Impact of Intellectual Capital on Financial Performance

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Abstract

Purpose - Nowadays despite the increasing importance of intangible assets, especially intellectual capital in the companies; the majority of the traditional accounting systems are unable to calculate the intellectual capital properly. The purpose of this study is to examine the relationship between intellectual capital and financial performance.

Design/methodology/approach – The empirical data were drawn from a panel consisting of 49 Iranian companies listed in the Tehran Stock Exchange (TSE), classified in three different industrial sectors observed over the ten-year period of 2001 to 2010. Various regression models were examined in order to test the hypotheses included in the proposed conceptual framework.

Research limitations/implications – The lack of available data for the appropriate analysis; the investigation of tree industrial sectors and are the main limitations of the present study.

Finding- Results demonstrate that there is significant positive relationship between intellectual capital and value added efficiency of structural capital component with the three financial performance measures (ROE, ROA, GR). Moreover, results indicate that that there is significant positive relationship between value added efficiency of capital employed and value added efficiency of human capital with two independent variables ((ROE, ROA) and there is no significant relationship between value added efficiency of capital employed and value added efficiency of human capital with growth revenue (GR).

Practical implications – Results proved that, in the business context, the organization can achieve sustainable value with investment on intellectual capital and with focusing on intellectual capital; they can move from the economy based on the tangible assets towards economy based on the intangible assets.
Originality/value – The results of this study can illuminate the role and importance of intellectual capital to improve financial performance for companies and also the results of this study can be used by shareholders and investors.

Keywords: Intellectual Capital, Financial Performance, VAIC, Tehran Stock Exchange

Introduction

The management found itself in a knowledge-based economy in the third millennium in which cash, buildings and equipment, could not be considered as competitive advantage differentiator (Fitz-enz, 2000). On the other hand, when knowledge is the engine of development, successful organizations are those that leverage the knowledge and skills of their employees to achieve competitive advantage. Nowadays the market value of the leading organization is much higher than their book value, this difference is interpreted as intellectual capital and includes the intangible assets that unlike physical assets and despite the more importance and value are not seen in the traditional balance sheet (Standfield, 2005). There are many definitions of intellectual capital; Edvinson & Malon (1997) defined intellectual capital as knowledge that can be converted to the value. The main objective of this study is to examine the relationship between intellectual capital and financial performance. Public (2000) developed a suitable method for measuring the intellectual capital, his method is called VAIC and this method indirectly measures intellectual capital through the value added efficiency of human capital (VAHU), value added efficiency of structural capital (STVA) and value added efficiency of capital employed (VACA). In this study based on the three studies Maditinos et.al (2011), Chen et al (2005) and Firer and Williams (2003) VAIC method is used for measuring intellectual capital. Empirical investigation was conducted using data drawn from a panel consisting of 49 Iranian companies listed in the Tehran Stock Exchange (TSE) classified in three different industrial sectors observed over the ten-year period of 2001 to 2010. Moreover, in this study based on VAIC methodology examines the separate effects of value added efficiency of capital employed, value added efficiency of human capital and value added efficiency of structural capital on financial performance. The following section includes a literature review about study and in the third and fourth section; the conceptual framework and the research methodology are being presented. The results, conclusion, study limitations and future research are discussed in the sections 5, 6 and 7 respectively.

2-Literature Review

Yang et.al (2009) argued that traditional financial reporting cannot be used to calculate the real value of the firm because it measures only short-term financial and tangible assets. But in the recent years companies are interested in measurement of intellectual capital for reporting to stakeholders and they seek to find a method for evaluating internal intangible assets. According to Edvinson & Malon (1997) intellectual capital can be defined as the gap between book value
and market value. Increasing gap between market value and book value of companies has attracted the attention of many researches to find the missing value of the financial statements.

