Intellectual Capital and Financial Performance: Evidenced from Quoted Non-Financial Firms in Nigeria

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Abstract
Performance is a major global challenge driving extensive organisational research. This study considered how Nigerian businesses' financial success is impacted by their intellectual capital. It examined the effects of relational capital efficiency, capital employed efficiency, structural capital efficiency and human capital efficiency on financial performance of quoted non-financial firms in Nigeria. Data were collected from 22 companies listed on the Nigerian Exchange Group (NGX) between 2013 and 2022 across four industries: manufacturing, ICT, health services, and oil and gas. This was done using an ex-post facto descriptive study design. Post estimation tests were utilised in conjunction with panel data analysis, incorporating fixed effect analysis, OLS (Ordinary Least Squares) analysis and random effect analysis. The study used the Generalised Method of Moments (GMM) to resolve endogeneity concerns and provided trustworthy estimations. The findings revealed that HCE considerably increased ROA, but both HCE and firm size (FS) positively influenced ROE. On the other hand, the financial performance of the companies was significantly and negatively impacted by SCE, CEE, and RCE. Overall, the study found that performance was primarily impacted negatively by intellectual capital. It was recommended that firms strengthen human capital, invest proactively in structural capital, optimise capital employed and maintain continuous investment in relational capital to enhance financial outcomes.

Keywords: Financial performance, human capital, intellectual capital, relational capital, structural capital

Introduction
In the highly competitive and corporate business environment, financial performance has become a critical measure of organisational health and competitiveness (Umar & Dandago, 2023). Intellectual capital (IC), which embodies knowledge, expertise, relationships, and experience, is essential for maintaining competitive advantage and creating value (Isola et al., 2019). Since the late 1980s, scholars such as Kenneth Galbraith and Leif Edvinson have advanced its theoretical foundation, highlighting its growing relevance, particularly in developed economies. IC is typically examined through its various components, human, structural, relational, and capital employed efficiency, which collectively determine a firm's

capacity to transform knowledge into financial gains (Muhammad & Ismail, as cited in cross-sector VAIC studies, 2014; Isola et al., 2019).

In general, empirical data show that financial performance metrics like Return on Asset (ROA) and Return on Equity (ROE) are positively correlated with Intellectual Capital (IC), though some studies report mixed outcomes (Giwa & Ikilidih, 2025; Umar & Dandago, 2023). Overall, IC is seen to be a key factor in competitive advantage and organisational success. The VAIC model is commonly applied in IC research, while its extended version, the Modified VAIC (MVAIC), incorporates relational capital for a more comprehensive assessment (Umar & Dandago, 2023; Ojianwuna & Chukwuekwu, 2023). However, in Nigeria, studies using advanced models like MVAIC remain limited (Umar & Dandago, 2023). This study focuses on how to close this gap by concentrating on how IC affects the financial performance of Nigerian firms across multiple industries, to guide organisations in leveraging intangible resources for sustainable growth.

Statement of the Problem

In the modern global economy, organisational success increasingly depends on intangible resources, as intellectual capital is recognised as one of the primary sources of competitive advantage. Many people believe that human capital is the most crucial element of IC due to its strong effect on firm performance (Izuchukwu et al., 2022; Abba et al., 2023). Although IC is widely studied globally, research within Nigeria remains limited despite the country's diverse industries where such insights are valuable (Salman & Abogun, 2023; Onuh & Abdullahi, 2024). Most prior Nigerian studies on IC have concentrated on specific sectors, notably banking and manufacturing, while industries such as health services and oil and gas have received limited attention (Izuchukwu et al., 2022; Onuh & Abdullahi, 2024). Given Nigeria's economic diversity, a multi-industry investigation is necessary to capture a holistic perspective of IC's impact. This study, therefore, investigates how Human Capital Efficiency (HCE), Structural Capital Efficiency (SCE), Capital Employed Efficiency (CEE), and Relational Capital Efficiency (RCE) components of IC affect financial performance, measured by ROA and ROE. Drawing on data from 22 firms across four industries (manufacturing, ICT, health services, and oil and gas) covering the period 2013 to 2022, and employing the MVAIC model, the research provides fresh perspectives on IC's strategic function in promoting firm performance and supporting Nigeria's economic growth (Salman & Abogun, 2023; Olohunlana et al., 2023).

