# Intellectual Capital and Corporate Performance: In the context of Banking Industry in Bangladesh

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## Abstract
This paper investigates the relationship between the intellectual capital efficiency and financial performance of Bangladeshi banks. The relationship between efficient use of intellectual capital and corporate performance was examined through the practical use of human capital efficiency (HCE), structural capital efficiency (SCE) and capital employed efficiency (CEE). The study used data from 52 commercial banks over the year 2000 - 2018 to assess their impact on financial performance. Our results show that human capital is positively and significantly associated with ROA. On the other hand, capital employed efficiency is negatively associated with ROA. We also demonstrate that impact of VAIC is more pronounced for Islamic banks than conventional banks. In an additional analysis, we also show that VAIC and human capital contribute more to increasing the financial performance of foreign banks than domestic banks. Our results are robust to alternative estimation techniques and alternative proxy of financial performance. The findings have theoretical and practical implications, particularly for the banking industry in emerging economy contexts. This study is among only a few reported on the relationship between intellectual capital efficiency and value creation in emerging economy contexts.
**Keywords:** Intellectual capital, Banking Industry, Emerging economy, Organisational performance

## 1. Introduction
The research paper intends to analyse the interconnections and interactions between the intellectual capital components and organisational performance in the banking industry. A considerable number of studies was conducted exploring this relationship in developed countries (i.e., Berzkalne and Zelgalve, 2014). However, very limited research was done in the developing country context. (Boekestein, 2006; Firer and Stainbank, 2003). This paper surveys the relationship between the effective use of intellectual capital and organisational performance in the context of

an emerging economy. In this study, Bangladesh is used as an example case because currently, banking companies in Bangladesh are progressing fast enough to become global leaders in this sector.

Intellectual capital is an intangible asset that is not listed explicitly on a bank's balance sheets. Still, it positively impacts the performance of the banks, thereby revealing the relationship between employees, innovative ideas, and information and measuring what is not measured (Edvinsson, 1997). Unfortunately, traditional accounting systems fail to reflect intangible assets creating value in enterprises (Canibao et al., 2000, Lhaopadchan, 2010). Thus, the practicality of the accounting data obtained from financial reports has diminished (Lev & Zarowin, 1999). In today's world, sources of economic value and wealth include the products manufactured by a business and their intangible assets, i.e. their intellectual capital (Chen et al., 2005, Goldfinger, 1997). It is widely believed that intellectual capital can play a significant role in creating value (Powell, 2003), especially in the modern banking business.

In recent years, Bangladesh has been experiencing a blooming period in the banking industry. The growth rate has remarkably increased, the signs of which have been noticed in enhanced customer base, heightened awareness of personal finance and cooperative regulatory policy (LR Global, 2017). According to the International Monetary Fund, Bangladesh is referred to as one of the three fastest-growing economies in the world (2019). In the "World Economic Outlook, April 2019", it was stated that the economy of Bangladesh would grow 7.3% this year, ranking the second-highest in the world (International Monetary Fund, 2019). Enormous investments are being made, both in physical and human capital, in the Bangladeshi Banking Industry (United Nation, 2018). An increase in the trend of going global among the emerging economies has encouraged the banking companies to come into synchronisation with better service management.

In modern times, there is no doubt that intellectual capital impacts creating value and increasing the financial performance of firms (Al-Musailli et al., 2004). There are several methods to measure intellectual capital (i.e., Edvinsson, 1997, Kaplan and Norton, 1996, Roos et al., 1997, Steward, 1991). Most of the recent studies analysing the relationship between the intellectual capital performance and financial performance of the firms use the value-added intellectual coefficient (VAIC) model developed by Pulic, 1998, Pulic, 2004, Chen et al., 2005, Joshi et al., 2013, Mondal and Ghosh, 2012, and Yalama (2013). Firer and Williams (2003) state that VAIC is an easily applicable and effective model to measure firms' intellectual capital performance and for comparing between firms,.

We use data from 52 banks operating in Bangladesh for the year 2000-2018 to test the impact of intellectual capital on performance. Our results show that VAIC is positively associated with ROA. Further, we also show that sub-components of VAIC – human capital, capital employed, and structural capital also play an essential role in increasing financial performance. Particularly, our results show that human capital is positively and significantly associated with ROA. On the other hand, capital employed efficiency is negatively associated with ROA. We also demonstrate that impact of VAIC is more pronounced for Islamic banks than conventional banks. In an additional analysis, we also show that VAIC and human capital contribute more to

increasing the financial performance of foreign banks than domestic banks. Our results are robust to alternative estimation techniques and alternative proxy of financial performance.

Our research has three significant contributions. First, our study is the first to identify the impact of intellectual capital on the financial performance of the banking industry in Bangladesh. Second, our study is the first to recognise the difference between Islamic and conventional banks regarding intellectual capital performance. Third, we also contribute to the extant literature that identifies the impact of intellectual capital on banking performance in the context of developing and emerging economies.

The remainder of this paper continues in the following order: Section 2 begins with the background to the study, along with a discussion of the literature and relevant theories; Section 3 highlights the research methodology; Section 4 discusses summary statistics and correlation matrix. Section 5 highlights the analysis and findings, and the conclusion and research implications and limitations are presented in Section 6.

