The Determinants of Intellectual Capital Performance of Banks in Ghana: An Empirical Approach

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Abstract

The objective of the study is to examine the variables that determine intellectual capital performance (ICP) of Ghanaian banks. The study applies the Value Added Intellectual Coefficient (VAICTM) model to estimate the ICP of banks, the data envelopment analysis technique to compute the technical efficiency (TE), and cost efficiency (CE) scores while ratio analysis is used to proxy the other variables. The study used an unbalanced panel data of 29 banks over the period 2000-2014 and the panel corrected standard error (PCSE) regression model is used so as to account for heteroscedasticity. Generally, the significant determinants of ICP are research and development investment (R&D), the efficiency of investment in human capital (HCInv), leverage, operational risk, insolvency risk (IR), diversification and return on asset (ROA). R&D, IR and ROA have a significant positive impact on ICP. HCInv and leverage have a significant negative effect on ICP. Diversification significantly enhances ICP but barriers to entry lower ICP. Size and TE negatively affect ICP while CE weakly but positively determines ICP. Bank of Ghana's policy to increase the minimum capital requirement is a good one and will reap the benefit of having a stable, stronger and resilient banking industry which strive for value creation. Banks should consider diversifying their operations so as to increase value. This can easily be done well if R&D is at the core of their operations. Bank managers should factor pricing decisions (strategies) in their attempt to increase value added.

Keywords: Intellectual Capital; Value Added; Efficiency; Integrated Report; VAICTM; Bank; Ghana; Africa.

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1.0 Introduction

There has been increased consideration of intellectual capital (IC) among academics, practitioners, consultants, policy-makers and regulatory bodies. This can be explained by the current knowledge era or knowledge economy where information or knowledge is considered as a vital resource for any organisation especially those in the services sector. In economic

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theory, labour and capital have been identified as essential factors of production. Capital in the current knowledge economy goes beyond physical capital or financial capital. The International Integrated Reporting Council (IIRC) (2013) for instance developed a framework which identified six core types of capital needed for production namely intellectual capital, natural capital, manufactured capital, financial capital, human capital, and social (relational) capital. Thus, the definition of capital has deviated from the earlier notion to an understanding that intangible and knowledge-based resources have the ability to increase firm value, enhance performance and competitive advantage (Drucker, 1993; Grant, 1996; Mention & Bontis, 2013).

The business of banking involves the collection of deposits and giving of loans. Unlike the agricultural or manufacturing firms, banks provide products that come in forms of financial services and so the industry is usually classed under the services sector. The business of banking involves greatly the act of managing risk and providing services that meet the changing needs of customers. Thus, the workforce of banks needs to have the requisite knowledge and experience to ensure that for instance the loans given are not affected by the problem of adverse selection. Also, the various processes, procedures and the internal structures available in the banks need to provide the conducive environment for the employees to work to achieve value for money. As it is said, “the customer is sovereign”, and so the banks should have a healthy relationship with their customers and generally their stakeholders and when that is done, there is the high possibility of obtaining a competitive edge. IC can be defined as the valuable and specific strategic knowledge-base of an organisation. The employees of the organisation, the internal structure and the external structure are very key elements of the IC of any company (Sveiby, 1997). Some studies viewed IC elements as capitals rather than structure and so reclassified the elements accordingly as human capital, internal (structural) capital and external capital (capital employed) (Bontis, 1996, 1998).

There have been a number of methodological frameworks developed as well as empirical examinations on IC. A number of studies have examined the effect of IC on firm performance (Firer & Williams, 2003; Goh, 2005; Kamath, 2007; Riahi-Belkaoui, 2003), corporate governance (Abeysekera, 2010; Al-Musalli & Ismail, 2012; Alizadeh, Chashmi, & Bahnamiri, 2014; Keenan & Aggestam, 2001; Li, Pike, & Haniffa, 2008; Makki & Lodhi, 2014), corporate social responsibility (Aras, Aybars, & Kutlu, 2011; Musibah & Alfa, 2013) and market value (Chen, Cheng, & Hwang, 2005; Maditinos, Chatzoudes, Tsairidis, & Theriou, 2011; Nimtrakoon, 2015; Sharma, 2018) among others. In spite of the increasing research into these relationships, there is little evidence on the determinants of IC. The extant literature conducted in this area failed to ignore relevant items like the effect of research and development, diversification, and different risk measures. Also, earlier studies measured efficiency in their model using ratio which is out-performed by the efficiency score generated using solution to an optimization problem. This current study seeks to extend this area of analysis by examining the determinants of ICP of banks in Ghana.

