



BUSINESS PERSPECTIVES



LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine

www.businessperspectives.org

Received on: 7th of September, 2019

Accepted on: 21st of October, 2019

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INTELLECTUAL CAPITAL AND MARKET VALUE: EVIDENCE FROM JORDAN

Abstract

This research aims to apply the value-added intellectual coefficient (VAIC) model to test the impact of intellectual capital (IC) on market value of the Jordanian industrial firms. The research increases the awareness of the need for firms of all sizes to communicate and value their business beyond capturing numbers alone. The sample for this study is 73 Jordanian manufacturing shareholders companies during the period 2005–2017. The sample employed consists of 648 firm-year observations. Market value is measured using the market capitalization over the total assets. Valuation approaches are a challenging area created to enable the stakeholders, or outside parties, to put an economic value on a firm.

The IC and its components: capital employed (CEE), structural capital (SCE), and human capital (HCE) of industrial firms have been analyzed, and their impact on market value has been estimated using regression models. The results show that there is no relationship between IC and the market value; HCE is associated with the market value, and SCE and CEE are not associated with the market value. This could be explained by the increase in employees' training, as a regular training program is an essential factor in managers' and employees' performance. Practically, investors have a positive view of a firm that has higher employee expenditure than its investment in physical capital. Future research should be made on the empirical analysis of other sectors to determine whether different results and explanations can be obtained.

Keywords

intellectual capital, VAIC, industrial companies,
intangible assets, Jordan

JEL Classification

M41, O34, G10

INTRODUCTION

Valuation frameworks and performance management have traditionally concentrated almost exclusively on financial results and have paid little attention to assessing the knowledge.

Intellectual property is intangible assets, such as trademarks, copyrights, and patents included in financial statements. Nowadays intellectual capital is the issue that evokes more and more fruitful and thorough discussions in such spheres as business, management, and economy. The tangible assets (money, land, buildings, machinery, equipment) and other assets of the balance sheet are sufficiently less in their value than the intangible assets which are not recorded, including patents, copyright, IT, databases and software, as well as skills, abilities, experiences, cultures, and loyalties.

In the context of contemporary changes, enterprises face enormous challenges in the form of intense competition, openness to world markets, and decreased chances of survival and stability. The current technological and information revolution resulted from knowledge-based economic changes and concepts. These changes highlight the importance of the intangible assets of IC as a major reason for increasing the

opportunities for survival and stability. This leads to the need of organizations to focus on and invest in intellectual capital to ensure survival opportunities.

Intellectual capital includes skills and knowledge from all levels of a company, and it has become an essential resource in today's new economy, replacing financial and physical capital. Different models have been proposed to quantify the numerous aspects of intellectual capital, for example, Tobin's Q, and the VAIC (Mehralian et al., 2012).

Human capital consists of the accumulated experience, skill, the ability to innovate and creativity, and the ability of the people to achieve tasks and includes the values, culture, and philosophy that have emerged. Structural capital expresses the knowledge assets that remain within the organization, when human capital, which is an individual characteristic, is not taken into account. In contrast to human capital, this type of capital is owned by the organization or the people and can trade it.

Due to the unique characteristics of the industrial sector, such as long development cycles; a highly regulatory environment; high level of risk and costs in the research and development; and facing intensive globalised competition, there is a boundless discernment that IC management is a major force that drives economic growth (Lin, 2018).

Valuation approaches are a challenging area created to enable stakeholders, or outside parties, to put an economic value on a firm. It is hard to perceive how some models can be applied in practice in their current state. They are mostly used by finance professionals and are based on available data.

Research objectives

The research aims are to examine the association between IC and market value in Jordanian industrial companies, using the value-added approach. Using cross-sectional time-series data, this research is an attempt to measure the effect of intellectual capital efficiency on market value of the Jordanian industrial firms.

The interest in the concept of IC and how to measure it has increased in the early 1990s, especially in private organizations, to increase the competitiveness of these organizations. This has led a number of these organizations to conduct several studies to assess the value of IC available.

The primary objectives of this study are to increase the awareness of the need for firms of all sizes to communicate and value their business beyond capturing numbers alone and to investigate the influence of IC efficiency on the market value (MB) of Jordanian industrial firms.