Objectives of the Study

The study's goal is to investigate the connection between Nigerian businesses' financial performance and their intellectual capital. To accomplish this broad goal, the study pursued the following specific objectives:

i. To assess the effect of HCE on the financial performance of selected firms in Nigeria.
ii. To evaluate the influence of SCE on the financial performance of selected firms in Nigeria.
iii. To examine the impact of capital employed efficiency CEE on the financial performance of selected firms in Nigeria.
iv. To determine the relationship between RCE and the financial performance of selected firms in Nigeria.

Conceptual Review

Financial Performance

The concept of performance remains an important yet complex issue in global research, with scholars struggling to define it clearly. Roger & Wright (1998) observe that although

performance is frequently employed as a dependent variable in organisational research, it remains an imprecisely defined concept. Similarly, Gavrea et al. (2011) emphasise its multifaceted nature. Watson (2007) defines performance as the effective utilisation of resources to generate revenue, while Davis & Cobb (2010) view it as the achievement of business goals based on predefined standards.

Generally, performance reflects an organisation's ability to achieve its objectives while optimising resources. Lee et al. (2013) describe firm performance as a measure of competitiveness and strategic goal attainment. Managers rely on performance assessments to understand their company's standing. Financial performance, which directly results from operational success, serves as a key measure, integrating dimensions like productivity, efficiency, and effectiveness. Since financial data is accessible and comparable, it forms the basis for empirical research on firm performance.

The efficiency with which a business generates income from its capital is reflected in its financial success, as suggested by Nwaiwu and Aliyu (2018). It functions as a crucial signal of corporate health within a given period and provides a basis for comparing performance across industries. Two primary methods exist for evaluating financial performance: accounting-based measures and market value assessments. The accounting approach relies on financial statements and key financial ratios, assessing profitability, liquidity, debt, and turnover. Profitability is particularly important for business owners and stakeholders, as achieving strong financial results is an essential objective for any economic organisation. (Ross et al., 2008).

Intellectual Capital (IC)

As industrialised nations realised the importance of intellectual capital for commercial success, they gained widespread recognition in the late 1980s and early 1990s. Researchers and companies developed frameworks to measure IC and highlight its importance in financial reporting. Sullivan & Patrick (1999) define IC as the knowledge and information that contribute to profit generation, encompassing four key dimensions: HCE, SCE, CEE and RCE. While traditional accounting focuses on tangible assets, IC represents intangible elements like knowledge, organisational processes, and customer relationships, which contribute to a company's competitive advantage.

Several scholars have provided different definitions of IC, emphasising its role in wealth creation. Edvinsson & Malone (1997) describe it as valuable knowledge held by an enterprise, while Brooking (1996) identifies it as a mix of infrastructure, human assets, intellectual property, and market resources. Patricia & Leif (2020) define IC as an organisation's total intangible assets that generate value. Adedeji et al. (2020) introduced the concept of spiritual capital, highlighting IC's role in mitigating risks, promoting transparency, and shaping long-term investment decisions.

IC plays an important function in modern enterprises by encouraging innovation, learning, and competitive advantage. Human resource management has evolved to enhance employees' productivity, recognising them as key intellectual assets. Quinn (1992) emphasise that great companies are built on ideas and intellect rather than physical assets.

Measuring IC remains challenging, but models like Pulic's VAIC provide a structured approach. Recent studies have expanded VAIC to include additional elements, reinforcing IC's significance in business performance. As knowledge-driven economies rise, effectively managing IC becomes essential for sustainable growth and corporate success.

Intellectual Capital and Firms' Performance

The importance of intellectual capital is becoming more widely acknowledged as a strategic resource that strengthens competitive advantage and enhances firm performance. It is

commonly conceptualised through three dimensions - HCE, SCE and RCE, which collectively drive organisational outcomes (Inkinen & Chase, 2015; Kweh et al., 2019). While human capital is often regarded as the most critical element (Fareed et al., 2016), IC as a whole remains a broad construct encompassing various intangible resources. Firm performance, in turn, is assessed through both financial metrics, including market expansion and profitability, as well as non-financial metrics, including customer satisfaction, innovation, and employee engagement (Indriana, 2022). Understanding IC helps firms manage stakeholder relationships effectively (Bontis, 1998). Structural capital enhances organisational productivity (Kasoga, 2020), and relational capital fosters connections with key external parties (Soetanto & Liem, 2019).