The current study employs the Value Added Intellectual Coefficient (VAIC™) model of Pulic (1998, 2001, 2004, 2008) to measure in IC with the components being human capital efficiency, structural capital efficiency and capital employed efficiency. In addition, efficiency scores for the regression analysis were estimated using the non-parametric data envelopment analysis (DEA). The study uses the panel corrected standard error (PCSE) regression for the second-stage analysis. The main results of the study reveal that the main factors that drive ICP

in Ghanaian banks are research and development, efficiency in IC, capital structure, profitability and diversification. The current study fills the gap in literature. The study contributes to the understanding of the effect of research and development investments on ICP. It provides understanding of the effect of risk and performance measures (both profitability and efficiency) on ICP. Again, the study provides insight to bank managers of the need for considering the significant factors which can enhance or impede on ICP.

The rest of the sections of the study are organised as follows. The second section reviews the IC literature. The third section describes the research methodology used for carrying out the study. The fourth section presents the analysis of data and the results of the study as well as discuss the results. The fifth section draws a conclusion on the study while the sixth section provides the implication of the study.

2.0 Literature Review

The concept of IC is associated with the history of human capital accounting, human resource accounting or accounting for intangibles. In the accounting profession, for instance, the *IAS 38: Intangible Assets*³ specify the treatment of “identifiable, non-monetary asset without physical substance” of corporate organisations in financial statements. The standard has covered intangible assets such as patents and copyrights. The standard is only able to consider those intangibles that meet the stringent definition of an asset as per the standard. Thus, the standard failed to consider the capitalization of the human capital, internal (structural) capital or the external capital (relational capital) of the companies which are the elements of IC. In effect, the book value reported by the financial statement prepared using the accounting standards may not reveal the total value of the company.

Consequently, there have been various attempts to quantify the concept of IC using quantitative models. These attempt has generated more than eight distinct IC valuation approaches. Examples of these approaches are the value-added, value creation index, market or value-based, Tobin’s q, calculated intangible value, Baruch Lev method, human resource accounting and the VAICTM. The difficulty in measuring IC is as a result of the recognition criteria of accounting standards used in recognising assets which IC elements may not meet. Also, the inability to quantify the elements because their form is a factor. Again, IC is context specific and depending on the context, it can be measured best in a certain way. The VAICTM model has been used extensively in literature because is based on the resource-based view, it provides easy and interpretable results, it is calculated using audited financial statements, and its ability to cover the three essential elements of IC. In a vast number of banking studies, the model has been employing judging from the fact that an earlier development of the model was based on data from the banking sector of Croatia (Pulic, 2001).

The literature on the determinants of intellectual is still at its infancy. El-Bannany (2008) conducted a study using six factors that can possibly affect IC. These factors were investment in information technology systems, efficiency of investment in IC (staff cost), barriers to entry, efficiency, profitability and risk. The first three factors provided a negative relationship with the last three were negative. The study found that increased investment in IT may negatively

³ Intangible assets excluded in IAS 38 may be treated in other standards such as IAS2 Inventories, IAS12 Income Taxes, IAS17 Leases or IFRS16 Leases, IAS19 Employee Benefits, IAS32 Financial Instruments: Presentation, IFRS3 Business Combinations, IFRS5 Non-current Assets Held for Sale and Discontinued Operations and IFRS15 Revenue from Contracts with Customers.

affect performance of their staff. This specific finding is similar to the results of El-Bannany (2012) but contrary to that of Meressa (2016) who found a positive effect. In the case of the negative effect from the efficiency of investment in IC, the study suggests that such inverse relationship may reveal that staff is not the solely to be credited with any innovation and such innovation may be from other factors. Nevertheless, this result is in contrast with the result of Meressa (2016) which found a positive nexus. Regarding the barriers to entry, the negative result has also been evidenced in the study of El-Bannany (2012) but a contrary result is evidenced in Hidayah and Adityawarman (2017). The results of El-Bannany (2008) suggests that the efficiency, profitability and risk were evidenced to have a direct effect on IC.