## 2. Literature review

Researchers define the concept of intellectual capital in different ways. Therefore, there is no single definition explaining the concept of intellectual capital. However, intellectual capital may be interpreted as the intangible assets that are not listed explicitly on a firm's balance sheets but positively impact its performance and success (Brooking, 1996, Mondal and Ghosh, 2012).

There are three components of intellectual capital, i.e. human capital, structural capital and capital employed/customer capital. Human capital can be defined as know-how that leaves an organisation when people leave, and it includes skills, capabilities, experience and expertise of employees. Structural capital covers an organisation's system, structure, and processes and involves non-physical components such as databases, organisation charts, management processes, and business strategies. However, customer capital refers to all intangible assets which regulate and manage the relationships of an organisation. It comprises the organisation's relationships with its customers, suppliers, shareholders and other stakeholders (Joshi et al., 2013, Mondal and Ghosh, 2012).

There are several research done in the area of intellectual capital; however, none of them come up with a single conclusion. For example, Md. Mohiuddin, Syed Najibullah and Abdullah Ibneyy Shahid (2006) measure the intellectual capital performance of 17 commercial banks in Bangladesh for a certain period. It states that measurement systems should consider the increase of incorporated value-added in products and services. Results show that the sample banks have relatively higher human capital efficiency than other capital efficiencies. It concludes that, although it is still impossible to assign monetary values to most internally generated intangible assets*, it should be considered.*

Khan and Ali (2010) examines the extent of human capital reporting in the annual reports of a sample of Bangladeshi companies using the HC reporting framework. Results imply that Bangladeshi enterprises show a gradually growing interest in disclosing HC in their annual reports. The banking sector discloses more HC items. It

concludes that HC reporting in Bangladeshi firms can be considered insufficient due to the absence of some specific regulation or guidelines.

Absar, Amran, and Nejati (2014) scrutinises the nature and extent of voluntary human capital reporting in the annual reports of 27 banks of Bangladesh. It recognises HC as a beneficial intangible asset and suggests proper reporting of HC. It argues that traditional accounting statements cannot incorporate the value of intangibles like HC. Results show that all the banks report HC in their annual reports in modern forms. It concludes that the management of HC will continue to grow in importance.

Asmawanti and Wijayanti (2017) *verify the relationship of intellectual capital with a company's corporate social responsibility by taking the banking industry in Indonesia as sample. Results show that the disclosure of intellectual capital significantly influences social responsibility. It concludes that, if human resources of a company are able to work optimally, then it will enhance the company's performance and have an effect on corporate social responsibility.* Mavridis (2004) analyses the intellectual capital of the Japanese banking sector and their impact on the sample (141) banks' value-based performance. It also considers the differences between the Japanese banks and some European banks. The recognition of intellectual capital as another important performance is challenging. Results show that there is a positive correlation between value-added and physical capital. It concludes that both physical capital and human resource capital contribute to the value of BPI in different ways.

Shih, Chang, and Lin (2010) examine the correlation between knowledge creation and IC of the banking industry and the correlation between human capital, structural capital, and customer capital. Cognitivists and Connectivists are considered the main knowledge creators in the banking industry. Results show that knowledge creation in the banking industry has positive and direct influence on human capital. The performance of human capital demonstrates a remarkable influence on structural capital and customer capital as well.

Bharathi (2010) measures the performance of banks in Pakistan on a new aspect of intellectual capital. Findings show that good performance is attributed to efficient usage and management of human resources. The current accounting practice do not support the measurement and reporting of intellectual capital. It concludes that the private sector banks did much better than all other banks in Pakistan on efficiency related to intellectual capital.

This research uses the VAIC model developed by Pulic (1998, 2004) to measures the intellectual capital performances of firms. The VAIC model is widely utilised to measure the intellectual capital performance of firms in various countries and within different sectors (Azim, and Azam, 2013; Ahmed, Khurshid, and Yousaf, 2019; Al-Musalli, and Ku Ismail, 2014, Kweh, Ting, Hanh and Zhang, 2019; Zahedee, 2017), Therefore, there is a wide range of studies investigating the impact of intellectual capital on the performance of firms by means of the VAIC model. The VAIC model reveals the intellectual capability of an organisation and whether its sources are used efficiently or not. In other words, VAIC measures the newly-created value per monetary unit invested in each source. The higher the VAIC value of an organisation is, the more is the value-added created by overall sources of that organisation (Pulic,

2004). Based on the above discussion, we develop the following hypothesis for this study:

*H1: Intellectual capital is positively associated with the financial performance of Bangladeshi banks.*

## 3. Data, variable and estimation technique

### *3.1 Data*

To empirically test our hypothesis, we refer to the FitchConnect database as a primary source of data. Based on data availability, we consider all public and private banks in our sample over the period 2000-2018. We allow banks to enter and exit during the sample period; however, we restrict a bank to have at least three years of data to be included in the sample. Finally, excluding all state-owned, specialised and non-scheduled banks, we obtain 677 observations from 52 banks for our sample period.

### *3.2 Variable definitions*

3.2.1 Dependent variable: Definition of ROA

The primary dependent variable is return on assets (ROA), measured as the ratio of net income to total assets. Prior studies have used ROA extensively as a proxy of bank performance. In our study, we have also used return on equity (ROE) as an alternative proxy of financial performance.

