

Linking Intellectual Capital to Firm Performance

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Abstract

The purpose of the study is to analyze the role of intellectual capital (IC) and its impact on the firm's financial performance and stock market performance in the context of Bangladesh. The study has followed a quantitative research design. Required data have been collected during the period of 2007-2017 from 141 listed manufacturing firms in DSE through administering a data observation sheet. Pulic's VAICTM method has been used to determine the relevant elements of IC. The study has used a fixed-effect estimation technique for balanced panel data (1,551 observations) to measure, describe, and analyze the relationship between IC and firm performance. The results reveal mixed behavioral effects: the firms' IC has a positive impact on financial performance although it has a negative impact on stock market performance. The results also indicate that even if IC triggers a significant rise in the firms' EPS, the firms' can't maximize shareholders' wealth due to their poor performance in the stock market of Bangladesh. The proposed models could be important tools for managers to integrate IC in their decision process. The proposed models could also be important tools for investors to select their portfolios that have a track record for continuous creation of value added (VA) in an efficient and sustainable way.

Keywords: Intellectual capital, VAICTM method, Firm performance, Manufacturing firms, Dhaka stock exchange

JEL Classification Codes: O34, L25, N65

1. Introduction

Bangladesh economy is now passing an era driven by the significant development of a new aspect of information technology, which helps it to be converted into a digital economy. In a digital and knowledge-based economy, intangible assets are predominant, and their role along with age and knowledge has become key success factors for manufacturing firms (Bontis, 1999). In a modern economy, it is also frequently argued that firms at present don't principally invest in fixed assets, however in intangible assets which Daum (2001) saw the key value drivers for the firms. Intellectual capital (IC) being one of the classes of intangible assets plays a crucial role in the development of firm performance. This is because the production-based economy has been transformed into a knowledge-based economy (Bontis et al., 2015). Since most of the activities in that economy rely on the knowledge, therefore for the development of knowledge capital manufacturing firms invest in human capital, which plays a very important role in the improvement of product and process innovation as well as assists in the enhancement of the firms' productivity. As the knowledge-based

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economy turns out to be more dominant, the role of IC in many types of manufacturing firms has grown ever more important than previous for the firms' operations and success. Several researchers (for example, Kaufmann & Schneider, 2004 and Cohen & Kaimenakis, 2007) consider investment in IC as fundamental tactical essentials to maintain the firms' growth, prosperity, profitability, competitiveness, and success.

IC and value creation or value added (VA) are recently realized in academic and corporate environments. They are additionally the subject matter of several studies and draw specific attention to practitioners, general investors, economic institutions, and governments. This occurs because IC brings several advantages for a firm. For example, IC brings strategic power (Bontis, 2001), adds value to the knowledge, motivates employee, and ensures maximum utilization of limited resources. Exploiting these advantages, a firm can ensure its existence and performance in a tightly competitive market over the long run. This assumption was confirmed by Subramaniam & Youndt (2005) and Dženopoljac et al. (2016) who recognized IC as knowledge asset which is invisible but can take part in a key role for the betterment of the financial performance of the firm. Dumay (2016) also studied the role of IC to increase a firm's value. He suggested that for increasing the value of a firm that firm must have the capability to utilize its IC to create monetary value, social value, and sustainable value and offer more utility to the customer. Monetary value is the most vital from all forms of value creation. It refers that IC should have influence to generate cash flow towards the firm. Utility value refers to the benefits or usefulness received from a firm's product. Nahapiet & Ghosal (1998) described social value as the benefits that a firm delivers to society. Finally, sustainable value focuses on the firm's capability to quench the current market needs without disordering the firm's present resources that will generate future value. IC is supposed to generate sustainable value for the firm if it is managed properly by the firm's management. Like the collection of benefits of R & D investment, the collection of benefits of IC occurs at different points of time. However, researchers are often encountering difficulties in measuring IC. The first reason is IC's nature which is intangible as well as has no physical existence. And the second reason is the firms' accounting treatment, which focused on fixed assets, overlooks most of the IC assets. Surprisingly, IAS/IFRS, international accounting standard body, have not prescribed a concrete valuation method of IC assets. Therefore, a high information asymmetry exists between what firms report and what investors receive. Ashton (2005) rightly addressed this phenomenon and stated that due to hard accounting treatment, shareholders and many other users fail to retrieve many useful information contents from the financial statements.