A significant correlation between IC and business performance is consistently demonstrated by empirical studies. Research from the manufacturing sectors of South Korea, ASEAN, and BRICS indicates that IC and financial metrics like ROA are positively correlated (Nimtrakoon, 2015; Nadeem et al., 2017; Xu & Wang, 2018). Similar results were found in Malaysian industries (Mohammad & Bujang, 2019b; Kasoga, 2020). However, some studies report inconsistent findings due to variations in economic conditions, data availability, and research scope. Despite occasional weak correlations, the majority of research supports IC's ability to improve performance (Xu et al., 2019; Handzic et al., 2016). Future research is needed in emerging economies to further explore IC's impact, particularly in countries with limited investment in human capital (Muhammad, 2016). Overall, IC is projected to boost Nigerian enterprises' performance.

Conceptual Model

This study uses the Modified Value Added Intellectual Coefficient (MVAIC) model to examine the relationship between intellectual capital and corporate financial performance. Relational capital efficiency, capital employed efficiency, human capital efficiency, and structural capital efficiency are the four primary dimensions of the approach. The MVAIC offers a more thorough evaluation than the conventional VAIC model since it incorporates RCE. Return on equity and return on assets are used to gauge a company's success, with firm size and age serving as control factors. The study's goal is to develop an improved model for analysing the efficiency of IC in the Nigerian corporate environment, as shown in Figure 1.