Another essential study in this area by El-Bannany (2012) examined the determinants of IC using nine factors. The study provided an extension to the author's earlier study. The additional variables included in this particular study are the global financial crisis as a dummy, concentration ratio, age and stock exchange listing age. This study found that among the additional variables, only the age of stock exchange listing has a positive effect on IC. Meressa (2016) used seven possible determinants which include size, age, profitability, risk, staff cost, investment in information technology and concentration. The study found that risk (insolvency risk), size and age negatively affect ICP. The results also indicated that apart for concentration and size, all the other factors have a statistically significant impact on ICP. Similarly, Hidayah and Adityawarman (2017) used six possible determinants of ICP namely concentration, barriers to entry, risk, size, profitability (return on asset) and age. The study found similar to Meressa (2016) that age and size negatively affect ICP. Also, the rest of the factors examined have a positive effect on ICP but among all factors, only the results of risk, concentration and profitability (return on asset) have a statistical significance if 1%, 5% and 10% respectively.

In Ghana, the literature on IC is generally scanty. Alhassan and Asare (2016) examined the effect of productivity on IC and its components. The study found that among the three components of IC, human capital is a significant factor and is the main driver of productivity. Onumah and Duho (2018) also examined the nexus between IC, stability and performance. The study agreed with the earlier finding that human capital is the main driver of profitability, efficiency and productivity. The study also concluded that ICP is necessary for stability of banks in Ghana.

For any generalisations about the existing literature on the determinants of IC, there is the need to conduct more studies to fill the gap, from which such generalisations could be made. The current study adds other relevant factors that may drive ICP such as research and development, operational risk, capital structure, technical efficiency, cost efficiency and diversification which has not been considered in existing literature. The study also makes this contribution in the context of an emerging economy.

3.0 Data and Methodology

The data used for this study has been mainly sourced from the Bank of Ghana's Banking Supervision Department, as well as, the annual reports of the banks. The study period for the study is from 2000 to 2014 and the study covers a sample of 29 banks that have operated over the period. As a result of entry and exit of some banks, the study employs the unbalanced panel data. The figures were extracted from the financial statements of the banks over the period while some were obtained from the annual reports of the banks.

3.1 Empirical Model

The current study examines the various determining factors of IC using regression analysis. To accurately specify the model, statistical tests were conducted on the data and the results indicated that the data suffer from heteroscedasticity. The panel corrected standard error model of Beck and Katz (1995) is employed because it is robust and corrects problems posed by autocorrelation and heteroscedasticity. The model employed in this case is specified as follows:

$$IC_{i,t} = \alpha_0 + \beta_1 RD_{i,t} + \beta_2 Entry_{i,t} + \beta_3 InvHC_{i,t} + \beta_4 Eff_{i,t} + \beta_5 Lev_{i,t} + \beta_6 OR_{i,t} + \beta_7 IR_{i,t} + \beta_8 Prof_{i,t} + \beta_9 Div_{i,t} + \beta_{10} Size_{i,t} + v_{i,t}$$

Where $IC_{i,t}$ is the IC performance; $RD_{i,t}$ is investment in R&D; $Entry_{i,t}$ is the measure of barriers to entry; $InvHC_{i,t}$ is the efficiency of investment in IC; $Eff_{i,t}$ is the relative TE or relative CE score; $Lev_{i,t}$ is the leverage; $OR_{i,t}$ is the operational risk; $IR_{i,t}$ is the insolvency risk; $Prof_{i,t}$ is the profitability measured by return on asset; $Div_{i,t}$ is the diversification; $Size_{i,t}$ is the size and $v_{i,t}$ is the error term.

