The Study of Intellectual Capital and Earnings in the Tehran Stock Exchange

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Abstract

Intellectual capital as a vital stimulate for various organizations has been increased since different societies have transferred from industrial era to an information era. The aim of this study is relationship between intellectual capital and earnings in the petrochemical and pharmaceutical companies in Tehran Stock Exchange. The study was carried out in a period of time, between the years 2002 to 2008 which involved 40 petrochemical and pharmaceutical companies listed on the Stock Exchange of Tehran. Hypotheses of research include: 1- Between intellectual capital and stability of Earnings are a significant relationship. 2- Between human capital and stability of Earnings is a significant relationship. 3- Between structural capital and stability of Earnings is a significant relationship. The variable of this study is variable is C, HCE, SCE, CEE, SIZE. The results of testing these hypotheses indicate that there is a significant relationship between intellectual capital and stability of earnings in the studied enterprises and the firm size also has a moderator effect on the relationship between the two. Therefore, the role and importance of intellectual capital is more marked while accessing the sustainable profitability. Finally, it may be suggested that with the numerous indicators of earnings quality, future researchers can examine the relationship between intellectual capital and these indicators. Also, since in the present research the focus was mainly on the relationship between intellectual capital and corporate performance, and little was investigated about the methods of measuring intellectual capital, it is recommended to the future researchers to take this important issue into their close considerations.

Keywords: intellectual capital, earnings, Tehran Stock Exchange, petrochemical and pharmaceutical companies, C, HCE, SCE, CEE, SIZE

Introduction

The companies' commercial environment always changes and if the petrochemical and pharmaceutical companies may adapt themselves with the changes and new conditions, they are able to develop; otherwise, their competitors replace them in the market (Khajavi, 2010). Management accounting is a process with added value and continuous improvement of programming, designing, measurement and application of financial and nonfinancial informative systems to guide the managers, encourage behaviour, support and create cultural values necessary to achieve operational, tactical and strategic goals (Yong &Slot, 1997). As one of the most important management mechanisms management accounting may play essential role in improving actual occasions, developing potential possibilities and controlling properly with flexibility through facilitating analysis, prediction, report and finally decision. In consideration of the changes continuous in commercial environment and economic competition all countries including the developing ones such Iran should insure to innovate its economic mechanisms and trading activity continuity; in line with this and in order to change from concentrated economic system to an economic system based on market, it is necessary to create some changes in the rules governing the market structure. Of the

rules influencing the market structure we can mention the accounting standards and procedures (Hassas Yeganeh *et al.*, 2011).

Theoretical Framework

Intellectual Capital: Intellectual capital has always existed in human societies, but in particular it has been considered as an important asset during the last few decades. Despite the efforts made in the past, the starting point of systematic intellectual capital can be traced in the late 60s in a friendly correspondence between the two European economists named "Galbraith" and "Kalecki". Since then, the evolution of the concept of intellectual capital, varied and sometimes very different definitions have been proposed which shows that the concepts are general definitions.

Intellectual Capital +Tangible Assets = Enterprise Intellectual Capital Bontis, *et al* (1999) argue that intellectual capital is a concept which has been classified according to all intangible resources and internal communications. Intangible resources are the factors that affect the company's value creation process (Bontis *et al.*, 1999).

McMaster World Congress (2006) stated that intellectual capital involves innovation, knowledge management, new technology, intangible assets, human capital, organizational learning and knowledge workers (McMaster World Congress, 2006).

Structural Capital: Structural capital refers to the structures and processes within an organization which employees can use; and to apply their knowledge and skills. This capital includes the mechanisms and structures the main role of which is to support the staff to achieve optimum mental performance and optimum performance of the business. Structural capital includes hardware, software, databases, organizational structure, organization, patents, trademarks and all the skills that support the efficiency of the staff (Edvinsson & Malone, 1997). Structural capital is the knowledge that remains at the end of a working day and belongs to the whole organization; it is reproducible, and shared with others (Mauriston, 2001).