The present study is worth of pursuing because there is no simple explanation that addresses the relationship between IC and firm performance as previous literature in other countries do not make this relationship clear-cut. However, the study has two important contributions to the extant body of research. First of all, it has developed a research framework which has a unique identification and measurement method of IC. Managers and investors are often experiencing trouble while working with IC because of non-availability of gener-

ally accepted standardized measurement method of IC. To address this gap, the study has offered two proposed models derived from research framework. These models could be important tools for managers and investors to identify and measure the IC. With the help of this framework, they can also establish the relationship between IC and firm performance. Second, to the best of our knowledge, no prior studies have been made so far by taking the data sample from Bangladesh. Therefore, this study could be considered as the first ever empirical study that intends to measure the IC and examines the linkages between IC and firm performance for the listed manufacturing firms in Bangladesh. In addition to that, the study has supported Pulic's method and reduced its criticism by providing the data from Bangladesh. In this way, the study has filled up the identified gaps and made the study more interesting and rationale to the stakeholders. The research questions of the study are: (i) is there any direct relationship between IC and firm performance? (ii) how do investors of Bangladesh see the information content about the IC? Keeping these questions as our background, the study has attempted to address this issue for Bangladesh where investing for the development of knowledge such as IC is just beginning to be felt. The aim of the research is twofold. The research aims: i) to measure expenditures amount of IC by using VAICTM method, and ii) to examine its effects on firm performance for the listed manufacturing firms in Bangladesh.

1.1 Conceptualization of Intellectual Capital (IC) and Value Added Intellectual Coefficient (VAICTM)

IC is a more extensive idea of the knowledge-based economy but Bhartesh & Bandyopadhyay (2005) found no agreement about its definition. But it is very much important to characterize the term 'IC' properly in order to identify, classify, and measure the phenomenon and also in managing and capturing the holistic impact of IC on firm performance. In this regard, several researchers attempted to give an accurate definition of IC. Hall (1992) defined IC that can convert production resources into valuable assets. He considered IC as one of the valuable drivers for the firms. Later, Stewart (1997) attempted to define IC; according to him IC is a collective brain power of a firm. His definition also included that it is the sum of everything such as knowledge which brings competitive advantages for the firms. Bontis (1999) analyzed this definition and put comments that IC includes various forms of knowledge, the employees' experience, secret information, and intellectual property. Dženopoljac et al. (2017) also attempted to provide a succinct definition of IC. According to them, IC is the sum of knowledge and innovative property held by everyone in a firm.

One of the most generally utilized approaches for the valuation of IC is VAICTM method. This approach, the most popular one, was first introduced by a Croatian professor, Ante Pulic (1998). Ante Pulic (2005), one of the principal researchers in the field of IC research, first addressed explicitly to find out the correlation between IC and firm performance. In 2005, he confirmed the VAICTM method through an empirical investigation on traditional industrial sectors in Croatia. His analysis was completely based on the firms' balance sheet figures, i.e. financial indicators. VAICTM measures IC's relative contribution to overall value generated by the firm and acts as a gauge for firm performance. This basic principle of VAICTM has served as a foundation for this study. The intention is to measure the

elements of IC and also validates the VAICTM method as an indicator of IC. The VAICTM method also demonstrates how a firm can improve total value creation efficiency. In VAICTM method, both the IC efficiency and tangible assets contribute to generate the value for the firms (Kujansivu & Lönnqvist, 2007). This method has been used to determine how human, structural, and tangible assets influence the firm performance. Since the calculated value of VAICTM is required for the study, the study has explained its element and measurement in more details.

1.1.1 The VAICTM Method

The VAICTM method starts with the firms' ability to generate VA. VA demonstrates how much capable the firm is to create value (value creation). Based on how much IC efficiency a firm has, the VAICTM method is able to quantify the degree to which a firm produces added value. It is clear that the calculation of VAICTM method is not straight forward rather the method follows different steps. The summary of VAICTM method computation of a firm is given below:

Step 1: Determination of VA, HU, ST, and CA

- The formula for VA has been interpreted as output minus input. The output means gross revenue and input represents employed resources.
- HU has been fundamentally interpreted as employee related expense. Pulic (1998) argued that a firm should treat employee development expenditure as investment.
- ST is determined as: $ST = VA - HU$, and
- CA is simply the summation of working capital and fixed assets.