Because of the role of the intellectual capital in filling the gap between book value and market value, the nature of intellectual capital has been considered in many studies. A significant number of scholars identify three main components for intellectual capital: human capital, customer (relational) capital, and structural capital (Edvinson and Malon, 1997; Mavridis and Kyrmizoglou, 2005; Wall, 2007; Ruta, 2009; Maditinos et al., 2011). Human capital refers to knowledge, skills, and experiences that employees take with them when they leave the organization. Structural capital includes all non-human resources of knowledge in the organization which consists of databases, organizational charts, procedures, and administrative processes, and strategies and generally consist of everything that create higher value for the organization rather than its physical aspect (Ross & Ross, 1999), and the major issues of customer capital is knowledge that exists in marketing channels and relationship with customers and it is a determinant factor in converting intellectual capital to market value (Chen et al., 2004). At first this classification was found in the literature of intellectual capital and led to development of indirect methods of measuring intellectual capital; For example Borneman et al. (1999) argue that intellectual capital is obtained from the total value of three indicators: Human capital (knowledge and skills), structural capital (databases and organizational structure), and customer capital (customer and supplier relationships). Up to now many models have been proposed to measure intellectual capital such as the economic value added (EVA), value-based management (VBM), Tobin's Q ratio, and etc (Chen et al., 2004). Some of these models are specific that have been designed and implemented in a particular company and others are purely theoretical models (Stewart, 1997).

Public (2000) develop a suitable method for measuring the intellectual capital, he argued that the market value of the companies is created by capital employed and intellectual capital and also intellectual capital is composed of structural capital and human capital, in this method the information about value creation efficiency is measured by both intangible (human capital and structural capital) and tangible assets of an organization. This method is called VAIC and it indirectly measure intellectual capital through the value added efficiency of capital employed (VACA), value added efficiency of human capital (VAHU) and value added efficiency of structural capital (STVA). However there are inherent limitation in the VAIC method but in comparison with other methods its simplicity, intelligibility, and reliability make it an ideal method (Maditinos et al., 2011). VAIC is a suitable and approved method for measuring intellectual capital because all of the data used in this method is based on accounting data that are observable and verifiable. Other methods of measuring intellectual capital are often customized so that they fit the profile of a particular company. In fact, the models are customized and therefore they can not be generalized (Firer & Williams, 2003).

Any organization, whether public or private for their survival or growth must have competitive advantage; Human resources are the most complex and critical factor for achieving competitive advantages and yet they are the most restrictive factor. Overall costs of manpower in many
organizations are greater than the sum of operating maintenance and manufacturing costs. It should be mentioned that these costs are various in different organizations with regard to the nature of the industry, product or service (Wall, 2007). Other researchers also measured the intellectual capital in different industries and sectors of the economy and they examined the impact of intellectual capital on the financial variables. Muhammad and Ismail (2009) examined the relationship between intellectual capital and business performance in the Malaysian financial sector, they concluded that intellectual capital has a positive relationship with firm performance (measured by ROA and profitability).

Tan et al. (2007) examined the relationship between intellectual capital and financial performance of companies listed in the Singapore stock exchange. For this purpose they used equity, earnings per share and annual return per share as indicators of financial performance and they used VAIC method for measuring intellectual capital. The results of their study indicated that there is a positive correlation between intellectual capital and the company's future performance. They also concluded that the growth rate of intellectual capital has a positive relationship with firm performance. Samiloglu et.al (2006) examined the relationship between value added intellectual coefficient (VAIC) and the ratio of market value to book value in the Turkish banking sector. The results of their study indicated that there is significant correlation between the dependent variable (ratio of market value to book value) and the independent variable (VAIC) and its three components. Firer and Williams (2003) used VAIC M to measure the relationship between intellectual capital and commercial performance of African firms; the results of their study indicated that there is no significant correlation between the three components of intellectual capital and three dependent variables (profitability, productivity, market value).

