Relationship between innovation capital and intellectual capital with value and financial performance

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Abstract: The term intellectual capital conventionally refers to the difference in value between tangible assets (physical and financial) and market value. The main purpose of this paper is to understand the intellectual capital and innovation capital with financial performance and value of Companies Accepted in Tehran Stock Exchange. Results indicate that there is not a significant relationship between intellectual capital and corporate value, there is a significant relationship between intellectual capital and financial performance of corporations, there is not a significant relationship between innovation capital and corporate value, there is a significant negative relationship between innovation capital and financial performance of corporations.


Keywords: Intellectual Capital, Innovation Capital, Financial Performance, Value of Companies, Tehran Stock Exchange

1. Introduction

Recent studies of intellectual capital can be divided into two trends, one is the overall surface, such as integration with the national innovation system, or create various types of capital indicators (Pomedaet al., 2002; Lin and Lin, 2008); the other is a decent look into the relationship between corporate performance (Kamath, 2008). Choong (2008) try to sum scholars from various countries on the construction and classification of intellectual capital, so that the content of intellectual capital accounting information can be translated into measurable by the subject to explore with the relationship between corporate performance, he uses a meta-analysis Methods appropriate classification of intellectual capital, of the academic general acceptance. Kamath (2006) that a company's intellectual capital is the potential that can be observed in strategic asset, and this strategic asset, tangible and intangible assets between inclusive. Because intellectual capital is, in essence, no specific shape is real assets; Kamath (2008) is divided into customer relationship capital, human resources, capital and structuralcapital, the three indicators of return on investment, market value - book value ratio correlation between productivity levels. As Kamath (2008) study looked only at the Indian biotech industry, and a statement of intellectual capital in India is just a fledgling country, this paper studies continuation Kamath, into Taiwan from 2001 to 2007 data of all listed companies, in addition to Index of use of the same impact on performance, but also increase R & D spending to discuss this variable impact on business performance, the use of mixed data ordinary least regression analysis found that all five indicators of business performance correlation. Then, according to industry characteristics, and to avoid sampling selection bias, I use of Logistic regression model to investigate whether the R & D expenditures under the conditions of the four indicators of intellectual capital on business performance.

From the resource base that (resource-based theory) point of view; core competencies can be constructed from the organizational point of view, many ideas that intellectual capital is a core competence or power. How do we use the simplest method from the internal resources or external search to form a reliable measure of further discussion and the relationship between corporate performances, intellectual capital is often used to demonstrate its value in the company to replace the implementation of force measurement. Academic definition of intellectual capital, and its characteristics are (1) intellectual capital is intangible assets, representing a potential value creation (Mavridis, 2005); (2) from the Board of Directors of the organization point of view, it is specific to the company and can often adapt changes in conditions; (3) the composition of many intangible assets can improve business functions (Brooking, 1996). Pulic (2000) proposed the added value of intellectual capital model (VAIC), to compare with the measure of corporate cross-sectional data,Deol (2009) in the same way with the concept of strategic environmental impact on Indian banks and state bank of wisdom capital on the local economy development.

The main purpose of this paper is to understand the intellectual capital and innovation capital with financial performance and value of Companies Accepted in Tehran Stock Exchange.

2. Research Method

We have used regression and correlation analysis in corporations of Tehran stock exchange.
Hypothesis:
1. There is a significant relationship between intellectual capital and corporate value.
2. There is a significant relationship between intellectual capital and financial performance of corporations.
3. There is a significant relationship between innovation capital and corporate value.
4. There is a significant relationship between innovation capital and financial performance of corporations.

Sample:
Statistical sample is corporations of Pharmaceutical industry and cement industry that accepted in Tehran stock exchange.

