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Effect of Intellectual Capital on Market Criteria in the Performance Evaluation of Accepted Companies in Tehran SEC

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Abstract The survival of organizations is in the current business and occupational atmosphere depends on the introducing of new products, innovation and proposing value-inducing processes based on modern knowledge. For this, managers have to evaluate intellectual capitals as an important criterion to improve the performance of organizations. The main propose of this research is to study the relationship between intellectual capital and performance indicators of companies. In order to measure the intellectual capital, the value added intellectual capital coefficient has been used which was developed by Pulic. The sample have consists of 146 accepted companies in Tehran Stock Exchange in a seven-year period between 2004 to 2010. The statistical methods used here were correlation analysis and regression pooled least squares by SPSS 18 software. The results showed that there is a meaningful relationship between intellectual capital and Return Stock, Tobin's Q and market to booking value (MTB). Of course the direction of this relationship and correlation to different industries is different.

Keywords Intellectual Capital, Return Stock, Tobin's Q, Market To Book Value

1 Introduction

Today, our world has left behind the industrial economy and has entered in knowledge-based economy. Knowledge-based economy, where economic efficiency of production and exploiting of knowledge, plays a major role in the process of creating wealth. Tangible assets can be easily copied or to be purchased; so they cannot be a strategic asset and make competitive advantage for those companies [1]. Conversely, Intellectual Capital is usually created to internal and is covered into staff skills and experience, so it isn't copying and duplication and can create competitive advantage for their companies. Thus, in the third millennium AD, in which intellectual capital rather than financial is the main foundation for dynamic and future success of company in the knowledge economy, is necessary the key resources and drivers of performance and value are determined by managers in organizations; because Increasing the understanding and application of intellectual capital to help companies

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more efficient, more effective, more efficient and more creative [2]. Also in Iran, the moving towards privatization has led to increased competition in the domestic economy; Therefore organizations need to pay attention to intellectual capital more than ever**.**

2 Theoretical study

Prevailing economic conditions on companies are causing these companies have a competitive advantage not based on tangible assets. Now what make these companies compete in the current economy, is their intangible assets and their intellectual capital of their turns. Such companies have been able to make it reality by Communicating with customers and gain the necessary experience in this direction and relying on the knowledge, organizational techniques and their specialized skills. Today, sustainable profit is obtained when at first organizations learn to acquire knowledge and secondly to manage this knowledge and to convert to the intellectual capital with the help of existing processes in knowledge management. Understanding the different components of intellectual capital leads to improve management and use it at the operational level and strategic. Overview division of intellectual capital from the perspective of the International Federation of Accountants can be traced in Fig. 1. [3].

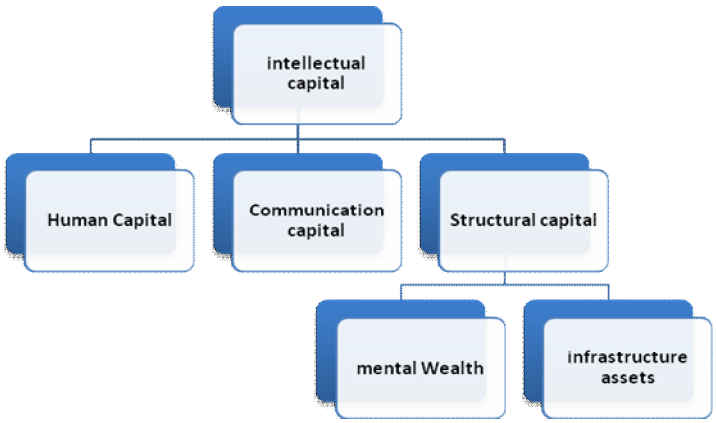

Fig. 1 IFAC classification of intellectual capital

- **Human Capital:** Human capital is defined as personal knowledge, Skills, abilities and experiences in an organization's staff to create value and to solve business issues and includes education, work-related knowledge, occupational or professional competence, professional assessments and psychometric , work competencies , the amount and rate of entrepreneurial and flexibility.
- **Communication capital (Customer):** Communication capital is knowledge used in the marketing channels organization and relationships with clients during business. Among the factors that increase communication capital can be mentioned to company name, distribution channels, Customers, customer honesty, business cooperation and favorable contracts.
- **Structural capital:** Structural capital consists of all stock of inhuman knowledge in organizations that includes (1) infrastructure assets: database, organizational charts,

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strategies and management culture; (2) mental Wealth: patents, trademarks and trade secrets.

3 Background of the research

Many studies have been done in the field of intellectual capital. Some of the most important one is mentioned here in 2 sections internal research and foreign research.

W. M. Lu, et al. investigated capability and efficiency of intellectual capital in the semiconductor manufacturers in Taiwan and concluded that intellectual capital performance is key element in achieving more innovation and achieves competitive advantage [4].

