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A study of relations between intellectual capital components, market value and finance performance

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In the intellectual capital (IC) literature, only a few studies have analyzed the relationship among the components of IC and organizational success. The purpose of this study is to examine the contact of IC's components on firms' market value and financial performance. The value added intellectual coefficient (VAIC) approach developed by Pulic is used to verify the effect of IC's components on firms' market value and financial performance in Iranian companies. Data were collected from 80 Iran companies listed in the Tehran Stock Exchange (TSE), from five different economic sectors for five-year period of 2006 to 2010; different regression models were constructed to examine the relationships between IC's components and the selected market value and financial performance measures of these companies. SPSS software is also used for analyzing. The results of the analysis revealed no conclusive evidence to support a definitive association between IC, as measured by VAIC, and fail most of the hypotheses, and there is just a statistically significant relationship between human capital efficiency and financial performance and M/B. The paper covers the procedure of measuring IC, determination of its effect on company results and creating IC for competitive advantage. The companies chosen for the study are from four industries in Iran. Thus, the results may not be applicable to other industries in different countries. Recognizing the most influential elements of IC on organizational performance would help organizations to understand better the organizational capabilities they possess. In the Iran business context, the development of human resources seems to be one of the most significant factors of companies' success. The paper explores value added of components of IC and these relationships with economic success of Iranian listed companies.

Key words: Market value, financial performance, intellectual capital, Iran stock exchange.

INTRODUCTION

Intellectual capital (IC) can be briefly defined as the knowledge-based equity of organizations and has attracted, during the last decade, a significant amount of practical interest (Campisi and Costa, 2008). The language of management is increasingly non-financial, yet accountants use metrics that are often solely financial in their traditional reporting practices (Richard et al., 2008). The growth of the knowledge economy has increased the importance of defining and measuring IC if there is to be any effective management of that asset item (Wood, 2003; Cabrita and Vaz, 2006). According to

the latest study conducted by OECD (2006), intellectual capital (IC) has played a significant role, as much as tangible capital, in improving labor productivity in the USA from 1995 to 2003 (Dong-Young and Vinod, 2009). In the last two decades, the importance of IC as a driver of national and international economic growth has steadily increased (Cabrita and Vaz, 2006). Mouritsen argued that traditional financial statements do not include the relevant information for users of these statements to understand how their invested resources might create value for them in the future (Mouritsen, 2004). Although the importance of IC is constantly increasing, many organizations face problems with its management, mostly due to measurement difficulties (Kim et al., 2009; Nazari and Herremans, 2007). Studies of the effect of IC treated

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holistically on the company's financial results have shown that: it directly influences their value (Wang and Chang, 2005) and the higher the level of IC in a company, the better its results (Tan et al., 2007). Bukh and Johanson (2003) believe that as recognition of the importance of IC in determining corporate performance spreads "stakeholders will demand more accountability and more stringent disclosure".

According to various scholars, IC is considered to be the hidden value that escapes financial statements and the one that leads organizations to obtain a competitive advantage (Ruta, 2009; Yang and Lin, 2009). Therefore, it can be asserted that IC is related to the sustainable competitive advantage of any organization and is mainly associated with an organisation's resources, its capabilities and competence (Bontis et al., 2000; Lonnqvist, 2004). Tseng and Goo (2005) examined the relationship between IC and corporate market value of a company based on three perspectives: IC, resource-based and finance. Chen et al. (2005) investigated the relationship between IC and a firm's market value and financial performance.

Additionally, it is believed that the limitations of financial statements in precisely explaining firm value reveal the fact that, nowadays, the source of economic value is the creation of IC and no longer the production of material goods (Chen et al., 2005). However, there are also some monetary measures that can be compared between companies and across various corporate sectors such as the calculated intangible value approach and the value added intellectual coefficient (VAIC) approach (Mahesh et al., 2010). VAIC measures the efficiency of three types of inputs: physical and financial capital, human capital, and structural capital (Firer and Williams, 2003; Montequin et al., 2006). Tseng and Goo (2005) categorized IC framework in term of human capital, organizational capital, innovation capital and relationship capital.