Step 2: Determination of VAHU, STVA

After computing VA, HU, ST, and CA, second step has involved to quantify the relationship between VA and HU, VA and ST. These relationships are as follows:

$$VAHU = VA/HU$$

$$STVA = ST/VA$$

Step 3: Determination of Value Added Intellectual Capital Coefficient (VAIN) and VACA

The following formula has been used to determine VAIN and VACA:

$$VAIN = VAHU + STVA$$

$$VACA = VA/CA$$

Step 4: Determination of VAICTM

This is the final step of the method. In this step, VAICTM has been calculated by using the following formula:

$$VAIC^{TM} = VAIN + VACA$$

The high coefficient value of VAICTM is always desirable since it calculates new value against per monetary unit invested in each resource. Like other method, VAICTM method is not without criticism. Researchers like Iazzolino & Laise (2013) are not happy with the

measurement of structural capital of VAIC™. Even then, this method is very much popular for the measurement of IC efficiency and often seen to be used as base to address the IC by the researchers as well as managers (Bontis et al., 2015).

2. Literature Review

Several studies tried to explain the effects of combined elements of IC on firm performance. However, not having the exact IC's measurement is the main obstacle in searching for the link. In the measurement of IC, different proxies such as human capital were used in different studies. Similarly, different proxies were also found to measure firm performance. For example, Lev & Sougiannis (1996); Lev (2004); Clarke et al. (2011) used revenue growth ratio (operating profit against sales revenue) as a proxy for the firm's financial performance. While Janošević et al. (2013) saw firm performance in the context of net profit, operating revenues, and earnings before income and tax (EBIT). Although these studies came up with different results, till now, the results are very encouraging. The study findings of Komnencic & Pokrajcic (2012); Amin et al. (2014); Han & Li (2015) suggested that IC affects the firm's financial performance positively. Researchers like Xinyu (2014) and Bontiset al. (2015) saw IC as a key source of the firm's competitive advantage and performance. According to them, the components of IC greatly influenced the firm's innovations. How IC affects the profitability of a firm? As a reference of most recent work in this context, we included the work of Dženopoljac et al. (2017) who came up with findings that earnings (EBIT and EBITDA) have a significant positive relationship with IC. Apart from IC's impact on firm profitability, let's see the influence of IC on market performance. As a reference, we included the work of Nimtrakoon (2015). In searching the relationship, Dumay (2016) revealed that even though the elements of IC are not shown in the financial statement, IC intensive firms have a high market value than its book value. Like the previous argument, the study findings of Lev (2004) and Roos et al. (2005) confirmed that IC not only plays a major role to augment the firm's market value above their book value but also contributes to improving the internal performance of a firm such as earnings and efficiency. However, taking a sample of 12 scheduled banks listed in Borsa Istanbul from 1998 to 2001, Şamiloğlu (2006) did not get any significant correlation between the elements of VAIC™ method and MB ratio. In the end, we included the study findings of Marr & Roos (2005). According to them, human capital, structural capital, and relational capital are the three components of IC. In a broad sense, the assumed linkage between IC's sub-domains and firm performance is positive (Bontis et al., 2018). After reviewing the literature, it has also been found that a large number of the methodologies have been connected utilizing the data samples in a variety of international settings standard such as the USA, Canada, the UK, Australia, Germany, and Turkey raise the issue of generalization on the empirical results. Do similar results are applied to developing economies like Bangladesh?

3. Hypothesis Development

Knowledge-based view (KBV) is the main approach that provides theoretical underpinnings for the measurement of IC and supports its effects on firm performance. Why a firm exists in the market? To address this question we need to resort KBV theory which opens up a new path to realize the existence of a firm. The KBV theory says that there are two

primary rationales for the existence of a firm. These are: the creation & transfer of knowledge and the application of knowledge. As per KBV, the firm acts as an institution. The primary responsibility of this institution is to integrate the knowledge. The KBV answers the question of why the firm performance differs from firm to firm. It is the heterogeneous knowledge and capabilities that determine the performance differences. In this connection, IC is important to generate knowledge for the firm. Knowledge resources such as “human capital”, “structural capital”, “relational capital”, “personnel competence and experience”, and “social capital” have also frequently been the focus of attention according to KBV of the firm. Considering KBV as the theoretical backdrop, the study has set four hypotheses. The development of hypothesis is based on the study of Ze’ghal & Maaloul (2010). H_{1a} and H_{1b} relate to the relationship between the different elements of IC and financial performance. And, H_{2a} and H_{2b} concentrate on the relationship between the various elements of IC and stock market performance. These hypotheses have been developed following the demonstration provided by Ze’ghal & Maaloul (2010) who explored the same relationship in the context of UK economy.