3. The Conceptual Framework

VAIC method is used in this study for measuring intellectual capital following the methodological framework of Firer and Williams (2003), Chen et.al (2005) and Maditinos et.al (2011). And this study investigates the relationship between intellectual capital and financial performance. The hypotheses of the study are presented below. Figure 1 indicate the conceptual framework of the study

3.1 Intellectual Capital And Financial Performance

The traditional financial accounting is not able to calculate the true value of the organization ant it only measure tangible assets and financial balance sheet. Intellectual capital provides a new model to measure the true value of the organization. Researchers generally argue that intellectual capital creates value for the organization. Gan and Saleh (2008) examined the relationship between intellectual capital and firm performance. They found that intellectual capital has a significant impact on profitability and productivity also Chen et.al (2005), using the same methodology and they found that Intellectual capital has an significant impact on
profitability. Appuhami (2007) found a positive relationship between intellectual capital and on investors' capital gains on shares. The hypotheses of this research are as follow:

\[ H_1 = \text{intellectual capital effects the financial performance} \]
\[ H_{1a} = \text{intellectual capital effects the return on equity (ROE)} \]
\[ H_{1b} = \text{intellectual capital effects the return on asset (ROA)} \]
\[ H_{1c} = \text{intellectual capital effects the growth revenue (GR)} \]

As mentioned earlier in the study, VAIC includes three component measures: Value added efficiency of capital employed (VACA) Value added efficiency of human capital (VAHU) and Value added efficiency of structural capital (STVA). Since different significance may be put on each of the three components of VAIC, it would be interesting to examine the separate effect of each on financial performance indicators. Such an investigation would increase the explanatory power of the conceptual framework. Thus, it is hypothesized:

\[ H_2 = \text{Value added efficiency of capital employed (VACA) effects the financial performance} \]
\[ H_{2a} = \text{Value added efficiency of capital employed (VACA) effects the return on equity (ROE)} \]
\[ H_{2b} = \text{Value added efficiency of capital employed (VACA) effects the return on asset (ROA)} \]
\[ H_{2c} = \text{Value added efficiency of capital employed (VACA) effects the growth revenue (GR)} \]

\[ H_3 = \text{Value added efficiency of human capital (VAHU) effects the financial performance} \]
\[ H_{3a} = \text{Value added efficiency of human capital (VAHU) effects the return on equity (ROE)} \]
\[ H_{3b} = \text{Value added efficiency of human capital (VAHU) effects the return on asset (ROA)} \]
\[ H_{3c} = \text{Value added efficiency of human capital (VAHU) effects the growth revenue (GR)} \]

\[ H_4 = \text{Value added efficiency of structural capital (STVA) effects the financial performance} \]
\[ H_{4a} = \text{Value added efficiency of structural capital (STVA) effects the return on equity (ROE)} \]
\[ H_{4b} = \text{Value added efficiency of structural capital (STVA) effects the return on asset (ROA)} \]
\[ H_{4c} = \text{Value added efficiency of structural capital (STVA) effects the growth revenue (GR)} \]

4. Research Methodology

4.1 Sample And Data Selection

The final sample of the present study consists of 49 Iranian companies listed in the Tehran stock exchange. These companies belong to tree industrial sector: vehicle (9 companies), other non-metallic mineral products (18), Chemical products and material (22). The selected data cover a period of ten years, from 2001 to 2010. All tree industrial sectors are knowledge based and have a significant importance to the Iran economy. The initial target of the study was to draw data from all companies listed in the Tehran stock exchange (approximately 300 companies with constant participation in the TSE for the ten-year examination period). However, the first screening of data availability demonstrated that such an endeavor was too ambitious. The second data screening led in the exclusion of many companies .Overall, the final sample consists of 49 companies which are belong to tree industrial sector.

4.2 Variable Definition

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4.2.1 Independent Variables

This study includes four independent variables (Pulic 2000a, b): 1-value added efficiency of capital employed (VACA) 2-value added efficiency of human capital (VAHU) 3-value added efficiency of structural capital (STVA) 4-value added intellectual coefficient (VAIC) the composite sum of the three separate indicators. The first step towards the calculation of the above variables is to calculate value added (VA). VA is calculated according to the methodology proposed by Riahi-Belkaoui (2003). Second, capital employed (CE), human capital (HU) and structural capital (SC) are being calculated: Equation 1, Equation 2, Equation 3. Finally, VAIC and its three components are being calculated: Equation 4, Equation 5, Equation 6, Equation 7.