The main objective of this study is to examine the relationship between IC, market value and financial performance. The methodology for the measurement of IC was based on the studies of Firer and Williams (2003), Chen et al. (2005) and Mahesh et al. (2010). The empirical investigation was conducted using data drawn from a section consisting of 80 Iran companies listed in the Tehran Stock Exchange (TSE), from five different economic sectors (period 2006 to 2010). Moreover, based on the aforementioned VAIC methodology, the study logically examines the separate effects of capital employed efficiency, human capital efficiency, and structural capital efficiency on market value and financial performance.

LITERATURE REVIEW

Various attempts have been made towards developing a

widely accepted definition of IC, until most authors finally agreed on its basic parameters. Klein and Prusak (1994) contributed to the creation of a universal definition by defining IC as the intellectual material that can be formalised, captured and leveraged to produce a higher value asset. A brief review of contemporary research shows that IC has been referred to by using different terms such as intangible assets, intangibles or knowledge assets (Bontis, 2001; Kujansivu, 2005). In the same vein, Edvinsson and Malone (1997) defined IC as the knowledge that can be converted into value. The growth of the knowledge economy has increased the importance of defining and measuring IC if there is to be any effective management of that asset item (Wood, 2003; Cabrita and Vaz, 2006). Cabrita and Vaz (2006) go as far as to assert that in today's economy, wealth and growth are mainly driven by IC.

Stewart (1997) argued that intellectual resources such as knowledge, information and experience, are the tools for creating wealth and defined IC as the new wealth of organizations. Sullivan (2000) defined IC as "knowledge that can be converted into profits. Intellectual capital (IC) consists of the non-physical sources of value related to employees' capabilities, organisations' resources and way of operating and the relationships with their stakeholders (Lonnqvist, 2004). In the last two decades, the importance of IC as a driver of national and international economic growth has steadily increased (World Bank, 1998; Cabrita and Vaz, 2006).

According to Edvinsson and Malone (1997), IC can be also defined as the gap that is observed between a firm's book and market value. There are two main ways of determining the value of a company: based on the company's financial statement (balance sheet) or based on its market value (stock market). Nowadays, the two values differ quite a lot (Andriessen, 2004; Edvinsson and Malone, 1997). Market value is often much higher than book value. Also, Kok (2007) argued that a method for determining the intellectual (intangible) assets of a company is to compare market to book value. These arguments are based on the nature of IC. The intellectual assets of a company are intangible in nature and thus, do not have a certain shape or an appropriate financial value. They are characterised as "hidden assets", since it is difficult to identify their contribution to a firm and quantify them in a financial statement (Fincham and Roslender, 2003).

The observed gap between market and book value that has been highlighted in Tseng and Goo (2005) and Zerenler and Gozlu (2008), can therefore be attributed to the IC assets that are not recognised in balance sheets (Chaharbaghi and Cripps, 2006). One explanation among others for the gap is the companies' IC, which is for the most part not included in the financial statement (Paula and Lonnqvist, 2007).

The role of IC in filling the gap between book and market value has brought even wider research attention

