer F test is presented).

Table 7: Total results of model estimation.

Independent variable	Coefficient	T statistics	Sig.
TAA	0.001	2.619	0.009*
SCE	-0.004	-0.273	0.785
HCE	0.025	2.564	0.011*
EPS	-0.005	-1.581	0.114
CEE	0.087	1.836	0.067
BV	0.009	4.355	0.000*
C	12.756	41.736	0.000*
R-Squared	0.905	Adjusted R-Squraed	0.904
F-statistics	1078.84	Prob (F-Statistics)	0.000**
Durbin –Watson stat	2.446	S.E. of regression	2142.62

As also observed in Table 7, according to the obtained statistic F (1078.84) can be expressed in 99% confidence level, in sum the independent variables are correlated to the company's market value. This is also corroborated by the results that about 90 percent of the variation of the company's market value is explained by the independent variables. In continuation obtained results will be examined for each research hypothesis.

The first hypotheses test:

The purpose of the first formulated hypothesis was to investigate efficiency influence in the employed capital utilization on the market value of the company that we have to check that:

H_0: Efficient in the employed capital utilization does not impact on the company's market value.

H_1: Efficient in the employed capital utilization impacts on the company's market value.

According to the obtained results in Table 7 of the pattern estimation, coefficient of employed capital variable is equal to 0.087, and with regard to the P-value it is equal to 0.067 and less than the error level of 0.10, as a result, this hypothesis is confirmed in confidence level of 0.90.

The second hypothesis test:

The purpose of the second formulated hypothesis was to investigate efficiency influence in the human capital utilization on the market value of the company that we have to check that:

H_0: Efficient in the human capital utilization does not impact on the company's market value.

H_1: Efficient in the human capital utilization impacts on the company's market value.

According to the obtained results in Table 7 of the pattern estimation, coefficient of human capital variable is equal to 0.025, and with regard to the P-value it is equal to 0.011 and less than the acceptable error level of 0.10, as a result, this hypothesis is confirmed in confidence level of 0.90.

The third hypothesis tests:

The purpose of the third formulated hypothesis was to investigate efficiency influence in the structural capital utilization on the market value of the company that we have to check that:

H_0: Efficient in the structural capital utilization does not impact on the company's market value.

H_1: Efficient in the structural capital utilization impacts on the company's market value.

According to the obtained results in chart number (4) of the pattern estimation, coefficient of structural capital variable is equal to - 0.004, and with regard to the P-value it is equal to 0.785 and more than the acceptable error level of 0.10, as a result, this hypothesis is confirmed in confidence level of 0.90.

Discussion and Conclusion:

First hypothesis:

The obtained statistical results revealed that there is a significant positive relationship between efficiency in employed capital utilization and the company's market value which the obtained result has been consistent with the result of the investigation by Wang (2008), Voltaire and Sylvester (2013), Namazi and Ebrahimi (2007) and Madhoushi and Asgharnejad (2008). In line with the outcomes can be expressed, sources support firm's performance and competition. Hence it is imperative that companies pay more attention to the intraorganization sources and its capabilities. Maximizing corporate value involves optimal utilization of financial sources and gaining efficiency and selection of appropriate risk for the company, with the right mix of sources of funds used by the company, its value will be maximized and therefore there is a combination of sources. Companies which have more money are validated greater ability to attract a loan, the customer and the ability to be more competitive in the market.

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Second hypothesis:

The obtained statistical results revealed that there is a significant positive relationship between efficiency in utilization of human capital and the company's market value. The results showed that human capital variables provide information to evaluate firms which the obtained results has been consistent to the result of research by Huang and Wang (2008), Chang (2007), Ton *et al* (2007), Voltaire and Sylvester (2013), Namazi and Ebrahimi (2009), Madhoshi and Asgharnejad (2009), Mojtahedzade *et al* (2010) and Abbasi and Sadeghi (2010). In line with the results, it can be said that today's world has passed industrial economy and entered the knowledge-based economy. Knowledge-based economy is an economy in which the production and utilization of knowledge plays a major role in the process of wealth creation.

Third hypothesis:

The obtained statistical results revealed that there is no significant positive relationship between efficiency in utilization of structural capital and the company's market value. The obtained results has been consistent to the result of research by Maditinous *et al* (2011), and opposite to result of research by Voltaire and Sylvester (2013), Namazi and Ebrahimi (2009), Madhoshi and Asgharnejad (2009), Mojtahedzade *et al* (2010). In line with the outcomes it can be expressed investors to illustrating the value of the firm pay more attention to physical and human assets than structural capital, and do not give much importance to the structural capital in the company, and investors attribute much more value to information of human and physical capital than information of structural capital. Individuals may have a high level of wisdom, but organizations may have poor systems and procedures and whereby individuals pursue their operations and can't create value for the organization.

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