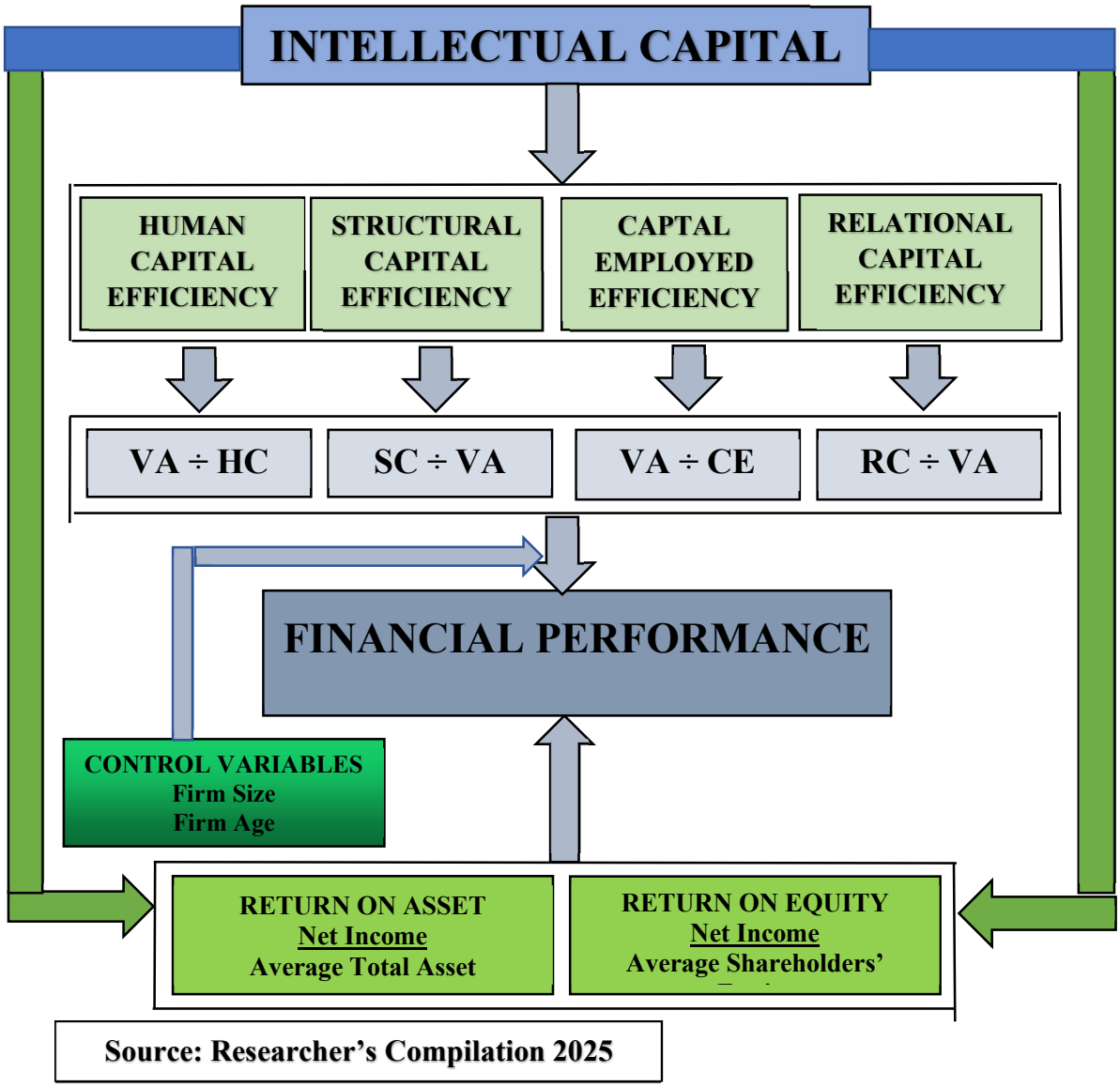

Figure 1: The Conceptual Model.
Source: Author's Conceptual Model (2025)

Theoretical Framework

This research examines the relationship between intellectual capital and the financial performance of publicly traded companies in Nigeria, using the Resource-Based View (RBV) and Knowledge-Based View (KBV) as theoretical underpinnings. These ideas describe how intangible resources influence corporate performance. RBV, advanced by Barney (1991), emphasises that sustained competitive advantage arises when firms effectively utilise unique, valuable, and inimitable resources. Within this framework, IC, including human capital (employee proficiency and abilities), structural capital (organisational structures and processes), and relational capital (customer and stakeholder interactions), is seen as a crucial driver of profitability and competitive positioning (Isola et al., 2020).

KBV extends RBV by emphasising knowledge as the most critical organisational resource. It contends that firms gain sustainable competitive advantages through knowledge creation, accumulation, and dissemination. Investments in employee education, training, and healthcare contribute to strengthening the knowledge base, fostering innovation and efficiency, and ultimately improving financial performance (Okafor & Daferighe, 2019). Nwaiwu & Aliyu

(2018) emphasise that IC should be regarded as a strategic asset in the same way as physical investments when assessing corporate value. RBV and KBV together offer a strong theoretical lens for examining how IC underpins organisational performance. By highlighting the importance of these viewpoints offer the framework for examining the impact of IC on Nigerian companies' financial performance through efficient management of human, structural, and relational capital.

Empirical Review

Empirical data regarding IC's impact on business performance presents mixed outcomes across different contexts, including Nigeria. While IC is often expected to positively influence organisational success, findings vary depending on the measurement model, industry, and national environment. Most studies have employed either the VAIC or its extended form, the Modified VAIC, which integrates relational capital, to assess IC's contribution to performance.

Okewale et al. (2020) evaluated the importance of human capital accounting to the attainment of the Sustainable Development Goals (SDGs) in Nigeria using data from 31 listed companies between 2013 and 2017. Their analysis revealed a positive link between HCE and sustainability but a negative relationship between CEE and human capital accounting. Similarly, Aluwong (2022) examined non-financial companies listed on the Nigerian Exchange Group (NGX) and discovered that while HCE had no discernible effect, SCE, CEE, and total VAIC greatly increased ROA. These results imply that in some industries, relational and structural capital can be more important than human capital.

Beyond Nigeria, other studies provide additional insights. Hesniati (2021), investigating rural banks in Indonesia, reported that HCE, SCE, CEE, and technological capital positively affected performance, while social and spiritual capital showed no significant contribution. Likewise, Mohammad (2022), using 788 firm-year observations from Jordanian industrial companies, demonstrated a strong positive relationship between IC and ROE. However, while HCE and CEE drove performance, SCE had a negative influence, suggesting inefficiencies in internal processes.