towards the investigation of its nature (Chen et al., 2005). The purpose of the valuation process is to define a fair market value of a company, which is not a trivial task in the case of innovative knowledge-based companies (KBC) (Daum, 2003). Fair market value is the price at which the asset (company) would change owner when neither the seller nor the buyer is under pressure to sell/buy, and both parties have equal knowledge about the asset (company) (Slee, 2004). Although there is a variety of IC definitions, mostly due to the fact that both knowledge-based and economic-based approaches exist (Walsh et al., 2008), a considerable number of scholars and practitioners identify three basic components of IC; human capital, structural capital and customer (relational) capital (Ruta, 2009; Yang and Lin, 2009; Walsh et al., 2008). Tovsiga and Tulugurova (2009) assumed that company IC constitutes the internal and external determinants. The commonly accepted components of IC are HC, relational capital and SC (Kujansivu, 2005). Petty and Guthrie (2000) added another dimension of relational capital to the definition which originally included HC and SC. The above categorisation, early manifested itself into the IC literature, led to the development of a method of indirect IC measurement. Intangible assets are the most difficult to value in acquisition accounting, and this problem is particularly acute where there has been a significant amount of previous accounting manipulation (Caldwell, 2006). More specifically, Bornemann et al. (1999) argued that IC can be measured by the accumulate value of three categories of indicators; human capital (knowledge, skills), structural capital (databases and organizational structure) and customer capital (supplier and customer relations). The usefulness and importance of IC indicators was, moreover, highlighted by (Brennan and Connell, 2000). Moreover, Sullivan (2000) supported that the various difficulties that are inherent to the direct measurement of IC can be resolved by using individual indicators. The same approach has been supported and utilised by various researchers (Andriessen, 2007; Montequin et al., 2006; Wall, 2007). Andriessen and Chan (2009) have listed methods for IC measurement after surveying the contemporary research. However, while many methods for IC measurement have been developed and used (Andriessen, 2004; Pike and Ross, 2004; Chan, 2009), the standard methods of financial reporting and accounting regulations have not been fully adequate to the task of reporting IC value and the knowledge economy (Kujansivu, 2005; Lajili and Zeghal, 2005).

Over the past few years, many methods have been developed for the measurement and valuation of IC (Sveiby, 2007). However, the measurement of IC is still in an exploratory stage (Jamal and Irene, 2007). The Skandia Navigator is one of the earliest models of IC (Edvinsson and Malone, 1997). Pulic (1998, 2000, 2004) partially based on Skandia Navigator, has developed the value creation efficiency analysis, called VAIC (value

added intellectual coefficient). Pulic (2004) criticized other IC measurement models because they lack comparability and scope. VAIC is the sum of value added human capital and the value added of physical capital (Pulic, 1998). Based on a statistical approach, some scholars have demonstrated a relationship between the IC factors and business performance (Bontis and Serenko, 2007; Colvin and Boswell, 2007). Pulic's model identifies both size and efficiency of IC rather than just quantities and prices (Jamal and Irene, 2007).

The higher the VAIC, the better the utilisation of the value creation potential of a firm. The VAIC approach is being adopted in the present study, following the methodological framework of Chen et al. (2005) and Mahesh et al. (2010). Chen et al. (2005) investigated the relationship between IC and a firm's market value and financial performance. Their regression model evaluated the relationship between market value/book value ratio and value creation. Moreover, they examined the relationship between IC and the firm's current and future financial performance. The statistical findings supported a significantly positive relationship among IC, market value and financial performance. As analyzed by Liang and Yao (2005), net income is the most significantly explanatory capability in market value of Taiwan information electronic company when examined on intangible asset, balanced scorecard and IC, respectively. The IC factors of 58 Fortune 500 companies were analyzed by Abdolmohammadi from 1993 to 1997, who found evidence that it is effective to employ IC disclosure on market value (Abdolmohammadi, 2005). The study conducted by Riahi-Belkaoui (2003) also has focused upon the empirical relationship between intellectual capital and the performance of selected multi-national companies of the USA. The result suggests that intellectual capital is positively associated with financial performance. Sofian et al. (2005) also has examined the impact of IC on management accounting practices. More specifically, the study focuses on the issue of performance measurement in the context of the IC being important player for generating revenue for the firm. Results of this investigation suggest that IC has countable influence on the corporate performance.

RESEARCH HYPOTHESES

This study introduces a conceptual framework that expands on previous methodologies (Chen et al., 2005; Firer and Williams, 2003; Mavridis, 2004) and investigates the relationship between IC, market value and financial performance. The hypotheses of the study are further presented.