Customer capital (relationships): Customer capital is the value created as a result of the company's relationships with customers. This value is reflected in customers' loyalty to the company or its products. Customer capital as a bridge and facilitator which acts as the intellectual capital operations necessary to transform the market value of intellectual capital and business performance of the organization. Without the customer capital, market and organizational performance cannot be created. Customer capital has been associated with business performance (Chen *et al*, 2004).

Direct Intellectual Capital methods (DIC): Include the estimated monetary value of intangible assets or intellectual capital, thereby identification of their constituent elements. According to this method, the value of the individual elements is calculated and then the total value of different classes as well as the value of the assets will be concerned.

1-Market Capitalization methods (MCM): The difference between the market value of a company (based on market prices) and shareholders' equity adjusted for inflation or cost of replacement, as the value of intellectual capital or intangible assets is considered (Chen Goh, 2005).

2- Return on assets (ROA): Average before Tax profits for several years is calculated, and then divided by average tangible assets in those years; the result of this calculation is called the rate of return on assets, which then is compared with the industry average. The difference between these two figures is multiplied by the average tangible assets, intangible assets to obtain the average annual income (Chen Goh, 2005).

3- Balanced Scorecard (BSC): This method is based on identifying the various elements of intangible assets or intellectual capital indicators and measures obtained based on the scorecard and report them to the charts

The difference between the four methods described above, the ability of monetary and non-monetary measure of intellectual capital, and also using them in the organization is big or small (Chen Goh, 2005).

Reporting Intellectual Capital: In the traditional accounting system, there are restrictions on the reporting and disclosure of intellectual capital, since most of the components of intellectual capital are not reflected in the balance sheet. Instead, the costs for intellectual capital are directly reflected as a current expense in income statement. Immediate recognition of these expenses as costs reduces current profits, and thus the financial status of enterprises shows to be distorted.

Review of Literature

Nishimura (2002) studied the research in relation to Singapore, Malaysia and Thailand in 2004. The findings indicated that management accounting methods are changing from temporal to traditional (First to second) steps in the countries ; also it became clear that the advanced management accounting methods have been never used by the three countries.

Abdurrahman *et al*. (2004) concluded that the methods related to the first and second steps of management accounting evolution are often executed in the selected countries of Malaysia and the third and fourth steps of the management accounting evolution such as Kayzen's pricing costing and EOQ and MRP models are very rare in the countries.

Maliah *et al*. (2004) show that new management accounting techniques (Such as jit system, pricing based on activity, TQM, reengineering processes, assessing lifecycle and pricing goal) are used rarely in a way that it can be said they are not used absolutely. In contrast, traditional management accounting techniques such as standard pricing, deviations analysis, traditional budgeting, and price - amount – profit analysis are used vastly yet.

Chen *et al* (2005) examined the relationship between intellectual capital, market value and financial performance of petrochemical and pharmaceutical companies in Taiwan's stock market during 1992 and 2002. The results indicated a positive impact of intellectual capital on financial performance and market value of the company. This research also showed that intellectual capital can be used as an index for predicting future financial performance.

Gosh and Mandal (2009) examined the relationship between intellectual capital and financial performance of 80 software and pharmaceutical petrochemical and pharmaceutical companies in India, in a five-year period. They concluded that there was a significant relationship between intellectual capital and profitability. But the relationship between intellectual capital and the productivity and market value was not significant (Gosh and Mandal, 2009).

Zigal and Malol (2010) examined the impact of intellectual capital on economic performance, financial and market shares of 300 petrochemical and pharmaceutical companies in 2005. The results indicated that intellectual capital has a positive impact on the economic and financial performance but the relationship between intellectual capital and stock market performance, only the high-tech industry, was significant Also, the results indicated that, although the employed capital and stock market performance were still the main financial factor but the capital had a negative impact on economic performance (Zigal and Malol, 2010).

Smith *et al*. (2010) examined technology development and its effect on the management accounting methods in Malaysian companies; their findings indicated that the Malaysian petrochemical and pharmaceutical companies use the financial accounting information for control yet and management accounting has no independent position in 90 percent of the studies companies; by virtue of their study 3, 37, 40 and unexpectedly 40 percent were in first, second, third and fourth steps. Their findings showed that the innovation in management accounting has been with the least

new techniques even for the great companies.TQM (Total quality management) is an exception for these cases.