Research problem

More than 60 percent of the sample in a KPMG recent survey of directors stated that they did not consider themselves very knowledgeable about non-financial performance indicators (Eissawi & Eltahan, 2018). The efficient and effective management of intellectual capital, therefore, becomes of utmost significance for the firms to operate both competitively and efficiently. Given its significance and its important role in the firms, this research aims to extend the scope of the IC and its influence on firms' financial performance by employing a widely used VAIC technique.

1. LITERATURE REVIEW

Chen et al. (2005) used 4,254 firm-year observations and found that IC and all the three IC ele-

ments were positively associated with the market performance of firms in Taiwan in the period from 1992 to 2002. Zeghal and Maaloul (2010) also found that, for a sample of 300 UK firms for the

year 2005, the IC components had an impact on market performance. The findings also indicate that companies with high value-added and innovation invest heavily in structural, tangible, and human capital.

On the other hand, the findings of Ariff et al.'s (2016) research that investigates the effect of IC on performance among research and development engaging firms in the U.S., by employing VAIC, indicate that the total IC efficiency and market performance of the R&D firms are positively and statistically significant. The results indicate that HCE and R&D firms have no significant association.

Nawaz and Haniffa (2017) investigated the 64 Islamic financial institutions for the period 2007–2011 operating in 18 countries by employing the widely used VAIC methodology. Their findings indicate a statistically significant positive association between VAIC and ROA. It is evident that ROA has significant positive relationship with CEE and HCE; however, no significant relationship related to the SCE.

In Jordan, Alqadi and Olimat (2018) aimed to identify the IC and its impact on accounting disclosure of the Jordanian industrial shareholding companies through studying the IC efficiency on the level of accounting disclosure of Jordanian industrial public shareholder companies. The study recommended the adoption of a clear strategy related to the development of IC and its components in industrial companies and executed it because of its strategic role in achieving the objectives of the companies.

Eissawi and Eltahan (2018) identified the role of IC as a mediator and variable in the association between the functional methodology of Six Sigma application and quality of life of workers in the Kingdom of Saudi Arabia. The main result was a significant relationship between the methodology Six Sigma and intellectual capital and the quality of working life.

Ishak and Al-Ebel (2018) aimed to measure the effect of the effectiveness of the Board of directors (BOD), the audit committee, and the foreign ownership percentage on the disclosure of IC. The

study population is listed in the GCC from 2008 to 2010. Consequently, the final sample consisted of 137 views from 2008 to 2010. The study found that the effectiveness of the BOD and the audit committee had an impact on the disclosure of IC. The study concluded that with the increase in the percentage of foreign ownership in banks, the level of disclosure of intellectual capital increased. However, the return on investment had nothing to do with intellectual capital.

In the banks sector, Tahir et al. (2018) employed the VAIC approach to analyze the efficiency of banks. ROA is used to measure the financial performance of the banks. The findings showed that VAIC is positively associated with ROA, while three components of VAIC showed mixed results on banks' performance.

Tarigan et al. (2019) provided evidence of the effects of IC on the firms' performance, focusing on market value, productivity, and profitability. The findings showed that the value-added model did not have a major relationship with the market value of the companies but had a significant relationship with financial performance.

Barrena-Martinez et al. (2019) highlighted the relevance of socially responsible human resource management and its association with the creation of value for firms' analysis. The results indicated that firms implementing socially responsible human resources policies could experience a more significant increase in Intellectual capital levels than other firms could.

Kesse et al. (2019) assessed the relationship existing between IC and performance of tourism and hospitality services firms in India using the VAIC. Data comprising 720 firms were sourced from the Prowess database for 12 years. The results indicated the existence of a relationship between the performance of firms and IC for the firms operating in the tourism and hospitality industry in India. Therefore, this study aims to investigate IC impact on banks' performance for the reason that no previous studies have been done in the banking sector. It is therefore of great significance, due to the rarity of the study related to the banking sector, to conduct the study in the banking sector of Pakistan.

Battagello et al. (2019) analyzed and appraised the prioritization of strategic assets and proposed a framework that supports the management of a firm in making the decisions about the allocation of such entities. This procedure returns quantitative and rational results and allows for a ranking of the examined resources.

2. HYPOTHESES DEVELOPMENT AND THEORETICAL FRAMEWORK

In this study, to determine the relationship between market value and IC in 72 industrial companies in Jordan for the period from 2005 to 2017, the study hypotheses are:

H1: Intellectual capital efficiency is associated with market valuation.

