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Abstract

The study aims to examine the effect of intellectual capital on the profitability of banks listed on the Ghana Stock Exchange. Secondary data of all the listed nine banks on the Ghana Stock Exchange for the period 2011 to 2015 were utilized for the analysis. The value-added intellectual capital (VAIC) and the panel data regression techniques were employed for the data analysis. The empirical findings obtained provide evidence of a positive and significant relationship between intellectual capital and firm performance measured using return on assets (ROA). Further analysis performed by decomposing intellectual capital into its parts reveals a significant and positive relationship between structural capital efficiency (SCE) and firm performance while a negative and significant relationship between capital employed efficiency (CEE) and firm performance was recorded. The findings further show that human capital efficiency (HCE) has a positive and significant impact on firm performance. The findings underscore the urgent need for banks in Ghana and cognate regions across Sub-Saharan Africa to invest more in improving their intellectual capital for increased profitability and competitiveness.

Keywords: Intellectual capital, banking sector, Ghana stock exchange, return on assets, bank performance

Introduction

Worldwide, societies have gone through a myriad of transformations, evolving from the prehistoric agrarian societies to the present industrial and technologically-driven era (Ozkan et al., 2016). Emphasis on increasing productivity across all facets of the socioeconomic functional systems by leveraging on the fundamental factors of production (land, labour, capital and entrepreneurship) aimed at increasing productivity became paramount. While acknowledging the significance of the major factors of production in stimulating economic growth and development, the contribution of intellectual capital as a catalyst to improve firms' performance and leverage profitability emerged strongly in the scientific literature in recent years (Delgado-Verde et al., 2011; Abdulai 2012; Ozkan et al., 2016).

Intellectual capital constitutes the intangible assets that are not explicitly recorded on a firm's balance sheets but have a strong positive association with its performance (Ozkan et al., 2016). Indeed, the success of knowledge enterprises has inspired experts and scholars to propose novel approaches to assessing a company's worth and to understand the characteristics of the value creation process (Pedrini, 2007; Ozkan et al., 2016). Consequently, research on how businesses create value and use their

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knowledge capacities has gained popularity in the field of business management (Delgado-Verde et al., 2011).

The resource-based theory states that companies can acquire, hold, and deploy strategic assets to achieve superior performance and a competitive advantage (Wernerfelt, 1984). These assets comprise of both intangible (intellectual capital) and tangible (physical) assets that the company has internalized and employed profitably and successfully to carry out certain lucrative and competitive strategies (Nawaz, T., & Haniffa, R. (2017). Therefore, it would not be a misplaced priority to invest in intellectual capital as a valuable resource in a services-oriented market like the banking sector, which drives industry players' performance capacity.

The value added intellectual capital (VAIC) and its components: capital employed efficiency (CEE), human capital efficiency (HCE) and structural capital efficiency (SCE) are employed as constituents of intellectual capital efficiency indicators in studies that examined the relationship between the efficacy of intellectual capital and the performance of financial institutions. Studies that examined the relationship between the elements of IC and financial performance used return on assets (ROA) as a financial measure. These indicators are said to positively correlate with banks profitability.

Also, studies on intellectual capital have given life to the effect of intellectual capital and its components on corporate performance Nawaz, T., & Haniffa, R. (2017). The VAIC was created by Pulic (1998) from a stakeholder viewpoint as a gauge of how well a company uses its financial, human, and intellectual resources to increase stakeholders' value (Clarke et al., 2011). Edvisson (2013) recognizes that in light of both the past and the future vision of intellectual capital, intellectual capital remains, for many, an imperceptible fuzzy dimension or primarily an accounting issue in relation to what others have also believed to be a developing strategic ecosystem for sustainable value creation. In accordance with earlier research, the VAIC model integrated the three elements of intellectual capital together with additional nominal values. In this study, the components of the VAIC used are human capital efficiency (HCE), capital employed efficiency (CEE) and structural capital efficiency (CSE).