Comparative studies also highlight the sectoral dimensions of IC. Okoye et al. (2015) found that human, structural, relational, and innovation capital collectively explained about 40% of firm performance variations in Nigeria, with innovation capital playing a central role. In a related study, Mitha et al. (2018), analysing 242 knowledge-based firms, showed that HCE enhanced both financial and market performance, while SCE and RCE had little effect. CEE was significant for financial but not market outcomes, underscoring industry-specific dynamics.

Taken together, these studies confirm that IC contributes to productivity, value creation, and profitability, but its impact differs across industries and firm characteristics such as size, governance, and sector orientation. Human and relational capital appear consistently beneficial, while the effects of structural capital remain inconsistent. From the perspective of RBV and KBV, managing IC strategically can provide firms with a sustainable competitive advantage. Future research is needed to refine IC measurement and to capture its long-term effect on business success, especially in the developing Nigerian economy.

Methodology

Using an ex post facto design, this study investigated the connection between intellectual capital and the financial performance of Nigerian companies. The Modified Value Added Intellectual Coefficient (MVAIC) model was used to assess the effects of relational capital efficiency, capital employed efficiency, structural capital efficiency, and human capital efficiency on return on equity and return on assets. From 2013 to 2022, the analysis focused on 22 publicly listed companies from four sectors: oil and gas (3), manufacturing (11), ICT (5),

and health services (3). Based on the quantity of intellectual capital revealed in their financial accounts, companies were selected. Ordinary Least Squares (OLS) regression, fixed-effects, and random-effects panel data techniques were employed, with post-estimation tests performed to validate the models. To reduce potential endogeneity, the Generalised Method of Moments (GMM) was also used. The methodological approach is compatible with previous research, such as Sohel and Hossain (2023) and Mitha et al. (2018), which improves the reliability and validity of the results.

Variables Specification

This section describes the models and variables utilised to investigate how Nigerian businesses' financial performance and intellectual capital (IC) relate to one another. The variables are classified as independent, dependent, and control, as previously reported by Sohel & Hossain (2023), Appah et al. (2023), Pertiwi et al. (2023), Noel et al. (2022), Aybars & Oner (2022), and Mitha et al. (2018). ROA and ROE are used to evaluate financial performance, the dependent variable. The independent variable, intellectual capital, is measured using the Modified Value Added Intellectual Coefficient (MVAIC) model, which combines HCE, SCE, CEE, and RCE. Firm Age (FA) and Firm Size (FS) are control variables that are used to account for firm-specific characteristics.

Financial Performance = f(Intellectual Capital)……………………………………………………......(i)

Financial Performance = f(HCE, SCE, CEE, RCE, FS, FA)…………………….………………….…(ii)

$$FP_{(ROA)} = \beta_0 + \beta_1\Sigma HCE_{it} + \beta_2\Sigma SCE_{it} + \beta_3\Sigma CEE_{it} + \beta_4\Sigma RCE_{it} + \varepsilon_{it} \quad \text{……………………………….(iii)}$$

$$FP_{(ROE)} = \beta_0 + \beta_1\Sigma HCE_{it} + \beta_2\Sigma SCE_{it} + \beta_3\Sigma CEE_{it} + \beta_4\Sigma RCE_{it} + \varepsilon_{it} \quad \text{………………………………..(iv)}$$

$$FP_{(ROA)} = \beta_0 + \beta_1\Sigma HCE_{it} + \beta_2\Sigma SCE_{it} + \beta_3\Sigma CEE_{it} + \beta_4\Sigma RCE_{it} + \beta_5\Sigma FS_{it} + \beta_6\Sigma FA_{it} + \varepsilon_{it} \quad \text{……..(v)}$$

$$FP_{(ROE)} = \beta_0 + \beta_1\Sigma HCE_{it} + \beta_2\Sigma SCE_{it} + \beta_3\Sigma CEE_{it} + \beta_4\Sigma RCE_{it} + \beta_5\Sigma FS_{it} + \beta_6\Sigma FA_{it} + \varepsilon_{it} \quad \text{……..(vi)}$$

Where:

FP = Financial Performance

IC = Intellectual Capital (HCE + SCE + CEE + RCE)

HCE = Human capital efficiency (HCE = VA/HC) this represents the value that one unit of invested human capital adds during the time period. (Soyemi, *et al*. 2019)

SCE = Structural capital efficiency (SCE = SC/VA)

CEE = Capital employed efficiency (CEE =VA/CE) this is the value produced by using one unit of capital.

