Intellectual Capital and Financial Performance of Quoted Companies in Nigeria

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Abstract

The study examined the impact of intellectual capital on the financial performance of quoted companies in Nigeria. The study employed twenty-five companies from five sectors of the economy. The ex-post facto research design was employed in the study, to aid the use of secondary data within 2015-2020 was soured from the financial statement of the companies. The dependent variable was measured using the sales and asset growth of the selected companies and the intellectual capital was measured using the human capital efficiency, structural capital efficiency, and relational capital efficiency. The findings revealed that structural, relational capital efficiency and value-added have a negative, positive and positive significant effect on sales and asset growth of the selected companies. It is therefore recommended that the organization should invest in the structural and relational capital efficiency in the organization because it has the intrinsic capacity to improve the level of performance in the organization.

Keywords: **Intellectual Capital, Financial Performance, Human Structural and Relational**

JEL Classification: C23, D21, G32

1. Introduction

The economy in recent times is now knowledge-based, this implies that knowledge and information are the two cogent tools that aid in the construction of any business operations. The knowledge-based economy is a proponent of the paradigm shift from the dependency on physical labor and natural resources to knowledge and information resources being the bane of wealth generation for the organization. The overdependence of firms on the physical and natural resources disallowed organizations to grow and participate continuously (El-Bannany, 2008). And the ability to remain in the industry was given to the

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firms that used their intangible asset of knowledge and information to carve out their market and generate a competitive advantage over others.

The disruptive nature of firms from the productive-based economy to the knowledge-based economy has given relevance to intellectual capital as the main source in a firm to determine competitive advantage and also establish wealth and value creation in a firm business model (Nassar, 2020). In a knowledge-based economy, information technology, innovation, creativity, and research and development are all considered key assets. Intellectual Capital has grown increasingly important as communication, storage, and accumulation of knowledge have improved, as well as easy access to knowledge (Rashid, Farooq, Liaqat, Qudeer, and Younas 2020).

However, studies on intellectual capital have attempted to work against the disadvantages of conventional indicators that are based on the only tangible asset that measures and account for organizational performance. This study examines the impact of intellectual capital on the human, structural and relational capital efficiency that an organization wields to improve its performance. The performance was examined from the sales and asset growth because it will allow the strategic level management to understand the extent to which the various intellectual capital concept in an organization influence growth. And the intellectual capital measurement microscope the three different components of intellectual capital in a firm.

It was equally observed from reviews that the focus of many studies that examined the relationship between intellectual capital and performance is majorly the financial sector while the service sector suffers neglect. So, considering non-financial firms in this context play a critical role in setting the economy in its developmental processes. It was observed from the review that most of the empirical studies only focused on the relationship between intellectual capital and performance in the financial sector, while other sectors that need the knowledge and information concept of intellectual capital were seriously neglected. So the consideration of the five sectors identified will play an important research gap in understanding the extent and direction of intellectual capital in various firms and the percentage the concept has on the financial performance of the selected firms. The population of the study includes five (5) companies each from ICT (Information and computer technology) companies, manufacturing companies, health care companies, oil and gas companies, and service companies. The companies were selected due to their dependence on the accuracy and effectiveness of intellectual capital on their performance and growth.

The limitation attached to the measurement of intellectual capital is because financial statements are only prepared to justify the differences between the book value and market value of an organization and those do not reveal the organizational value holistically (Holmen, 2011). This unsolved problem has denied management and other stakeholder's interest in the company's timely and relevant information that would allow them to make critical decisions about their human, structural, and relational capital (Ewereoke, 2018).

The negligence of the Nigerian firms to properly put to use the intrinsic benefits of the human, structural and relational capital of the skilled and unskilled labor in the internal environment of the firm and externally, has caused movement of the intellects to move to other countries that have a package for the usage and benefits of intellectual capital advantages (Ewereoke, 2019). And this in the long-run has stunted the growth and performance of companies in the economy. It is readily imperative that the employment of knowledgeable and innovative personnel in an organization as the tendency to improve the reputation of the organization and also improve the human capital of such firm (Chen, Cheng & Hwang, 2005).