Despite the fact that intellectual capital is a major determinant of firms' performance, the empirical literature appears to focus primarily on intellectual capital when considering disclosure indices (see Guthrie et al., 2009; Branco et al., 2011; Haji and Mubarq 2012; Asare et al., 2013; Alhassan and Asare, 2016). Furthermore, studies on the banking industry have used the VAIC to examine how well banks

function in relation to intellectual capital (Mavridis 2004; Goh 2005' Cabrita and Vaz 2006; Yalama and Coskun 2007; Abdul-Salam et al. 2011; Mondal and Ghosh 2012). However, none of these studies have explored the effect of intellectual capital on the performance of banks in Ghana. Mavridis (2004), for example, examined the intellectual capital performance of five Japanese banking groups using quarterly data from 2000 to 2001. Goh (2005) analysed the data of the Malaysian banking sector and points to a dominant effect of HCE on intellectual capital and supporting the importance of staff knowledge resources in banks' value-creation strategies. A study by Nawaz, T., & Haniffa, R. (2017) divided Kuwait banks into commercial and non-commercial firms for a ten years period from 1996 to 2006 and found that the non-commercial banks were out performed by almost all the commercial banks in terms of the three VAIC indicators.

The dominant literature suggest that IC plays a significant role for the creation of corporate value addition (Maji and Goswami, 2016; Al-Musalli and Ismail, 2011). Moreover, it remains problematic establishing a relationship between IC and bank performance (Clarke et al., 2011). Both past and recent scholars posit that the problem of establishing a relationship between IC and bank performance emanates from the death of universally acknowledged and accepted technique for measuring IC. Therefore, the myriad of quantitative techniques employed in measuring the relationship between IC and bank performance is saddled with a plethora of challenges (Rouf and Hossan, 2020; Zambon, 2004). As result, very few studies are able to bring to the fore that IC has effects on banks performance. The overall objective of this study is to assess the effect of intellectual capital on the performance of listed banks on the GSE. Specifically, the study aims to:

(a) Assess VAIC contribution to the profitability of the listed banks in Ghana; and

(b) Examine the various components of IC contribution to firms' profitability.

The paper investigates the relevance of intellectual capital on the performance of the banking sector in Ghana, specifically listed banks on the Ghana Stock Exchange (GSE). The study, therefore, analysed the data of all the nine banks listed on the Ghana Stock Exchange using the value-added intellectual capital (VAIC) model and the panel data regression models from 2011-2015.

Literature Review and Conceptual Framework

Banks Profitability

The banking industry is considered the lifeblood of modern trade and commerce because banks are the major source of funding. Profitability is necessary for a bank to maintain on-going activity and for its

shareholders to obtain fair returns. To identify and measure the profitability indicators of bank is a matter of concern to stakeholders, since profits are the ultimate goal of banks (Kamath, 2008). The profit a bank makes is also a matter of key interest for managers and investors when making strategic decisions. Consequently all strategies designed and the activities implemented by management of banks are aimed at realising bank profitability. Firm profits are relevant in several ways, some of the ways include; firstly, dividends and taxes are paid from profits (cash profits) and secondly, profit is an important source of retained earnings. Retained earnings are residual profits after dividends are paid to shareholders. These earnings are vital components of banks' capital for expansion and growth purposes (Nawaz & Haniffa, 2017).

The efficiency of a bank measures how best a bank performs over other banks in the industry in the process of converting same and similar inputs into outputs. Banks are different from other business entities and they function as an intermediary between depositors and borrowers. Therefore, the efficiency of banks had to be measured considering the financial intermediation process. Imperatively, the overall long-term financial performance of banks results in their financial stability.

Intellectual Capital

Until now, there has not been a uniform or generally accepted definition or classification of intellectual capital (Zeghal & Maaloul, 2010; Chan, 2009; Nadeem et al., 2018; Rouf & Haniffa, 2020). This may be due to the fact that the field is still in its infancy since attempts to define and classify IC only began in the 1990s (Zeghal & Maaloul, 2010). Andriessen (2004) argues that the problem with intangible resources is that they are intangible; therefore, a key problem is how to identify something that is hidden or non-material. As a result, a generally accepted definition of IC remained elusive (Ho & Williams, 2003). However, the definition of IC is not significantly different among researchers (Ozkan et al., 2016) since most of the definitions basically contain the same words: knowledge, employees' experience and skills, employees satisfaction and loyalty, customer satisfaction and loyalty, firm reputation, organizational routines, procedures systems, cultures, information technology and value creation (see for example, Edvinsson, 1997; Brooking, 1996; Edvinsson & Maalol, 2010; Yalama & Coskun, 2007; Kamath, 2008).

