THE IMPACT OF INTELLECTUAL CAPITAL ON RETURN OF FIXED ASSETS AND FIRMS' TOTAL ASSETS RETURN WHICH LISTED ON THE TEHRAN STOCK EXCHANGE

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ABSTRACT

Nowadays, there are a lot of differences in value of commercial corporations. Existing capitals other than physical capitals in balance sheet is the most important reason that researchers of capital market have focused on it. In this paper, hypotheses were set by using of Pulic model and were presented in the form of regression. The study was carried out in a five-year period, between the years 2008 to 2012, and data have been collected from audited financial statements of Tehran Stock Exchange. Regarding the subject of this study and limitations of information just 41 firms were chosen. The results of this research show that intellectual capital has impact on return of a firm's total asset (financial performance) meanwhile it doesn't have any effect on fixed asset's return. The findings of this research are important because it claims that firm's value doesn't consist of just tangible assets and according to science progress the role of intangible assets in increasing firm's value becomes much more important than tangible assets.

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Keywords: Added value, Total assets return, Tehran stock exchange, Intellectual capital, Public model, Impact on return, Intangible assets.

JEL Classification: G1, G10.

Contribution/ Originality

This study contributes in the existing literature that regarding the role of human forces of firms along with their other capitals in the form of formulated compound in order to increase the total return of firms and with respect to requirements of today business world should devise more strategic policies.

1. INTRODUCTION

As today's economy is the knowledge based one so the role of knowledge in creating wealth is considerable. Human capital plays key role in knowledge based economy. In this economy it's possible to create unlimited resources by human because human's capability for producing knowledge is limitless. Produced capitals in knowledge based economy are consisting of intellectual capital along with physical capital which leads to increase a firm's total capital.

In knowledge based economy that has been identified as the latest level of economic development up to now, capitals of a firm is observed with newer measurement scales. The main objective of this study is to examine the changes in return of a firm's fixed and total assets with considering of the intellectual added value's role. Also we are going to investigate the return of some assets other than fixed assets including intellectual added value. Although previous studies have focused a lot on the performance of corporations which are assets' return but they didn't study in details on the components of assets.

2. LITERATURE REVIEW

The term of intellectual capital had been used by John Kens Galberis for the first time in 1969. He believed that intellectual capital is beyond of sheer thought and encompasses a kind of action of thoughts. In this concept, intellectual capital is a static intangible asset and it is considered as a means of reaching goals. (Namazi and Ibrahimi, 2009)

In this area, we should not ignore the efforts of James Tobin in the second half of previous century which his model based on ratio -QV Tobin- for the first time enabled the organizations to investigate the effective performance of firm's intellectual capital. (Khavandkar *et al.*, 2009)

Intellectual capital is defined as intangible assets that enable the firms to operate. (Khavandkar *et al.*, 2009)

From Michel Mullen and Leif Edvinson point of view some of the subsets of Intellectual capital include: human capital, external (customer) capital, structural capital, organizational capital, process capital and innovation capital. On the basis of Michel Mullen and Leif Edvinson's statements, three main elements of Intellectual capital are: human capital, customer capital and structural capital. (Khavandkar *et al.*, 2009)

Each part of intellectual capital's coefficient of efficiency has positive and significant impact on the rate of return of shareholder's equity. The higher intellectual capital the companies have the better financial performance they do. (Abbasi and Sedghi, 2010)

Pulic suggestion with focus on profit and loss statements' added value does not have any contradiction or diversion with basic principles of accounting, additionally measuring the suggested performance by Pulic isn't a real rival for traditional methods. (Lazzolino and Laise, 2013)

There is an interaction between investments in components of intellectual capital and firm's performance. Thus in the area that encounters minor differences it follows with a positive effect of economic profit on micro human capital. (Naidenova and Parshakov, 2013)