Table 1. Selection and sample extraction

<table>
<thead>
<tr>
<th>Condition Industry</th>
<th>Industry</th>
<th>Condition Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>1383 to 1388</td>
<td>Pharmaceuticals</td>
<td>The number of manufacturing companies in the years 1383 to 1388 have been in stock</td>
</tr>
<tr>
<td>1389</td>
<td>Cement</td>
<td>Financial year-end number of companies that are leading to the end of March</td>
</tr>
<tr>
<td>1389</td>
<td>Pharmaceutical</td>
<td>The number of companies during the financial year have not changed</td>
</tr>
<tr>
<td>1389</td>
<td>Cement</td>
<td>The number of companies that are actively trading symbol and its stock has traded at least once a year.</td>
</tr>
<tr>
<td>1389</td>
<td>Pharmaceutical</td>
<td>The number of companies during the course of their financial information is available.</td>
</tr>
<tr>
<td>1389</td>
<td>Cement</td>
<td>The final sample size</td>
</tr>
</tbody>
</table>

We have used 42 corporations at 6 years during 2004-2009 period.

Measuring Intellectual Capital
First Step: determine Value Added

\[ VA = \text{OUT} - \text{IN} \]
\[ VA : \text{Value Added} \]
\[ \text{OUT} : \text{Total Revenue} \]
\[ \text{IN} : \text{Total Cost} \]

Second Step: Determine efficiency of Capital

\[ \text{CEE} = \frac{VA}{CE} \]
\[ \text{CEE}: \text{Efficiency of Capital} \]
\[ \text{CE}: \text{Capital} \]

Third Step: Determine Efficiency of Human Capital

\[ \text{HCE} = \frac{VA}{HC} \]
\[ \text{HCE}: \text{Efficiency of Human Capital} \]
\[ \text{HC}: \text{Human Capital} \]

Fourth Step: Determine Efficiency of Structural Capital

\[ \text{SC} = \frac{VA}{HC} \]
\[ \text{SC}: \text{Structural Capital} \]
\[ \text{SCE} = \frac{VA}{SCE} \]
\[ \text{SCE}: \text{Efficiency of Structural Capital} \]
\[ \text{ICE} = \frac{VA}{ICE} \]
\[ \text{ICE}: \text{Efficiency of Intellectual Capital} \]

Fifth Step: Determine Coefficient of Intellectual Value Added

\[ \text{VAIC} = \text{ICE} + \text{CEE} = \text{HCE} + \text{SCE} + \text{CEE} \]
\[ \text{VAIC}: \text{Value Added Intellectual Capital} \]

Measuring Innovation Capital

\[ \text{R&D IN} = \frac{\text{R&D EX}}{\text{NI}} \]
\[ \text{R&D IN}: \text{R & D intensity} \]
\[ \text{R&D EX}: \text{R & D Expenditure} \]
\[ \text{NI}: \text{Net operating profit} \]

Measuring Financial Performance

\[ \text{ROA} = \frac{\text{NI}}{\text{TA(A)}} \]
\[ \text{ROA}: \text{Return on assets} \]
\[ \text{NI}: \text{Net profit} \]

Measuring Value of Corporation

We have used Q Tobin for measuring value of corporation.

\[ \text{Tobin’s } Q_t = \frac{\text{M.V.S}+\text{B.V.D}}{\text{B.V.A}} \]
\[ \text{M.V.S}: \text{Market value of common stock} \]
\[ \text{B.V.D}: \text{Book value of debt} \]
\[ \text{B.V.A}: \text{Book value of assets} \]

Method of Testing Hypothesis

We have used four regression models for testing hypothesis as following:

Model for First Hypothesis:

\[ \text{Q}_t = \beta_0 + \beta_1 \text{VAIC}_t + \beta_2 \text{SIZE}_t + \beta_3 \text{GROW}_t + \epsilon_t \]

Model for Second Hypothesis:

\[ \text{ROA}_t = \beta_0 + \beta_1 \text{VAIC}_t + \beta_2 \text{SIZE}_t + \beta_3 \text{GROW}_t + \epsilon_t \]

Model for Third Hypothesis:

\[ \text{Q}_t = \beta_0 + \beta_1 \text{RDT}_t + \beta_2 \text{SIZE}_t + \beta_3 \text{GROW}_t + \epsilon_t \]