4.2.2 Dependent Variables

The present study includes one dependent variable and it is financial performance. The financial performance is measured with the use of three indicators: Return on equity (ROE): Equation 8; Return on assets (ROA): Equation 9; Growth revenues (GR): Equation 10. Return on equity represents the use efficiency of shareholder equity. Return on assets indicates the use efficiency of the assets and growth revenues indicate the growth of an organization (Gan and Saleh, 2008).

4.3 Regression Models

In order to examine the hypotheses of the study, various regression models have been evaluated. Models (1a) to (1c) examine the relationship between VAIC and financial performance (ROE, ROA, GR), models (2a) to (2c) examine the relationship between VACA, VAHU and STVA and financial performance (ROE, ROA, GR): Equation 11, Equation 12, Equation 13, Equation 14, Equation 15, Equation 16.

5. Results

5.1 Descriptive Statistics

Table I presents the descriptive statistics for all study variables. As shown in Table I the mean of value added intellectual coefficient (VAIC) is 0.60 and its standard deviation is 4.07 and between the components of the VAIC, the value added efficiency of structural capital (STVA) with mean 0.65 has highest mean among other VAIC components and the return on equity (ROE) indicator with mean 0.62 has highest mean among other financial performance indicators.

5.2 Hypotheses Verification

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Table II presents the results considering H1a-H1c and Table III the results considering (H2a-H2c), (H3a-H3c), (H4a-H4c). Results in Table II demonstrate that there is significant positive relationship between intellectual capital (measured with VAIC) and the three financial performance measures (ROE, ROA, GR), since all coefficients are statistically significant (P<0.05, t>0). Therefore, H1a, H1b and H1c are supported by the empirical data. Moreover, results depicted in Table III indicate that that there is significant positive relationship between value added efficiency of capital employed (VACA) and value added efficiency of human capital (VAHU) with two independent variables (ROE, ROA) (P<0.05, t>0) and there is no significant relationship between and value added efficiency of capital employed and value added efficiency of human capital (VAHU) with growth revenue (GR). Therefore H2a, H2b and H3a and H3b are supported by empirical data but the empirical investigation failed to support H2c and H3c (P>0.05).

As shown in Table III there is significant positive relationship between in value added efficiency of structural capital (STVA) and the three financial performance measures (ROE, ROA, GR); Therefore H4a, H4b and H4c are supported by empirical data (P<0.05, t>0).

6. Conclusion

Because of the increasing knowledge-based economy and knowledge management in modern organizations; this study was oriented toward the organization's intangible assets. In the past years, most of the industrialized countries have attempted to identify and evaluate intellectual capital. This research has received little attention by scholars in developing countries. The empirical data of this study were drawn from a panel consisting of 49 Iranian companies listed in the Tehran stock exchange (TSE), VAIC Method is used in this study for measuring intellectual capital which is one of the most valuable methods of measuring. The present study attempted to investigate the relationship between intellectual capital and financial performance of companies listed Tehran stock exchange. The results of the study support from this fact that intellectual capital is an important strategic asset for sustainable competitive advantage. Empirical results support the most of the proposed hypotheses only verifying the relationship between value added efficiency of capital employed (VACA) and value added efficiency of human capital (VAHU) with growth revenue is insignificant (P>0.05).