#### *3.2.1 Measurement of IC*

Based on prior studies, we measure IC by following the methodology developed by Pulic (2000). This model considers the value of a company to consists of CE (i.e. financial and physical capital) and IC. The VAIC model provides information on the value creation efficiency by both the physical capital and intellectual capital of a company. VAIC is measured as follows:

VAIC = HCE+ + CEE+ SCE

where VAIC is the value-added intellectual coefficient of bank *i*. HCE (human capital efficiency) shows the marginal contribution of the human capital of each unit of human capital to value-added. CEE (capital employed efficiency) indicates the marginal contribution of each unit of physical and financial capital to valued-added. SCE (structural capital efficiency) measures the contribution of structural capital to value-added. In general, this method tries to measure the contribution of physical and financial, human and structural resources to create value-added for banks. Then, intellectual capital components are calculated using the following formula:

HCE = VA/ HC

SCE= SC/ VA

CEE = VA/CE

where VA is defined as the value-added to the banks. In our study, VA is calculated as the sum of profit before taxes and employee expenditures. Human capital (HC) refers to employee expenditures such as wages, salaries and training. Structural capital (SC) is calculated as the difference between VA and HC. Capital employed

(CE) refers to both physical and financial capital, measured by the difference between total assets and intangible assets.

### *3.2.2 Control variables*

Following prior studies, we have included several control variables that have a significant influence on ROA. First, we control the *size* of the bank, measured as the natural logarithm of total assets. The loan to deposit ratio is measured as the ratio of net loan to total customer deposits. A higher loan to deposit ratio is expected to affect the bank performance negatively. We then control for *growth of gross loan* measured as the difference between the previous year loan and current loan and divided by the previous year's loan. *The equity to total assets* ratio is included to control risk aversion and is measured as the ratio of equity to total assets. We control for operational inefficiency (*Inefficiency*) by following the relative efficiency paradigm, according to which firms earn superior profits because of their efficiency compared to other less efficient firms. Operational inefficiency is measured by the ratio of noninterest expenses to total revenue. We include the non-performing loans (NPLs) ratio as a proxy for credit risk (*NPLs*), and the NPLs ratio is measured as an impaired loan divided by the net loan. All variables are defined along with their sources in Table 1.

**Table 1: Definitions of variable**

| Variable | Definition | Source |
|---|---|---|
| ROA | Return on Assets | FitchConnect |
| ROE | Return on Equity | FitchConnect |
| VAIC | HCE+CEE+SCE | Authors' Calculation based on Pulic (2004) |
| HCE | Human Capital efficiency | Authors' Calculation based on Pulic (2004) |
| CEE | Capital Employed efficiency | Authors' Calculation based on Pulic (2004) |
| SCE | Structural capital efficiency | Authors' Calculation based on Pulic (2004) |
| Size | Natural logarithm of Total Asset | Authors' calculation |
| Loan to Deposit | Total Loan/ Customer Deposit | FitchConnect |
| Growth of gross loans | Growth of loan from previous year | FitchConnect |
| Equity to Assets | Total Equity/ Total Asset | FitchConnect |
| Inefficiency | Non-interest expense/Total Revenue | FitchConnect |
| NPL ratio | Non-performing Loan/Net Loan | FitchConnect |

Notes: This table presents the definition of all variables used in the regression analysis

### 3.3 Model specification and estimation technique

To test the impact of IC on the financial performance of banks, we estimate the following model by using the ordinary least square (OLS) method:

$$ROA_{it} = \alpha_0 + \beta_1 VAIC_{it} + \beta_2 SIZE_{it} + \beta_3 Loan\ to\ Depost_{it} + \beta_4 Growth\ of\ Gross\ Loan_{it} + \beta_5 Equity\ to\ Asset\ ratio_{it} + \beta_6 Inefficiency_{it} + \beta_7 Non-performing\ Loan_{it} + \mathrm{Year}_t + \varepsilon_{it} \quad (1)$$

To test the impact of components of VAIC on financial performance, we estimate the following model

$$ROA_{it} = \alpha_0 + \beta_1 HCE_{it} + \beta_2 CEE_{it} + \beta_3 SCE_{it} + \beta_4 SIZE_{it} + \beta_5 Loan\ to\ Depost_{it} + \beta_6 Growth\ of\ Gross\ Loan_{it} + \beta_7 Equity\ to\ Asset\ ratio_{it} + \beta_8 Inefficiency_{it} + \beta_9 Non-performing\ Loan_{it} + \text{Year}_t + \varepsilon_{it} \quad (2)$$

## 4. Descriptive statistics and correlation matrix

### 4.1 Summary statistics

The summary statistics are reported in Table 2. The average (median) ROA among the sample banks is 0.96% (1.10%), with a standard deviation of 1.64%. The alternative proxy of performance – ROE shows a mean (median) value of 15.11% (14.51%). Among the variables of interest, we find VAIC has a mean (median) score of 1.69 with a range between -215.03 and 97.45. A decomposition of VAIC shows that, HCE, CEE and SCE have a mean (median) value of 0.59 (0.46), 0.11 (0.09) and 1.37 (0.54) respectively. Among the control variables, Log of total assets (Size) has a mean value of 6.82 with a standard deviation of 1.17. The average loan to deposit ratio is 106%, with a range between 37.85% and 358%. The growth of gross loans has a mean value of 33.53% among the sample banks of Bangladesh. The average (median) value of equity to asset ratio, inefficiency and NPL ratio are 7.81% (7.16), 2% (2%) and 9.29% (4.72%) respectively.