Robinson and Kleiner (1996) proposed the value-added approach valuation and measurement technique and used Porter's value chain concept.

Intellectual capital is presented by VAIC, CEE, HCE, and structural capital efficiency (SCE) directed towards market value, which shows that intellectual capital influences the financial market performance. Control variables such as current ratio (CR) and leverage (LEV) have an effect on market value, i.e., the dependent variable (Tahir et al., 2018).

H2: Human capital efficiency (HCE) is associated with market valuation.

Human capital is associated with the individual knowledge stock of a firm delegated by its staff; relational capital means the relationship between external and internal stakeholders. Capital employed efficiency measured the firm efficiency in increasing profits and returns from its investment.

H3: Structural capital efficiency is associated with market valuation.

Structural capital is the knowledge that remains inside the company. It includes cultures, procedures, databases, and systems. Examples are the

existence of a knowledge center, organizational flexibility, documentation service, and organizational learning capacity (Nawaz & Haniffa, 2017).

H4: Capital employed efficiency is associated with market valuation.

Internally developed intangible assets are recorded initially at the amount of the additional costs, excluding research and development (e.g., legal fees). Externally acquired intangible assets are initially recorded at acquisition cost plus any additional costs, such as legal fees.

An intangible asset with a useful life is amortized over that useful life, and the amortization methods are similar to the depreciation methods for fixed tangible assets. An intangible asset with an indefinite life, such as goodwill, is not amortized.

Some of this knowledge may be generic, and some are unique to the individual; examples of this are knowhow and previous experience, employee flexibility, innovation capacity, teamwork capacity, creativity, satisfaction, and loyalty (Tahir et al., 2018).

The primary advantage of this approach is simplicity; the figures are obtained from the annual report. However, this simplicity has several disadvantages. An organization could be utilizing its labor assets wastefully, but this could be concealed by the efficient use of other inputs, which would create the same ratio (Mehralian et al., 2012).

3. RESEARCH METHODOLOGY

According to the VAIC methodology, three components were used as IC items, which comprise these four independent variables. First, CEE_i equal value-added VA_i over the total assets CA_i .

The value added is computed using the following (AlNajjar & Riahi-Belkaoui, 1999):

$$W + I + D + De + R + T,$$

where (Lin, 2018): $HCE_i = VA_i / HC_i$, I is interest, De is dividends, T is taxes, D is depreciation, M_i is non-controlling interest in net income, and R is retained earnings.

The independent variables are the of the *VAIC* model components which are calculated as $VAIC = CEE + SCE + HCE$, $CEE_i = VA_i/CE_i$, $SCE_i = SC_i/VA_i$, and $HCE = VA_i/HC_i$,

where CE_i is the net assets or the equity of the firm i , $SC_i = VA_i - HC_i$, HC_i is the personnel expenses of the company i .

Market value is the dependent variable and computed as the ratio of market capitalization to the total assets of the company.

The control variables are the current ratio, which is equal to current assets over current liabilities, and the leverage ratio, which is equal to the total debt over total assets.

4. RESEARCH RESULTS

4.1. Descriptive analysis

Table 1 shows the descriptive measures for the variables. The descriptive statistics in Table 1 give the summarized picture of the data during the period from 2005 to 2017. The mean value calculated for the market value was 0.92. This means that the market value is less than the total assets.

The *VAIC* average in this study is 2.66, which is less than the Mehralian et al. (2012) study shows. This means that for each 1 *JD* paid to the employees, there is 2.66 *JD* from value-added. The average value for *IC* shows that the sample companies are close to being efficient in using their resources since any *IC* ratio above 2.0 is a sign of a value-creating company (Pulic, 2008). It can be observed that the *VAIC* average is higher than in Pakistan (2.49) and Malaysia (1.78) but is lower than the average *VAIC* of companies operating in the Saudi Arabia (3.65), Australia (3.67), Turkey (3.88), UAE (7.94) and the United Kingdom (10.80) (Tahir et al., 2018).

For *VAIC* components, *HCE* was the highest mean (2.18). This shows that *HCE* plays a significant role in the value creation of industrial companies in Jordan rather than the remaining two components *SCE* and *CEE*.

For the control variables, the companies finance 35% of their total assets from debt obligations that put them in a sound leverage position. The current ratio mean indicates that industrial companies have more than three *JD* from current assets to cover each current liabilities' *JD*, which means that they have a good liquidity position and can cover their current liabilities from their current assets.

