The Impact of Intellectual Capital on Organizational Performance

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Abstract

In the field of organizational performance, managers always need to be aware of the importance of accounting in economy for decision-making in economic units, financial reports being considered an index for decision-making of investors. However, in the knowledge era, where intellectual capital represents a large part of the value of a product, the traditional annual financial statements report only partially the value of intangible assets (concessions, licenses, patents, trademarks, etc.). In fact, intellectual capital is an important activity for organizations which want to be efficient on the market and thus to obtain sustainable competitive advantage. The aim of this research is to investigate the relation between the intellectual capital and the organizational performance in four companies operating in the distribution of drinking water, between 2010 and 2014. According to the research objectives, four hypotheses were determined and the research results show that all of them were proven correct. The results obtained from this study showed that there is a significant relationship between the intellectual capital and organizational performance.

Keywords: Intellectual capital, organizational performance, hypotheses

1. Introduction

The increase of the organizational performance is not the result of macroeconomic policies or financial balance, but the result of technical progress, innovation and quality of human, structural and relational factors that, in turn, are heavily influenced by investment in knowledge -- education, research and development (Seleim, Ashour, & Bontis, 2004). The innovative performance of a company in the twenty-first century, in line with the Europe 2020 goals requires knowledge and intellectual capital management (which are key areas for most organizations), but...
particularly for those that are knowledge-intensive. The key factor of this creative performance is the intellectual capital, considered one of the most critical, yet strategic value that an organization can have. Using intellectual capital with maximum efficiency, finding innovative solutions to reduce consumption of resources – these are two directions which must be taken in order to implement intellectual capital management in a knowledge-intensive company through changes in organizational structure, culture and processes (Wang & Chang, 2005). Previous research (Bontis, N., 1998; Bontis, N., Chua Chong Keow, W. & Richardson, S. 2000; Seleim, A., Ashour, A. & Bontis, N., 2004; Wang, W. Y. & Chang, C., 2005; Cabrita, M. D. R. & Bontis, N., 2008; Kamukama, N., Ahiauzu, A. & Ntayi, J. M. 2010; Sharabati, A. A. A., Naji Jawad, S. & Bontis, N., 2010) confirms the existence of a strong and positive relationship between intellectual capital and organizational performance. However, this link should be confirmed in other fields as well in different countries.

This paper focuses on the importance of the intellectual capital for companies in order to increase organizational performance. The aim of this paper is to examine the relationship between the intellectual capital and the performance of companies operating within the distribution of the drinking water sector in the south-west region of Romania. The analytical approach of the essential elements of intellectual capital management in the four companies surveyed is relevant because of the immediate practicality of results: the evaluation of the performance of companies on intellectual capital elements using a proposed model; the assessment of the existing association between the proposed variables and human capital, structural and relational and not least, the positive correlation between them and the organizational performance; the interrelation conceptual model of organizational performance - intellectual capital is regarded as an instrument for diagnosis and monitoring organizational performance.

2. Conceptualising the intellectual capital

The concept of intellectual capital is not new; however, the organizational space has a limited understanding which is suggested by the multitude of existing definitions. The importance of the concept of intellectual capital in the age of knowledge becomes the new core of economic progress, since the influence of fixed assets and financial assets is reduced in comparison to the influence of intangible assets. An increasing number of specialists support the argument that intellectual capital is an essential element in achieving performance in an organization (Sydler, Haefliger, &Pruksa, 2014). Currently, a process to change the composition of capital is undergoing in order to develop a significant share of intangible assets that have priority. Therefore, these assets are intangible (the ability to use information, organizational culture).

The role of each intangible asset and the economic capacity of an organization lies in the art of assembling a coherent set of resources in a means to create those resources. In this regard, A. Toffler (1995) says that as long as investors of sectoral industry still consider traditional means as critical assets, investors from the most advanced and fastest growing sectors total are based on different factors in order to support investments. Rastogi (2002) agrees with the previous definition and adds to this remark that intellectual capital is the ability of a company to exploit the opportunities in order to create value. This perspective often uses a multilevel analysis combining individual knowledge and skills with organizational and inter-organizational processes.