Intellectual capital is classified as human capital and structural capital (Kamath, 2008; Ling & Lean, 2009). There are other classifications of intellectual capital, but the most widely used is human capital and structural capital (Zeghal & Maaloul, 2010), which this study adopted.

Value Added Intellectual Capital (VAIC) and Banks' Profitability

Value added intellectual capital model is used to measure the efficiency of intellectual capital Pulic (2000). The model converts two components of intellectual capital (human capital and structural capital) into financial figures known as the value added intellectual capital co-efficient (VAIC). The model is widely used to measure the two variables identified by Pulic (1998) as a measure of firms' profitability. This model is likewise perused as credible to measure listed banks' profitability on the Ghana Stock Exchange. Accordingly, there has been a wide range of studies that used this model and its variables to investigate the impact of intellectual capital on the performance of firms across the globe (Al-Musalli & Ismail, 2011). While some of the studies (Chen et al., 2005; Kamath, 2008; Pal & Soriya, 2012) indicated that intellectual capital has a positive association with firms' performance, others (Chan, 2009a, 2009b; Ghosh & Mondal, 2009) could not produce evidence showing this positive relationship. Available literature indicates that, the majority of studies conducted using this model is focused on the banking industry (Ismail & Al-musalli, 2011). Pulic and Bornemnn (2004) offered valuable information on the efficiency of intellectual capital held by 24 major banks operating in Austria between 1993 and 1995. They opined that increasing efficiency of intellectual capital is the cheapest and the safest way to ensure sustainable functioning of banks.

Capital employed and banks profitability

For the purpose of this work, capital employed refers to the physical capital and financial capital of a firm (Pulic, 1998). It is the value of all physical and financial assets employed by the firm and is calculated by dividing the total value created by the firm over capital employed: $CEE_i = \frac{VA_i}{CE_i}$

Here, VA_i is the total value created by the firm and CE_i is the capital employed by the firm.

A study by Chu et al. (2011) indicates how important capital employed is among the VAIC variables. The findings of the aforementioned study show that intellectual capital, as a measure by VAIC, has a positive correlation with the performance of listed Chinese firms. The study employed four performance indicators such as market valuation, returns on assets, return on equity and asset turnover. In their study, capital employed (CE) as explained in the above is identified as the most important predictor of all the four performance indicators.

Human capital and banks' profitability

Following the work of Abdulai (2012) and Ozkan et al. (2016) and the emergence of the "endogenous growth theory", human capital has been perused as the most essential asset responsible for performance differences among financial institutions and countries. Human capital refers to the knowledge, skills, and health people invest in any activity in order to realize their abilities as productive member/s of society Pulic (2000). It has been described as the "engine of growth" (Ehrlich, 1990, as cited by Abdulai, 2012) and as the ultimate determinant of a country's economic and social development (Gosh, 2005). The importance of its critical role spans many industries including the banking sector as empirical studies show it is the most important corporate asset (Ozkan et al., 2006).

Structural capital and banks' profitability

Structural capital can be explained as the intellectual value the organization accumulates as a result of products or systems the firm has created over a given period of time. It includes the internal processes, patents and policies, infrastructure (such as information technology and systems), and organizational culture and strategies that support its core competence (Edvinsson, 1997 as cited by Abdulai, 2012). It is the supportive infrastructure that aids human capital to function; hence, it includes the content part of the firm knowledge resource; the intellectual investment made in the physical, technical and organizational culture; and the infrastructure that collaborates its activities (Abdulai, 2012). The impact of structural capital on banks' profitability has been properly documented (Pulic, 1998; Al-Musalli & Ismail, 2011; Abdulai, 2012; Ozkan et al., 2016).