Table 1. Descriptive measures

Measure	MB	VAIC	CEE	SCE	HCE	LEV	Current
Min	0	-314.6	-309.37	-40.46	-23.81	0.01	0
Mean	0.92	2.66	-0.42	0.91	2.18	0.35	3.16
Median	0.67	2.55	0.092	0.68	1.64	0.31	2
Max	7.22	5.47	5.47	84.1	48.61	2.28	97.2
Std. dev	0.85	14.29	12.17	4.93	4.94	0.26	5.02

4.2. Bivariate correlation

The correlation coefficients, as shown in Table 2, are from -0.387 to 0.279, which is less than 0.8, so we can ignore multicollinearity as an issue. The variance inflation factor (*VIF*) was computed for the four models. The *VIF* varies between 1.183 and 1.346. Accordingly, there is no multicollinearity in the models (Gujarati & Porter, 2009).

The correlation between *MB*, *CEE*, and *SCE* is not statistically significant. However, the correlation between *MB*, *VAIC* and *HCE* are positive and statistically significant. Therefore, the higher the *VAIC* value, the larger the market value that companies can obtain. The findings also suggest that *HCE* among independent variables is positively and statistically significantly related with market value.

For the control variables, a positive relationship with liquidity means that a strong liquidity position leads to high market value, and an expected negative significant relationship with leverage means that more debt will decrease the company market value. This shows that a larger firm's debt structure will adversely impact the market value and performance of the company.

Table 2. Correlation matrix

Variable	<i>MB</i>	<i>CEE</i>	<i>SCE</i>	<i>HCE</i>	<i>LEV</i>	Current
<i>CEE</i>	0.006	–	–	–	–	–
<i>SCE</i>	0	–0.004	–	–	–	–
<i>HCE</i>	0.279**	0.079*	–0.033	–	–	–
<i>LEV</i>	–0.267**	–0.101*	0.08*	–0.323**	–	–
Current	0.151**	0.020	–0.025	–0.016	–0.387**	–
<i>VAIC</i>	0.101*	0.878**	0.331**	0.400**	–0.170**	0.002

Notes: ** correlation is significant at the 0.01 level (2-tailed), * correlation is significant at the 0.05 level (2-tailed).

4.3. Regression analysis

First, the four regression models went through the standard assumption tests, i.e., the normality test (Kolmogorov-Smirnov), the heteroscedasticity test (Spearman and Glejser) and the multicollinearity test, and the sample data initially comprised 648 firm-year observations. All the regression models successfully passed the multicollinearity test ($VIF < 10$; $TOL > 5\%$) and the normality tests ($p > 0.05$). There was no heteroscedasticity problem found in the regression. Therefore, all 648 samples were qualified and valid for hypotheses testing.

Tables 3 to 6 represent the four hypotheses testing results. Results in Table 3 show that there is not a statistically significant association between *MB* and *VAIC*. This finding indicates that an insignificant correlation was found between *VAIC* and market value. Therefore, $H1$ is rejected, so, intellectual capital efficiency is not associated with market valuation. For the control variables, the table shows that the leverage coefficient is significant and negative, which asserts that companies that rely more on debt will suffer from a market value decrease.

This result suggests the importance of firms' efficiency in using physical, human, and structural capital effectively and efficiently to create higher company market values. This finding is similar to those of Chan (2009) and Tarigan et al. (2019) who also found insignificant correlation between *VAIC* and a company's financial performance, explaining that market valuation is based on investors' decisions in valuing and selecting a firm and that different values could be placed on firms' performances that may or may not include intellectual capital.

Table 4 also indicates a significant positive impact for *HCE* on *MB*; so, $H2$ is supported and human capital efficiency is associated with market valua-

tion. This result differs from the findings by Morris (2015) who fails to find a correlation between market-to-book value and *HCE* in South Africa; so, the market appears to pay great attention to human capital assets. This points to the possibility that the market acts positively if the company concentrates on increasing human resources at the expense of physical capital asset development.

On the other hand, the figures in Tables 5 and 6 do not support Hypotheses 3 and 4, so *SCE* and *CEE* are not associated with market valuation. Generally, in emerging stock markets, market sentiment is more influential on share prices than the fundamental analysis of market behavior. The higher structural capital efficiency does not influence a company's market value. This might be explained by the nature of the Jordanian manufacturing industries, where physical capital may be more dominant, as business operations are highly related to machinery. Besides, investors tend not to place more emphasis or value on the capital employed and structural capital of the firms.