Stewart (2001) places intellectual capital in the current economic reality centre saying that intelligence and knowledge become the intellectual capital, when the power of intellectual freedom achieves certain financial benefits through careful processing of intangible assets. From this point of view, the intellectual capital includes all intangible resources available to the company to confer an advantage on the market, which in combination with other advantages may result in future benefits. These definitions and underlying concepts provide a useful foundation for understanding intellectual capital.

A. Lönnquist and P. Mettanen conclude that intellectual capital has the following characteristics (Lönnquist and Mettanen 2003):

- It is invisible;
- It is closely related to the knowledge and experiences of employees as well as to the customers and technologies of an organisation;
- It offers better opportunities for an organisation to succeed in the future.
A common taxonomy has emerged in which intellectual capital is defined as encompassing:
- **Human capital** - refers to the characteristics and the intellectual qualities of the people from the company who have to react to market changes and customer needs;
- **Structural capital** - is the component of the organization which can be described as the organization's infrastructure and the organizational processes used to obtain products and services;
- **Relational capital** - refers to the ability to establish relationships with stakeholders and the market in a sustainable and stable environment, the ability to establish interpersonal relationships and the ability to develop relationships based on trust.

3. **Framework and hypotheses**

The research objective of this section is to propose and test a conceptual model of intellectual capital management in order to determine the impact of intellectual capital on organizational performance. In order to substantiate the most consistent research approach, main and specific objectives were proposed.

The main objectives proposed are:
- Determining the role of intellectual capital for the economic and financial development of water distribution companies;
- Identifying the most important characteristics of intellectual capital in order to facilitate the methodological framework of managing intellectual capital.

The specific objectives in conducting this research are:
- Analyze the relationships between the intellectual capital and the performance of water distribution companies in the south-west region of Romania;
- Testing correlations between variable components of intellectual capital and organizational performance. Correlations will show how strong the link is between variables and identify those variables with the strongest connection, as well as establish the weakest correlations.

The proposed conceptual model is based on three independent variables, namely: human capital, customer capital, structural capital. The model is also based on one dependent variable, namely organizational performance. The research model was derived from the theoretical framework of intellectual capital. In essence, this model postulates that there is a direct and positive association between intellectual capital and organizational performance. The theoretical research model is presented in figure 1.
Defining the hypotheses of this research is closely linked to the objectives mentioned above. The set of hypotheses are actually the answers which were supposed to be obtained from this research. The hypotheses were done taking into account the results of previous research. The following hypotheses were formulated for the conceptualization model:

**Hypothesis 1: Human capital positively influences organizational performance.**
This hypothesis is further explained by the following equation:

\[
\text{Organizational} = \beta_0 + \beta_1(\text{HC})
\]

(1)

Where: \( HC \) - Human capital
\( \beta_0, \beta_1 \) - are expected to be positive parameters

**Hypothesis 2: Structural capital positively influences organizational performance.**
This hypothesis is further explained by the following equation:

\[
\text{Organizational} = \beta_0 + \beta_1(\text{SC})
\]

(2)

Where: \( SC \) - Structural capital
\( \beta_0, \beta_1 \) - are expected to be positive parameters

**Hypothesis 3: Relational capital positively influences organizational performance.**
This hypothesis is further explained by the following equation:

\[
\text{Organizational} = \beta_0 + \beta_1(\text{RC})
\]

(3)

Where: \( RC \) - Relational capital
\( \beta_0, \beta_1 \) - are expected to be positive parameters

**Hypothesis 4: Intellectual capital (human capital, structural capital and relational capital) positively influences organizational performance.**
This hypothesis is further explained by the following equation:

\[
\text{Organizational} = \beta_0 + \beta_1(\text{IC})
\]

(4)

Where: \( IC \) - Intellectual capital
\( \beta_0, \beta_1 \) - are expected to be positive parameters