Competitive advantage scheme in emerging SMEs proposes that resources which influence capabilities of organizations would be affected the resources, domain and capabilities of organizations that are considered as strategic factors in improving the performance. In this scheme human capital may impress the strategic factors that are effective in improving performance. Based on this, human capital influences the structural capital which leads to establish relational capital. (Jardon and Martos, 2012)

Zéghal and Maaloul worked over the impact of intellectual capital with added value index on financial performance, economic and market share of 300 companies. The intellectual added value coefficient model was used to measure intellectual capital. The results expressed that intellectual capital has a positive impact on the economic and financial performance but the relationship between intellectual capital and market value just in high-tech industry is significant. (Zéghal and Maaloul, 2010)

Purzamani and et al In their paper entitled, the impact of intellectual capital on market value and financial performance; revealed that there is no expressive relationship between intellectual capital and market value to book value even though a positive link can be seen between intellectual capital and rate of return-assets. (Purzamani *et al.*, 2012)

An affirmative correlation can be seen between intellectual capital and financial return of company. If a company possesses higher intellectual capital it will have better future financial performance. There is a positive correlation between growth rate of firm's intellectual capital and future performance. Role of intellectual capital on future performance of company in various industries is different. (Hemmati and Mehrabi, 2011)

In investigating the relationship between board of directors' structure and intellectual capital of pharmaceutical firms listed on Tehran Stock Exchange, using fuzzy approach, it has been noted that the independent variable of number of board of directors influenced positively on firm's intellectual capital, yet the percentage of staffs to all members of board of directors are two variables that do not have significant relationship on intellectual capital. (Ahmadpur *et al.*, 2012)

In explanation of intellectual capital's effect on financial performance of pharmaceutical firms using fuzzy approach, the results have shown that independent variables of relational and human capital have positive effect on firms' performance, while the structural capital as an independent variable has not shown any significant effect on firms' performance. (Mallekian and Zare Behnamiri, 2010)

In exploring of intellectual capital's impact upon efficiency as a performance criteria of a commercial unit, was concluded that intellectual capital had negative impact on performance of all under studying industries except automotive industry and automotive parts manufacturing, thus type of industry may not influence much in the impact of investment on performance (efficiency). (Ghayuri Moghadam *et al.*, 2012)

In evaluating the impact of intellectual capital to produce added value (economic & market), the results has indicated a significant and positive relationship between intellectual capital and firm's economic added value. On the other hand, with increasing the intellectual capital of

companies, their economic and market's added value will grow too. The explanation power of intellectual capital in the market's added value of companies is much higher than their economic added value. (Rezaei *et al.*, 2010)

The result of testing hypotheses in exploring the relationship between intellectual capital and financial return of listed companies in Tehran Stock Exchange have indicated that a positive correlation can be found between intellectual capital and financial performance and future performance of company. The intellectual capital's role on future performance of a firm in various industries seems different as well. However intellectual capital's growth rate and firm's future performance are not related to each other. (Hemmati and Mehrabi, 2011)

In analyzing the effect of intellectual capital on performance of branches of Sepah Bank in Tehran, the results of the study were supported the positive effects of intellectual capital's elements on working of mentioned branches of bank. Also, the customer capital was verified as the most effective factor and structural and human capital have placed on next levels. In addition, it was identified that customer capital plays an intermediary role in relationship between structural and human capital with organizational performance. (Shahaei and Khef Allahi, 2010)

This study about effects of fixed strategy on market's share and assets return reveals that firms that match an aggressive approach to seven other dimensions often possess higher market share related to credit unions characterized by a different alignment of the various aspects of marketing strategy. In addition, the results recommend that reaching such a fit is not match with maximizing a firm's return on assets. (Pleshko *et al.*, 2014)

3. RESEARCH METHOTHOLOGY

3.1. Hypotheses of the Research

Following hypotheses are considered in order to achieve the objectives of the research.

The first hypothesis: There is a significant relationship between firm's fixed assets return and ratio of intellectual capital.