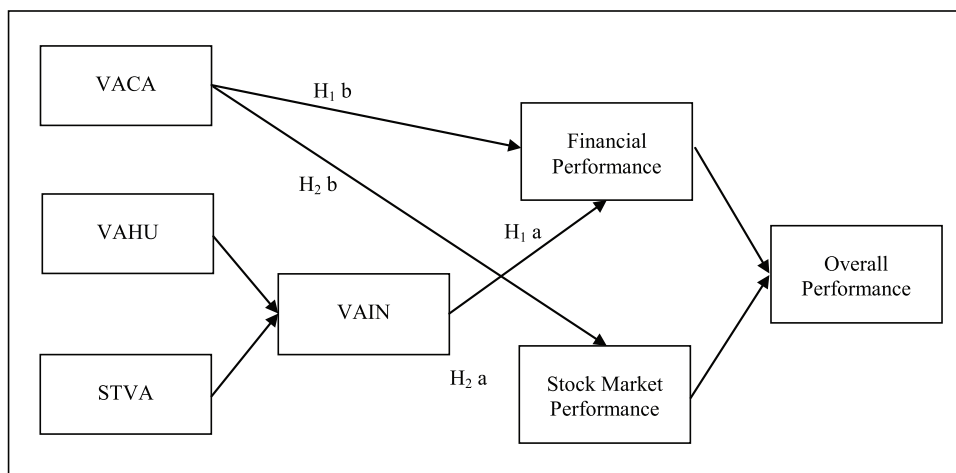


Figure 1: Conceptual Framework

Most of the researchers argued that financial performance of the firms is positively connected with the IC. As references we included the study findings of Amin et al. (2014) and Han & Li (2015). They saw firm performance as the firm’s ability to earn profit in a certain level from invested capital. Chen et al. (2005), following KBV theory, established that IC is a valuable resource that brings competitive advantages for a firm. They also assumed that IC contributes to improve the firm’s financial performance. However, Firer & Williams (2003) suggested effective and efficient use of IC, physical, and financial capital to create VA for the firm. If firms can do so, then they, according to them, could achieve superior financial performance as well as sustainable competitive advantages. At this point, the study exploiting the VAICTM method measures has planned to explore the following hypotheses:

H_{1a}: There exists a positive relationship between VAIN and financial performance.

H_{1b}: There exists a positive relationship between VACA and financial performance.

While constituting portfolio, investors will try to select the firms which regularly adds value i.e. VA by utilizing its IC resources properly (Ze'ghal, 2000). In 2005, Chen et al. found that an efficient stock always indulges IC intensive firms. In effect, investors put a higher value to the firms that have more IC. This assumption was validated by the study findings of Skinner (2008) who found that investors keep trust more on IC intensive firms than less or no IC intensive firms. At this point, the study exploiting the VAIC™ method measures has planned to explore the following hypotheses:

H_{2a}: There exists a positive relationship between VAIN and stock market performance.

H_{2b}: There exists a positive relationship between VACA and stock market performance.

4. Research Methodology

The study is empirical, descriptive, and relational. According to time reference of research, it is longitudinal (2007-2017), and research philosophy is inductive. Sources of data are secondary, published audited annual report. The quantitative research has been used as a method for data collection and analysis. The unit of analysis consists of manufacturing firms listed in Dhaka Stock Exchange (DSE), Bangladesh. As per DSE reports, there are nine manufacturing industries listed in the country's biggest bourse, DSE. The study has taken all; therefore, no sampling techniques have been required to follow. We, however, cautiously have set some criteria and strictly followed those while selecting the firms. After detailed assessment, the final sample firm and firm-year observations have been shown in Table-1.