M. A. Makki, S. A. Lodhi, R. Rahan measuring the performance of intellectual capital in Pakistan began and showed that in addition to financial performance measurement, performance measurement of intellectual capital is important. Results show that the chemical, oil and gas and cement sectors have high performance intellectual capital the bank sector has an average performance of intellectual capital and public sector companies have lower performance intellectual capital [5].

S. L. Chang studied the effect of intellectual capital on market value and profitability The Information Technology Industry in Taiwan during 2001-2005 and adjusted value added intellectual coefficient Palyk through the inclusion of R & D expenditure and intellectual property as two separate independent variables in multiple linear regression. But in various Information Technology Industries, positive or negative relationship between intellectual capital and its components with market value and profitability exists [6].

M. C. Chen, S. J. Cheng and Y. Hwang Investigated the relationship between intellectual capital and firms' market value and financial performance companies listed in Taiwan Stock Exchange in the period 1992-2002. They measured intellectual capital using value added intellectual coefficient and market value and financial performance using market value ratios to book value, return on equity, return on assets, revenue growth and productivity of employees. Hypothesis test results showed that intellectual capital has a positive effect on market value and financial performance and may be considered a criterion for future performance [7].

K. W. Maree, L. Stack, P. Court studied valuation of intellectual capital in South African Companies.The research question was posed so that the three Q - Tobin, an appropriate value for the measurement of intellectual capital is? The results show that the balance sheet does not reflect firms' current value and in fact represents the net asset value of the company. The study determined that the proposed methods, the most popular and most convenient methods are to measure intellectual capital [8].

H. Hemmati and A. Mehrabi investigated the relationship between intellectual capital and financial returns of companies listed in Tehran Stock Exchange during 2004–2008. The results show that between intellectual capital and corporate financial performance and future performance are positively correlated. Also the contribution of intellectual capital on the company's future performance is different in various industries and there is no correlation between growth rates of capital and firm performance [9].

A. Samadi and S. Motiee studied the relationship between intellectual capital and performance indicators (profit before tax, operating cash flows and value added) in firms listed in Tehran Stock Exchange during the 2004–2008. The results show that there is a significant relationship between intellectual capital and profit before tax, operating cash flow

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and value-added companies. On the other hand, among the dependent variables, profit before tax has a higher correlation with the intellectual capital [10].

M. Namazi and S. Ebrahimi investigated the effect of intellectual capital on current and future financial performance of companies listed in Tehran Stock Exchange during the 2004-2006 and concluded that there are positive correlation between capital and current and future financial performance of companies across all companies and industries regardless of company size, debt structure and past performance [11].

4 Methodology

This study intends to investigate the effect of intellectual capital on performance indicators in all industries of companies listed in Tehran Stock Exchange between 2004–2010.Therefore, this research is applied and a quasi-experimental research and Ex post facto approach was used. For sampling, Judgment sampling (systematic elimination) has been used with regard to the following:

1. Before 2004 are listed in Tehran Stock Exchange.
2. Corporate financial period lead to the end of March.
3. In the three months ended financial year-end stock is traded at least once.
4. They are not investment companies, financial institutions-banks and holding.

According to the above conditions, 146 companies were selected. Data was collected through information of companies listed in Tehran Stock Exchange and SPSS software was used for data analysis.

5 Hypotheses

According to the theoretical study and research background, the hypothesis is as follows:

- There is a significant relationship between intellectual capital and Return Stock of companies listed in Tehran Stock Exchange
- There is a significant relationship between intellectual capital and Q – Tobin of companies listed in Tehran Stock Exchange
- There is a significant relationship between intellectual capital and the ratio of market value to book value of companies' shares listed in Tehran Stock Exchange.

6 Variables

Variables are classified as follows:

6.1 Independent variables

According to the reasons discussed in the theoretical study, in this study, intellectual capital based on Palyk model (1998) has been considered as independent variables [12] which were calculated as follows:

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$$VA = Output - Input$$

VA: Value-Added Enterprises
Output: Gross Income
Input: Operating costs (excluding costs related to employees)

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

VAHC: Value added of human capital
HC: Costs related to staff

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

VACA: Value added of physical capital
CA: Physical capital (book value of total assets)

$$VAIC = VAHC + VACA$$

VAIC: Value Added of intellectual capital

6.2 Dependent variable

The dependent variable in this study is the corporate performance indicators in terms of Return Stocks, Q - Tobin and the ratio of market value to book value stocks have provided:

- **Return Stock**: Nowadays the most important criteria for evaluating organizational performance are Return Stock. This criteria alone have been the content of the information for investors because the performance evaluation based on market value reflects investors' information well and was calculated as follows:

$$RE = \frac{(P_1 - P_0) + D}{P_0}$$

RE = Return Stock
P_1 = Stock market price at the end of the year
P_0 = Stock market price at the beginning of the year
D = cash dividend

- **Q–Tobin:** This method was proposed by James Tobin, Nobel laureate economist. Traditionally, Q - Tobin as a prediction method was used in investment decisions. This method compares the market value of a company with the replacement cost of its assets. If this ratio is more than one, it means that the company's market value has been estimated more than actual value and this indicates the organizational intangible factors [13]. Q - Tobin was calculated as follows:

$$Q.Tobin_{it} = \frac{MVE_{it} + BVE_{it}}{TA_{it}}$$

MVE_{it} = Stock market value of company (i) in the financial period (t)
BVE_{it} = Debt´s book value of company (i) in the financial period (t)
TA_{it} = Total assets of company (i) in the financial period (t)

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- **Market value to stock book value ratio :** This ratio was calculated by the contrast between market value to book value of companies and is one of the known methods for measuring intangible assets and intellectual capital [2] and was calculated as follows:

$$MTB_{it} = \frac{MVE_{it}}{BVE_{it}}$$

MTB_{it} = market value to stock book value ratio for company (i) in the financial period (t)
MVE_{it} = Stock market value of company (i) in the financial period (t)
BVE_{it} = Debt´s book value of company (i) in the financial period (t)

7 Result

7.1 Descriptive Statistics

Descriptive statistics is to summarize and explain the characteristics of sets of data. The summary of descriptive statistics of variables is presented in table 1.

Table 1 Descriptive Statistics

	intellectual capital	RE	Q.Tobin	MTB
Views	1022	1022	1022	1022
average	1.50	0.126	6.18	6.05
Standard deviation	2.25	1.70	1.97	1.09
Variance	5.07	2.91	3.90	1.20
Skew	18.20	28.59	97.31	9.98
Kurtosis	357.95	879.46	226.67	165.11

Among the variables, intellectual capital had the highest variance and standard deviation. So we can say that among the companies which their intellectual capital were studied the, the difference and distribution is remarkable. Distribution of all variables is crooked to the right. Kurtosis values of all variables are positive, so height and kurtosis of variables distribution is longer than height and kurtosis of variables distribution normal distribution. The distribution of intellectual capital in the histogram chart is shown below (Fig. 2). To investigate and identify the normal distribution of these variables using P-P diagram (Fig. 3), which numbers are scattered around the trend line in a balanced manner, we can conclude that the distribution of the variables follow a normal distribution.

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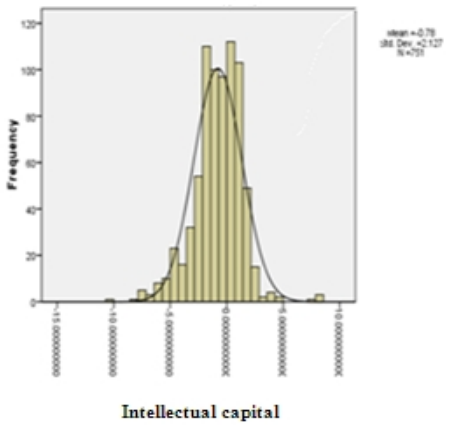

Fig. 2 Histogram of intellectual capital

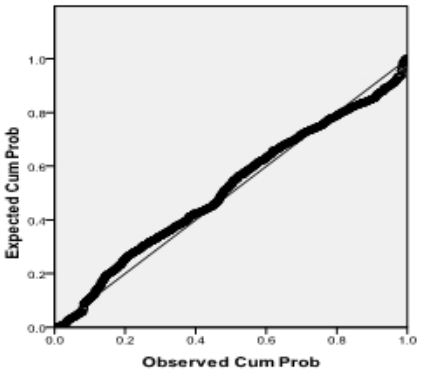

Fig. 3 P-P diagram of intellectual capital

7.2 Hypothesis testing

In order to test normality of data Kolmogorov - Smirnov test was used and test output shows that all variables are normally distributed. After making sure about normality of the variables in order to ensure about the absence of linearity between the variables the Index of the variance inflation factor was used. Index values for these variables were not significant, because the variance inflation factor for all variables was less than 5. In other words, there is no linearity between the variables. Because of using the cross-sectional data to eliminate dissimilarity of variance, Heteroscedasticity generalized least squares method was used.

First hypothesis: According to table (2), Intellectual capital has a positive significant effect on Return Stocks of companies at 5% significance level, so the first hypothesis is confirmed. Durbin - Watson statistic is 2.15. This number is located between 1.5 -2.5 and the lack of correlation in the components of regression model is proved. The coefficient of determination shows that 20% of the resulting changes in the dependent variable are due to the independent variable. The F statistics is 0/000 that shows regression model is correct %99 and is significant.