4.4. Additional tests

To ensure that our findings are not driven by the endogenous association between intellectual capital and company market value, I follow Bennouri et al. (2015) and use the system of generalized method of moments (GMM) to address the endogeneity issue. This provides efficient and consistent coefficient estimators, especially when examining controls for time-invariant fixed effects and small panel data that may bias the estimation of the dependent variable, and addresses issues related to heteroscedasticity, autocorrelation, and omitted variables. The results show relatively similar results to those reported in Tables 3 to 6. Thus, these results assert that our findings are robust even after controlling for the endogeneity concern.

Table 3. Hypothesis 1

Variable	Coefficient	Error	t	Sig
Equation constant	1.144	0.070	16.329	0
VAIC	0.004	0.002	1.583	0.114
LEV	-0.759	0.137	-5.517	0
Current	0.010	0.007	1.482	0.139
R ²	0.077		Adj R ²	0.073
F-statistics	17.712		Sig.	0
VIF	1.217		Durbin-Watson	1.570

Table 4. Hypothesis 2

Variable	Coefficient	Error	t	Sig
Equation constant	0.960	0.076	12.678	0
HCE	0.040	0.007	5.791	0
LEV	-0.506	0.141	-3.592	0
Current	0.016	0.007	2.329	0.02
R ²	0.12		Adj R ²	0.116
F-statistics	28.877		Sig.	0
VIF	1.346		Durbin-Watson	1.622

Table 5. Hypothesis 3

Variable	Coefficient	Error	t	Sig
Equation constant	0.169	0.068	17.128	0
SCE	0.004	0.007	0.557	0.578
LEV	-0.802	0.135	-5.921	0
Current	0.010	0.007	1.369	0.172
R ²	0.074		Adj R ²	0.070
F-statistics	16.923		Sig.	0
VIF	1.183		Durbin-Watson	1.563

Table 6. Hypothesis 4

Variable	Coefficient	Error	t	Sig
Equation constant	1.173	0.068	17.153	0
CEE	-0.001	0.003	-0.535	0.593
LEV	-0.803	0.136	-5.919	0
Current	0.010	0.007	1.361	0.174
R ²	0.074		Adj R ²	0.070
F-statistics	16.914		Sig.	0
VIF	1.188		Durbin-Watson	1.563

Finally, autocorrelation and Sargan tests are used to test the accuracy of the models. In all models, the autocorrelation 2 test indicates that second-order serial correlation is not found; the

autocorrelation 1 test gives proof for negative first order serial correlation. These findings do not violate the OLS estimation assumptions (Al-Fayoumi et al., 2010).

CONCLUSION

Generally, previous researches that have used the VAIC model to assess the effect of IC on market value have reached opposing results. Pulic (2000) demonstrated a positive relationship with samples taken from the Vienna and London Stock Exchanges. Chen et al. (2005) detected a relationship between IC,

financial performance and market value. In contrast, Kamath (2008) found that, in the Indian pharmaceutical industry, there is no significant relationship between the independent variables and firms' performance in terms of market valuation. Gan and Saleh (2008) also concluded that VAIC in Malaysia can justify productivity and profitability but is not able to justify market valuation.

The descriptive statistics give the summarized picture of the data during the period 2005 to 2017. For VAIC components, HCE was the highest mean (2.18). This shows that HCE plays a significant role in value creation of industrial companies in Jordan rather than the rest of the two components SCE and CEE.

This study's main result means that there might be a discrepancy among investors in terms of the level of awareness on IC importance in companies' value creation, as this possibility exists in different capital markets in different countries. Arguably, IC is also influenced by the maturity level of intellectual capital consciousness found in investors in a specific market.

The research findings also show a significant relationship between market value and human capital. This could be explained by the increase in employees' training, as a regular training program is an essential factor in managers' and employees' performances.

It can be concluded that a firm should concentrate more on its IC, as it can be seen from the result of this study that this could increase its financial performance, which in the long term could positively affect its value in the market. It is also beneficial for companies to offer more disclosures and updates on how they operate intellectual capital management.

Future research should concentrate more on other control factors to provide more precise results. The study also recommends that managers should make a voluntary disclosure of IC components. Besides, researchers can use other approaches to evaluate IC, like Tobin's Q and the balanced scorecard.

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