**Table 2: Summary statistics**

| | N | Mean | Standard Deviation | Median | Min | Max |
|---|---|---|---|---|---|---|
| ROA | 677 | 0.96 | 1.64 | 1.10 | -7.85 | 5.50 |
| ROE | 677 | 15.11 | 19.35 | 14.51 | -80.36 | 108.12 |
| VAIC | 677 | 1.84 | 9.49 | 4.50 | -35.03 | 55.45 |
| HCE | 677 | 0.59 | 2.39 | 0.46 | -18.99 | 18.29 |
| CEE | 677 | 0.11 | 0.99 | 0.09 | -3.01 | 23.79 |
| SCE | 677 | 1.37 | 9.59 | 0.54 | -35.24 | 55.96 |
| Size (Log of Total Assets) | 677 | 6.82 | 1.17 | 6.82 | 3.30 | 9.62 |
| Loan to Deposit Ratio (%) | 677 | 106.30 | 24.27 | 85.39 | 37.84 | 358.25 |
| Growth of Gross Loan (%) | 677 | 33.53 | 82.01 | 18.89 | -19.83 | 286.49 |
| Equity to Asset Ratio (%) | 677 | 7.81 | 10.30 | 7.16 | -47.40 | 65.79 |
| Inefficiency | 677 | 0.02 | 0.01 | 0.02 | 0.00 | 0.10 |
| Non-Performing Loan (%) | 677 | 9.29 | 13.67 | 4.72 | 0.00 | 98.17 |

Notes: This table presents descriptive statistics for variables used in the study, including mean, standard deviation (SD), minimum value (MIN) and maximum value (Max). All variables are defined in Table 1.

### 4.2 Correlation matrix

A pair-wise correlation matrix is presented in Table 3. The table shows ROA is positively significantly associated with VAIC and HCE at a 5% significant level. These results primarily support our hypothesis. On the other hand, CEE and SCE show a negative correlation with ROA. As expected, there is a highly positive and significant correlation (0.586) between VAIC and HCE. Among the control variables, ROA is positively associated with the growth of gross loans, equity to asset ratio and negatively associated with size, loan to deposit ratio, inefficiency and NPL ratio. The results also reveal several significant relationships ($p<0.05$) among the independent variables. Finally, the table shows that the highest correlation is between the NPL ratio and HCE (0.535); therefore, multicollinearity is not a problem in the estimation. Additionally, we compute and examine the variance inflation factor (VIFs) for each

independent variable. In all cases, the VIFS are far below the threshold value of 10, suggesting that multicollinearity is not an issue in the model.

**Table 3: Pairwise correlations**

| Variables | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| (1) ROA | 1.000 | | | | | | | | | |
| (2) ROE | 0.748* | 1.000 | | | | | | | | |
| (3) VAIC | 0.371* | 0.511* | 1.000 | | | | | | | |
| (4) HCE | 0.516* | 0.548* | 0.586* | 1.000 | | | | | | |
| (5) CEE | -0.014 | 0.026 | -0.100* | 0.035 | 1.000 | | | | | |
| (6) SCE1 | -0.049 | -0.006 | -0.059 | -0.053 | -0.022 | 1.000 | | | | |
| (7) Size | -0.046* | -0.170* | -0.127* | -0.141* | 0.018 | -0.013 | 1.000 | | | |
| (8) Loan to Deposit | -0.005 | -0.054 | 0.006 | 0.005 | -0.009 | -0.006 | -0.116* | 1.000 | | |
| (9) Growth of Gross Loan | 0.063 | 0.014 | 0.029 | 0.044 | -0.000 | -0.010 | -0.169* | -0.021 | 1.000 | |
| (10) Equity to Asset Ratio | 0.358* | -0.102* | 0.206* | 0.321* | -0.029 | -0.026 | -0.127* | 0.157* | 0.131* | 1.00 |
| (11) Inefficiency | -0.291* | -0.004 | -0.222* | -0.364* | -0.008 | 0.003 | -0.063 | -0.069 | -0.016 | -0.1 |
| (12) NPL ratio | -0.171* | -0.287* | -0.395* | -0.535* | -0.029 | 0.059 | -0.052 | 0.001 | -0.134* | -0.3 |
| **VIF** | | | 1.24 | 2.31 | 1.45 | 0.69 | 1.97 | 1.25 | 0.37 | 0.98 |

Notes: This table gives the pair-wise correlation matrix among all the variables used in this study. * shows significance at the 0.05 level. All variables are defined in Table 1.