Table 1: Sample Selection Procedure

Initial Identified Firms	173
Firms with missing data on selected variables	-09
Firms having insufficient number of observations on selected variables	-07
Firms having negative value of net profit after tax (NPAT) and capital employed (CA)	-05
Firms Date of incorporation year as a company after 2007	-11
Final Firms	141
Firms-Year Observation (Balanced Panel Data)	1,551

Note: The study has identified 173 manufacturing firms from 9 different manufacturing sectors: Cement, Ceramic, Engineering, Food & Allied, Fuel & Power, Miscellaneous, Pharmaceuticals & Chemicals, Tannery Industry, and Textile listed in DSE till June 30, 2018. However, the final sample firm is 141 which produce 1,551 observations.

4.1 Development of Panel Regression Model

Generally, in analyzing the panel data anyone of the following three estimations, namely, Pooled Ordinary Least Square (OLS), Fixed-Effects Model (FEM) and Random-Effects Model (REM) can be used but with different assumptions. The study has considered the two most popular statistical tests: Breusch-Pagan Lagrange Multiplier (LM) and Hausman Specification test to make choice among three estimates. Test results recommend using Fixed-Effect Model. Therefore, regression model namely fixed-effects model for model-1 model-2 dedicated to elucidate the firms' financial performance and stockmarket performance, respectively are specified as follows:

$$\text{LN EPS}_{it} = \beta_0 + \beta_1 * \text{LN VAIN}_{it} + \beta_2 * \text{LN VACA}_{it} + \beta_3 * \text{LN SIZE}_{it} + \beta_4 * \text{LN LEV}_{it} + \epsilon_{it} \quad \text{..... (1)}$$

$$\text{LN PE}_{it} = \beta_0 + \beta_1 * \text{LN VAIN}_{it} + \beta_2 * \text{LN VACA}_{it} + \beta_3 * \text{LN SIZE}_{it} + \beta_4 * \text{LN LEV}_{it} + \epsilon_{it} \quad \text{..... (2)}$$

Where, Subscript (i) = Cross-sectional unit, Firms (i=1, 2,141)

(t) = Time series unit (t=1, 2, ...11)

ϵ_{it} = Error term with $E(\epsilon_{it}) = 0$ and $\text{var}(\epsilon_{it}) = \sigma^2_{\epsilon}$

5. Empirical Results and Discussions

5.1 Descriptive Statistics

Table-2 describes the descriptive statistics of main dependent variables, EPS and PE ratio, independent variables, VAIN and VACA, and control variables, SIZE and LEV for the total sampled firms.

Table 2: Descriptive Statistics of the Variables

Variables	No. of Observations	Mean	SD	Minimum	Maximum
EPS	1,551	7.02	14.77	0.027	141.728
PE	1,207	73.19	32.33	0.234	404.778
VAIN	1,551	14.57	84.95	0.027	327.97
VACA	1,551	2.46	50.27	0.034	197.50
VAIC TM	1,551	17.03	20.02	0.050	328.26
SIZE	1,551	417,722,643	107.02	329,893	11,941,448,684
LEV	1,551	0.45	0.22	0.0004	1.21

Notes: Variables are defined as follows: EPS is the ratio of the net profit after tax divided by total number of common shares outstanding, used as proxy for financial performance; PE is the ratio of the market price per share divided by EPS, used as proxy for stock market performance; VAIN is the sum of VAHU and STVA; VACA is calculated as VA/CA, and VAICTM is the sum of VAIN and VACA. Natural logarithm of net profit after tax has been taken as a proxy for Firm size (SIZE), and firm leverage (LEV) has been calculated by the ratio of book value of total liability to book value of total assets.

The key elements of descriptive statistics are VAIN and VACA. If we compare the sampled firms' VAIN and VACA value during the period between 2007-2017, then we find that all the firms have done very well in creating VA from their IC compared to physical and financial capital employed. Prior literature also suggests the same findings. For example, Pulic (2004) and Ze'ghal & Maaloul (2010) compared the contribution of intellectual resources and physical and financial resources in adding value and found that intellectual resources add more value to wealth. The mean value of cumulative VAICTM which is 17.03 indicates that listed manufacturing firms of Bangladesh studied in this paper created Tk. 17.03 for every Tk. employed.