Gender discrimination can also affect companies in benefiting from the value of intellectual capital. Unlike countries like Spain and Norway that have legislated the gender quota in the employment process of the firm in their countries to also improve the benefit of human capital enjoyed by the firm in terms of females and males. But developing countries like Africa and Nigeria specifically, have a biased practice in the business environment on the gender type employment that is available to the populace in the country. This practice has affected the required human, structural and relational capital that will aid performance in such a firm when effectively handled by their strategic teams. And this behavioral lacuna of the firm, through determining the suppliers and customers has drained their reputation from other stakeholders and performance (Brannstrom & Giuliani, 2009; Nnado & Ozouli, 2016).

Firms' performance is the capability of organizations to meet their stakeholder's needs and their own needs for survival and growth (Abualoush, Masa'deh, Bataineh, & Alrowwad, 2018). Financial performance is the numerical advantage or monetary dexterity a firm can harness during a calendar year through the effective usage of its tangible and intangible capabilities and asset. Organizational performance, according to Apiti, Ugwoke, and Chiekezie (2017), is the result of firm economic activities that can come from three distinct areas: product market performance, shareholder returns, and financial performance. The focus of this research is on financial performance, which is a company's ability to generate profit over time. Profitability is a key indicator of a company's success (Adegbayibi, 2021).

This study captured five sectors of the economy (manufacturing, health, ICT, services and pharmaceutical). Extant studies, especially in Nigeria, only concentrate on manufacturing and the financial sector. This brings about the novelty of this study and the robustness in literature and practice. The limitations of this study can be seen from the viewpoint that it only concentrate on performance. There are other indices like growth, non-financial indices that can also be covered in subsequent studies. Other studies can also concentrate on the developed and other developing economy.

The rest of this paper is structured as follows; Section 2 is literature review, Section 3 deals with methodology. Section 4 deals with result and discussions and the last section deals with conclusion and the policy implication.

2. Literature Review

Theoretically, the resource-based view can also be referred to as the resource-advantage theory. The theory is one of the strategic planning paradigms for all organizations that want to remain in the ideology of improving overall performance internally and externally. The positioning school and its rather prescriptive approach, which concentrated managerial emphasis on external concerns, particularly industry structure, can be understood as a reaction to RBV. Throughout the 1980s, the so-called positioning school dominated the field. Penrose (1959) and other scholars like Wernerfelt 1984, Barney 1991, and Conner 1991 gave credence to the theory. The theory position is that sustainable competitive advantage can only be attained and maintained by an organization through the development of internal and superior capacities, capabilities, resources, and intangible assets. The groundbreaking scholastic work of Jay Barney'd 1991 of "Firm Resources and Sustained Competitive Advantage, gave much relevance to the resources-based theory and postulation.

The Resource-based perspective is an umbrella to the knowledge-based perspective because the resource-based captures all information and tangible and intangible capabilities that a firm can use to its advantage in the competitive environment where innovation is apparent. (Hoskisson, Hitt, Wan, and Yiu, 1999). But the knowledge-based perspective encourages the exceptional and rare intangible asset that an organization can use in generating increasing returns, just like the economic factors of an organization. (Roos, Edvinsson, and Dragonetti, 1997).

The lack of being imitated by other firms in the industry is what makes the knowledge-based asset dynamic and comprehensive. This is also the reason why this capability guarantees a competitive advantage in the industry (Putra and Ratnadi, 2021). The firm's knowledge resources have sparked a lot of interest because they reflect how the scholarly world has recognized the fundamental economic changes that have resulted from the accumulation and accessibility of knowledge over the last two decades (Bansal & Singh, 2020). In most industrialized economies, the transition from manufacturing to services is based on the manipulation of data and images rather than the use of actual goods. Singh and Bansal, 2020).

The work of Penrose (1959) gave inductive reasoning, that a firm is a conglomerate of managerial associations that as a beneficial physical and human asset to its advantage. Material assets, like human resources, can provide a variety of services to a company. Similar assets can be used in a variety of ways, depending on the organizations' perspectives on the most effective way to use them. In this way, there is a strong link between the information that members of the organization possess and the services obtained from the assets. The RBV of a firm beams the uniqueness of the firm in terms of its abilities, assets, and the beneficial advantage of accurate utilization of such resources (Prasojo and Hadinata 2020). The RBV of any organization naturally puts that organization one step ahead in terms of profit, positioning in the industry, and performance, because the firm enjoys a semi monopolist structure over other organizations.