7. Limitations And Future Research

A limitation of this study is the difficulty in finding complete data for the ten-year period under investigation. Therefore, the sample was limited to 49 companies, while the average number of listed companies during 2001-2010 was approximately 300. Another limitation may be considered to be the investigation of only three industrial sectors. Moreover, future research should focus on the following directions:

- Investigate ways to improve the growth rate of intellectual capital
• Study on improving future performance of the industries with benefiting from intellectual capital
• Comparing other measures of intellectual capital such as Tobin’s Q and EVA with VAIC model.
• Investigate the relationship between intellectual capital and non-financial performance such as customer satisfaction and employee

Equation 1:
CE=Total assets – intangible assets
Equation 2:
HU=Total investment on employees
Equation 3:
SC=VA-HU
Equation 4:
VACA=VA / CE
Equation 5:
VAHU= VA / HU
Equation 6:
STVA= SC / VA
Equation 7:
VAIC=VACA+ VAHU +STVA
Equation 8:
ROE=Net Income / Shareholders Equity
Equation 9:
ROA= Net income / Total assets
Equation 10:
GR=\([Sales of the current year /Sales of the last year]-1\)× 100%
Equation 11:
\(H_1=\beta_0 + \beta_1 \text{ VACI} + \varepsilon\) (1a)
Equation 12:
\(H_2=\beta_0 + \beta_1 \text{ VACI} + \varepsilon\) (1b)
Equation 13:
\(H_3=\beta_0 + \beta_1 \text{ VACI} + \varepsilon\) (1c)
Equation 14:
\(H_{2a}, H_{3a} \text{ and } H_{4a}: ROE= \beta_0 + \beta_1 \text{ VACA}+ \beta_2 \text{ VAHU}+ \beta_3 \text{ STVA}+ \varepsilon\) (2a)
Equation 15:
\(H_{2b}, H_{3b} \text{ and } H_{4b}: ROA= \beta_0 + \beta_1 \text{ VACA}+ \beta_2 \text{ VAHU}+ \beta_3 \text{ STVA}+ \varepsilon\) (2b)
Equation 16:
\(H_{2c}, H_{3c} \text{ and } H_{4c}: GR= \beta_0 + \beta_1 \text{ VACA}+ \beta_2 \text{ VAHU}+ \beta_3 \text{ STVA}+ \varepsilon\) (2c)
Table I. Descriptive statistics for all study variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAIC</td>
<td>0.60</td>
<td>4.07</td>
<td>1.39</td>
<td>39.01</td>
</tr>
<tr>
<td>VACA</td>
<td>4.07</td>
<td>0.36</td>
<td>0.04</td>
<td>6.41</td>
</tr>
<tr>
<td>VAHU</td>
<td>0.65</td>
<td>3.92</td>
<td>1.05</td>
<td>37.46</td>
</tr>
<tr>
<td>STVA</td>
<td>5/10</td>
<td>0.17</td>
<td>0.05</td>
<td>0.97</td>
</tr>
<tr>
<td>ROE</td>
<td>0.62</td>
<td>0.15</td>
<td>0.01</td>
<td>3/50</td>
</tr>
<tr>
<td>ROA</td>
<td>0.18</td>
<td>0.54</td>
<td>0.00</td>
<td>0.54</td>
</tr>
<tr>
<td>GR</td>
<td>0.21</td>
<td>0.44</td>
<td>-1.03</td>
<td>7/68</td>
</tr>
</tbody>
</table>

**Figure 1** The conceptual framework of the study
Table II. Regression result of Models 1a to 1c: VAIC and financial performance
Note: Significant at the 0.05

<table>
<thead>
<tr>
<th>Variable</th>
<th>ROE</th>
<th>ROA</th>
<th>GR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>t-statistic</td>
<td>p-value</td>
</tr>
<tr>
<td><strong>Constant</strong></td>
<td>0.0228</td>
<td>0.4833</td>
<td>0.6291</td>
</tr>
<tr>
<td><strong>VACA</strong></td>
<td>0.1778</td>
<td>4.9270</td>
<td>0.000</td>
</tr>
<tr>
<td><strong>VAHU</strong></td>
<td>0.0285</td>
<td>3.5294</td>
<td>0.000</td>
</tr>
<tr>
<td><strong>STVA</strong></td>
<td>0.4790</td>
<td>5.4952</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Table III. Regression result of Models 2a to 2c: VAICs components and financial performance
Note: Significant at the 0.05

References