IC and market value

There are two main ways of determining the value of a

company: based on the company's financial statement (balance sheet) or based on its market value (stock market). Nowadays, the two values differ quite a lot (Andriessen, 2004; Edvinsson and Malone, 1997). Market value is often much higher than book value (Paula and Lo'nnqvist, 2007). Market valuation describes the degree to which a firm's market value exceeds its book value (Santanu and Amitava, 2009). Market value exceeds its book value. One explanation among others for the gap is the companies' IC, which is for the most part not included in the financial statement. For example, the value of customer relationships, experiences of employees or organisational culture cannot be determined on the basis of the balance sheet (Paula and Lo'nnqvist, 2007). The market estimates the value of companies with high intangible assets (IC) to be significant higher than the calculated book value (Chen et al., 2005; Riahi-Belkaoui, 2003). The relationship between IC and corporate market value of a company is based on three perspectives: IC, resource-based and finance (Tseng and James Goo, 2005). As a result, conservative accounting practices failed to account one the most important intangible assets of every organization: IC (Sveiby, 2001). The gradual introduction of the International Accounting Standards (IAS) in nearly every developed and developing country (except from the USA which is expected to implement the IAS in the next five years) forced companies to calculate assets at their real market value, while giving full definition and credit to all intangibles (International Financial Reporting Standards, 2008). Despite that, the inability of most companies to comply with the IAS and the significant cost of such an implementation, still deteriorate the recognition of the intangible assets of every organization (Judge et al., 2010). Tseng and Goo (2005) categorized IC framework in term of human capital, organizational capital, innovation capital and relationship capital.

The result of such a short seeing is a growing divergence between the market and book value of organizations. Therefore, it is hypothesised that the greater the IC, the higher the ratio of market-to-book value:

H₁: Companies with greater capital employed efficiency have higher ratios of market-to-book value.

H₂: Companies with greater human capital efficiency have higher ratios of market-to-book value.

H₃: Companies with greater structural capital efficiency have higher ratios of market-to-book value.

IC and financial performance

There are plenty of methods available to measure the success of physical capital. For measuring the effectiveness or efficiency of the use of the physical capital the well known conventional tools like profit, ROI, ROE, and ROA can be used, but these are considered to

be ineffective for measuring the performance of intellectual capital (Santanu and Amitava, 2009). ROI and ROA and growth rate was adopted as the measure of financial performance (Andrzej and Marian, 2009). Tan et al. (2007) have reported a positive association between intellectual capital of firms and their financial performances. The study of Riahi-Belkaoui (2003) found a positive relationship between IC and financial performance, while Bontis et al. (2000) concluded that, regardless of industry, the development of structural capital has a positive impact on business performance. On the other hand, Firer and Williams (2003) examined the relationship between IC and traditional measures of firm performance (ROA, ROE) and failed to find any relationship, while Chen et al. (2005), using the same methodology, concluded that IC has an significant impact on profitability. The present paper makes an attempt to enrich the IC literature, thus, hypothesising:

H₄: Companies with greater capital employed efficiency have better financial performance.

H₅: Companies with greater human capital efficiency have better financial performance.

H₆: Companies with greater structural capital efficiency have better financial performance.

METHODOLOGY

The final sample of the present study consists of 80 Iran companies listed in the TSE. These companies belong to five economic sectors (according to official sector classification): Cement, Lime and Gypsum (32 companies), Basic metals (30), Motor Vehicles and Auto Parts (31), Textiles (27) and Chemicals and By - Products (35). The selected data cover a period of five years, from 2006 to 2010. All five sectors are knowledge based and have a significant importance to the Iran economy.

The original objective of the study was to draw data from all companies listed in the Tehran Stock Exchange (about 155 companies with constant contribution in the TSE for the five-year examination period). However, the first screening of data availability demonstrated that such an attempt was too ambitious. The second data screening led in the exclusion of many companies, leaving the sample with only 100 companies with satisfactory available data. Finally, 20 more companies were excluded from the sample after the third and most detail data screening. In general, the final sample (80 companies) represents the 51.6% of the total number of listed companies in the TSE for the year 2010.