Hassas Yeganeh et *al*. (2011) believe that this originates from lack of legal necessities to execute management methods, needing an appropriate level of other sciences such as economics, mathematics, software's, sociology, etc., lack of a defined structure for decision process in some petrochemical and pharmaceutical companies and shortcoming of national professional departments to promote and train management accounting in Iranian companies.

Hassas Yeganeh *et al*. (2011) examined the management accounting in Iranian companies. They stated that the foreign exchange needs to report yearly budget so it is unavoidable to use traditional techniques and at the same time, the managers and accountants of the petrochemical and pharmaceutical companies do not know new techniques of management accounting because there is a great gap between what is learn at university and what should be done later by the performers in field of accounting. In their measurement study Norvasc and Mashayekhisent a questionnaire to the two groups under study namely the academic personnel and the employed accountants and concluded that there are differences between the viewpoints of the two groups regarding concepts, new management accounting methods and necessary qualities for the volunteers to become management accountant.

The aim of this study is relationship between intellectual capital and earnings in the petrochemical and pharmaceutical companies in Tehran Stock Exchange

Materials and Methods

This study was an experimental study to examine the relationship between intellectual capital and earnings in the Tehran Stock Exchange. This study used the combined data time series and cross section data. In this study used the all source, such as the Stock Exchange, the New Deal and other software, electronic archives, papers, books, and related documentation has been used, it can be of research type of classification based on previous data.

Besides, the effect of firm size as a modulator factor on the relationship between these two variables has been examined. Also, the effect of firm size as a modulator factor on the relationship between these two variables was examined.

The study was carried out between the years 2002 and 2008.Samples of this research were from petrochemical and pharmaceutical petrochemical and pharmaceutical companies listed in Tehran Stock Exchange for the time period mentioned above which had the following eligible:

1.   Given the time period, the petrochemical and pharmaceutical petrochemical and pharmaceutical companies is listed on the Stock Exchange prior to 2002, and until the end of 2008, it has been removed from the list of companies.

2.   The company shares have been traded during the financial year, and will not substantially interrupt the transaction.

3.   In the study period, the company should not be operating loss in its fiscal year-end audited income statement.

4.   In order to increase comparability, the financial year of the Company is based on the calendar year.

5.   Due to the lack of clear boundaries between operating and financing activities, financial petrochemical and pharmaceutical companies (investment companies, financial intermediation, holding companies, and leasing), and also because they have different reporting structures, these petrochemical and pharmaceutical companies are excluded from the sample.

Thus, considering the above-mentioned limitations, 40 petrochemical and pharmaceutical companies were identified as eligible, all of which have been studied and therefore no sampling was done.

To summarize the data, initial variables using the collected data were calculated in Excel, and the hypotheses were tested using Eviews7 software. The method used in this study was that of panel data with fixed effects.

Research Hypotheses

According to the theoretical foundations of study, and also in order to achieve the research objectives, the following research hypotheses have been formed:

1- There is a significant relationship between intellectual capital and stability of Earnings.

2- There is a significant relationship between human capital and stability of Earnings.

3- There is a significant relationship between structural capital and stability of Earnings.

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 and human capital were considered as independent variables

Determining the value added: Value added to (VA) physical capital used ratio, is called the coefficient of physical capital efficiency, the index is calculated by the following equation.

	Equation	Details
Model	$VA = P_i + I_i + C_i + D_i + DIV_i + T_i$	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
Equation	$CEE = \dfrac{VA}{CE}$	CEE: Physical Capital Efficiency CE: Capital used is equal to the book value of the company's total assets minus intangible assets.
Equation	$HCE = \dfrac{VA}{HC}$	HCE: Human Capital efficiency HC: Human capital, is the total employee costs
Equation	$SCE = \dfrac{SC}{VA}$	SCE: Structural Capital Efficiency SC: Structural Capital
Model	$VAIC = HCE + SCE + CEE$	VAIC: value added intellectual coefficient HCE: Human Capital efficiency SCE: Structural Capital Efficiency CEE: Physical Capital Efficiency

Determining the physical capital efficiency:

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

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

Determining 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.