## 5. Findings and discussion

### *5.1 Baseline regression results*

We employ the OLS regressions estimation technique to test whether banks with higher intellectual capital have higher financial performance. Regression results are presented in Table 4. Column (1) of Table 4 shows that VAIC is positively related to ROA at a 1% significant level. The coefficient of 0.022 indicates that an increase of one within firm-standard deviation (9.49) in VAIC is associated with a 0.29 (calculated as 0.022 x 9.49) increase in ROA, which is equivalent to 21.74% of average ROA. The result is consistent with our univariate results reported in the correlation matrix and our hypothesis. Earlier studies also reported similar findings *(Ahmed, Khurshid, and Yousaf, 2019; Kweh, Ting, Hanh and Zhang, 2019; Zahedee, 2017)*. The results indicate that intellectual capital efficiency positively affects and helps explain the financial performance of listed Bangladeshi banks. This result indicates that banks in Bangladesh should focus not only on financial assets but also on the intellectual capital of banks. Gaining intellectual capital would give them a competitive advantage over other competitors and create a long-term value for the firms, eventually increasing firm performance.

In column (2) of Table 4, we show the impact of three components of VAIC – HCE, CEE and SCE on banks' ROE. Consistent with our hypothesis, our results indicate that HCE is positively and significantly related to ROA at a 1% significant level. A plausible explanation could be that, in a competitive market, human capital is expected to create efficiency in the process, products or services. This will, in turn, lower the operating costs, thus increases the profitability of banks. However, contra to our expectation, the relationship between CEE and ROA is negative and significant at a 10% significant level. Finally, SCE does not appear to be significant with ROA in our regression model, indicating that SCE does not significantly increase ROA among the Bangladeshi banks. In addition, we also find similar results in the context of Thailand banking sectors *(Ahmed, Khurshid, and Yousaf, 2019)*.

Among the control variables, our results indicate that size is positively related to ROA at a 5% significant level in columns (2) and (4), implying that larger banks have higher profitability. Consistent with our prediction, the loan to deposit ratio is negative

and significant, with ROA at a 5% significant level. The equity to asset ratio shows a significant relationship with ROA in columns (2) and (4), indicating that banks with higher capitalisation have better financial performance. Consistent with the literature, inefficiency shows a significant negative correlation with ROA (Ahmed, Khurshid, and Yousaf, 2019; Dzenopoljac, Yaacoub, Elkanj and Bontis, 2017), Kweh, Ting, Hanh and Zhang, 2019). Finally, the NPL ratio – a proxy of a bank's default risk shows a significant negative relationship with ROA, indicating that banks with higher default risk have lower profitability. Overall, in line with the literature, our control variables show a consistent relationship with banks' performance.

**Table 4: Baseline Regression results: Impact of IC on ROA**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Dependent variable | Return on Assets (ROA) | | | |
| VAIC | 0.030*** | 0.022*** | | |
| | (5.242) | (3.172) | | |
| HCE | | | 0.440*** | 0.470*** |
| | | | (3.935) | (6.367) |
| CEE | | | -0.103*** | -0.063* |
| | | | (-3.586) | (-1.909) |
| SCE | | | -0.003 | 0.000 |
| | | | (-0.662) | (0.036) |
| Size | | 0.028** | | 0.090*** |
| | | (2.855) | | (3.020) |
| Loan to Deposit ratio | | -0.001** | | -0.003** |
| | | (-2.340) | | (-2.557) |
| Growth of Gross Loan | | -0.000 | | -0.000 |
| | | (-1.024) | | (-0.204) |
| Equity to Asset Ratio | | 0.041*** | | 0.032*** |
| | | (10.540) | | (8.992) |
| Inefficiency | | -16.747*** | | 2.361 |
| | | (-4.053) | | (0.616) |
| Non-performing Loan | | -0.034*** | | -0.019*** |
| | | (-10.934) | | (-6.444) |
| Constant | 0.893*** | 1.165*** | 0.680*** | -0.021 |
| | (20.373) | (4.290) | (16.590) | (-0.082) |
| Observations | 762 | 677 | 762 | 677 |
| R-squared | 0.456 | 0.664 | 0.563 | 0.736 |
| Year Fixed Effects | Yes | Yes | Yes | Yes |

Notes: This table report results from regressions analysing the effects of IC on ROA using ordinary least square analysis. The dependent variable is ROA. All variables are defined in Appendix Table 1. All columns include year fixed effects. Standard errors are clustered at bank level. *T-statistics* are in parentheses. Superscripts ***, **, * indicate statistical significance at 1%, 5%, and 10% level respectively.

### *5.2 Islamic vs conventional banks*

Prior literature examines the relationship between intellectual capital and bank performance in the context of Islamic and conventional banks (Khalique et al., 2013). In this study, we further explore the impact of intellectual capital on bank performance by comparing conventional and Islamic banks in Bangladesh. to do so,

we split our sample between Islamic and conventional banks. Currently, there are seven listed Islamic banks in our sample, and the remaining banks are conventional banks. We rerun our baseline regression model separately for both Islamic and conventional banks. Results are reported in Table 5

Column (1) and (3) presents the relationship between VAIC and ROA along with other control variables for Islamic and conventional banks respectively. Our results show VAIC is positively correlated with ROA at 1% significant levels for both banking systems. We also identify that the coefficient of VAIC is much higher for Islamic banks than conventional banks, indicating that the impact of intellectual capital is more for Islamic banks than conventional banks. Since products of Islamic banks are more sophisticated than conventional banks due to *Shariah* guidance, a higher intellectual capital in Islamic banks contributes more to the financial performance of Islamic banks.