5.2 Correlation Analysis

Table-3 shows the output of Pearson pair wise correlation analysis. From the table it is clear that VAIN, VACA, VAICTM, firm size, and firm leverage are significantly positively correlated with financial performance measure, earnings per share (EPS). On the one hand, all the variables except VACA are significantly negatively associated with stock market performance. Consequently, these results entirely support hypotheses: H_{1a}, H_{1b} and H_{2b} while rejecting the H_{2a}.

Table 3: Correlation Analysis of the Variables (n=1,551)

Variables	LNEPS	LNPE
LNVAIN	0.2375*	-0.2515*
LNVACA	0.1149*	0.0385***
LNVAIC TM	0.2284*	-0.2209*
LNSIZE	0.6425*	-0.5484*
LNLEV	0.1486*	-0.0865*

Note: *, **, and *** indicate 1%, 5%, and 10% level of significance

5.3 Linear Regression Analysis

This section has discussed, in details, the second objective of the study. A fixed-effect regression model (FEM) has been implemented for the model-1 and model-2 to estimate the firms' financial performance and stock market performance respectively. It is important to note that the Pearson's correlation coefficients range from -0.0358 to 0.4686. As the range suggests low value, so we can conclude that both of the models are free from multi-collinearity problem.

Table 4: Pearson Correlation Matrices for the Explanatory Variables

Variables	LNVAIN	LVNACA	LNSIZE	LNLEV
LNVAIN	1.0000			
LVNACA	0.0763*	1.0000		
LNSIZE	0.4686*	-0.0344***	1.0000	
LNLEV	-0.0399**	0.0700*	-0.0358	1.0000

Notes: *, **, and *** indicate 1%, 5%, and 10% level of significance

5.3.1 Financial Performance Model

Table-5 demonstrates the output of financial performance model. EPS acts as a dependent variable for the model. The value of F-statistic, 382.98, is statistically significant at 1% level of significance meaning that the coefficients of all the variables are not significantly zero. The value of R-square of the estimated model-1 is 0.4347, presenting a moderate degree of explanatory power.

Table 5: Linear Multiple Regression Results for Model-1 & 2

Dependent Variable: LN EPS (for Model-1) and LN PE (for Model-2)		
	Model -1 (Fixed-Effect)	Model -2 (Fixed-Effect)
LNVAIN	0.0651333*	-0.0233634***
LVNACA	0.0533412*	0.0773577*
LNSIZE	0.7256442*	-0.6970037*
LNLEV	0.2040456*	-0.223763*
Constant	-12.26152*	16.04501*
No. of Observations	1,550	1206
No. of Firms	141	141
The Value of R ²	0.4347	0.3158
The Value of F (P-value)	382.98 (0.0000)	138.03 (0.0000)

Notes: *, **, and *** indicate 1%, 5%, and 10% level of significance

5.3.1.1 Explanation of Independent Variables of Model-1

5.3.1.1.1 VAIN of Model-1

It is clear from the FEM estimation results of model-1 that the coefficient of key variable VAIN along with other explanatory variables is statistically significant at 1% level of significance. VAIN and financial performance of the firm is positively correlated which supports the hypothesis (H_{1a}) meaning that IC strives a crucial role in minimizing the cost of production. Casta et al. (2005) and Ze'ghal & Maaloul (2010) also reached the similar conclusion. They found the same positive impact of IC on firm performance in the context of UK and Spanish firms, respectively.

5.3.1.1.2 VACA of Model-1

Like VAIN, VACA is also significant at 1% level of significance and positively associated with EPS. The study finding is similar to the study finding of Lev & Sougiannis (1996) and Gu & Lev (2003) who also observed a positive coefficient value of VACA in their regression model output. This result has confirmed hypothesis (H_{1b}) that VACA reins the additional expenses for firms.

5.3.1.1.3 Firm Size of Model-1

The first control variable of model-1 is firm size which is positively associated with the firms' financial performance. It is well established that the larger firms perform better. Das et al. (2009) established that firm size positively influences financial performance of a firm. Consistent with the prior findings the positive coefficient value of firm size suggests that sampled firms are large enough to exploit the economies of scale as well as have better bargaining power over their competitors and suppliers.