RBV sees asset aggregation as a reflection of creative and entrepreneurial activities. These exercises may yield benefits if asset aggregation costs are lower than the rents that those assets may generate (Prasojo and Hadinata 2020).

The Knowledge-based approach depicts the various internal resources that will enable a firm to attain performance its intangible resources are also very germane. The knowledge and skills are the resources that aid to answer the what, why, and how the enterprise operates (Kirsimarja and Aino, 2015). The theory reveals the understanding that knowledge in all the three strata of the organization determines the attainment of the short and medium-term objectives of the firm. Its proponents say that because knowledge-based resources are difficult to duplicate and socially complicated, varied knowledge bases and capacities among organizations are the most important predictors of long-term competitive advantage and superior corporate performance.

These capabilities of knowledge in the firm are motioned through organizational culture, policies, documents, systems, routines, employees, and identity. Drawing from the strategic management literature, this ideology is extended on the deductive position of the resource-based view of the firm that was promoted by Penrose (1959) and other scholars (Wernerfelt 1984, Barney 1991, Conner 1991).

The intangible resources in an organization are rare in nature, complex, and very impossible to imbibe by other competitors in the industry because they give the superior position to gain a competitive advantage and in the long run give the owner improved performance in all levels performance (Curado and Bontis, 2006; Mercan 2021, Aya and Ōgürdal, 2021).

The disparity in the position of performance of a firm occurs due to the different amount of information they wield and the different ability to disrupt such knowledge to generate profit and sales in the market (Kirsimarja and Aino, 2015). Also, knowledge-based resources constitute the foundation of performance superiority in this context, capitalizing on this position appears to be largely dependent on socio-cultural factors within the organization and industry (Reihlen and Ringberg, 2013). This study can therefore be related to this theory as the knowledge acquired by firms is the intellectual capital and the firms can enhance their performance based on the knowledge by harnessing its Human Capital Efficiency (HCE), Structural Capital Efficiency (SCE), and Capital Employed Efficiency (CCE).

Empirically, Shahzad, Baig, Rehman, Saeed, and Asim (2021) examine if intellectual capital efficiency can explain corporate social responsibility. The environmental, social, and governance performance of the United States of America was employed. The unbalanced panel data of the listed public firms were employed from 2009 to 2918. The OLS Regression analysis revealed that CSR participation is linked to IC, CSR has an indirect impact on company performance, and the relationship between CSR and firm performance is mediated by Intellectual capital efficiency. Xu and Liu (2021) investigated the intellectual capital relationship with financial performance using the Chinese manufacturing industry listed on the

Shanghai and Shenzhen stock exchanges market. The secondary data was collected from the CSMAR database and the RESET database from 2012-to 2017. The descriptive analysis and spearman's correlation test were carried out on the variables to aid the determination of the intensity. The results reveal that NPM, GPM, ROI, ROA, ROE, and IC have a favorable association (measured through the market-to-book ratio). Furthermore, manufacturing organizations that are more intangible-intensive fare better financially. The study shows that increasing IC investment might boost value generation in emerging economies. Kelchevskaya, Deghles, and Chernenko (2021) investigated the effect of intellectual capital on the investment and performance attractiveness of Russian Companies. The study employed the nominal logistic regression that aids the probability occurrence of the dependent variable on the occurrence of other factors. The secondary data employed was between 2018 to 2019, via the information technology of Google Forms and platforms. The findings reveal a moderately favorable association between revenue and market share, which reflects the company's investment attractiveness, as well as qualitative measures of static and dynamic intellectual capital. Putra and Ratnadi (2021) examine the relationship between intellectual capital and firm value disclosure: evidence from the banking sector. The secondary data was sourced from the official IDX website within 2015-2019 of the listed banks on the country's stock exchange market. The multiple regression analysis was employed. According to the findings, an average of 49.91 percent is expressed as a story, 16.44 percent is expressed as a blend of qualitative and quantitative, 7.53 percent is expressed as numbers, and 1.44 items are expressed as monetary units (rupiah). Meanwhile, 24.33 percent of items of disclosure were not disclosed on average. Intellectual capital disclosure increases corporate value, whereas intellectual capital has no effect.