The second hypothesis: There is a significant relationship between firm's assets return and ratio of intellectual capital.

$$ROA_{it} = a_0 + a_1 VACA + a_2 VAHU + a_3 STVA + e$$

$$ROFA_{it} = b_0 + b_1 VACA + b_2 VAHU + b_3 STVA + e$$

3.2. Research Variables

3.2.1. Independent Variables

- Applied capitals efficiency coefficient (VACA) : This factor indicates produced added value obtained from applied visible physical assets.

- Human capitals efficiency coefficient (VAHU) : This factor indicates produced added value to wages and salaries of firm's staff.

- Efficiency coefficient of structural capital (STVA) : This factor indicates produced added value by firm's structures**.**

3.2.2. Dependent Variables

- Rate of assets return: financial performance was measured by assets index.

$$ROA = \frac{NP}{TA}$$

NP: net profit

TA: total assets

This index shows ability of managers in using efficiency of assets to make profit.

- Fixed assets rate of return: It measures firm's total income to its net fixed assets.

This index shows that a company earns how much income regarding to amount of its fixed assets.

$$ROFA = \frac{TE}{NFA}$$

TE: total earning

NFA: net fixed assets

3.3. Statistical Population and Sampling

In this research, the financial information were collected from Rahavarde Novin software, financial statements and explanatory notes of Development and Research Managmentof Islamic Studies of stock exchange companies plus Irbourse for a five- years period from 2008 to 2012.

In this study, the companies having following qualifications without conducting sampling process have been selected.

1. Their financial year shall be ended up on March 20th and no changes occure in the course of the study.
2. During the survey, the company has not been removed from the list of companie in stock exchange.
3. The required information must be available comprehensivly during the investigated period.
4. These companies shall not belong to the investment firms,banks and monetery and credit institutions.
5. These companies do not have negative stockholder's rights and do not sustain loss.

Thus with considering the above mentioned limitations, 41 companies were chosen in each financial year.

3.4. Research Methodology

The method of this study is practical and descriptive and since their data through collecting the financial statments of companies in previous years were examined so it is a descriptive-post event study. The ultimate goal of current study is to present approperate method for impact of intellectual capital on return of fixed and total assets as well as experimental test of these methods on Tehran Stock Exchange. In order to reach this goal, firstly the value of intellectual capital of each available companies in the sample for the five-years period (2008- 2012) have been calculated by using Pulic model.

4. RESEARCH MODEL

Intellectual added value's model that has been introduced by Pulic, is a part of return assets models. Pulic belives that today's business can not be displayed in the form of traditional scales models anymore. (Khavandkar *et al.*, 2009)

Pulic Model consists of five steps: calculation of added value which is the first step includes of intra and extra of an organization. From beneficiaries' point of view calculation of added value is better than calculation of accounting profit which represents just shareholders' return. Beneficiaries are shareholders, government, people, office workers, financial suppliers and finally the society. (Purzamani *et al.*, 2012)

$$VA = R - C - DP = W + I + T + PAT$$

VA: value added

R: revenue (from sales or services)

C: cost of goods sold

DP: depreciation charge

W: staff wages

I: interest

T: tax

PAT: profit after tax

The second step: calculation of efficiency coefficient of human capital.

In this model all staffs' expenditures have inserted in the form of human capital concept. (Khavandkar *et al.*, 2009)

$$VAHU = \frac{VA}{HU}$$

HU: total staffs' wages and salaries

The third step: calculation of value added coefficient of structural capital. (STVA)

$$SC = VA - HU$$

firms' structural capital: SC

$$STVA = \frac{SC}{VA}$$

The fourth step: calculation of added value coefficient of capital applied.

$$VACA = \frac{VA}{CA}$$

$$CA = TBA - IA$$

CA: applied capital

TBA= book value of company's total assets

IA: Intangible assets

The fifth step: calculation of intellectual's added value coefficient. (VAIC)

$$VAIC = VACA + VAHU + STVA$$

5. RESEARCH FINDINGS

Initially we go through the regression model.

$$ROA_{it} = a_0 + a_1 VACA + a_2 VAHU + a_3 STVA + e$$

The first hypothesis: there is a significant relationship between return on firm's assets and coefficient of intellectual capital.

