



INTELLECTUAL CAPITAL AND FINANCIAL PERFORMANCE OF SELECTED DEPOSIT MONEY BANKS IN NIGERIA

¹Uniamikogbo Emmanuel, ²Onwuchekwa John Chika,
³Arowoshegbe O. Amos, & ⁴Ali Peter Ifeanyichukwu

¹Department of Accounting, Rhema University Nigeria, Aba

²Department of Accounting, Federal University, Otuoke, Bayelsa State, Nigeria

³Department of Accounting, Ambrose Alli University, Ekpoma, Nigeria

⁴Department of Accountancy, Imo State Polytechnic, Umuagwo, Nigeria

^{1, 2, 3 & 4} Emails: emmasunnyu4@gmail.com ; chikajohn29@yahoo.com ;
futona4christ2@gmail.com ; frpeterali@yahoo.com

ABSTRACT

This study examines the relationship between intellectual capital and financial performance of selected Deposit Money Banks (DMBs) listed on the Nigerian exchange group. Specifically, the study attempts to find whether intellectual capital elements have significant effect on financial performance of selected DMBs or not in Nigeria. The study uses the ex-post facto design. The fixed effect estimation was used to evaluate the research hypotheses using panel data from 12 banks listed on the Nigerian exchange group from 2010 to 2019. The study hypothesizes that intellectual capital components do not appear to have a substantial impact on banks financial performance. The results show that intellectual capital significantly affect bank's financial performance and that value added human capital, value added capital employed and structural capital value added have a significantly positive effect on return on assets of selected deposit money banks in Nigeria. This study's findings call for clear responsibility and a strong drive for intellectual capital from banking institutions in Nigeria. Whilst the overall responsibility rests on the management, the actualization of intellectual capital in the banks cannot be achieved without support from the shareholders. The study emphasizes the need for banks to integrate intellectual capital information into their reporting cycle and embrace sustainable practices.

Keywords Intellectual capital, return on asset, structural capital, capital employed, human capital, value added, financial performance.



1. INTRODUCTION

The World economy started experiencing certain changes that have substantial impact on the generation of wealth and economic growth at the end of the 20th Century (Chaharbaghi & Cripps, 2006). However, contemporary years marked the increasing importance of the role of intangible assets in firms (Augier & Teece, 2005). According to Bontis (2002), the current trend for organisations is to focus less on material assets and more on intangible assets when seeking competitive advantage because, firms with adequate intellectual capital have a better chance of survival (Daley 2001).

For the past decades, the global economy had witnessed gradual transition from industry-based environment, with focus on physical assets such as factories, plants, machines and equipment; to a high technology, information, and innovation-based environment, which focus on the expertise, talents, creativity, skill, dedication and experience of people in the organisation-the organisation's intellectual capital (Karanja, 2014). The fundamental difference between these two environments lies in the nature of their assets and effect on financial performance indices. In the former, the physical assets like plants, machinery, materials, equipment, etc., were of utmost importance and made up the bulk of the organisation's assets and value while in the latter, knowledge, ability, skills, experience and attitude of workers, assume greater significance (Karanja, 2014).

Before now, land, labour and capital were traditionally considered in economics to be the most valuable assets, as a result, conventional physical assets were considered to be the main determinants of performance of any economic activity (Ahangar 2011). However, the fast expansion of science, technology and finally, globalisation has altered the pattern and structure of the production systems today. The new production system is mainly driven by technology, knowledge, expertise and relations with stakeholders, etc., which may be collectively described as Intellectual Capital (Ahangar 2011). Contemporary economic system, which is commonly known as the knowledge economy, intangible or intellectual assets have been



recognised as the prominent resource needed for organisational growth and survival (Hejazi, et al., 2016).

Companies that provide services such as software programming, financials, pharmaceutical, banking, hospitality, consultancy, accounting, legal, and educational services depend to a considerable extent on their intellectual capital for earnings while production or manufacturing companies use Intellectual Capital with its physical assets to sharpen their competitive edge (Firer & Williams, 2003).