Conceptual Framework

The conceptual framework (Figure 1) follows the work of Al-Musalli and Ismail (2011) and Ozkan et al. (2016). From Figure 1, it could be observed that the components of the VAIC variables (CEE, HCE & SCE) are related to firms' performance measure, ROA. This is done to observe the effect of VAIC and firm profitability. Then, VAIC was decomposed to observe the relationship between the individual variables to firm performance measure, ROA. This is, moreover, done to observe the effect of each of the variables on firm profitability. Some variables are controlled (natural log of total assets and bank leverage) for in line with past empirical studies (Alipour, 2012; Mondal & Ghosh, 2012; Yalama, 2013; Ozkan et al., 2016).
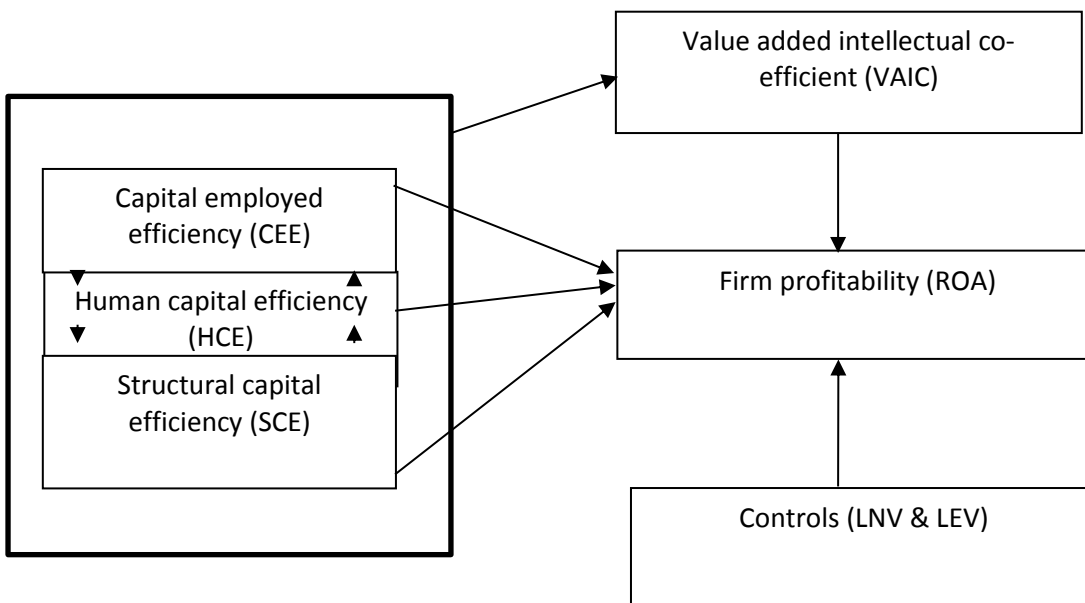
Figure1: Conceptual Framework

Overview of the Banking Industry in Ghana

Banks form a key and sensitive part of every economy and therefore serve as catalysts for economic growth. Thus, the banking sector is the lifeblood of every economy since it mobilizes the needed resources for the players in a nation's economy. These resources mobilized by the banking industry are utilized by the various sectors of the economy for expansion and growth. Until the passage of the Universal Banking Law in Ghana, banking was conducted along a restricted scope as commercial, developmental and merchant banking (Hinson, 2004, cited in Alhassan and Asare, 2016). The expansion of the banking industry has brought about heightened competition resulting in new product development in diverse areas including international funds transfer, consumer/hire purchase loans, travellers' cheque negotiable certificate of deposit, school fees loans and car loans (Hinson et al., 2006).

The two major developments in the industry over the past decades are the Payment System Act 2003 (Act 662) and the Credit Reporting Act 2007 (Act 726), resulting in the e-zwich payment and credit reference of bureaus, respectively. Currently in Ghana, there are 27 deposit money banks, which are operating as universal banks made up of 15 foreign-owned banks and 12 domestic-owned banks (Alhassan & Asare, 2016). The industry has been highly dependent on revenue from traditional banking activities in lending over the past decade. Available studies show that about two-thirds of a bank's revenue is generated from interest income from loans and advances as compared to non-traditional activities in fees and commissions (Alhassan & Asare, 2016; Onumah & Duho, 2018; Nadeem et al., 2018; Hermewan et al., 2020).

Methodology

Research Approach and Design

This study draws on the quantitative research approach to analyse the effect of intellectual capital on banks' performance in Ghana. The quantitative research approach gives room for the researcher to describe and analyse the phenomena while at the same time identifying the major issues based on the prevailing information (Abdulai 2012). Therefore, the research employs the descriptive research design which encourages further analysis and discussion of the research problem when the data needed to accomplish the study objective ought to be collected. As a result, the study collected secondary data (quantitative) – the annual accounting data of banks listed on the Ghana Stock Exchange (GSE).