Independent variables

The VAIC methodology developed by Ante Pulic forms the underlying measurement basis for the independent variable in the present study (Pulic, 1998, 2000). In his words, VAIC is an analytical procedure designed to enable management, shareholders and other relevant stakeholders to effectively monitor and evaluate the efficiency of VA by a firm's total resources and each major resource component. VAIC is the sum of three indicators. These are:

1. Capital employed efficiency (CEE) – the indicator of VA efficiency of capital employed;

2. Human capital efficiency(HCE) – the indicator of VA efficiency of human capital;
3. Structural capital efficiency (SCE) – the indicator of VA efficiency of structural capital;
4. VAIC, the composite sum of the three separate indicators.

Dependent variables

This study includes two dependent variables: 1) Market-to-book value ratios (M/B); 2) Financial performance (ROE, ROA, GR).

- i. Market valuation (MB): Market valuation describes the degree to which a firm's market value exceeds its book value. It is the ratio of total market capitalization (average share price times number of outstanding common shares) to book value of net assets.
- ii. Return on equity (ROE): ROE measures an organization's profitability by revealing how much profit a company generates with the money shareholders have invested.
- iii. Return on assets (ROA): ROA is an indicator of how profitable a company is in relation to its total assets. It gives an idea as to how efficient the management uses assets to generate earnings.
- iv. Growth revenues (GR): GR is the most traditional measure that indicates the growth of an organization.

Measurement

$$VAIC = CEE + HCE + SCE \quad (1)$$

VA is calculated according to the methodology proposed by Riahi-Belkaoui (2003); CEE = capital employed efficiency coefficient VA; HCE = human capital efficiency coefficient VA; SCE = structural capital efficiency coefficient VA.

$$CEE = \frac{VA}{CE} \quad (2)$$

CE = Total assets – Intangible assets

$$HCE = \frac{VA}{HC} \quad (3)$$

HC = total salary and wage costs

$$SC = VA - HC \quad (4)$$

SC: Structural capital; HC: total salary and wages

$$SCE = \frac{SC}{VA} \quad (5)$$

$$MV = \text{Number of shares} \times \text{Stock price at the end of the year.} \quad (6)$$

$$BV = \text{Stockholders equity} - \text{Paid capital of preferred stocks.} \quad (7)$$

$$ROE = \frac{\text{Net Income}}{\text{Shareholder's Equity.}} \quad (8)$$

$$ROA = \frac{\text{Net Income}}{\text{Total Assets}} \quad (9)$$

$$GR = \left[\left(\frac{\text{CURRENT YEAR'S REVENUES}}{\text{last year's revenues}} \right) - 1 \right] \times 100\% \quad (10)$$

$$H1, H2, H3: \frac{M}{B} = a_0 + a_1 + a_2 CEE + a_2 HCE + a_3 SCE + e \quad (11)$$

$$H4, H5, H6 : ROE = a_0 + a_1 CEE + a_2 HCE + a_3 SCE + e \quad (12)$$

$$H4, H5, H6 : ROA = b_0 + b_1 CEE + b_2 HCE + b_3 SCE + e \quad (13)$$

$$H4, H5, H6 : GR = c_0 + c_1 CEE + c_2 HCE + c_3 SCE + e \quad (14)$$

RESULTS

Table 1 illustrates the CEE, HCE and SCE hypothesized relationships and M/B that H₁ and H₃ hypotheses are not supported by the results and a give only support to H₂, since human capital efficiency is treated differently with capital employed efficiency and structural capital efficiency and HCE had a significant, positive relationship with M/B. Finally, it should be pointed out that the statistical analysis produced the same results, even when each of the four sectors was separately analysed.