These days, intellectual capital (IC), along with financial capital, is considered the main factor of firms' profitability. The main resources of companies do not only include tangible resources, but also intangible ones which are rare, priceless, irreplaceable and unending (Anshori & Iswati, 2007). Studies have revealed that 50 to 90 percent of the value created for firms in the 'new economy' is due to intellectual capital rather than production and sale (Ehrhardt, 2007).

Thus, business management and competitive strategy for the company has adapted to the development of the business environment and economic change (Solikhah, 2015). The business paradigm has shifted from the possession of tangible assets to the possession of innovation, information systems, organisational management and human resources (Solikhah, 2015). The focus of companies on value creation has changed from the use of physical assets to intangible assets. Literature on intellectual capital dominates in the areas of accounting and management in developed economies. This, however, is lacking in developing and less developed economies, including Nigeria. The dearth of studies on intellectual capital and financial performance of firms in Nigeria, coupled with the inconsistent and inconclusive submissions from prior studies conducted in the developed economies necessitated this study. Thus, this study seeks to examine the effect of intellectual capital by measuring intellectual capital and its components using Value Added Intellectual Coefficient (VAIC), thereby establishing a relationship between intellectual capital and financial performance of selected Nigerian Banks using country's-specific data. VAICTM is one of the most important methods for measuring intellectual capital which reflects the value created in a business entity. This method has been used by



business entities as an intellectual ability index. Generally, in firms where this coefficient is higher, it indicates that the firms had better managed the value creating potentials (Pulic, 2000a).

This paper is structured as follows. The introduction gives the brief overview of the subject of the paper. Section two is devoted to intellectual capital and its theoretical issues. Section three harps on the research method. Section four discusses the empirical results. This is followed by section five which is the conclusion.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Intellectual capital and theoretical issues

The study of human capital, which began back in 1776 with the known work of Adam Smith “Wealth of Nations” ends in the 1960s when the theoretical and empirical basis of human capital, as an integral part of intellectual capital were designed (Sweetland, 1996). The concept of Intellectual Capital (IC) was popularised in 1969 by Galbraith. The philosophy of Galbraith was to explain the dissimilarity between the market and book value of firms. According to Wu, Chang, and Chen (2008), IC has played a significant role in management research effective from 1980. Stewart (1997) defines IC as the intellectual material: that is knowledge, information, intellectual property, and experience that can be put to use to create wealth. IC is the collective sum of market assets, human centered assets, intellectual property assets, and infrastructure assets (Brooking, 1996). Intellectual Capital (IC) has been widely acknowledged as that innate attribute usually acquired by a firm which drives it on the wheel of value creation, value addition and value sustainability (Onyekwelu & Ubesie, 2016).

Similarly, Sullivan (1999) indicates that intellectual capital is that knowledge that can be converted into future profits and comprises resources such as ideas, inventions, technologies, designs, processes and informatics programs. Stewart (1991) indicates that intellectual capital is everything that cannot be touched but can earn money for the firm. Intellectual capital is defined as the relationships with customers and partners, innovation efforts, the infrastructure of the firm and the



knowledge and skill of the members of the organisation (Edvinsson & Malone, 1999). Intellectual Capital is a collective knowledge embedded in personnel, organisational routines and networking relationships (Choo & Bontis, 2002). Intellectual Capital has been recognised as the sum of knowledge and essential resources that organisations need to develop and utilise to gain sustainable competitive advantage (Subramaniam & Youndt, 2005; Ming Chen & Jun Lin, 2004).

According to Ali, Murtaza, Hedvicakova, Jiang & Naeem (2022), the value of IC cannot be understated, especially in the context of Nigeria's financial sectors, where the effective deployment of IC is increasingly recognised as the single most important determinant in the sector's performance. This is due to the fact that financial industries using IC typically offer high-quality services through ongoing training, brand development, system improvements, enhanced workflows, and improved stakeholder connections. Therefore, in order for financial sector to compete effectively, IC's management must be effective and efficient. From a global viewpoint, it is clear that the financial sector is maximising its use of IC and technology to increase shareholders' wealth (Asif, Ting, & Kweh, 2020).