Shairi, Mohammad, and Tuyon (2021) investigated the relationship between intellectual capital and firm financial performance in the technological sector in Malaysia. The secondary data used was sourced from listed technological companies in Bursa Malaysia from 2013-to 2019. The study anchored on the MVAIC model to measure intellectual capital competencies. The ordinary least square was used to determine the impact of intellectual capital on firm performance. The study reveals a positive and substantial relationship between MVAIC and profitability. A separate examination of MVAIC components shows that two of them, HCE and CEE, are positively and significantly associated with ROA. SCE has a large but negative relationship with ROA, but RCE has a negligible relationship with ROA. Even though both HCE and CEE are positively and significantly connected with ROA, CEE has a higher level of efficiency.

AlQershi and Abas (2021) investigated the intellectual capital dynamics on the strategic level and innovation in manufacturing SMEs. The population of the study was Yemeni manufacturing small and medium enterprises in the 2019 Ministry of Trade and industry. A quantitative cross-sectional survey study approach was used, with 475 self-administered questionnaires issued to SME managers; 307 responses were received, with 23 being incomplete, leaving 284 responses for analysis. The researcher chose a

quantitative design strategy to distribute the questionnaires in this study since it is deemed good for exploratory studies because it relies on a literature review. In addition, a cross-sectional survey method was used also to conduct this. The organization level is the unit of analysis, with SMEs' owners serving as representatives of their businesses. The survey results were rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). According to the study's objectives, the effect of intellectual capital aspects on SME SI was investigated and found to be substantial. Desoky and Mousa (2020) examined the relationship between intellectual capital efficiency and a firm's financial performance taking evidence from Bahrain. The secondary data was sourced from twenty-nine companies for one hundred and fifty for five years. The dependent variables include the return on equity and return on asset used to measure the financial performance and the structural, human, and customer capital for the explanatory variables. The findings revealed that intellectual capital has positive correlations with firm performance. Human capital is also determined to be the most important component of the IC, with structural capital having the least impact on company performance, which is in line with earlier research findings. Furthermore, the studies from the services sector demonstrated that IC is strongly linked to business performance. Furthermore, two human capital sub-variables (the number of Bahraini employees and labor expenses) had the greatest impact on the firm's success.

Nadeem, Gan, and Nguyen (2020) examine the importance of intellectual capital on firm performance by viewing evidence from Australia. The study employed the generalized method moments to determine the impacts to view different from the OLS fixed-effects estimations. The population of the study includes five-hundred and seventy-one firms from 2005-to 2014. The findings show that IC efficiency is favorably related to ROA and ROE, supporting resource-based theory. Further investigation reveals that human capital, structural capital, and physical capital are all important, confirming resource-dependency and organization-learning theories.

Alturiqi and Halioui (2020) examine the impact of intellectual capital and firm financial performance of firms in Saudi- Arabia. The secondary data was sourced from twenty-five listed firms from 2015-to 2018. The multiple linear regression was used and the VAIC intellectual capital was also used in the building the dependent and independent variables in the study. The findings show that overall intellectual capital efficiency, as well as each of its three components, has a favorable relationship with financial performance. Furthermore, human capital efficiency (HCE), structural capital efficiency (SCE), and company market performance all have a favorable correlation. Overall, the data demonstrate that in Saudi Arabia, human capital efficiency (HCE) has a considerable and favorable impact on financial and market performance. Managers and investors may find the VAIC technique valuable in their decision-making process.

Bansal & Singh (2020) examines the relationship between intellectual capital and the financial performance of the Indian software sector in India. The Centre for Monitoring the Indian economy carries

the prowess database used for the secondary data. The study used seventy-one companies from the software knowledge-based sector. The panel data technique model revealed that VAIC has a positive and significant relationship with the profitability of companies and not productivity. Pekovi, Zdravkovi, and Pavlovi (2020) investigated the role of balanced scorecard models in evaluating the performance of boards of directors. The paper used descriptive statistical analysis to identify the mean values, average deviation, and maximum and minimum financial performance attained. Furthermore, the study uses simple linear regression analysis to see if board members' salary, which is considered an investment in human capital (HCE), has an impact on the rate of return on total invested capital (ROE) and the rate of return on total assets invested (RATI) (ROA). The study hypotheses will be confirmed or rejected based on the results of the regression analysis. The statistical software "SPSS v.20" will be used to process the data. The research found that the Balanced Scorecard is a useful model for measuring the performance of board members, and that board member compensation is favorably connected with the company's financial performance.