RCE = Relational capital efficiency **(**RCE = RC/VA**)**

VA = Value Added (Operating profit (OP) + Employment Cost (EC) + Total Depreciation and Amortization (TD&A).

HC = Human capital (The total amount of wages and salaries paid out to employees over the course of the year + Expenses allocated to staff training + Spending on seminars and workshops + Expenditures on short-term courses and boot camps + Other employees' benefits).

SC = Structural capital (VA–HC. A higher share of HC in VA will result in lower SC)

CE = Capital employed (VA + output – input); where, capital employed refers to the book value of assets and VA refers to value-added.

OUT = All revenue derived from the sale of goods and services in the marketplace.

IN = All expenditures made to generate that revenue.
RC = Relational capital (Marketing Expenses + Advertisement Expenses)
ROA = Profit after tax / Total Assets
ROE = Profit after tax / Shareholders' Equity
C = Constant
β_0 = Intercept / Constant;
β_{1-4} = Slope Coefficients; and
ε = Error Term.

Control Variables

FS = Firm size (Log of Total Assets)
FA = Firm age (Log of number of years of establishment)

Result and Discussion

Table 1: Descriptive Analysis

Statistics	ROA	ROE	HCE	SCE	CEE	RCE	FS	FA
Mean	0.0599	0.1258	4.1388	0.5756	0.4383	0.4349	6.9571	1.6805
Median	0.0553	0.1281	3.0559	0.6788	0.4559	0.2493	7.4565	1.7634
Maximum	0.3175	5.0686	53.333	3.5065	0.7501	9.0552	9.7999	2.0899
Minimum	-0.5655	-31.897	-11.537	-7.0482	-0.4857	0.0009	2.8924	1.0000
Std. Dev.	0.0819	2.2384	4.8617	0.7971	0.1216	0.9509	1.5773	0.2603
Skewness	-1.9114	-13.303	5.467	-6.4869	-2.5256	7.1998	-0.5146	-0.722
Kurtosis	19.575	192.34	52.022	62.414	18.291	59.739	2.1535	2.5358
Jarque-Bera	2652.2	335117	23125	33902	2377.1	31411	16.276	21.088
Probability	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0000
Sum	13.17	27.669	910.54	126.64	96.42	95.667	1530.6	369.72

Source: Author's Computation (2025)

The descriptive statistics summarise the dataset used to test the study's hypothesis, covering ROA, ROE, HCE, SCE, CEE, RCE, Firm Age (FA) and Firm Size (FS). With a standard deviation of 0.0819 and a range of -0.5655 to 0.3175, the average ROA is 0.0599, suggesting little dispersion. Although ROE has a mean of 0.1258, its standard deviation of 2.2384 indicates significant variability. HCE is the most volatile, with an average of 4.1388, a standard deviation of 4.8617, and a range of -11.537 to 3.5065. Significant variance is indicated by SCE's mean of 0.5756 and standard deviation of 0.7971. Significant variance is also seen in CEE and RCE, with standard deviations of 0.9509 and 0.1216, respectively. With respective standard deviations of 1.5773 and 0.2603, the mean values for FS and FA are 6.9571 and 1.6805, indicating significant variability. According to the skewness analysis, the other variables are negatively skewed, whereas HCE and RCE are positively skewed. The dataset exhibits

leptokurtic distributions (kurtosis >3) except for FS and FA, which are platykurtic, indicating flatter distributions.