The accounting profession is presently being challenged to reinvent itself to meet up with the current challenges in accounting practice. This move originates from the inherent deficiencies of traditional accounting, which has failed to recognise the intangibles and knowledge acquired by organisations as non-current assets (Onyekwelu & Ubesie, 2016). Thus, the need for a more elaborate platform of financial reporting that could capture knowledge and other Intellectual Capital (IC) components (Human, Structural and Capital) in quantitative terms in financial information for informed decision-making. The continuous exclusion of these IC components from financial reporting implies the neglect of the enormous intangible values and investments incurred by firms in the acquisitions and development of intellectual properties (Onyekwelu & Ubesie, 2016). This practice has often time led to the undervaluation of banks which brings about the huge gap that often exists between book value and market value of banks.



The International Accounting Standards Board (IASB) through International Accounting Standards (IAS) 38 on Intangible Assets and the subsequent International Financial Reporting Standards (IFRS) 3 on Business combinations and IAS 36 on Impairment of Assets applied by IFRS adopting nations and the treatment of goodwill, research and development and other identifiable intangible assets all give credibility to the need for incorporating Intellectual Capital in financial reporting (Vafaei, Taylor & Ahmed, 2011). Berzkalne and Zelgalve (2014) argue that though intellectual capital and knowledge assets are difficult to differentiate and quantify, their results will none the less be reflected in the bank's greater productivity, efficiency and overall profitability.

In the light of this, several prior studies conducted on the influence of intellectual capital (IC) on financial performance of firms were faced with mixed submissions. Studies conducted (i.e., Weqar, Zubair, & Haque, 2020; Poh, Adem, & Ibrahim, 2018; Avci & Nassa, 2017; Ogbodo, Nestor & Mary-Fidelis, 2017; Meles, Porzio, Sampagnaro, & Verdoliva, 2016; and Fatima & Ousama, 2015) on the influence of intellectual capital (IC) on the financial performance of firms in Indian, Malaysia, Nigeria, and USA showed significant influence of intellectual capital (IC) on the financial performance of these firms. However, the study by Nazir, Tan, and Nazir (2020) on the effect of intellectual capital (IC) on the financial performance of China, Hong Kong, and Taiwan revealed an insignificant effect of intellectual capital (IC) on the financial performance.

The intellectual capital theory, which has origins in both management and macroeconomic theory, is used in this study. The intellectual capital theory is a new prominent theory that is based on the premise that, in today's circumstances, intangible assets not disclosed on the statement of financial position are extremely important for the firm's operations because they can significantly increase the value of assets or the firm's market value (Kolakovi, 2003). This theory is founded on the idea that a company's wealth is determined by its human, structural, and relational capital, and that value is created by transforming one type of capital into another (Kolakovi, 2003).



The origins of the concept of intellectual capital in the twentieth century can be traced back to Taylor's 1911 book "The Principles of Scientific Management," in which he discusses employee knowledge, experience, and abilities (Taylor, 1911). However, notable authors and practitioners have influenced the development of intellectual capital theory in recent years (Harris, 2000; Viedma Marti, 2007). Intellectual capital has become the most crucial predictor of growth and competitiveness since the 1980s. Knowledge resources are the primary source of generating and maintaining a firm's competitive advantage in the knowledge economy. Specifically, the technology revolution and the development of knowledge-based activities have changed the way businesses are organized. Rather than relying on traditional production factors, they have placed a greater emphasis on knowledge resources and the capabilities of their effective application (Raenovi & Krsti, 2017b).