5.3.1.1.4 Firm Leverage of Model-1

Positive coefficient of leverage ratio suggests that it promotes EPS. This is because perhaps the leverage ratio has reduced the agency problem and tax shield of the sampled firms. In searching the impact of CSR on financial performance, Surroca et al. (2010) included intangible resources which play as a mediator role in that relationship. They developed a regression model using a database of 500 firms from 28 countries and demonstrated a positive coefficient value of firm leverage.

5.3.2 Stock Market Performance Model

Table-5 also demonstrates the output of stock market performance model. PE ratio acts as a dependent variable for the model. The value of F-statistic, 138.03, is statistically significant at 1% level of significance meaning that the coefficients of all the variables are not significantly zero. The R-square value of the estimated model-2 is 0.3158, presenting a fair degree of explanatory power.

5.3.2.1 Explanation of Independent Variables of Model-2

5.3.2.1.1 VAIN of Model-2

It is clear from the FEM estimation results of model-2 that the coefficient of key variable VAIN is statistically significant at 10% level of significance. VAIN and stock market performance of the firm is negatively associated which does not support the hypothesis

(H_{2a}). This finding matches with the previous literature. As references, we included the work of Tahinakis & Samarinas (2013) and Ferdaous & Rahman (2017) in the context of Greece and Bangladesh economy respectively. Although their methodologies were different but they concluded that investors do not consider intangible assets such as R&D as creator of innovation as well as future growth of their country.

5.3.2.1.1.1 Clarification of Negative Coefficient of IC on PE Ratio

The estimation of model-2 incorporates a new point of view suggesting that if a firm invests less in IC, this will positively influence the stock market performance. This phenomenon leaves some questions: why the firms that have IC do not perform better in the stock market of Bangladesh? Why is the true appreciation of those firms is absent in the stock market of Bangladesh? To answer these questions let's investigate why IC negatively influence the market value of a firm. The study has identified some reasons, and because of those reasons the stock market fails to reward the firms that have IC.

First, the possible reason is the absence of an efficient market. Although the economy of Bangladesh is on a strong footing on many measures (GDP, export, import, and remittance), the stock market is not efficient. It neither follows a weak form of efficiency nor follows the random walk model since DSE violates the necessary conditions of an efficient market (Raquib & Alom, 2015) and (Rahman et al., 2016). One of the features of an inefficient market is investors do not assess the sources of firm value considering intangible assets. Another feature of an inefficient market is the movement of stock price does not follow the fundamental analysis, EIC analysis, of investors. As a result, the securities are not strictly priced. The second possible reason is investors' attitude towards the firms that work for the development of IC to gain sustainable competitive advantages. Perhaps investors have doubts for the firm's ability to create value from the adoption of IC. They may think the firms may not create sustainable competitive advantages using IC. Because of the investors' negative perception about IC they see them following the international accounting standards (IAS 38) as expenses rather than investment, and lower their market value.

The third possible reason is information asymmetry. It means investors are not getting sufficient information content about the IC. Because of the nature of IC, a high information asymmetry exists which is much larger than that of fixed assets and financial assets. Asymmetry of information may trigger the perceived risk by the investors. The absence of an organized market for IC also contributes to information asymmetry. The accounting treatment of IC further exacerbates the phenomenon. Unlike fixed assets and financial assets, IC is not routinely reported to investors by most of the sampled firms. Sampled firms uniformly expense the development amount of IC and show them in the report, thereby there remains an information gap between what firm reports and what investors receive about the elements of IC. As a result, investors can't retrieve considerable information from the published financial statements and often fail to infer the stock price of IC intensive firms. Aboody & Lev (2000) saw this phenomenon as one of the reasons for the low stock price of IC intensive firms in the context of the U.S. economy. Perhaps these reasons are responsible for the negative coefficient value of IC of sampled firms which suggests a negative relationship in the context of Bangladesh.

5.3.2.1.2 VACA of Model-2

Unlike VAIN, VACA is significant at 1% level of significance. VACA and PE are positively correlated. The study finding is reliable with the study findings of Firer & Williams (2003); Chen et al. (2005); Shiu (2006); Ze'ghal & Maaloul (2010) who also observed a positive coefficient value of VACA in their regression model output. This result has confirmed hypothesis (H₂b).