4. Research methodology

This research measured the relationship between variables and intellectual capital and aims to specify the relationship between intellectual capital and organizational performance. Therefore, the research was based on the correlation method. In order to collect data, a literature review was done, while additional information was gathered. The collection of data for the research was based on a questionnaire, which was applied in four drinking water distribution companies (from the Mehedinti, Timis, Caras Severin and Dolj counties in Romania). In order to select intellectual capital variables the most representative models and methodologies for evaluating the intellectual capital were analyzed, namely: Skandia Navigator (Edvinsson & Malone, 1997), Dashboard (Kaplan & Norton, 1996), Ericsson (Lovingsson et al., 2000), Ramboll (Ramboll Group, 2009), Infineon Technologies (Kircher-Kohl & Welzl,
2006), Intangible Assets Monitor (Sveiby, 1997) is measurement system IQ (Stewart, 2007). Organizational performance-related variables were chosen after studying the annual financial statements of the studied companies (balance sheet, results and trial balance).

The data analysis was performed using statistical methods of analysis. The indicators used in the research were the analysis of a series of distribution coefficient of correlation, coefficient of determination and multiple regressions. Statistical analysis was done by collecting information with the help of programmes such as Microsoft Excel, and Data Analysis module of the Statgraphics software. The four hypotheses formulated were tested. This was done using the correlation matrix and coefficient. For the interpretation of the correlation coefficient, various scales of valuation were proposed - by assigning correlation coefficient marks, depending on their size (correlation coefficient $r$ – have values between +1 and -1). The model used on the interpretation of the values of correlation coefficients is proposed by Hopkins (Table 1).

<table>
<thead>
<tr>
<th>Correlation coefficient</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\leq 0.1$</td>
<td>Association is very small, negligible</td>
</tr>
<tr>
<td>0.1 $\rightarrow$ 0.3</td>
<td>Association is small, minor</td>
</tr>
<tr>
<td>0.3 $\rightarrow$ 0.5</td>
<td>Association is moderate</td>
</tr>
<tr>
<td>0.5 $\rightarrow$ 0.7</td>
<td>Association is high</td>
</tr>
<tr>
<td>0.7 $\rightarrow$ 0.9</td>
<td>Association is very high</td>
</tr>
<tr>
<td>$\geq 0.9$</td>
<td>Association is almost perfect, describe the relationship between two variables virtually indistinguishable</td>
</tr>
</tbody>
</table>

The coefficient of determination ($r^2$) is considered a more appropriate indicator for the interpretation of the size of the effect because the slightly lower values than those of the correlation coefficient. In order to interpret the coefficient of determination Cohen proposed a model to evaluate the impact of the correlation (Table 2).

<table>
<thead>
<tr>
<th>Correlation coefficient</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2600</td>
<td>High impact</td>
</tr>
<tr>
<td>0.1300</td>
<td>Medium impact</td>
</tr>
<tr>
<td>0.0196</td>
<td>Small impact</td>
</tr>
</tbody>
</table>

A further analysis of this research can meet specific objectives such as the analysis of the relationship between intellectual capital and organizational performance, and the analysis of the correlations between the components of intellectual capital and organizational performance.

5. Results

The results related to the path analysis are obtained using the correlation matrix which allowed testing the association between intellectual capital dimensions and organizational performance (Fig. 2).
Hypothesis 1: There is a positive influence between human capital and organizational performance. Therefore, the growth of human capital will increase organizational performance. The correlation method was used to test hypothesis 1 (H1). The correlation will show how strong the link is between variables. It therefore calculated the Pearson correlation coefficient using Excel - correlation and Statgraphics. The correlation coefficient obtained between human capital and organizational performance is more than 0.5 for the first three companies which expressed a high positive association (Fig. 2). Company 4 has an almost perfect association. The impact of human capital on organizational performance was calculated using the coefficient of determination and can be expressed with the following table.