Data Collection and Sources

The study relies solely on secondary data obtained from the annual reports of all the financial institutions listed on the Ghana Stock Exchange from 2011 to 2015. The annual reports are obtained from audited reports of the listed banks as well as from the fact book of the Ghana Stock Exchange. The data extracted covers the items of the financial statements, such as gross profits, employees' emoluments, capital employed, depreciation, and amortization, which are required for measuring all the variables.

Dependent variable

The study used the panel data regression model for the analysis of the data collected. A panel data is a multi-dimensional data of an observation that is measured repeatedly over time Ozkan et al, (2016). In this study, return on assets (ROA), one of the traditional performance measures, is used to represent the financial performance of banks. ROA is the key measure of bank profitability and has been utilized in similar studies (Joshi et al., 2013; Yalama, 2013). ROA is calculated by dividing the net profit (loss) for the current year by total asset.

Independent variables

Components of the VAIC model are used as independent variables in this study. VAIC is calculated as follows (Ghosh & Mondal, 2009; Pulic, 1998, 2004; Yalama, 2013):

$$VAIC_i = CEE_i + HCE_i + SCE_i \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.(1)$$

Here, i stands for the cross sectional units of banks.

In this equation, CEE refers to the capital employed efficiency of the bank; HCE refers to the human capital efficiency of the bank and SCE refers to the structural capital efficiency co-efficiency of the bank. In order to calculate the variables, the total value added (VA) created by banks needs to be calculated.

The total VA is calculated as follows (Al-Musalli &Ismail, 2011; Alipour, 2012; Chu et al., 2011; Pulic, 2004).

$$VA = OP + EC + A \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

In equation (2), VA refers to the total value added created by the bank; OP refers to the operating profit of the bank, EC refers to the employment cost of the bank, and A refers to the amortization and depreciation of the bank

Following the calculation of VA, the components of VAIC (CEE, HCE and SCE) are calculated. Therefore CEE as the first component of VAIC is calculated as follows:

$$CEE = VA \div CE \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3)$$

In equation (3), CE refers to capital employed (Book value of asset) of the bank. This shows the contribution of capital employed (physical capital and financial capital) in value creation. The next step is to calculate the value added efficiency of human capital (HCE) by dividing the total value added over human capital.

$$HCE = VA \div HC \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (4)$$

According to Pulic (2000), employees' costs are perused as an indicator of human capital (HC). As indicated earlier, these expenses are no longer considered as inputs. This implies that all costs related to employees are treated as investments and not as cost. Hence, the relationship between VA and HC indicates the capability of HC to create value in an organization. The last step in determining values of the independent variables is to calculate the value added efficiency of structural capital contribution to value creation; hence, structural capital is found by dividing the total value added as shown below.

$$SCE = SC \div VA \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (5)$$

Pulic (2004) stated that structural capital is obtained when HC is deducted from VA (i.e. SC = VA-HC).

Control variables

As in other studies (e.g. Alipour, 2012; Mondal and Ghosh, 2012; Yalama, 2013), bank size (LNTV-Natural Log of total assets) and leverage (LEV- Ratio of long term debt to total assets) are included in the Panel data regression model as control variables.

Panel Data Regression Model

The models to be tested in the study as demonstrated in Table 1. Model-1 in Table 1 test the relationship between the financial performance measure (ROA_t) of banks and VAIC; and models 2, 3 and 4 examine the relationship between ROA and the components of VAIC (CEE, HCE and SCE). The control variables

are included in all the models. The panel data regression models, as illustrated in Table 1, were used for the analysis.

Table 1: Panel Data Regression Models

Model	Regression equations
1	$ROA_{it} = ß_0 + ß_1 VAIC_{it} + ß_2 LNTV_{it} + ß_3 LEV_{it} + \varepsilon_{it}$
2	$\mathbf{ROA_{it}} = \delta_0 + \delta_1 CEE_{it} + \delta_2 LNTV_{it} + \delta_3 LEV_{it} + \Phi_{it}$
3	$\mathbf{ROA_{it}} = \acute{\alpha}_0 + \acute{\alpha}_1 HCE_{it} + \acute{\alpha}_2 LNTV_{it} + \acute{\alpha}_3 LEV_{it} + \pi_{it}$
4	$ROA_{it} = \alpha_0 + \alpha_1 SCE_{it} + \alpha_4 LNTV_{it} + \alpha_5 LEV_{it} + \eta_{it}$

The model was deemed appropriate in obtaining responses to the research questions where:

ROA_t stands for the dependent variable

$ß_0, \delta_0, \acute{\alpha}_0$ and α_0 interpret the intercept of model1, 2, 3 and 4 respectively

$ß_1, ß_2, ß_3$, stand for the co-efficient of the independent variables of model-1

$\delta_1, \delta_2, \delta_3$ stand for the co-efficient of the independent variables of model-2

$\acute{\alpha}_1, \acute{\alpha}_2, \acute{\alpha}_3$ stand for the co-efficient of the independent variables of model-3

$\alpha_1, \alpha_4, \alpha_5$ stand for the co-efficient of the independent variables of model-4

CEE_t stands for capital employed efficiency

HCE_t stands for human capital efficiency

SCE_t stands for structural capital efficiency

$LNTV_t$ stands for the natural log of the total assets

LEV_t ratio of long-term debt to total assets

i stand for cross-section (9units).

t stand for the period (2011-2015).

ε, Φ, π and η represent the random errors term in the model 1, 2, 3 and 4 respectively.

Since all the variables considered in the study are not constant and therefore can change depending on the economic conditions of the particular year in question. The study therefore used the random effect model.

Results and Discussions

Table 1 shows the average ranking of the independent variables (VAIC). The VAIC values are evaluated based on the individual banks since the sample frame was too small to be grouped for the analysis. From Table 1, it is observed that Access Bank (8.1375) and Trust Bank (7.4093) have the highest VAIC average values for the period; this is followed by Cal Bank (6.8772), Ecobank (6.5902), and Standard

Chartered Bank (6.0364). The banks with the lowest average values of VAIC are Ghana Commercial Bank (5.8069), SG-SSB (5.5860), HFC Bank (5.1597), and UT Bank (5.0463). In analysing the VAIC components, it is realized that the most important component of the VAIC for banks operating in the Ghanaian banking industry is HCE (Table 1). This result is consistent with many previous studies (Gog, 2005; Joshi et al., 2010; Ozkan et al., 2016).

Table 2: VAIC Average Ranking of banks base on their performance

Bank	CEEi	HCEi	SCEi	VAIC	Position
1. AccessB.	0.4239	6.8616	0.8520	8.1375	Ist
2. Trust B.	1.1151	5.4779	0.8162	7.4093	2nd
3. Cal B.	0.5019	5.5567	0.8186	6.8772	3rd
4. Ecobank	0.8013	4.9897	0.7991	6.5902	4th
5.Stand Chart	0.5781	4.6800	0.7782	6.03642	5th
6. GCB	0.9889	4.0684	0.7496	5.8069	6th
7. SG-SSB	0.7521	4.0798	0.7543	5.5861	7th
8. HFC B.	0.3122	4.0929	0.7546	5.1597	8th
9. UT B.	0.7474	3.5260	0.7729	5.0463	9th
Total	**6.2209**	**43.333**	**3.395**	**55.9489**	
Average	**0.6912**	**4.815**	**0.377**	**6.2165**	

In addition, it was observed that the overall total average value of the VAIC (6.2165) of all the banks operating in the Ghana Stock Exchange from 2011-2015 is lower than the overall total VAIC average of banks operating in the United Kingdom (10.80) and the United Arab Emirates (7.94); but higher than banks operating in Austria (3.67), Saudi Arabia (3.65) and Malaysia (1.78) (see AlMuslli and Ismail, 2011). A study by Al-Musalli and Ismail (2011), who anaylzed data of 23 banks in the United Arab Emirates Stock Exchange indicated that the banks with the highest VAIC averages in the United Arab Emirates were Tamweel Bank (8.607) and First Gulf Bank (8.265) whereas their counterparts in the Ghana Stock Exchange have the highest VAIC averages of 8.1375(Access Bank) and 7.4093 (Trust Bank) The results indicate that efficiency in utilizing HC is the main reason for the high profitability demonstrated by Access Bank and other banks; and, moreover, Access Bank was the best performing bank for SC. In general, banks in Ghana have relatively high HC as compared to CE and SC (Table 1).

The VAIC model has not been able to address the research objectives. However, the study aims to assess and observe the behaviour of the independent variables to the dependent variable considering the fact that empirical studies indicate that the higher the average value, the higher the returns of value creation

by the various banks. In addition, this study aims to compare the results to the results of the OLS regression model.