Model for Fourth Hypothesis:

\[ \text{ROA}_t = \beta_0 + \beta_1 \text{RDT}_t + \beta_2 \text{SIZE}_t + \beta_3 \text{GROW}_t + \epsilon_t \]

\[ \text{Q}_t: \text{Q-Tobin Index} \]
\[ \text{ROA}_t: \text{Return of company assets} \]
\[ \text{VAIC}_t: \text{Efficiency of Intellectual Capital} \]
\[ \text{RDT}_t: \text{R & D intensity} \]
\[ \text{SIZE}_t: \text{Size of Corporation} \]
\[ \text{GROW}_t: \text{Rate of sales growth} \]
3. Results
Results for First Hypothesis:
First hypothesis: There is a significant relationship between intellectual capital and corporate value.

Table 2. Regression Results

<table>
<thead>
<tr>
<th></th>
<th>$R^2$</th>
<th>DW</th>
<th>F-Statistic</th>
<th>P-Value (F-Test)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.641</td>
<td>1.207</td>
<td>142.054</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Table 3. Estimation Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t-statistic</th>
<th>(P-value)</th>
<th>Colinearity Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Tolerance</td>
</tr>
<tr>
<td>VIAC</td>
<td>-0.90</td>
<td>-0.902</td>
<td>0.438</td>
<td>0.267</td>
</tr>
<tr>
<td>Size</td>
<td>0.697</td>
<td>18.2</td>
<td>0.00</td>
<td>0.787</td>
</tr>
<tr>
<td>Grow</td>
<td>0.931</td>
<td>3.615</td>
<td>0.001</td>
<td>0.961</td>
</tr>
</tbody>
</table>

Results indicate that there is not a significant relationship between intellectual capital and corporate value. So, first hypothesis is rejected. Also, the size of corporation and rate of sales growth have a significant positive effect on value of corporations.

Results for Second Hypothesis:

Table 4. Results from second model

<table>
<thead>
<tr>
<th></th>
<th>$R^2$</th>
<th>DW</th>
<th>F-Statistic</th>
<th>P-Value (F)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.459</td>
<td>1.65</td>
<td>67.488</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Table 5. Estimation Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t-statistic</th>
<th>(P-value)</th>
<th>Colinearity Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Tolerance</td>
</tr>
<tr>
<td>VIAC</td>
<td>0.396</td>
<td>12.713</td>
<td>0.00</td>
<td>0.762</td>
</tr>
<tr>
<td>Size</td>
<td>0.154</td>
<td>2.871</td>
<td>0.004</td>
<td>0.787</td>
</tr>
<tr>
<td>Grow</td>
<td>0.137</td>
<td>2.831</td>
<td>0.005</td>
<td>0.961</td>
</tr>
</tbody>
</table>

Results indicate that there is a significant relationship between intellectual capital and financial performance of corporations.

Second Hypothesis: There is a significant relationship between intellectual capital and financial performance of corporations.

Results for Third Hypothesis:

Table 6. Results from third model

<table>
<thead>
<tr>
<th></th>
<th>$R^2$</th>
<th>DW</th>
<th>F-Statistic</th>
<th>P-Value (F)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.64</td>
<td>1.704</td>
<td>142.178</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Table 7. Estimation Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t-statistic</th>
<th>(P-value)</th>
<th>Colinearity Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Tolerance</td>
</tr>
<tr>
<td>RDT</td>
<td>0.003</td>
<td>0.082</td>
<td>0.935</td>
<td>0.995</td>
</tr>
<tr>
<td>Size</td>
<td>0.8</td>
<td>20.527</td>
<td>0.00</td>
<td>0.989</td>
</tr>
<tr>
<td>Grow</td>
<td>0.37</td>
<td>2.52</td>
<td>0.00</td>
<td>0.992</td>
</tr>
</tbody>
</table>

Third Hypothesis: There is a significant relationship between innovation capital and corporate value.

Results for Third Hypothesis
References
18. Moustafa AA. Environmental Gradient and Species Distribution on Sinai Mountains. Ph. D. Thesis, Botany Department, Faculty of Science, Suez Canal University, Egypt, 1990;115.

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