<table>
<thead>
<tr>
<th>Company 1</th>
<th>HC</th>
<th>SC</th>
<th>RC</th>
<th>IC</th>
<th>Organizational Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>HC</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SC</td>
<td>0.1694</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RC</td>
<td>0.84294</td>
<td>0.52704</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IC</td>
<td>0.966734</td>
<td>0.413617</td>
<td>0.9018</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Organizational Performance: 0.716857 0.145462 0.37636 0.719968 1

<table>
<thead>
<tr>
<th>Company 2</th>
<th>HC</th>
<th>SC</th>
<th>RC</th>
<th>IC</th>
<th>Organizational Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>HC</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SC</td>
<td>0.500365</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RC</td>
<td>0.146235</td>
<td>0.644658</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IC</td>
<td>0.150165</td>
<td>0.930926</td>
<td>0.658289</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Organizational Performance: 0.739018 0.921404 0.6418 0.741213 1

<table>
<thead>
<tr>
<th>Company 3</th>
<th>HC</th>
<th>SC</th>
<th>RC</th>
<th>IC</th>
<th>Organizational Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>HC</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SC</td>
<td>0.967433</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RC</td>
<td>0.998558</td>
<td>0.952579</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IC</td>
<td>0.400618</td>
<td>0.615448</td>
<td>0.350919</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Organizational Performance: 0.536055 0.511306 0.526648 0.268371 1

<table>
<thead>
<tr>
<th>Company 4</th>
<th>HC</th>
<th>SC</th>
<th>RC</th>
<th>IC</th>
<th>Organizational Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>HC</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SC</td>
<td>0.885651</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RC</td>
<td>0.569797</td>
<td>0.227791</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IC</td>
<td>0.976761</td>
<td>0.957763</td>
<td>0.481909</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Organizational Performance: 0.935492 0.716857 0.760519 0.877331 1

From Table 3, it was determined that human capital (51.39; 53.29; 28.16; 26.49) plays a dominant role in describing the latent construct of organizational performance. Therefore, the impact of human capital on organizational performance is high (> 0.26). This research result enables the validation of hypothesis 1 (H1).

**Hypothesis 2:** Structural capital positively influences organizational performance. For testing hypothesis 2, the correlation matrix was used once more (Fig. 2). In the case of the first company, the correlation coefficient obtained > 0.1, and it can be said that between structural capital and organizational performance was a minor association. But the next three companies had a high association which allowed the validation of the proposed hypothesis, namely that the organizational performance is significantly influenced by structural capital. The calculation of the percentage of the total variation that is explained by the independent variable was performed using the coefficient of determination. The results obtained are shown in Table 4.
Table 4 The impact of SC on organizational performance

<table>
<thead>
<tr>
<th>Equation</th>
<th>Determination coefficient (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Company 1</strong></td>
<td>Organizationa Performance = 52.811 + 0.9263 (SC) R Square = 29.76</td>
</tr>
<tr>
<td><strong>Company 2</strong></td>
<td>Organizationa Performance = 24.133 + 0.7585 (SC) R Square = 84.90</td>
</tr>
<tr>
<td><strong>Company 3</strong></td>
<td>Organizationa Performance = 74.913 + 0.8722 (SC) R Square = 26.14</td>
</tr>
<tr>
<td><strong>Company 4</strong></td>
<td>Organizationa Performance = 13.016 + 0.319 (SC) R Square = 40.80</td>
</tr>
</tbody>
</table>

As shown in the table above, the coefficient of determination obtained shows that the share of variable structural capital on organizational performance variable is more than 26%. This means that the impact of structural capital on organizational performance is high for all companies surveyed.

Hypothesis 3: The relational capital has a positive influence on organizational performance. The same correlation matrix was used for testing hypothesis 3 (H3). As shown in Figure 2, a value >0.5 was obtained, which expresses a high association between the variables analyzed for the last three companies, while the first company has a moderate correlation (0.37). The intensity of the linear relationship between two variables is calculated using the coefficient of determination (Table 5).