3.2 Variable Description

3.2.1 Dependent Variable

The VAIC™ model of Pulic (1998, 2001, 2004, 2008) postulates that IC is the summation human capital efficiency, structural capital efficiency and capital employed efficiency. The three components can be developed from the value added of the banks. Value addition can be computed by deducting input from outputs of an entity. For banks, the output is the total revenue while the input is the operational cost of the bank less any investment in labour which is treated as investment in human capital (HC). This is given as:

$$VA = OUTPUT - INPUT \quad (1)$$

The structural capital (SC) is obtained by deducting HC from VA. Capital employed (CE) is obtained by deducting current liabilities from total assets. Thus the components and the composite measure of the VAIC™ model can be expressed as follows:

$$HCE = \frac{VA}{HC} \quad (2)$$

$$SCE = \frac{SC}{VA} \quad (3)$$

$$CEE = \frac{VA}{CE} \quad (4)$$

The VAIC™ provides the overall measure of the ICP of the banks and is obtained by adding Equations (2), (3) and (4)

$$VAIC^{\text{TM}} = HCE + SCE + CEE \quad (5)$$

3.2.2 Independent Variables

The current study use the variables employed in earlier research which include barriers to entry (Depoers, 2000; El-Bannany, 2008), efficiency of investment in IC (human cost) (El-Bannany,

2008, 2011), profitability (El-Bannany, 2008, 2011, 2012), size (El-Bannany, 2011, 2012) and insolvency risk (Meressa, 2016). Although El-Bannany (2008) used a relative efficiency measure, it is based on ratios. The current study employs two efficiency scores based on data envelopment analysis namely technical efficiency and cost efficiency. In estimating the efficiency scores, the current study followed the studies of Das and Ghosh (2009) and Moffat and Valadkhani (2011) to use physical capital, labour and deposits as inputs and loans and investments as output. In the cost model, input costs are also used. The financial leverage has also added as a determining factor of ICP. Operational risk, the third risk type considered in Basel II is the risk of loss as a result of poor or unsuccessful internal processes, systems and people or from orthogonal events. It is the least understood and most challenging risk to measure, manage and monitor. In line with the Basic Indicator Approach (BIA), this study adopts the ratio of 15% of 3 years average gross income to total equity to measure this risk. To diversify is to operate in novel markets different from the existing market segment. For banks, their core business is to accept deposit and give out loans at a premium. Universal banking status allows banks to carry out other activities such as investment services. In the current study, income diversification, the ratio of net interest income to gross income which has been used in existing studies (Chronopoulos, Girardone, & Nankervis, 2011; Fiordelisi, Marques-Ibanez, & Molyneux, 2011) is used as the proxy. Table 1 presents the variables used for this study, their measurement, as well as, their expected relationships and actual relationships with IC.

Table 1: Variables and Relationship

Variable	Measurement	Expected Signs	Actual Signs
Intellectual Capital (VAIC™)			
Research and Development (R&D)	Total R&D cost by total revenue earned	+	+
Barriers of Entry (Entry)	Property, plants and equipment to total assets	-	-
Efficiency of Investment in Intellectual Capital (HCInv)	The ratio of staff costs to total revenue	+	-
Technical Efficiency (TE)	Technical efficiency score	+	-
Cost Efficiency (CE)	Cost efficiency score	+	+
Leverage (Lev)	Leverage ratio	-	-
Operational Risk (OR)	15% of 3 years average gross income to total equity	+	+
Insolvency Risk (IR)	Z-score	+	+
Return on Asset (ROA)	Return on asset	+	+
Income Diversification (Div)	Net-interest income to gross income	-	-
Size of Bank (Size)	Logarithm of total assets	+	-

3.3 Model Estimation

In estimating regression models using panel data, there is the possibility of the model being inconsistent and biased as a result of serial correlation or heteroscedasticity or both. A model to correct problem has been developed by Beck and Katz (1995) which is known as the panel

corrected standard error (PCSE) regression model. The test for serial correlation and heteroscedasticity using the dataset of this study provide a result which suggests that the data only suffer from heteroscedasticity. Thus, the choice of this model for this current study is justified.