In today's world, a firm's competitive edge is derived not from its market position, but from the difficulty of replicating, or imitating, intellectual assets and how they are utilised. Because it is not always possible to get or imitate resources, emphasis must be directed to the firm's internal organization in order to identify the true source of long-term resource differences, i.e., the firm's internal organization is just as significant as its environment (Krsti, 2014). Intellectual capital is a multi-dimensional portfolio of resources, according to the strategic management literature, which emphasizes the multi-dimensional features of a firm's resources, i.e. their numerous combinations (Lin, 2013). Employees and leaders, institutions and processes, and social relations are all part of intellectual capital, which is a unique and comprehensive collection of resources. As a result, the theory of dynamic capabilities holds that effective resource utilization is insufficient for a firm's success, and that certain functionally specific capabilities (in manufacturing, purchasing, sales, research and development, and so on) are required (Krsti, 2007). In other words, resources alone cannot contribute to a firm's long-term competitive advantages; rather, the firm's capabilities, which are developed through complex interactions with resources and allow the firm to use its available resources in conjunction with specific information and organizational processes, play this role (Amit & Schoemaker, 1993).



Several stages in the development of intellectual capital can be distinguished based on research (Chaminade & Vang, 2007; Krsti, 2014): The first stage, which lasted until the mid-1980s, was when intellectual resources, which are uncommon, durable, and difficult to imitate, and particularly knowledge, were considered as a critical factor for achieving and retaining competitive advantage, and it was vital to manage them; The second stage, from the mid-1980s to the middle of the first decade of the twenty-first century, when researchers were primarily concerned with issues of conceptualization and measurement of intellectual capital, as well as reporting on intellectual capital with the goal of efficiently managing it; The third stage begins in the middle of the first decade of the twenty-first century, when academics' focus is primarily on issues of effective use of intellectual capital in business system management in order to achieve higher economic efficiency.

In order for a company to maximize its long-term strategic advantages in today's environment, it must concentrate on its own internal resources and key sources of intellectual or supplementary activities that represent its core competencies, i.e. capabilities that create and maintain significant long-term differences in consumers' minds (Andriessen, 2001). In this sense, a firm's strategy should focus on developing internal best capabilities or competencies, such as database, skills, organizational, and technical competencies, in which the firm already has significant expertise and which will enable the achievement of maximum value for key stakeholders, as well as focusing externally on those networks of suppliers that perform activities that must be purchased in the market (Viedma Marti, 2007). Given the firm's current market position and previous practices, dynamic capabilities show the firm's ability to achieve distinctive and innovative types of competitive advantage. As a result, businesses compete based on their core capabilities and knowledge.

Value Added Human Capital

The original idea of human capital can be traced back at least to Adam Smith in the 18th century. The modern theory was popularised by Gary Becker, an economist and Nobel Laureate from the University of Chicago. Human capital is one of the main strategic resources of firms and a requirement for success (Schultz, 1961).



Human Capital as it were has been adjudged to have constitutes over 50 percent of the entire resources, given the fact that every other resource is redundant and irrelevant without the applicability of the human resource capital (Intangible assets which include ideas, knowledge and experience). Dulewicz and Herbert (1999) showed that firms must pay attention to the competencies and proficiencies of their human resources in order to successfully implement their strategies.

Human capital is the main body of IC, and refers to the knowledge that exists in the minds of individuals and their experiences (Simsek & Heavey, 2011). Human capital is especially important in today's competitive environment (Subramaniam & Youndt, 2005), because it is the sum of employees' capacity to create tangible and intangible assets using their ideas and knowledge. It is these ideas that create value for the organisation and help it succeed in competitions (Yudawisastra, Manurung, & Husnatarina, 2018). Human capital is employee-dependent, such as employees' competence, commitment, motivation, loyalty, and so on. Although, human capital is recognised as being the heart of creating intellectual capital, a distinctive feature of human capital is that it may disappear as employees exit (Bontis, 1999). Human capital can also be created or bought (Youndt, Subramaniam, & Snell, 2004). Human capital consists of three components: competence, attitude, and intellectual agility (Ashton, 2007). Firms with better and more human capital have higher productivity, income, and market value (Darby, Liu, & Zucker, 2004).

Consequent on the above assertion, the study tries to find out whether human capital of the bank truly has any effect on the financial performance of banks in Nigeria. Thus, the first hypothesis is stated in the null as follows:

H₀₁: Human capital has no significant influence on return on asset of Deposit Money Banks in Nigeria.