5.3.2.1.3 Firm Size of Model-2

The first control variable is firm size. Although firm size positively influences market value (Acheampong et al., 2014), the study has found that it is negatively associated with PE. The possible explanation could be the absence of homogenous measurement method of firm size.

5.3.2.1.4 Firm Leverage of Model-2

The second control variable is firm leverage which is also negatively associated with PE. Perhaps the market has considered high leveraged firms as riskier than low leveraged firms and lowers the market value. Literature suggests that there exists a negative relationship between firm leverage and market value, other things being equal. For example, Acheampong et al. (2014) established a negative relationship between firm leverage and market value of a firm.

6. Conclusion

The nature of IC often brings multifaceted challenges to the researchers to measure and value since it has no physical substances, thereby it is very much difficult for the firms to identify and control them separately. Estimation of future economic benefits from IC over multiple periods of time is also challenging due to absent of reliable measurement tools. The conventional accounting standards merely set the policy (IAS-38) but in reality, its implication often creates trouble for managers or practitioners while working with IC. Treatment of expenditures on IC as expensed strongly decreases the firms' NPAT and aggravates the margin ratio. The study has argued that like tangible assets IC has the capability to bring benefits for the firms. These benefits are sustainable; bring competitive position over the rival firms. In the field of IC and firm performance relationship, most of the studies have reached the conclusion that firms should view the expenditures for the development of IC as investment which is supposed to generate future economic benefits such as superior returns for the firms. The central argument of the study is how IC affects the firm performance: financial performance and stock market performance in the context of manufacturing firms in Bangladesh. The study has concerned the issue: do the manufacturing firms of Bangladesh gain benefits from IC?

An important gap in the existing literature related to this field is the lack of empirical studies in developing economies like Bangladesh. This study has documented that gap providing the data during the period between 2007 – 2017. The study has used a panel regression model (fixed-effects estimation technique) to estimate the firm performance. The sampled firms consist of 141 firms from nine manufacturing industries listed in DSE. The study has set two objectives: measurement of IC using VAIC™ method and searched

the relationship between IC and firm performance. It is obvious from the descriptive analysis of IC that the average score of VAICTM is 17.03, which indicates that listed manufacturing firms of Bangladesh studied in this paper created Tk. 17.03 for every Tk. employed. The second objective of the study is intended to look at how IC affects the firms' financial performance and stock market performance respectively. After reviewing literature, the study has found that most of the theoretical approaches suggest a positive linkage of IC on firm performance. Considering those theoretical approaches as background the study has set four hypotheses: IC and VACA positively influence both financial performance and stock market performance.

The study findings indicate a mixed behavioral effect. Specifically, IC has a strong positive influence on the firms' financial performance; however, the relationship is reversed with the firms' stock market performance which indicates diminishing stock price against IC intensive firms. The reverse relationship with the firms' stock market performance does not prove that investors of Bangladesh do not consider IC as a source of value creation since our stock market is not efficient. By combining the behavioral effects of IC on the firms' financial and stock market performance, the study has formalized above mentioned fact saying that even if IC triggers a significant rise in the firms' EPS (measure of financial performance), the firms' can't maximize shareholder's wealth due to poor performance of IC intensive stocks in the stock market of Bangladesh. This phenomenon suggests that perhaps investors in Bangladesh overlook IC as a value creator for both of the firms and the economy. The probable reasons for such behavior of intangible assets are the nature of IC, investors' attitude, and information asymmetry. Due to time constraint, the study could not provide sufficient evidence whether any one or all of these reasons are truly responsible for the inverse relationship. The result also reveals that VACA has played a significant role to create value for the firm and important to stockholders and stakeholders. As for practitioner implications, the findings are essential to managers in exploiting relevant elements of IC. The proposed models will be helpful to practitioners to manage their IC resources. In general, the proposed models could be important tools for practitioners who are paying attention in the integration and development of IC.

The present study is not without limitations. First, the findings of the study simply tell us associations between the IC and firm performance rather than causal impacts. Therefore, a further research may be carried out to examine the causality and interrelationships among elements that are crucial to that relationship. Second, because of the limitation of time, the study could not validate the underlying reasons why IC intensive firms are not performing well in the stock market. A further investigation of the study may be carried out to validate the reasons: information asymmetry, investors' attitude, and inefficient market for the poor performance of IC intensive firms in the context of Bangladesh.

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