4.0 Data Analysis and Results

4.1 Descriptive Statistics

Table 2 presents the results of the descriptive statistics of the dependent and independent variables of the study. On average, the ICP of Ghanaian banks is at 4.341 with a minimum of -2.827 and a maximum of 33.263 with variations across banks and years (SD=3.022). The standard deviation of the independent variables shows that there are variations across time and banks. According to Naser and Al-Khatib (2000), these variations will augment the confidence level of the results.

Table 2: Descriptive Statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
VAIC TM	319	4.341	3.022	-2.827	33.263
R&D	297	0.006	0.010	0.000	0.066
Entry	321	0.036	0.032	0.001	0.273
HCInv	321	0.284	0.138	0.006	1.298
TE	321	0.785	0.243	0.075	1.000
CE	321	0.605	0.269	0.054	1.000
Lev	321	0.824	0.180	0.090	1.937
OR	321	0.118	0.085	0.007	1.236
IR	321	5.541	3.874	-1.122	30.965
ROA	321	0.033	0.038	-0.171	0.181
Div	321	0.384	0.123	0.020	0.751
Size	321	19.495	1.498	13.692	22.476

Notes: VAICTM represents the value added intellectual coefficient; R&D represents research and development; Entry represents barriers to entry; HCInv represents efficiency of investment in IC; TE represents technical efficiency; CE represents cost efficiency; Lev represents leverage; OR represents operational risk; IR represents insolvency risk; ROA represents return on asset; Div represents diversification and Size represents the size of bank.

4.2 Multicollinearity Test

The aim of a multicollinearity test is to examine the data statistically to ensure that no two or more independent variables are strongly correlated. Such strong correlations may result in a researcher obtaining results that are error-ridden and misleading. The correlation matrix is thus used in this case to do this test. The results from the test show that highest correlation is between profitability and efficiency of investment in IC. The result, however, does not violate the requirement of the cut-off set by Kennedy (2008) which is at 0.7. Also, the results of the variance inflation factor produced a VIF below 3 which is not greater than the cut-off of 10 set by Wooldridge (2009). In this study, the problem of multicollinearity is thus not evidenced.

Table 3: Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) VAIC TM	1.000											
(2) R&D	-0.131**	1.000										
(3) Entry	-0.324***	0.396***	1.000									
(4) HCInv	-0.525***	0.322***	0.551***	1.000								
(5) TE	0.175***	-0.043	-0.234***	-0.196***	1.000							
(6) CE	0.258***	-0.119**	-0.237***	-0.146***	0.654***	1.000						
(7) Lev	-0.108*	-0.071	-0.151***	-0.105*	-0.104*	-0.079	1.000					
(8) OR	0.087	-0.002	-0.137**	-0.084	0.050	0.013	0.279***	1.000				
(9) IR	0.378***	-0.192***	-0.125**	-0.202***	0.133**	0.228***	-0.262***	-0.423***	1.000			
(10) ROA	0.536***	-0.274***	-0.483***	-0.693***	0.234***	0.346***	0.119**	0.095*	0.276***	1.000		
(11) Div	-0.263***	0.046	0.209***	0.017	-0.208***	-0.149***	0.144***	0.057	-0.312***	-0.147***	1.000	
(12) Size	0.018	-0.163***	-0.331***	-0.106*	-0.143**	0.049	0.091	-0.000	0.045	0.254***	-0.144***	1.000

Notes: VAICTM represents the value added intellectual coefficient; R&D represents research and development; Entry represents barriers to entry; HCInv represents efficiency of investment in IC; TE represents technical efficiency; CE represents cost efficiency; Lev represents leverage; OR represents operational risk; IR represents insolvency risk; ROA represents return on asset; Div represents diversification and Size represents the size of bank. “*”, “**” and “***” show significance at the 1%, 5% and 10% respectively.

4.3 Regression Results

The results of the study found that among the various determining factors studied, the effect of research and development, efficiency of investment in IC, leverage, operational risk, insolvency risk, profitability, and diversification have a statistically significant impact on ICP. The regression result indicated that there is a positive effect of research and development on ICP with a significant level of 5%. This is in line with the expectation that banks that engage in activities to create innovative products and services in forms of research and development may also have high ICP. This result is similar to the positive effect found by Morck and Yeung (1991). As regards the result of the effect of the barriers to entry in the banking industry, the analysis reveals that such situations negatively but insignificantly affect ICP. This is also similar to the results of El-Bannany (2008) and El-Bannany (2012). This means that increased barriers to entry may lead to less innovation and consequently less competition to create value among existing banks.