Structural Capital Value Added

Jansen, Tempelaar, van den Bosch, and Volberda (2009) define structural capital as the knowledge entrenched in an organisation's processes, routines, and practices. Structural capital includes non-human storehouses of knowledge in an organisation



and supports its human capital (Watson & Stanworth, 2006). According to Kong (2008), structural capital is the routine knowledge which include the knowledge stored in databases, procedures, publications, and organisational culture, which creates value for an organisation. Structural capital belongs to firms, including innovative capital, relational capital, organisational infrastructure, and so on. Unlike the human capital that is embedded in the people in an organisation, and when these individuals leave the organisation, the organisation loses these capitals, the structural capital is owned by the business. This value created by this nature of capital is known as the structural capital value added of the firm. Effective structural capital is built through organisational processes, information systems, organisational culture, internal organisational structure, or administrative systems (Tseng & Goo, 2005).

Besides, it only structurally belongs to the organisation which can be reproduced or shared. Structural capital does not only create systems for knowledge acquisition (Crossan, Lane, & White, 1999), but also offers a mechanism for gathering and incorporating the acquired knowledge (Grant, 1996b) into the firm. Structural capital value added measures the amount of Structural Capital (SC) needed to generate one naira (₦) of value added and is an indication of how structural capital success creates value for the company (Pulic, 1998). According to Moon and Kym (2006), structural capital is less understandable and more specialised than other components of Intellectual Capital (IC). Gozali and Hatane (2014) showed that structural capital value added (SCVA) has a positive and most significant impact on company's financial performance and firm value.

Flowing from the above, the study seeks to know whether the presence of structural capital of the bank has any relevance on the financial performance of the banking sector in Nigeria. It is on this basis that this research examines the effect of structural capital on some selected DMBs in Nigeria. Hence, we hypothesised our second hypothesis as follows in the null form:

H₀₂: Structural capital has no significant effect on return on asset of Deposit Money Banks in Nigeria.



Value Added Capital Employed

Value added capital employed is one component that reflects the book value of the company's net assets (Chen, Cheng, & Hwang, 2005). Value added human capital is the contribution generated by each Naira invested in capital in the form of human resources to add value to the company (Habibah & Riharjo, 2016). Value added capital employed is an indicator for value added, which is created by a unit of physical capital. This shows the proportion of contribution made in terms of value added by each unit of capital employed to the organisation (Gozali & Hatane, 2014). Value added capital employed shows how much value added can be generated with the funds spent on labour.

Habibah and Riharjo (2016) show that value added capital employed (VACA) has a positive and significant correlation in forming an Intellectual Capital construct that affects the company's financial performance. This means that companies with efficient operation processes will create favorable conditions for the company and customers. Also, Tan, Plowman, and Hancock (2007) conducted a study of 150 companies listed on the Singapore Stock Exchange and concluded that IC has a positive and significant effect on the financial performance of the company, both in the present and future. Resulting from the above, the third hypothesis is stated thus in the null:

H₀₃: Capital employed has no significant influence on return on asset of Deposit Money Banks in Nigeria.

Financial Performance

Financial performance refers to the subjective measure of how firms use the assets from its primary mode of business to generate revenues. Financial performance is the general measure of firms' overall financial health over a given period of time, and can be used to compare similar firms across the same industry or to compare industries or sectors in aggregation (Santos & Brito, 2012). Financial performance is a determinant of specific measures that can measure the success of a company in generating profits and a corporate achievement, which is shown as a display state of the company during a specified period (Devi, Khairunnisa, & Budiono, 2017).



Financial performance is highly affected by the decisions made by firms to effectively utilise assets to increase profit (Abreu & Mendes, 2000). In the financial sector, decision made by DMBs indicates how effective the management is working with a mathematical value of the operational efficiency being the measure of the revenues from intellectual capital of the firm (Saira, Jamil, Khalid, & Abdul, 2011). Return on Asset on the other hand (ROA) is a performance measure that assesses the firms' operating performance. It defines the relationship between net profit before interest and tax, and total assets. ROA indicates the assets turnover, gross profit margin and operating leverage. It reflects the operating efficiency of the firm and as such the overall efficiency in the usage of the firm's assets. Indeed, according to Onaolapo and Kajola (2010), ROA can be viewed as a measure of management's efficiency in utilising all the assets under its control, regardless of source of financing.