Table 2 shows the CEE, HCE and SCE hypothesized relationships and financial performance. It indicates that the only statistically significant relationship is the one between human capital efficiency (HCE) and ROE in which H₄ and H₆ are not supported by the results. Results in Table 3 demonstrate that there is no significant relationship between IC (measured with VAIC) and the three financial performance measures (ROE, ROA, GR), since all coefficients or model solutions are statistically insignificant. The results did not radically change, even after each of the four sectors included in the study was separately analysed. Similar studies have been done to show the positive relationship among IC, market value, and financial performance, like Chen et al. (2005) who investigated the relationship between IC and a firm's market value and financial performance. Their regression model evaluated the relationship between market value/book value ratio and value creation. Moreover, they examined the relationship between IC and the firm's current and future financial performance. The statistical findings supported a significantly positive relationship among IC, market value and financial performance.

Conclusion

The principal reason of this study is to examine the relationship between components of intellectual capital, market value and three dimensions of corporate financial performance of Iranian companies. These three dimensions are ROA, ROE, and GR and the three components of intellectual capital are CE, HU and SC. Components of intellectual capital has been measured using VAIC methodology.

Empirical results failed to support most of the proposed hypotheses, only confirming the relationship between human capital efficiency (HCE) and ROE, which is one of the three indicators of financial performance used in this study, and the relationship between human capital efficiency

Table 1. Regression results – M/B and VAIC and its components.

Independent variable	Coefficient	t-statistic	Significance
Constant	-1,567.234	-0.486	0.699
VAIC	-0.031	-0.156	0.781
Constant	-3,121.719	-0.698	0.477
CEE	0.013	0.023	0.289
HCE	0.134	0.345	0.029
SCE	-0.031	-0.213	0.689

Table 2. Regression results – financial performance and VAIC and its components.

Dependent	ROE		ROA		GR	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Independent						
Constant	1,805.245	2,568	2,123.205	2.123	8,342.256	1.001
VAIC	0.087	0.678	0.054	0.543	0.0016	0.143
Adjusted R ²	0.087		0.003		0.000	
F-Value	2.323		3.456		31.765	
Constant	3,289.213	4.356	2,342.323	2.345	7,567.675	0.789
CEE	0.008	0.083	0.043	0.512	0.032	0.152
HCE	0.467	3.421	0.034	0.412	-0.023	- 0.189
SCE	0.074	0.698	0.043	0.334	0.031	0.163
Adjusted R ²	0.167		0.008		0.003	
F-value	4.356		20.678		8.876	

Table 3. Results of testing the hypotheses.

Hypothesized relationship	Result
H ₁ : Companies with greater capital employed efficiency have higher ratios of market-to-book value	Not supported
H ₂ : Companies with greater human capital efficiency have higher ratios of market-to-book value	Supported
H ₃ : Companies with greater structural capital efficiency have higher ratios of market-to-book value	Not supported
H ₄ : Companies with greater capital employed efficiency have better financial performance	Not supported
H ₅ : Companies with greater human capital efficiency have better financial performance	Supported
H ₆ : Companies with greater structural capital efficiency have better financial performance	Not supported

(HCE) and M/B (H₂ and H₅), but results demonstrate that there is no significant relationship between IC (measured with VAIC) and the three financial performance measures (ROE, ROA, GR), since all coefficients or model solutions are statistically insignificant. Even though the fact that IC is progressively more accepted as an essential strategic asset for sustainable competitive advantage, the results of the study be unsuccessful to support such a claim. Empirical analysis also shows that the Iranian businesses are not influenced by intellectual capital.

The result therefore indicates that Iranian companies have not succeeded in retaining its high level of utilising IC. From a managerial point of view, this study is important for identifying the problems or strengths of different industries for using components of IC. In

assessing the real value of a company, investors have to consider intangible capital, such as the human resources, skills, knowledge, processes, and innovation capabilities of an organization. With this shift from building tangible to intangible assets and resources, leaders and managers need to understand the changing marketplace landscape. Although components of IC are difficult to determine and compute, the results will nonetheless be reflected in the company's greater efficiency, and overall success. Although the samples for the study were not very vast but the results from this analysis may be used as a guideline for future research on Iranian companies and other financial institutions for the reasons of the dominance of the sample companies in the Iranian companies and the level of their standing in the global

financial system.

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