Table 3: Descriptive Statistics

	Obs	Mean	Std. Dev.	Min	Max
ROA	36	0.3754	0.0171	0.0067	0.0696
VAIC	36	6.3647	1.2918	1.6911	9.1184
CEEi	36	.7012	.3168	.2011	1.3514
HCEi	36	4.8721	1.2486	.4694	7.9889
SCEi	36	.7914	.03912	.6816	.8748
LEV	36	.1155	.1161	.0179	.5894
LNTV	36	6.2419	.3260	5.4483	6.7536

Table 3 reports the descriptive statistics of the intellectual capital and its components on the dependent variable. The mean VAIC for all the banks throughout the study period is 6.3647 with a standard deviation of 1.2981, which is somehow in line with figures reported by Goh (2005) for Malaysia banks (7.11). The average VAIC on firm performance of listed banks in the Ghana Stock Exchange is low as compared to findings by El-Bannany (2008) for UK banks (10.80), but it is better compared to the findings of Joshi et al. (2010) in Australia (3.80). The results also show that the averages of the VAIC components (CE, HC and SC) are .7012, 4.8721, and .7914, and their respective standard deviations are .3168, 1.2486 and .0381. This indicates that both CE and SC are positive and moderately significant while HC is highly significant. It could further be seen that the mean of one of the control variables (LEV) is positive (.1155) and somehow significant while the other control variable (LNTV) is highly significant at 6.2419.

Table 4 demonstrates the relationship between VAIC and banks' profitability. From the results, the adjusted R^2 value (20.6%) shows the proportion of variation in the dependent variable (ROA) as explained by the independent variable (VAIC). This indicates that the model can explain about 20.6% of the relationship between the input variable and the dependent variable.

Table 4: Results of Model 1 (VAIC and bank performance)

ROA_{it} =	$\beta_0 + \beta_1 VAIC_{it}$	$+ \beta_2 LNTV_{it}$	$+ \beta_3 LEV_{it} + \varepsilon_{it}$	
	Coef	Std. Err.	t-values	p>t
Cons	-.1535	.0685	-2.240	.032
VAIC	.0047	.00204	2.32	.027
LEV	.0348	.0295	1.18	.248
LNTV	.0251	.0104	2.43	.021

Adjusted R^2 = 0.2057 and F-statistics =4.02

The results of model-1 (Table 4) show that there is a statistically significant positive relationship between VAIC and banks' profitability, ROA for the period 2011-2015. This means that, when all the components (CEE, HCE and SCE) of the VAIC are put together, the impact on banks' performance is positive and significant. These findings confirm the findings of previous studies (Saengchan, 2007; Al-Musalli and Ismail, 2011; Pal & Soriya, 2012).

Table 5 shows the relationship between capital employed efficiency and banks' performance. It is observed from the table above that the adjusted R^2 value (17.4%) can explain the relationship between the dependent variable, ROA and the independent variable, CEE. Comparatively, the adjusted R^2 value of model-1 (20.6%) is higher than the adjusted R^2 value (17.4%) of this model. This indicates that model-1 is good at explaining the relationship between the input variable and the dependent variable when comparing the two models.

Table 5: Results of Model 2 (CEE and bank performance)

$ROA_{it} = \delta_0$	$+\ \delta_1 CEE_{it\ t}$	$+\ \delta_2 LNTV_{it}$	$+\ \delta_3 LEV_{it} + \Phi_{it}$	
	Coef.	Std. Err	t-values	P>t
Cons	-.1336	.0686	-1.95	.060
CEEi	-.02190	.0111	-1.98	.056
LEV	-.0057	.0329	-.17	.864
LNTV	.0300	.0109	2.75	.010

Adjust R^2 =0.1738 and F-statistics =3.45

Furthermore, the results of model-2 in Table 5 indicate there is a negative but significant relationship between CEE and banks' profitability (ROA) for the period under study in Ghana. This clearly shows that stakeholders of the banking industry should focus more on the effective utilization of its intellectual capital as compared to its financial and physical capital in terms of value creation as shown by the findings. The findings in this study contradict the findings of Al-Musalli & Ismail (2011) and Ozkan et al. (2016), who examined the relationship between VAIC and bank performance in the United Arabs Emirates and the Turkey banking sector.