In this hypothesis, we attempt to discover the effect of intellectual capital' coefficient on return on assets; therefore descriptive statistic table has presented average quantities and standard deviation of each variables of the hypothesis.

Table-1. Descriptive statistic table of the first hypothesis

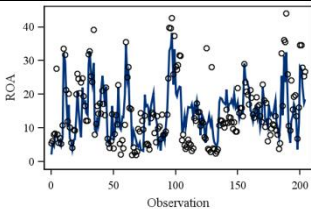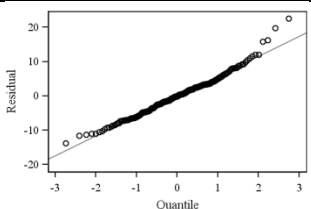| Variable name	Sample volume	average	Standard deviation	total	minimum	maximum
ROA	205	14.84683	9.52669	3044	1.95502	44.02983
VACA	205	0.20248	0.10872	41.50903	0.01498	0.55369
VAHU	205	6.31575	6.11011	1295	0.18853	38.98214
STVA	205	0.62506	0.54358	128.13767	-4.30413	0.97435

Since the collecting data is on Panel method, before all else the type of data's pattern (including combined regression, fixed effects pattern and accidental effects pattern) should be specified. Amount of probability on Limer test is less than test level of this research. (0.05), which explains that using of combined regression is not suitable and panel pattern should be fitted to data. Also, according to Brush Pagman and Hasman tests that using of accidental effects pattern are better than fixed effects patters.

Table-2. Recognition of the First hypothesis pattern

Pattern type	Test name	Degrees of freedom 1	Degrees of freedom 2	Statistic amount	Probability amount
combined regression	F Limer	40	161	19.09	0.0001
Fixed effects pattern	Brosh Pagman	2	-	250.49	0.0001
accidental effects pattern	Hasman	3	-	1.05	0.7896

The results of goodness of fit on accidental effects pattern to data of this study indicate that efficiency coefficient of applied capital (VACA) on assets return has significant and direct effect. The variables of human capital efficiency and structural capital efficiency also have direct impact, yet with considering probability amount of significance test these variables' coefficient, the effect of these coefficients on assets return is meaningless. The amount of efficiency coefficient of applied capital equals 66.49 which show that with adding one variable unit of efficiency of applied capital, the assets return increases to 66.49 units.

Table-3. Estimating of coefficients of the first hypothesis pattern parameters

variable	parameter	Degrees of freedom	Estimating parameter	Standard deviation	T statistic	Probability amount
intercept	α_0	1	1.105713	1.189	0.93	0.3535
VACA	α_1	1	66.49363	4.7766	13.92	<.0001
VAHU	α_2	1	0.055656	0.0635	0.88	0.3816
STVA	α_3	1	-0.11875	0.6989	-0.17	0.8653
Statistic of pattern sufficiency	Coefficient of determination			Standard deviation error		
amount	0.575			3.462		
Fitted pattern diagrams	Diagram of fitted amounts by pattern			Diagram of reminders normal probability		

We will continue with analyzing of the second model.

$$ROFA_{it} = b_0 + b_1 VACA + b_2 VAHU + b_3 STVA + e$$

The second hypothesis: There is a significant relationship between firm's assets return and ratio of intellectual capital.

In this hypothesis, we attempt to discover the effect of intellectual capital' coefficient on fixed assets return, therefore descriptive statistic table has presented average quantities and standard deviation of each variables of the hypothesis.