3. RESEARCH METHOD

The study employed a longitudinal research design over a period of time using convenience sampling technique to select a sample of twelve (12) banks listed in the Nigerian Exchange Group (NGX Fact Book, 2019) as at 31st December, 2019. Secondary data were retrieved from corporate annual reports of the sampled banks for the period 2010-2019, employing descriptive statistics and econometric analysis as the statistical tools. The panel data regression was used for the analysis because of the multi-dimensional nature of the data which has both time and cross-sectional dimension. The Hausman test was used to select between the fixed effect and random effect estimator in panel data analysis. The pooled OLS, random effects (RE) and fixed effects (FE) were estimated. In determining a better model for this study, an F-test for the FE model, the Breusch-Pagan Lagrange Multiplier (LM) test for RE and the Hausman test for both fixed and random models was conducted. Based on the results of these tests, the fixed effect model was found to be most suitable for the study because, it allows for correlation between the unobserved effect and the independent variable.



In line with the objective of the study, the models examined are presented both in their functional forms and in the econometric specifications. The models build on the studies of Meynhardt and Gomez (2019) and Panda, D'Souza, and Blankson, (2019). The model is functionally presented as:

$$CFP=f (IC) \text{ -----(i)}$$

Where; CFP= Corporate financial performance and IC= Intellectual capital. Decomposing the variables into their measures and specifying the econometric form and including control variables of firm size we have;

$$ROA_{it} = \lambda_0 + \lambda_1 SCAP_{it} + \lambda_2 VACE_{it} + \lambda_3 VAHC_{it} + \lambda_4 FSIZE_{it} + u_{it} \text{ -----(ii)}$$

Where; ROA= Return on asset measured as ratio of profit after tax to total asset; SCAP= Structural capital measured as the difference between profit after tax and equity; VACE= Value added capital employed measured as the ratio of profit after tax to capital employed or equity; VAHC= Value added human capital measured as the ratio of profit after tax to human capital expenditures; FSIZE= Firm size measured as the log of total assets; t = Time dimension of the variant; u = error term; λ_0 = the intercept coefficient; $\lambda_1 - \lambda_4$ = the slope coefficients, and $\lambda_1, \lambda_2, \lambda_3, \lambda_4 < 0$.

Statistical results

Descriptive statistics

The data for the study was analysed and the results of the descriptive statistics are presented in Table 1. The descriptive statistics include the mean, median, maximum, minimum, standard deviation, Jarque-Bera, and probability value of research variables.



Table 1
Descriptive Statistics

	Mean	Median	Maximum	Minimum	Std. Dev.	Jarque-Bera	Probability
SCAP	286466	18711	7.31E+08	0.00.	85906526	11647.12	0.000
VACE	0.4605	0.4285	0.7143	0.4285	0.066605	274.1904	0.00
VAHC	0.0879	0.1	0.62	0.38	0.094671	26.06121	0.000
ROA	5.5024	3.75	53.96	-17.18	8.416129	1620.177	0.000
FSIZE	7.0196	7.01	8.68	5.38	0.635391	1.284116	0.5262

Source: Authors' compilation (2022).

The descriptive statistics results showed that the mean for structural capital stood at 2864668. The standard deviation of 85906526 is very large which indicates that SCAP varies considerably from one bank to another despite the fact that they are all in the same financial services industry. The mean for value added capital employed (VACE) stood at 0.4605 with maximum and minimum values of 0.714 and 0.4285 respectively. The standard deviation of 0.066 is low and indicates less variability and volatility in VACE across time for the sampled banks. The mean for value added human capital (VAHC) stood at 0.0879 with maximum and minimum values of 0.62 and 0.38 respectively. The standard deviation of 0.0947 is low and indicates less variability and volatility in VAHC for the cross-sections. The mean for ROA stood at 5.502% with a standard deviation of 8.416. The maximum and minimum values stood at 53.96% and -17.18% respectively. Looking at the control variables, the mean for firm size (FSIZE) measured as the log of total assets stood at 7.019 with a standard deviation of 0.063. The maximum and minimum values stood at 8.68 and 5.38 respectively.