Columns (2) and (4) show the relationship among the three components of VAIC and ROA. Similar to VAIC, HCE is positively significantly correlated with ROA; however, the coefficient of HCE is much higher for Islamic banks (0.557) than conventional banks (0.457). Our regression results also reveal that CEE is negatively significantly correlated with conventional banks only. CEE does not appear to be significant for the performance of Islamic banks.

**Table 5 Impact of IC on ROA: Islamic VS Conventional banks**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Islamic Banks | | Conventional Banks | |
| Dependent Variable | Return on Assets (ROA) | | | |
| VAIC | 0.039*** | | 0.023*** | |
| | (6.105) | | (20.478) | |
| HCE | | 0.557*** | | 0.457*** |
| | | (12.695) | | (22.171) |
| CEE | | -0.272 | | -0.061* |
| | | (-0.691) | | (-1.817) |
| SCE | | 0.001 | | -0.002 |
| | | (0.314) | | (-0.487) |
| Size | 0.359*** | 0.022** | 0.017 | 0.061* |
| | (3.320) | (2.310) | (0.486) | (1.769) |
| Loan to deposit | -0.005 | -0.000 | -0.000** | -0.000 |
| | (-0.740) | (-0.072) | (-2.182) | (-1.394) |
| Growth of Gross Loan | -0.002 | 0.001 | -0.000 | -0.000 |
| | (-0.316) | (0.378) | (-0.854) | (-0.164) |
| Equity to Asset Ratio | 0.106*** | 0.110*** | 0.029*** | 0.024*** |
| | (4.301) | (6.767) | (6.082) | (5.082) |
| Inefficiency | -2.869*** | -7.191*** | -1.019*** | -0.511 |
| | (-4.384) | (-4.384) | (-4.707) | (-0.110) |
| Non-performing Loan | -0.051*** | 0.006 | -0.027*** | -0.017*** |
| | (-3.618) | (0.624) | (-7.477) | (-4.617) |
| Constant | 1.753* | -1.150* | 1.446*** | 0.333 |
| | (1.834) | (-1.785) | (5.055) | (1.148) |
| Observations | 105 | 105 | 572 | 572 |
| R-squared | 0.830 | 0.931 | 0.650 | 0.676 |
| Year Fixed Effects | Yes | Yes | Yes | Yes |

Notes: This table report results from regressions analysing the effects of IC on ROA using ordinary least square analysis by splitting the sample between Islamic and conventional banks. Columns (1) and (2) are for Islamic banks, and columns (3) and (4) are for conventional banks. The dependent variable is ROA. All variables are defined in Appendix Table 1. All columns include year fixed effects. Standard errors are clustered at the bank level. *T-statistics* are in parentheses. Superscripts ***, **, * indicate statistical significance at 1%, 5%, and 10% level respectively.

### 5.3 Foreign vs domestic banks

To further deepen the understandings of the relationship between intellectual capital and financial performance, we split our sample between foreign and domestic banks. Banks that have more than 50% foreign ownership are considered foreign banks. Currently, nine foreign banks are operating their business in Bangladesh. We rerun the baseline regression model on the sample of foreign banks and domestic banks separately. Results are reported in Table 6.

Columns (1) and (3) of Table 6 show the relationship between VAIC and ROA, while columns (2) and (4) show the relationship among the three components of VAIC with ROA. Similar to our baseline regression results, Columns (1) and (3) show that VAIC is positively correlated with ROA for both foreign and domestic banks, respectively. However, the size of the coefficient of VAIC is more than twice for foreign banks than domestic banks. This implies that intellectual capital plays a significant role in making better performance for foreign banks than domestic banks. In general, foreign banks invest more towards developing intellectual capital, creating more efficiency in their products and services. Moreover, foreign banks bring know-how from their home country, contributing to developing intellectual capital, thus improving their financial performance.

Columns (2) and (4) show the relationship between the three components of VAIC - HCE, CEE and SCE; and ROA for foreign banks and domestic banks, respectively. HCE appears to be significant for both types of banks at a 1% significant level, and the coefficient of HCE is significantly higher for foreign banks than domestic banks. It implies that human capital is contributing to the financial performance of foreign banks more than domestic banks. In addition, CEE is positively (negatively) associated with ROA for foreign (domestic) banks, indicating that foreign banks have better capital efficiency and increasing foreign banks' performance. Finally, SCE does not appear to be significant in either type of bank.