Table 2 Results of hypotheses testing - Partial least squares regression (PLS regression)

Hypothesis	Independent variable	dependent variable	R^2	F statistics	Sig	β	t-test	Sig	Durbin - Watson	Conclusion
1	Intellectual capital	Return Stock	% 20	1738.4	0.00	0.11	8.63	0.00	2.15	supported
2	Intellectual capital	Q –Tobin	% 43	32964.1	0.00	0.021	4.82	0.00	2.13	supported
3	Intellectual capital	MTB	% 53	65015.2	0.00	6.125	4.82	0.00	2.16	supported

Second hypothesis: According to table (2), Intellectual capital has a positive significant effect on Tobin Q ratio of companies at 5% significance level, so the first hypothesis is

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confirmed. Durbin - Watson statistic is 2.13. This number is between 1.5 - 2.5 and the lack of correlation in the components of regression model is proved. The coefficient of determination shows that 43% of the resulting changes in the dependent variable are due to the independent variable. The F statistics is 0.000 that shows regression model is correct 99% and is significant.

The third hypothesis: According to table (2), Intellectual capital has a positive significant effect on the ratio of market value to book value stocks of companies at 5% significance level, so the first hypothesis is confirmed. Durbin - Watson statistic is 2.16. This number is between 1.5 - 2.5 and the lack of correlation in the components of regression model is proved. The coefficient of determination shows that 53% of the resulting changes in the dependent variable are due to the independent variable. The F statistics is 0.000 that shows regression model is correct 99% and is significant.

Pearson correlation method is used to determine a significant relation to investigate the effect of independent variables on dependent variables in different industries. The results of table (3) shows the correlation between the various industries is different.

Table 3 Results of hypotheses testing in industrials

Industrials	Number of companies	Return Stock			Q –Tobin			MTB		
		correlation coefficient	Sig	Conclusion	correlation coefficient	Sig	Conclusion	correlation coefficient	Sig	Conclusion
Machinery & Equipment	11	0.141	0.304	negative	0.316	0.019	positive	0.198	0.071	supported
Beverage and food	11	-0.454	0.044	positive	0.172	0.468	negative	0.152	0.062	supported
negative	23	0.215	0.362	negative	0.658	0.002	positive	-0.390	0.021	supported
negative	3	-0.492	0.001	positive	0.380	0.016	positive	0.027	0.843	rejected
Automotive	23	-0.043	0.766	negative	-0.361	0.010	positive	-0.276	0.339	rejected
Electric & Electronic	12	0.497	0.000	positive	-0.131	0.339	negative	-0.439	0.053	supported
Steel	6	0.444	0.014	positive	0.336	0.069	positive	-0.555	0.000	supported
Cellulose & Chemical	12	-0.317	0.063	positive	0.488	0.003	positive	-0.132	0.001	supported
Manufacture of metal products and non-metallic	7	-0.214	0.096	positive	0.535	0.015	positive	-0.275	0.042	supported
negative	6	0.325	0.162	negative	0.462	0.003	positive	-0.480	0.802	rejected
Cement, lime, gypsum	15	0.814	0.000	positive	0.363	0.010	positive	-0.383	0.023	supported

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Industrials	Number of companies	Return Stock			Q –Tobin			MTB		
		correlation coefficient	Sig	Conclusion	correlation coefficient	Sig	Conclusion	correlation coefficient	Sig	Conclusion
Textile , Leather & Clothing	7	0.543	0.000	positive	0.269	0.047	positive	0.169	0.027	supported
Transportation	3	0.493	0.000	positive	0.638	0.000	positive	0.038	0.878	rejected
Sanitary and industrial ceramics	7	0.258	0.050	positive	-0.338	0.047	positive	-0.211	0.372	rejected

8 Conclusions and recommendations

With the arrival of knowledge economy, knowledge of organizations in comparison with other production factors like land and capital, machinery, etc. is higher priority so that in this economy, knowledge is considered as the most important production factor and called it as the most important competitive advantage of organizations. In this study we investigated the effect of intellectual capital on market criteria in the performance evaluation in Accepted Companies in Tehran SEC. The results of this study indicate that there is significant positive relationship between intellectual capital and performance indicators. This result is consistent with company resource-based view.

In this view, resources are supporting competition and performance of company. Hence, it is necessary that the companies have paid more attention to the resources and capabilities within your organization.

Future research is recommended to:

- The relationship between intellectual capital and non-financial performance such as customer satisfaction and employee
- The role and importance of intellectual capital in organizations
- Survey and research on improving methods for promote the growth of intellectual capital in companies
- Study and research in the identification of intellectual capital reporting purposes

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