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

Determining the value added intellectual coefficient

$$VAIC = HCE + SCE + CEE$$

Public 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.

The Dependent Variable: In this study, stability of earnings, which is one indicator of the quality of earnings, is considered as the dependent variable. To evaluate the stability of the earnings Sloan model (2005) was used as follows:

Sloan model (2005)	$E_{i,t} = \beta_{o,i} + \beta_{1,i}E_{i,t-1} + e_{it}$	$E_{i,t}$: net profit of company i in year t $E_{i,t-1}$: Net profit of company i in year t-1 β_1: stability of earnings

In above model, the coefficient of explanatory variable $E_{i,t-1}$, namely B_1, which is a regression model, indicates the stability of earnings. Stability of earnings is more when the value obtained for the coefficient of the explanatory variable is closer to one; conversely, the closer this coefficient is to zero, the less the stability of earnings will be. It should be noted that in the above equation, e_{it} is an independent random assumption, which may be resulted from earnings manipulation by managers, or principles of conservatism.

Testing the hypotheses

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 Main Hypothesis

The first main hypothesis: There is a significant relationship between intellectual capital and stability of earnings as an indicator of the quality of earnings.

To test the main hypothesis, the following model is estimated

$$Y = \beta_\circ + \beta_1 VAIC + \beta_2 SIZE + e_{it}$$

Table 1: Descriptive statistics.

Type of variable	Variable	Number of observations	Mean	Standard deviation(SD)
Dependent	stability of earnings	301	0.81	1.33
Independent	Human Capital	301	55.60	77.9
	Structural Capital	301	1.12	-3.213
Moderator	Firm Size	301	7.98	1.187

The following results were obtained from test of the first main hypothesis:

Table 2: Results of regression analysis of the first main hypothesis

Variable	Coefficient of correlation	SD	T-test	p-value
C	0.555	0.00057	1075.44	0.00334
VAIC	8.12E-09	4.42E-05	2.569	0.0234
SIZE	-5.34E-05	1.18E-05	-3.885	0.003
AR(1)	0.0657	0.345	0.195	0.987
Durbin – Watson test	3.90	Adj-R-squared		1
Prob(F-statistic)		0.007		

The prob (F-statistic) in Table (2) indicates significance of fitted regression model to the 99% of confidence level. It has been confirmed that there is a linear relationship between the independent and dependent variables. Adjusted R^2 is equal to 1, which indicates that all changes in the dependent variable are because of the independent and moderator variables. To test the independence of the error components in fitted model Durbin– Watson statistics was used. If the result is between 1.5 and 2.5, it can be confirmed that there is no significant correlation between the error components in the model and their behaviour is independent from each other. According to Durbin – Watson statistics, in estimation of the basic model, it was found that the above model has autocorrelation, and to overcome this, "AR" was used. As it can be seen in the Table 2, the obtained statistics is equal to 5.888; therefore in this model the independence of error components in fitted regression model may be resulted.

Table 3: Results of theory analysis of two hypotheses

Variable	Coefficient of correlation	SD	T-test	p-value
C	0.545	0.343	4.18	0.001
HCE	0.003	0.023	2.121	0.076
SCE	0.006	0.098	0.564	0.657
CEE	-0.008	0.089	-0.999	0.401
SIZE	-0.002	0.030	-0.334	0.999
Durbin – Watson test	1.543	Adj-R-squared		0.898
Prob(F-statistic)		0.024		

Finally, as shown in Table 2, the intellectual capital variable coefficient, at the level of 1% of error, is significant, so there is a significant relationship between these variables and the dependent variable and thus according to the projections, the coefficient is considered to be positive. The result

shows that, there is a significant relationship between intellectual capital and stability of earnings as an indicator of earnings quality and, therefore, the first main hypothesis will be accepted.

According to the results listed in Table 3, the assumptions of the first sub-hypothesis will be also tested.