Table 2: Estimation Results for Intellectual Capital and Financial Performance

Models	**MODEL A (ROA)**				**MODEL B (ROE)**			
Estimation Techniques	**Random-effects Regression**				**Random-effects Regression**			
Dependent variables ROA/ROE	Coeff	Std. Err	T-Stat	Prob	Coeff	Std. Err	T-Stat	Prob
C	0.1005	0.2156	0.4663	0.6415	-0.2968	1.3991	-0.2121	0.8322
HCE	0.0086	0.0012	6.9671	0.0000	0.0242	0.0343	0.7062	0.4808
SCE	0.0076	0.0105	0.7293	0.4667	0.1756	0.3158	0.9268	0.5788
CEE	0.0218	0.0500	0.4366	0.6629	0.0909	1.4613	0.5560	0.9505
RCE	-0.0045	0.0101	-0.4447	0.6570	0.0495	0.2912	0.0622	0.8652
FS	-0.0139	0.0053	-2.6445	0.0089	0.1316	0.1014	1.2983	0.1956
FA	0.0049	0.1196	0.0408	0.9675	-0.4497	0.6384	-0.7044	0.4820
R^2	0.4485				0.0175			
Overall/Adjusted R^2	0.3709				-0.0102			
F-Stat	5.7829 (0.0000)				0.6312 (0.7052)			
Hausman Test	10.1620 (0.1180)				0.6610 (0.9953)			
LM Test	358.763 (0.0000)				378.35 (0.0000)			
Heteroskedasticity Test	0.4196 (0.6752)				0.1547 (0.8772)			
Durbin-Watson Stat	1.9267				2.2741			

Source: Author's Computation (2025)

Model A (ROA) and Model B (ROE) are the two models used in the regression findings to evaluate the effect of IC on the financial performance of Nigerian listed firms. Model A's R^2 of 0.4485 indicates that the independent variables (HCE, SCE, CEE, RCE, FS, and FA) explain 44.85% of the variation in ROA. By comparison, Model B records an R^2 of 0.0175, reflecting a very weak explanatory power for ROE. In terms of variable contributions, HCE, SCE, and CEE exhibit positive effects on ROA, while RCE exerts a negative influence. Among these, only HCE is statistically significant ($p < 0.05$), underscoring the central role of HCE in driving firm profitability as measured by ROA. The adjusted R^2 (0.3709) and F-statistic (p-value = 0.0000) further support the model's reliability. Model B, however, exhibits weak explanatory power, as none of the independent variables significantly impact ROE (all p-values > 0.05).

Though all coefficients are positive, their effects are not statistically meaningful. The adjusted R^2 is negative (-0.0102), reinforcing the model's poor fit. Diagnostic tests indicate no heteroscedasticity issues, but serial correlation is present. The Hausman test results support the use of a random-effects regression model in this investigation. Overall, the analysis shows that the most crucial element of IC for improving financial performance, particularly ROA, is HCE. This conclusion emphasises the need to invest in employee skills, knowledge, and capacities as a means of increasing profitability. Further research is recommended to explore alternative determinants of ROE in Nigerian firms.

Table 3: GMM Estimation Results for Intellectual Capital and Financial Performance

Models	**MODEL A (ROA) (DGMM)**				**MODEL B (ROE) (SGMM)**			
Dependent variables ROA/ROE	Coeff	Std. Err	T-Stat	Prob	Coeff	Std. Err	T-Stat	Prob
ROA(-1)/ROE(-1)	0.0192	0.0334	0.5733	0.5672	-0.1282	0.0003	-486.72	0.0000
HCE	0.0259	0.0030	8.7005	0.0000	0.1654	0.0062	26.535	0.0000
SCE	-0.0268	0.0049	-5.4686	0.0000	-0.5023	0.0510	-9.8587	0.0000
CEE	-0.1705	0.0229	-7.4323	0.0000	-2.9298	0.2642	-11.088	0.0000
RCE	-0.0383	0.0067	-5.7364	0.0000	-0.7503	0.0643	-11.669	0.0000
FS	-0.0291	0.0072	-4.0687	0.0001	0.1220	0.0189	6.4469	0.0000
FA	-0.2173	0.1353	-1.606	0.1101	-0.7416	0.2496	-2.9705	0.0034
AR(1)	0.4789 (0.6530)				-872.55 (0.2830)			
AR(2)	NA				-172.82 (0.3763)			

Source: Author's Computation (2025)

To mitigate endogeneity issues in the panel data, the Generalised Method of Moments (GMM) approach is used in the study, incorporating lagged values of ROA and ROE to capture the effects of past performance. The analysis shows that earlier ROA has a slight favourable impact on present ROA, whereas current ROE is negatively impacted by former ROE. AR(1) and AR(2) diagnostic tests do not reveal any autocorrelation, which supports the instruments' validity.