Prasojo and Hadinata (2020) examine intellectual capital efficiency and firm financial performance in Jakarta Islamic Index. Secondary data from company annual reports were gathered from IDX.co.id and each company's website for this study. Companies listed on JII make up the population in this study. Researchers looked for companies that were routinely registered in JII between 2015 and 2017. According to the findings, intellectual capital has little bearing on a company's financial performance.

3. Methodology

3.1 Data

This research work utilizes a descriptive research design that is ex-post facto in nature, relying on secondary source of data obtained after the occurrence of the event which the researcher has no control over. Both inferential and descriptive statistics are relied on to examine the effect of intellectual capital on the performance of manufacturing, pharmaceutical, ICT, health and Service companies in Nigeria. The sample size includes five (5) each from the above sectors in the economy. A total number of (25) twenty-five firms were employed for the study from 2015-to 2020.

3.2 Model Specification

This model was adopted and adjusted to suit the present study from the study of Hafiz and Sadia, Faiza, Abdul and Nazish (2020), and Mesut and Mustapha (2020).

Model One

$$SG_{i,t} = \left(\alpha_0 + \beta_1 HCE_{i,t} + \beta_2 SCE_{i,t} + \beta_3 RCE_{i,t} + \beta_4 LEV_{i,t} + \beta_5 VA_{i,t} + \mu_t \right) \ldots\ldots\ldots\ldots\ldots 1$$

Model Two

$$AG_{i,t} = \left(\alpha_0 + \beta_1 HCE_{i,t} + \beta_2 SCE_{i,t} + \beta_3 RCE_{i,t} + \beta_4 LEV_{i,t} + \beta_5 VA_{i,t} + \mu_t \right) \ldots\ldots\ldots\ldots\ldots 2$$

Where:

SG= Sales Growth at time t

AG= Asset growth at time t

HCS= Human Capital Efficiency at time t

SCE= Structural Capital Efficiency at time t

RCE= Relational Capital Efficiency at time t

LEV= Leverage at time t

VA= Value added at time t

U= Disturbance term/White noise at time t

i= nth term

α = Interception

$\alpha_1 - \alpha_6$ = Coefficient of the Independent Variables

3.3 Description of Variables

Variables	Description
Dependent Variable	
SG (Sales growth)	It is the percentage increase of the turnover of a firm within a specified period. it is calculated by the Log differential of Turnover
AG (Sales growth)	It is the percentage increase of the total asset of a firm within a specified period. It is calculated by the Log differential of Total Asset.
(Intellectual Capital) Independent Variables	
VA(Value added)	Total Sales (output)-Total Operating Expenses (Input). Nimtrakoon (2015).
HCE (Human Capital Efficiency)	It is measured by Value-added divided by total salaries and wages and training development expenses. Mondal (2016)
SCE (Structural capital efficiency)	It is measured by Value-added divided by administrative expenses. Vishnu (2015).
RCE (Relational Capital Efficiency)	It is measured by Value-added divided by total marketing, selling, and promotional expenses. Mondal (2016)
LEV (Leverage).	It is measured by the debt-to-equity ratio of the firm.

4. Results and Discussions

This section deals with the analysis and discussion of empirical findings. This covers the descriptive statistics, correlation matrix, Chow Test, Hausman Test, and Langrage Test. The Fixed and Random Effect Model.

Table 2: Showing the Descriptive Statistics

	AG	SG	SCE	RCE	LEV	HCE	VA
Mean	7.296805	7.154206	2.575981	19.06302	2.789261	6.372873	1.7687971
Median	7.306146	7.220584	1.660192	5.026796	1.633484	4.414729	4.021611.
Maximum	9.081116	8.843871	12.80450	301.0352	42.46713	89.82451	1.283708
Minimum	3.688509	2.064458	0.102932	0.829496	0.252611	0.355948	46.23000
Std. Dev.	1.041598	1.283246	2.623424	42.65164	5.089161	9.673831	2.913437
Skewness	-1.351616	-1.773734	2.100105	4.842588	5.726389	6.298072	2.232481
Kurtosis	6.284637	7.438581	7.036511	29.25991	39.74100	49.56533	7.263344
Jarque-Bera	113.1019	201.7846	212.0949	4896.160	9256.671	14543.70	238.1999
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	1094.521	1073.131	386.3971	2859.453	418.3891	955.9310	2.654209
Sum Sq. Dev.	161.6540	245.3615	1025.471	271055.2	3859.034	13943.87	1.263317
Observations	150	150	150	150	150	150	150