Pearson Correlation Matrix Results

The correlation statistics for the variables is to ascertain the associations between the financial performance measured by Return on asset (ROA) and the independent variables. The results are reported in Table 2.



Table 2
Pearson Correlation Matrix

	SCAP	VACE	VAHC	FSIZE	ROA
SCAP	1				
VACE	0.0928	1			
p-value	0.135				
VAHC	0.0598	0.3593	1		
p-value	0.336	0.00*			
FSIZE	0.0488	-0.101	-0.062	1	
p-value	0.4326	0.1042	0.3167		
ROA	0.0504	0.0923**	0.012	-0.198	1
p-value	0.4178	0.137	0.8429	0.0013*	

Source: Authors' compilation (2022). * sig @5%, **sig @ 10%

The results of the correlation statistics reveal that ROA is positively correlated with SCAP ($r= 0.0504$) but not significant at 5% ($p=0.4178$), positively correlated with VACE ($r=0.0923$) and significant at 10% ($p=0.137$). In addition, the result shows that ROA is also positively correlated with VAHC ($r=0.012$) though not significant at 5% ($p=0.8429$).

Variance Inflation Factor Test

The variance inflation factor test is constructed to test for multicollinearity. The variance inflation factor (VIF) explains how much of the variance of a coefficient estimate of a regressor has been inflated, as a result of collinearity with the other regressors. Essentially, VIFs above 10 are seen as a cause of concern. The results are reported in Table 3.

Table 3
Variance Inflation Factor Test

Variable	VIF
SCAP	1.708008
VACE	3.133199
VAHC	2.207941
FSIZE	2.144613

Source: Authors' compilation (2022)



Multicollinearity among the independent variables implies that they are perfectly correlated. If there exist perfect correlation between the independent variables, the parameter coefficients will be indeterminate. In the presence of multicollinearity, there will be large standard errors of the estimated coefficients. As observed from the results above, none of the variables have variance inflation factor's (VIF's) values more than 10 hence, none gave serious indication of multicollinearity.

Regression Results

The results of the estimated fixed effects (FE) model were used for the hypothesized variables. The choice of FE model was premised on Hausman test used in selecting between the fixed effect and random effect estimator in panel data analysis. The Hausman test statistic shows that the fixed effects (with p-value = 0.000) is the preferred model to the random effects, indicating the presence of correlations between the errors and the explanatory variables which is the key assumption of the fixed effects (Hausman, 1998). Results of the panel regression are presented in Table 4.

Table 4
Regression Result

Variable	Aprori sign	FE-estimates Coefficient () standard error { } p-values	RE-estimates Coefficient () standard error { } p-values
C		0.0469* (0.0227) {0.0395}	0.0395 (0.033) {0.2358}
SCAP	+	0.0617* (0.0142) {0.000}	0.0183 (0.0620) {0.7670}
VACE	+	0.0298* (0.0146) {0.0408}	0.0082 (0.0352) {0.8156}
VAHC	+	0.0415* (0.0112) {0.000}	0.1338** (0.0764) {0.0803}
FSIZE	+	-0.0751* (0.0079)	-0.1013* (0.0162)



	{0.000}	{0.0000}
Model Parameters		
R ²	0.641	0.085
Adjusted R ²	0.533	0.076
F-statistic	28.982	11.032
Prob(F-stat)	0.000	0.000
Durbin-Watson	1.93	1.46
Model Diagnostics		
χ^2_{Hetero}	(0.284)	
$\chi^2_{\text{Serial/Corr}}$	(0.381)	
χ^2_{Norm}	(0.670)	
χ^2_{Hausman}	(0.00)	