Table 6 demonstrates the relationship between human capital efficiency and banks' profitability. The adjusted R^2 value (25%) of model-3, as shown in Table 6, explained the relationship between the dependent variable, ROA, and the input variable, HCE of the model used. This implies that the model used can predict about 25% of the association between the dependent variable and the predicted variable.

Table 6: Results of Model 3 (HCE and bank performance)

$ROA_{it} =$	$\acute{a}_0 + \acute{a}_1 HCE_{it}$	$+ \acute{a}_2 LNTV_{it} +$	$\acute{a}_3 LEV_{it} + \pi_{it}$	
	Coef.	Std. Err.	t-value	P>t
Cons	-.1580	.0666	-2.37	.024
HCEi	.0055	.0020	2.73	.010
LEV	.0293	.0284	1.03	0.310
LNTV	.0265	.0101	2.62	.013

Adjusted R^2 =.2480 and F-statistics =4.85

The results of Model-3 (Table 6) show the relationship between human capital efficiency (HCE) and banks' profitability, ROA. The findings clearly show that there is a statistically positive association between HCE and the profitability of banks in Ghana. In other words, any increase in HCE will correspondently increase banks profitability. The results imply that the performance of banks in Ghana is affected by HCE rather than any of the other input variables. Therefore, banks operating in the Ghanaian banking industry should utilize their human capital efficiently if they intend to reach a higher profitability level. The findings are in line with studies such as Ozkan et al. (2016), Goh (2005) and Joshi et al. (2013) who have drawn similar conclusions for financial institutions in Turkey, Malaysia and Australia, respectively.

Table 7 contains the relationship between structural capital efficiency and banks' performance. The adjusted R^2 value (22%) of Model-4 explains the relationship between the dependent variable, ROA and the predicted variable, SCE of the banks operating in the Ghana Stock Exchange for the period under study.

Table 7: Results of Model-4 (SCE and bank performance)

$ROA_{it} =$	$\alpha_0 + \alpha_1 SCE_{it}$	$+ \alpha_4 LNTV_{it} +$	$\alpha_5 LEV_{it} + \eta_{it}$	
	Coef.	Std. Err.	t-value	P>t
Cons	-.2565	.0868	-2.95	.006
SCEi	.1620	.0661	2.45	.020
LEV	.0332	.0291	1.14	.263
LNTV	.0260	.0103	2.53	.017

Adjusted R^2 = .2191 and F-statistics =4.27

The results of model-4 (Table 7) show the relationship between SCE and banks' performance, ROA. The findings clearly indicate that there is a significant positive relationship between SCE and banks profitability in Ghana. In other words, any increase in SCE will enhance banks' profitability. The finding of this objective is consistent with the study of Ozkan et al. (2016). It was, however, realized that the significance of SCE in this study is much higher than the findings of Ozkan et al. (2016).

It was observed from the results that HCE and SCE are the ones that affect banks' performance in Ghana as compared to the other input variables. However, HCE has the higher positive influence on banks' performance than SCE. Further, the results show that the components of the VAIC are better at explaining the performance of banks than the VAIC alone (Chen et al., 2005; Joshi et al., 2013; Ozkan et al., 2016).

The empirical evidence obtained regarding the control variables indicate that the natural log of total assets has a significance positive relationship with profitability of banks operating in the Ghana Stock Exchange. Leverage ratio likewise has a significant relationship with banks' performance except for model-2, which shows a negative but significance relationship with profitability.

Conclusions

The aim of this study is to examine the effect of intellectual capital on the profitability of banks listed on the Ghana Stock Exchange. The study investigates the relationship between VAIC and the performance of listed banks in Ghana by decomposing the components of VAIC to assess their relationship with banks performance. The results indicate there is a statistically positive and significant relationship between VAIC and firm performance of banks in Ghana. The findings of the study suggest there is a positive significant relationship between two of the components' parts of the VAIC (HCE and SCE) and firm performance, while the CEE shows a negative relationship with firm performance. Based on the findings of the study, the following recommendations were made for stakeholders' consideration. Management of the banking industry should pay critical attention to the quality of the people they engage as employees. This is because the higher the quality of bank staff, the more they are able to create value for the firm since the sector is purely a service one. It is also important to draw the attention of management to the need to organize refresher trainings for employees to consistently update their skills, which will enable them to work effectively and efficiently, and that in turn would lead to banks' value creation.

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