The findings emphasise the different effects of IC components on company success. HCE regularly demonstrates a favourable and noteworthy correlation with ROE and ROA, emphasising its role in achieving financial success. However, SCE, CEE, and RCE have a negative impact on ROE. Firm size (FS) also contributes positively to ROE, while other firm-specific factors show mixed results.

In conclusion, while IC as a whole may not always improve firm performance, the most important element in boosting profitability is human capital, particularly in terms of ROA, among Nigerian businesses.

Conclusion

The statistical study shows that HCE is the only variable with a t-value in the ROA and ROE models greater than 1.96, demonstrating its statistical importance. In contrast, the other intellectual capital components—SCE, CEE, and RCE—have t-values below 1.96, indicating no substantial effect on ROA and a considerable negative impact on ROE. These regression results suggest that HCE positively influences financial performance, while the remaining IC elements may hinder it in the Nigerian context. These findings are consistent with those published by Aybars and Oner (2022), who found a negative correlation between IC and business success. However, they contrast with prior studies by Faruq et al. (2023), Znar et al. (2022), Mitha et al. (2018), and Rafrini & Yetty (2015), which all revealed a beneficial association between IC and firm success.

Finally, the research indicates that whereas HCE greatly boosts ROA, IC has a detrimental impact on Nigeria's financial performance, which implies that other IC components may not contribute effectively to firm success.

Recommendations

The report assesses IC's influence on the financial performance of publicly traded enterprises in Nigeria and makes critical suggestions.

i. Human capital development should be prioritised through competitive remuneration, training programs, and employee welfare initiatives to enhance workforce productivity.
ii. Structural capital investment is crucial, including infrastructure, databases, R&D, and operational systems to improve efficiency.
iii. Capital employed should be strengthened by allocating resources to physical assets such as property, machinery, and inventory to boost revenue generation.
iv. Relational capital requires continuous investment in marketing, advertising, and distribution expenses to maintain strong external relationships and understand customer needs.

By strategically managing these IC components, firms can improve their financial results while maintaining a competitive advantage.

Contribution to Knowledge

This study adds value to both academic literature and practical application by exploring how intellectual capital influences firm financial performance through conceptual insights, theoretical grounding and methodological perspective.

i. Conceptually, it provides a full breakdown of IC components (HCE, SCE, CEE, RCE) and includes company size and age as control variables for more exact analysis.
ii. Theoretically, it reinforces the RBV and KBV, showcasing how people and structural capital drive financial performance.
iii. Methodologically, it advances research by using the Modified VAIC model and addressing endogeneity through the GMM. The study's dataset, covering 22 firms across four industries over ten years, enhances its reliability.
iv. Practically, it emphasises the necessity for businesses to invest in human capital, infrastructure, and relational networks to sustain financial growth. These insights benefit policymakers, regulators, and business leaders in shaping strategic investment decisions.

Suggestions for Further Studies

For further research on IC and financial success in Nigerian enterprises, several recommendations are proposed.

- **i.** Expanding the sample size by including private and unquoted firms would provide broader insights.
- **ii.** A comparative sectoral analysis across industries like agriculture, construction, and financial services could enhance understanding of IC's impact across different sectors.
- **iii.** Diverse research methods, such as interviews and financial statement reviews, may offer deeper insights.
- **iv.** Introducing moderating or mediating variables, like corporate governance, could reveal how IC efficiency is influenced by governance structures.
- **v.** Enhancing the MVAIC model by incorporating social, innovation, or spiritual capital could refine IC efficiency measurements.
- **vi.** **Alternative methodologies** such as 2SLS could address GMM limitations and provide additional robustness in analysing IC's effect on firm performance.

These suggestions can help future studies develop a deeper comprehension of the function of IC in financial success.

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