Source: Authors' compilation (2022) * sig @5%, ** sig @ 10%

The results of the FE estimates showed that R² for the model stood at 0.641, which implies that the model explains 64.1% of systematic variations in the dependent variable with an adjusted value of 53.3%. The F-stat of 28.982 (p-value = 0.00) is significant at 5% and suggest that the hypothesis of a significant linear relationship between the dependent and independent variables cannot be rejected. It is also indicative of the joint statistical significance of the model. The analysis of coefficients reveals that structural capital (SCAP) estimated in its log form, has the expected positive effect (0.0617) on financial performance and statistically significant at 5% (p=0.000). The result thus confirms that increase in structural capital can improve the financial performance significantly. The effect of value-added capital employed (VACE) is also positive (0.0298) and is statistically significant at 5% (p=0.0408). The result indicates that an increase in the valued added capital employed will significantly increase firm financial performance.

Value added human capital (VAHC) has a positive effect (0.0415) on banks' financial performance and statistically significant (p=0.000) at 5%. The control variable, FSIZE is also significant at 5%. Examining closely the performance of the diagnostic tests, the results confirm normality of the residuals ($\chi^2_{\text{Norm}} = 0.670$), the



absence of stochastic dependence ($\chi^2_{\text{Serial/Corr}} = 0.381$) and heteroscedastic errors ($\chi^2_{\text{Hetero}} = 0.284$).

The results of the regression analyses on the effect of intellectual capital variables on financial performance of DMBs in Nigeria showed a positive effect between intellectual capital measures (VACE, VAHC and SCAP) and ROA. The findings of the study corroborate those of Ali, et al. (2022), Weqar, et al. (2020), Yudawisastra, et al. (2018), Poh, et al. (2018), Ogbodo, et al. (2017), Avci and Nassa (2017), Meles et al. (2016), and Fatima and Ousama (2015) who examined intellectual capital and financial performance of banks in Pakistan and India, Malaysia, Nigeria, Istanbul and USA respectively and found that value added human capital and structural capital value added have significant positive effect on return on asset of banks in their respective jurisdictions. However, the study negates the study of Nazir, et al. (2020) who examined the relationship of value added capital employed, value added human capital, structural capital value added and financial performance of banks and found no significant effect between VACE, VAHC, SCAP and financial performance of banks.

5. CONCLUSION

Intellectual Capital (IC) is the knowledge-based assets of organisations which had attracted a significant amount of practical interest during the last decade. Thus, there is a widespread acceptance of Intellectual Capital (IC) as a source of competitive advantage for firms. Intellectual capital plays a significant role for value creation in today's economies because organisations are depending more on knowledge-based assets than tangible assets to enhance its competitive advantages and performance. Intellectual capital (IC) is the knowledge that can be converted into profit by exploiting the non-financial and non-physical resources of the company. Notably, the absence of intellectual capital information in the financial statements is of great concern to Researchers with respect to the reliability and adequacy of traditional accounting methods. Intellectual capital is one of the human capital assets that boost banks efficiency and financial performance hence an inefficient intellectual capital would decrease banks' financial performance. The study revealed that Value Added



Human Capital, Value Added Capital employed and Structural Capital Value Added each had a significant effect on Return on Assets of Deposit Money Banks in Nigeria. Conclusively, Banks' management may need to pay more attention to intellectual capital by having a policy plan for intellectual capital development. A situation where intellectual capital is not recognised in the financial statements by banks is a huge glitch given the critical role it plays in sustaining the growth and survival of banks in Nigeria. Furthermore, managers of servicing firms like banks should as a matter of urgency continually train and retrain (training, research and development) their personnel, given the fact that human capital do not only contribute over 50% to the banks' total revenues which determine the financial performance of its economic activities, but as well constitute over 50% of the human resources that put into use the physical assets of banks to achieve organisational goal. Thus, to sustain the bank's financial performance through a knowledge-based assets and enhance its competitive advantage, priority and adequate training must be given to its personnel.

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