Table 4: IC Determinants- Panel-Corrected Standard Errors Regression Results

	(1) TE-ROA	(2) CE-ROA
R&D	23.957** (11.237)	23.184** (11.091)
Entry	-3.750 (4.460)	-1.877 (4.233)
HCIInv	-6.442*** (1.476)	-6.749*** (1.595)
TE	-0.679 (0.432)	
Lev	-2.066** (0.885)	-1.879** (0.841)
OR	6.762*** (1.449)	6.595*** (1.435)
IR	0.210** (0.106)	0.205* (0.105)
ROA	24.030*** (7.472)	21.681*** (7.853)
Div	-4.048*** (1.240)	-3.851*** (1.201)
Size	-0.195* (0.115)	-0.156 (0.107)
CE		0.466 (0.451)
_cons	10.915*** (3.245)	9.277*** (2.832)
Observations	295	295
Banks	29	29
<i>R-squared</i>	0.458	0.457
<i>P-value</i>	0.000	0.000
<i>RMSE</i>	2.303	2.306
<i>Chi2</i>	129.717	129.889

Notes: Standard errors are in parenthesis and *** p<0.01, ** p<0.05, * p<0.1. R&D represents research and development; Entry represents barriers to entry; HCIInv represents the efficiency of investment in IC; TE represents technical efficiency; CE represents cost efficiency; Lev represents leverage; OR represents operational risk; IR represents insolvency risk; ROA represents return on asset; Div represents diversification and Size represents the size of bank.

The efficiency of investment in IC negatively affects IC at a significant level of 1%. This

relationship is similar to the study of El-Bannany (2008, 2011). This suggests that ICP increases with human (staff) cost. A possible explanation for this is that the staff are not the only people who initiate and execute innovation. The negative relationship between the cost and ICP may also suggest that the labor market for the Ghanaian banking industry is not effectively priced. Thus, there may be some who shirk responsibility and contribute less to IC but still paid high. The impact of efficiency on ICP is dependent on the efficiency measure used. In terms of technical efficiency, the relationship is negative but in terms of cost efficiency, the relationship is positive and both results are not significant statistically. The difference between technical efficiency and cost efficiency is pricing or cedi value. Thus, the attempt by the banks to solve an input minimization problem and cost minimization problem affects ICP negatively and positively respectively. Profitability affects the ICP of banks positively with the effect strongly significant at 1%. This result is similar to the finding of El-Bannany (2008, 2011, 2012).

With regard to risk, the result of the risk measures, leverage, insolvency risk and operational risk are as follows. The leverage of the banks negatively affect ICP and such relationship is significant at 5%. This suggests that banks that have high debt in their capital structure will end up performing abysmally in terms of IC. The result, however, is in contrast with the finding of Hidayah and Adityawarman (2017). The insolvency risk of banks positively impacts the ICP of banks at a significant level. This positive effect is similar to a study by Onumah and Duho (2018) which found that insolvency risk positively affects IC. This seems to suggest that such relationship is bidirectional. The operational risk faced by banks also have a positive impact on ICP with the impact being significant at 1%. This suggests that banks that have high IC are significantly exposed to operational risk. The size of banks has a negative effect on the ICP of banks. This suggests that bigger banks perform poorly in terms of IC. Such may be as a result of inefficiencies that may be associated with dealing with large staff, client-base and complex business processes and systems. In terms of diversification, the negative effect suggests that the more diversified a bank is, the more its ICP increases. This can be explained by the fact that in their attempt to diversify, the banks are forced to innovate and create new ideas for use to meet the ever-changing demands of customers.