**Table 6: Impact of IC on ROA: Foreign VS Domestic Bank**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Foreign Banks | | Domestic Banks | |
| Dependent Variable | Return on Assets (ROA) | | | |
| VAIC | 0.050*** | | 0.021*** | |
| | (5.270) | | (18.156) | |
| Size | -0.929*** | 1.181*** | 0.022 | 0.106*** |
| | (-3.106) | (6.682) | (0.642) | (4.373) |
| Loan to deposit | 0.012** | 0.001 | -0.000** | -0.000 |
| | (2.106) | (0.159) | (-2.580) | (-0.464) |
| Growth of Gross Loan | -0.011 | 0.011 | -0.000 | 0.000 |
| | (-0.709) | (0.851) | (-1.034) | (0.088) |
| Equity to Asset Ratio | -0.060** | 0.152*** | 0.044*** | 0.023*** |
| | (-2.117) | (3.308) | (10.022) | (7.360) |
| Inefficiency | -67.581 | -43.493 | -17.269*** | 19.633*** |
| | (-1.166) | (-1.081) | (-4.118) | (6.000) |
| Non-performing Loan | -0.039*** | -0.015 | -0.033*** | -0.015*** |
| | (-3.477) | (-1.691) | (-8.767) | (-5.436) |
| HCE | | 0.014 | | 0.661*** |
| | | (0.315) | | (35.246) |
| CEE | | 8.134*** | | -0.062** |
| | | (5.454) | | (-2.391) |
| SCE | | -0.355 | | 0.002 |
| | | (-1.683) | | (0.780) |
| Constant | 8.749*** | -8.921*** | 1.192*** | -0.633*** |
| | (3.324) | (-4.177) | (4.347) | (-3.014) |
| Observations | 33 | 33 | 644 | 644 |
| R-squared | 0.883 | 0.944 | 0.653 | 0.823 |
| Year Fixed Effects | Yes | Yes | Yes | Yes |

Notes: This table report results from regressions analysing the effects of IC on ROA using ordinary least square analysis by splitting the sample between foreign and domestic banks. Columns (1) and (2) are for foreign banks, and columns (3) and (4) are for domestic banks. The dependent variable is ROA. All variables are defined in Appendix Table 1. All columns include year fixed effects. Standard errors are clustered at the bank level. *T-statistics* are in parentheses. Superscripts ***, **, * indicate statistical significance at 1%, 5%, and 10% level respectively.

## 5.4 Robustness test

### *5.4.1 Alternative estimation technique*

Our baseline regression result is estimated by using the OLS estimation technique. OLS estimation technique might be biased due to the reverse causality of our dependent variable. We employ alternative panel estimation techniques such as random effect and fixed-effect models to run our baseline model to overcome this problem. Results are presented in Table 7.

Columns (1) and (2) present results obtained from the random effect model, and Columns (3) and (4) present results obtained from the fixed-effect model. Table 7 shows that VAIC is positively associated with ROA in both estimation models. HCE is positively significantly related to ROA, while CEE is negatively significantly related to ROA. Our results are qualitatively similar to the results presented in Table 4. Other control variables also have consistent results as our baseline regression results.

**Table 7: Impact of IC on ROA: alternative estimation technique**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Random Effect | | Fixed Effect | |
| Dependent Variable | Return on Assets (ROA) | | | |
| VAIC | 0.027*** | | 0.028*** | |
| | (21.410) | | (21.240) | |
| HCE | | 0.526*** | | 0.592*** |
| | | (30.177) | | (32.164) |
| CEE | | -0.053* | | -0.051* |
| | | (-1.929) | | (-1.937) |
| SCE1 | | 0.000 | | 0.001 |
| | | (0.013) | | (0.235) |
| Size | -0.141*** | 0.054* | -0.203*** | 0.018 |
| | (-3.995) | (1.779) | (-5.040) | (0.565) |
| Loan to deposit | -0.000* | -0.000 | 0.000 | 0.000 |
| | (-1.755) | (-0.717) | (0.319) | (0.745) |
| Growth of Gross Loan | -0.000 | -0.000 | -0.000 | -0.000 |
| | (-0.911) | (-0.083) | (-1.167) | (-0.545) |
| Equity to Asset Ratio | 0.035*** | 0.027*** | 0.054*** | 0.035*** |
| | (5.918) | (5.386) | (5.298) | (4.333) |
| Inefficiency | -15.364*** | -3.724 | -8.747 | 4.931 |
| | (-3.179) | (-0.900) | (-1.595) | (1.104) |
| Non-performing Loan | -0.027*** | -0.019*** | -0.019*** | -0.020*** |
| | (-6.656) | (-5.399) | (-3.943) | (-5.210) |
| Constant | 2.189*** | 0.280 | 2.265*** | 0.274 |
| | (7.519) | (1.079) | (8.056) | (1.146) |
| Observations | 677 | 677 | 677 | 677 |
| R-squared | 0.57 | 0.65 | 0.571 | 0.724 |

Notes: This table report results from regressions analysing the effects of IC on ROA using random effect and fixed-effect model. Columns (1) and (2) are for the random effect model, and columns (3) and (4) are for the fixed-effect model. The dependent variable is ROA. All variables are defined in Appendix Table 1. Standard errors are clustered at the bank level. *T-statistics* are in parentheses. Superscripts ***, **, * indicate statistical significance at 1%, 5%, and 10% level respectively.

### *5.4.2 Alternative proxy of performance*

To test the robustness of our baseline results, we use the alternative proxy of performance – return on equity (ROE). Return on equity is measured as the ratio of net profit to total equity. Results obtained from an alternative proxy of performance is presented in Table 8. Our results show that VAIC is positively associated with ROE at a 1% significant level. Similar to our baseline results, HCE (CEE) is positively (negatively) associated with ROE. We also observe that SCE does not appear to be significant with ROE. Based on our alternative estimation techniques and alternative performance proxy, we argue that our baseline results are robust.