Table-4. Descriptive statistic table of the second hypothesis

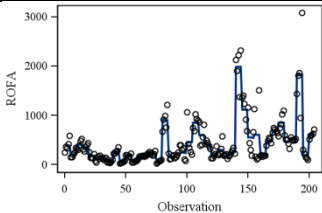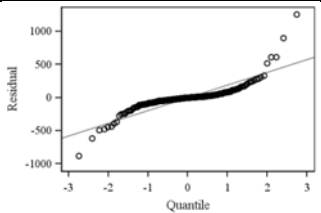| Variable name	Sample volume	average	Standard deviation	total	minimum	maximum
ROFA	205	437.36004	461.49806	89659	19.39834	3083
VACA	205	0.08705	0.07033	17.8449	-0.03405	0.33299
VAHU	205	2.94902	3.87865	604.5496	-0.82523	28.56187
STVA	205	-0.00989	5.11057	-2.02844	-41.18847	45.23615

Since the collecting data is on Panel method, before all else the type of data's pattern (including combined regression, fixed effects pattern and accidental effects pattern) should be specified. Probability amount on Limer test is less than test level of this research. (0.05), which indicates that using of combined regression is unsuitable and panel pattern should be fitted to data. Also, according to Brush Pagman and Hasman results using of accidental effects pattern is better than fixed effects patters.

Table-5. Recognition of the second hypothesis pattern

Pattern type	Test name	Degrees of freedom 1	Degrees of freedom 2	Statistic amount	Probability amount
combined regression	F Limer	40	161	19.09	0.0001
fixed effects pattern	Brosh Pagman	2	-	250.49	0.0001
accidental effects pattern	Hasman	3	-	1.05	0.7896

The results of goodness of fit on accidental effects pattern to data of this study show that efficiency coefficient of applied capital, human capital efficiency and structural capital efficiency with considering probability amount of significance test coefficient of these variables, the effect of these coefficients on fixed assets return is meaningless.

Table-6. Estimating of coefficients of the first hypothesis pattern parameters

variable	parameter	Degrees of freedom	Estimating parameter	Standard deviation	T statistic	Probability amount
intercept	β_0	1	432.0338	77.8443	5.55	<.0001
VACA	β_1	1	117.4181	442.8	0.27	0.7911
VAHU	β_2	1	-1.66	6.7608	-0.25	0.8063
STVA	β_3	1	-0.05299	3.2487	-0.02	0.987
Statistic of pattern sufficiency	Coefficient of determination			Standard deviation error		
amount	0.826			216.6		
Fitted pattern diagrams	Diagram of fitted amounts by pattern			Diagram of reminders normal probability		

6. CONCLUSIONS AND SUGGESTIONS

Regarding the first hypothesis of this study, results of goodness of fit on accidental effects pattern to data of this study indicate that efficiency coefficient of applied capital (VACA) on assets return has direct significant effect. The variables of human capital efficiency and structural capital efficiency also have direct impact, yet with considering probability amount of significance test of these variables' coefficient, the effect of these coefficients on assets return is meaningless. The amount of efficiency coefficient of applied capital equals 66.49 which indicate that this finding is consistent with researches of Zéghal and Maaloul (2010), Purzamani *et al.* (2012), Namazi and Ibrahimi (2009). But the difference is in it that variables of human capital efficiency and structural capital efficiency on return on assets are not significant. This could said that human resources have no attention to produce value through intellectual capital.

On the other hand, the results of goodness of fit on accidental effects pattern to data in the second hypothesis of this study reveal that efficiency coefficient of applied capital, human capital efficiency and structural capital efficiency with considering probability amount of significance test on coefficient of these variables, the effect of these coefficients on fixed assets return is meaningless.

Finally, it is suggested that: 1- the impact of intellectual capital on intangible assets' value, which is a part of firm's total assets, should be evaluated.

2- The impact of intellectual capital on ratio of intangible assets' value book value of firm's total assets should be evaluated.

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