Table 5 The impact of RC on organizational performance

<table>
<thead>
<tr>
<th>Equation</th>
<th>Determination coefficient (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Company 1</strong></td>
<td>Organizationa Performance = 76.398 + 2.6981 (RC) R Square = 14.16</td>
</tr>
<tr>
<td><strong>Company 2</strong></td>
<td>Organizationa Performance = 144.42 + 20.762 (RC) R Square = 41.19</td>
</tr>
<tr>
<td><strong>Company 3</strong></td>
<td>Organizationa Performance = 28.329 + 4.6456 (RC) R Square = 27.74</td>
</tr>
<tr>
<td><strong>Company 4</strong></td>
<td>Organizationa Performance = 19.216 + 0.1377 (RC) R Square = 65.67</td>
</tr>
</tbody>
</table>

In case of the first company, R Square = 14.16% shows a medium impact of the relational capital on the organizational performance, while for the next three companies the results obtained demonstrate a strong impact of model variable on organizational performance. The results of the equations allow the validation of the hypothesis according to which relational capital positively influences organizational performance.

Hypothesis 4: There is a positive influence between intellectual capital and organizational performance. Therefore, the variable organizational performance is positively correlated with the variable intellectual capital. Accordingly, the Pearson correlation coefficient was calculated using Excel data analysis program - correlation (Fig. 2). The positive correlation coefficient obtained, expresses that an increase of the value of the intellectual capital variable will determine the increase of organizational performance. As a consequence, it obtained a coefficient of Pierson > 0.7. The value of the correlation coefficient is very close to +1, which means that the association is very high. The exception is company 3 which has a small association. Determining what percent of the variance in the dependent variable can be explained by the linear relationship with the independent variable is done by using the coefficient of determination. The result of the determination coefficient is shown in Table 6.

Table 6 The impact of IC on organizational performance

<table>
<thead>
<tr>
<th>Equation</th>
<th>Determination coefficient (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Company 1</strong></td>
<td>Organizationa Performance = 26.392 + 1.3548 (IC) R Square = 51.84</td>
</tr>
<tr>
<td><strong>Company 2</strong></td>
<td>Organizationa Performance = 2.8034 + 2.1311 (IC) R Square = 54.94</td>
</tr>
<tr>
<td><strong>Company 3</strong></td>
<td>Organizationa Performance = 38.233 + 3.2096 (IC) R Square = 25.30</td>
</tr>
<tr>
<td><strong>Company 4</strong></td>
<td>Organizationa Performance = 7.3318 + 0.3621 (IC) R Square = 61.78</td>
</tr>
</tbody>
</table>

The resulting coefficient of determination shows that more than 50% of the variance of organizational performance is determined by the intellectual capital variable for the three companies. Consequently, the impact of intellectual capital on organizational performance is high, allowing the validation of the assumed association in
hypothesis 4. Company 3 obtained the value 25.30, which allows the assertion that the impact of the intellectual capital on the organizational performance is medium.

6. Conclusions

As a result of applied research performed for testing and validating the proposed model of evaluation, the impact of intellectual capital on organizational performance in 4 companies of distribution of drinking water confirmed the efficiency and effectiveness of the proposed approach. The present study is the first to investigate the impact of human, structural, and relational capital and intellectual capital in Romanian distribution of drinking water firms. This study aims to discover, step by step, the interdependencies between the three elements of intellectual capital and how they affect performance. The above results revealed that the companies in the field of distribution of drinking water in Romania possess many elements of intellectual capital and these elements can be, in fact, measured. Thus, it can be said that the proposed model for evaluation intellectual capital has a positive impact on organizational performance, being oriented on intense development.

The most important directions of further research would be:
- Expanding the research to drinking water distribution on departmental level and individual level;
- The implementation of the model can be made in organizations of other areas (IT, manufacturing, healthcare, education etc.) and if the model variables are not applicable in the field, they can be eliminated and others can be suggested;
- The correlation analysis between IC and various other variables such as organizational competitiveness, subsidiaries competitiveness, competitiveness of groups etc.

Acknowledgements

This work was partially supported by the strategic grant POSDRU/159/1.5/S/137070 (2014) of the Ministry of National Education, Romania, co-financed by the European Social Fund – Investing in People, within the Sectoral Operational Programme Human Resources Development 2007-2013.

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