5.0 Conclusion

The current study contributed to the IC literature by examining the determinants of ICP of banks in Ghana using an unbalanced panel data of 29 banks over the period 2000-2014. The study applies the panel corrected standard error regression to examine how research and development, barriers to entry, efficiency of investment in human capital, technical efficiency, cost efficiency, leverage, operational risk, return on asset, diversification and size of banks affect ICP. The result indicates that increased investment in R&D and high profitability of banks positively and significantly determines their ICP. The efficiency of investment in human capital and bank size inversely affect ICP. In terms of efficiency, technical efficiency negatively and cost efficiency positively affect ICP. The three risk measures used resulted in significant results such that leverage negative affect ICP while insolvency risk and operational risk affects positively. The proxy for diversification affects IC negatively and significantly suggesting that diversification is actually a positive driver.

6.0 Implications of the Study

With the recent instability and collapse of some banks, there is the need for bank managers to be aware of the significance of IC in driving performance and value. It is recommended that

the banks should invest more in research and development in the areas of their operations. For instance, there should be empirical basis on which loans are offered, interest rates are determined and there should be attempts to increase innovation which is possible by investing in these areas. Such activities should be tailored to cover the staff of the banks by way of enhancing their professional competence through training and development, the various internal structures and systems as well as on the customers and other stakeholders of the banks. The significant negative relationship between efficiency of investment in human capital and IC suggests that the labour market of the banks may not be efficiently priced and so staff that shirk their responsibility are paid highly. Bank managers should attempt to develop employee remuneration packages that reflect the contribution of employees towards value creation. This can be done in line with the executive compensation theory so that income based and share-based performance measures are considered in determining their compensations. Regarding risk, the bank managers should consider risk management as a relevant tool for enhancing ICP. In this era of universal banking, the banks should consider diversifying their operations so as to render value-driven services to the customers and doing this will enhance ICP. The study also suggests that the Bank of Ghana should determine to execute the Basel II/III framework in a timely manner.

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Appendix 1: Data Envelopment Analysis

DEA is one of the techniques used to measure the efficiency of Decision Making Units (DMUs). It estimates efficiency scores based on the use of outputs and inputs as well as inputs prices and output prices. A ratio of the outputs to inputs is taken to ascertain how efficient a DMU is relative to other DMUs. One essential feature of the technique is that it uses multiple inputs and outputs as well as able to work with a small number of DMUs. A basic mathematical formulation of the DEA can be expressed as:

$$\theta^* = \underset{\lambda_j, \theta}{\text{Min}} \theta \text{ such that} \quad (6)$$

$$\sum_{j=1}^n \lambda_j x_{ij} \leq \theta x_{io} ; i = 1, 2, 3, 4, \dots, m$$

$$\sum_{j=1}^n \lambda_j y_{rj} \geq y_{ro} ; r = 1, 2, 3, 4, \dots, s$$

$$\sum_{j=1}^n \lambda_j = 1 \text{ (vrs)}; \lambda_j \geq 0; j = 1, 2, 3, 4, \dots, n$$

Where DMU_o is one of the n DMUs being evaluated; θ^* represents the TE (input-oriented) score; x_{io} and y_{ro} are respectively the i th input and the r th output of DMU_o ; and $0 < \theta^* \leq 1$. The TE measure can either be under the conditions of variable returns to scale (VRS) or constant returns to scale (CRS). It is argued that most service organisations tilt towards the VRS while manufacturing organisations towards CRS.

Another measure of efficiency is the CE which measures the ability of DMUs to produce the current outputs at a minimal cost given each DMUs current price levels. Thus, input cost is included in computing the scores. An earlier model developed by Farrell (1957) and Debreu (1951) could compute a cost-minimized score. This model is weak and limited under market imperfections in the sense that it assumes that factor inputs are homogenous meanwhile they are heterogeneous (Camanho & Dyson, 2008; Sahoo & Tone, 2013). The current study employs the Tone (2002) CE measure which solves the problems with the earlier model. The new model expressed as the ratio of minimal cost value to the actual/current cost which is given by:

$$CE_T = \frac{C_m}{C_T} = \frac{\sum_{i=1}^m \bar{x}_i}{\sum_{i=1}^m w_{io} x_{io}} \quad (7)$$

Where $\bar{x}_{ij} = w_{ij} \times x_{ij}$ and w_{ij} is the price of input i at the DMU j ; C_m is the minimal cost value and C_T the actual cost at DMU_o .