According to the results of testing the regression model, as described above, it can be stated that the P-Value of F- statistic, which indicates the significance of the regression, is equal to 0. 024, and indicates that the model is significance at the 95% confidential level. Adjusted R^2 is also equal to 0.95 which indicates that approximately 95% of changes of the dependent variable can be explained by the independent variables in the model, which represents a good explanatory power of the regression. According to the table, the results obtained of the sub-hypotheses are as follows: The first sub-hypothesis: As it is obvious, the correlation coefficient of independent variable of human capital is equal to 0.05, and significant at 0. 030. Thus, according to the t-statistic and p-value of this variable, the results indicate the significance of this coefficient, at the error level of 5 percent. This result indicates that there is a positive and significant relationship between human capital efficiency and stability of earnings in the listed petrochemical and pharmaceutical companies on the Stock Exchange, and consequently, the first sub-hypothesis is verified. Since the correlation coefficient of independent variable of structural capital is 0.001 and a significant number is 0. 657, therefore, the t-statistic and p-value of this variable show that coefficient is not significant at the 1% level of error. This result indicates that there is no significant relationship between structural capital efficiency coefficient and stability of earnings in the listed petrochemical and pharmaceutical companies of the Stock Exchange, and consequently, the second sub-hypothesis can be rejected. Since the correlation coefficient of independent variable of physical capital is -0.005, and a significant number is equal to 0. 401, therefore, considering t-statistic and p-value of this variable, the results indicate that coefficient is not significant at 5% level of error. This result indicates that there is no significant relationship between physical capital efficiency coefficient and stability of earnings in the listed petrochemical and pharmaceutical companies on the Stock Exchange, and consequently, the third sub-hypothesis may be rejected.

The second main hypotheses

The second main hypotheses: Firm size affects the average intellectual capital, and stability of Earnings of a corporation. To test the second hypothesis, the following model will be used:

$$Y = \beta_\circ + \beta_1 VAIC + \beta_2 SIZE + \beta_3 VAIC \times SIZE + e_{it}$$

In this study, firm size variable was considered as a moderator variable, and the impact of firm size on the components of intellectual capital and the stability of earnings was assessed.

Table 4: Results of analysis of the second main hypotheses

variable	Coefficient of correlation	SD	T-test	p-value
C	0.434	0.343	1.4345	0.454
VAIC	0.0056	0.034	2.434	0.045
SIZE	0.045	0.076	0.343	0.756
VAIC× SIZE	-0.00343	0.098	-2.756	0.039
AR(1)	0.045	0.342	0.1121	0.879
Durbin – Watson test	1.987	Adj-R-squared		0.564
Prob(F-statistic)		0.0489		

According to the results of testing the regression model, as shown in the Table 4, it can be seen that the P-value of F- statistic, which indicates the significance of the regression, is equal to 0.

0489 and this indicates that the model is significance at 95% of confidence level. Adjusted R^2 is also 0.95,and this indicates that approximately 95% of changes in the dependent variable can be explained by the independent variables in the model , which represents a good explanatory power of the regression.

Conclusion

Resource management, including the concepts along "strategy while focusing on distributional" The aim of planning, resource allocation and evaluation form. In the past, many supply chain activities traditionally with paper, phone and fax were carried out, which is very inefficient, costly, and error-filled. Because of today's competitive arena, the ability to achieve sustainable profitability is considered as one target in the business organizations. On the other hand, since the importance and recognition of intellectual capital in organizations is increasingly growing, the present study was conducted to examine the relationship between intellectual capital and stability of earnings as an indicator of the quality of earnings in the listed petrochemical and pharmaceutical companies in the Tehran Stock Exchange. Therefore, the value of added intellectual capital coefficient model was used as an indicator of intellectual capital in a six - year period. Stability of earnings also was assessed through the Sloan model. The research includes two main hypotheses and three sub-hypotheses. The results of testing these hypotheses indicate that there is a significant relationship between intellectual capital and stability of earnings in the studied enterprises and the firm size also has a moderator effect on the relationship between the two. Therefore, the role and importance of intellectual capital is more marked while accessing the sustainable profitability. Finally, it may be suggested that with the numerous indicators of earnings quality, future researchers can examine the relationship between intellectual capital and these indicators. Also, since in the present research the focus was mainly on the relationship between intellectual capital and corporate performance, and little was investigated about the methods of measuring intellectual capital, it is recommended to the future researchers to take this important issue into their close considerations.

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