**Table 8 Alternative proxy of performance: ROE**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Dependent Variable | Return on Equity (ROE) | | | |
| VAIC | 0.312*** | | 0.297*** | |
| | (16.043) | | (13.579) | |
| HCE | | 3.893*** | | 5.663*** |
| | | (15.802) | | (15.658) |
| CEE | | -1.512*** | | -0.408 |
| | | (-3.347) | | (-0.660) |
| SCE | | 0.031 | | 0.035 |
| | | (0.461) | | (0.564) |
| Size | | | -3.147*** | -2.187*** |
| | | | (-5.417) | (-3.854) |
| Loan to deposit | | | -0.002 | -0.000 |
| | | | (-0.836) | (-0.059) |
| Growth of Gross Loan | | | -0.001 | 0.002 |
| | | | (-0.176) | (0.374) |
| Equity to Asset Ratio | | | -0.565*** | -0.650*** |
| | | | (-6.300) | (-7.425) |
| Inefficiency | | | 91.284 | 425.434*** |
| | | | (1.066) | (4.899) |
| Non-performing Loan | | | -0.075 | 0.053 |
| | | | (-1.166) | (0.809) |
| Constant | 13.622*** | 11.684*** | 39.353*** | 21.341*** |
| | (21.561) | (17.455) | (8.420) | (4.478) |
| Observations | 723 | 723 | 642 | 642 |
| R-squared | 0.263 | 0.265 | 0.327 | 0.374 |
| Year Fixed Effects | Yes | Yes | Yes | Yes |

Notes: This table report results from regressions analysing the effects of IC on ROE using ordinary least square analysis. The dependent variable is ROE. All variables are defined in Appendix Table 1. All columns include year fixed effects. Standard errors are clustered at the bank level. *T-statistics* are in parentheses. Superscripts ***, **, * indicate statistical significance at 1%, 5%, and 10% level respectively.

## 6. Conclusions, research implications and limitations

This study acknowledges and contributes to a continual dialogue among management and accounting scholars surrounding the role of intellectual capital. Since there is a lack of managerial practice and eagerness for disclosing and translating intellectual capital (as evident in the studies of Giacosa *et al.*, 2017; Abhayawansa and Azim, 2014), the stakeholders might find it challenging to associate intellectual capital efficiency with innovation and corporate performance (Campanella et al., 2014). Giacosa *et al.* (2017) produced an effectively integrated framework by merging intellectual capital disclosure using performance measures such as value-added models. This claim agrees with Abhayawansa and Azim (2014), who found the Bangladesh Banking industry void of the intellectual capital reporting framework. In this paper, we expect to have a constructive and consonant framework for intellectual capital disclosure and thus, help stakeholders, including global investors, enable more decision facilitation or usefulness.

This research has a couple of theoretical and practical inferences for both academicians and specialists. Information related to the efficient use of intellectual capital for value creation can benefit experts or Professionals such as accountants,

corporate managers, regulators, policymakers and investors in making revolutionary decisions. The model mainly implies that it can realise the relationship of intellectual capital with novel and higher corporate performance and development of a strategic tool for the execution of activities of managers (Campanella et al., 2014; Murray et al., 2014). The application of this model can be significant in intellectual capital disclosure externally by means of reporting and setting them in long-term strategy formulation, performance measurement and management control systems (Novas *et al.*, 2017). The combined model of intellectual capital disclosure and performance management displays probabilities of both periodic and continuous reporting (Giacosa *et al.*, 2017; Abeysekera, 2013). This study may act as an epiphany for the stakeholders of the banking industry and government policymakers in emerging economies, as it is one of the pioneer studies concentrating on the impact of intellectual capital on the organisational performance of the banking industry of booming economies. They can plan ahead of time and compete in the global industry after losing their emerging economy status.

The fact that essential inferences of intangible intellectual capital are key determiners of corporate performance must be realised by regulators. Abhayawansa and Azim (2014) pointed out a remarkable and digressive structure of intellectual capital disclosure leading to less functional intellectual capital information for stakeholders, as noticed in the impact analysis of intellectual capital for corporate performance management. Merging financial and managerial accounting could provide the relevant framework for improving the effectiveness of decisions and intellectual capital disclosure and reducing information imbalance. However, the acceptability of traditional financial reporting is becoming incapable of communicating varied information about intellectual capital.

Similar to other existing studies, this paper has its restraint too. Two main limitations were identified in this study. First, the data that was collected belonged to a single sector. The results are limited to the sample industry, geographical location, and period under study due to the low availability of data from company websites and the restricted number of publicly listed companies. This may not be deemed a general scenario. Second, the VAIC model is based on theoretical underpinnings that received criticism for being inconsistent (Ståhle *et al.*, 2011) with the presumption of a reverse relationship between human capital and structural capital (Dutta, 2011).

Further research could help improve the intellectual capital framework by collaborating intellectual capital disclosure with the research and development partnerships, performance measurement, risk management, management control systems and strategy development. Prolonged research could identify different types of industries or sectors like manufacturing organisations or organisations in the tertiary sector such as banks and non-profit cross-industry and cross-country analysis. Suppose alternative methodologies are used in further research, like surveys or in-depth case studies. In that case, it will draw added attention to the interaction of organisational and circumstantially relevant variables that may influence the relationship between intellectual capital efficiency, financial performance and non-financial performance.

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