Author's Compilation 2022

The minimum value and maximum value of the variable include the following: AG (Asset growth) has a minimum value of 3.68 and a maximum value of 9.08. SG (Sales growth) has a minimum of 2.06 and a maximum value of 8.84. SCE (Structural Capital efficiency) has a minimum value of 0.10 and a maximum value of 12.80. RCE (Relational capital efficiency) has a minimum value of 0.82 and a maximum value of 301.0. LEV (Leverage) has a minimum value of 0.25 and a maximum value of 42.46. HCE (Human capital efficiency) has a minimum value of 0.35 and a maximum value of 89.82 and VA (Value added) has a minimum value of 46.23 and a maximum value of 1.28.

The Skewness in the variable includes: AG (Asset growth) has a long right tail which is negatively skewed at -1.35, indicating it has a lower value than the sample mean. SG (Sales growth) has a long right tail which is negatively skewed at -1.77, indicating it has a lower value than the sample mean. SCE (Structural Capital efficiency) has a long right tail which is positively skewed at 2.10, indicating it has a higher value than the sample mean. . RCE (Relational capital efficiency) has a long right tail which is positively skewed at 4.84, indicating it has a higher value than the sample mean. LEV (Leverage) has a short left tail which is positively skewed at 5.72, indicating it has a higher value than the sample mean. HCE (Human Capital efficiency) has a short left tail which is positively skewed at 6.29, indicating it has a higher value than the sample mean and VA (Value added) has a short left tail which is positively skewed at 2.23, indicating it has a higher value than the sample mean.

The Kurtosis (measures the peakedness or flatness of the distribution of the series. AG (Asset growth) leptokurtic (greater than 3) at 6.28 (peaked curve, higher value for the same mean). SG (Sales growth) leptokurtic (greater than 3) at 7.43 (peaked curve, higher value for the same mean). SCE (Structural Capital efficiency) leptokurtic (greater than 3) at 7.03 (peaked curve, higher value for the same mean). RCE (Relational capital efficiency) leptokurtic (greater than 3) at 29.25 (peaked curve, higher value for the same mean). LEV (Leverage) leptokurtic (greater than 3) at 39.74 (peaked curve, higher value for the same mean). HCE (Human capital efficiency) leptokurtic (greater than 3) at 49.56 (peaked curve, higher value for the same mean) and VA (Value added) leptokurtic (greater than 3) at 7.26 (peaked curve, higher value for the same mean).

Table 3. Correlation Matrix

	AG	SG	SCE	RCE	LEV	HCE	VA
AG	1.000000						
SG	0.953230	1.000000					
SCE	0.147649	0.188325	1.000000				
RCE	0.052054	0.051786	-0.176801	1.000000			
LEV	0.001159	0.045391	-0.106960	0.203298	1.000000		
HCE	-0.015394	-0.010437	0.075318	-0.058489	-0.122140	1.000000	
VA	0.591866	0.526315	0.468159	-0.092268	0.014527	-0.000501	1.000000

Author's Compilation 2022

Table 3 above shows the correlation matrix among the variables used in the study. AG (Asset growth) has a positive relationship with SCE (Structural capital efficiency) at 0.14, RCE (Relational capital efficiency) at 0.05, LEV (Leverage) at 0.00, and VA (Value added) at 0.59, and a negative relationship with HCE (Human capital efficiency) at -0.01. SG (Sales growth) has a positive relationship with SCE (Structural capital efficiency) at 0.18, RCE (Relational capital efficiency) at 0.05, LEV (Leverage) at 0.04, and VA (Value added) at 0.52, and a negative relationship with HCE (Human capital efficiency) at -0.01.

The pooled regression model results depict that HCE (Human capital efficiency) has a positive relationship with SG (Sales growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically insignificant to SG (Sales growth) which implies that a percentage increase in HCE (Human capital efficiency) will lead to 0.00 increase in SG (Sales growth).

Table 4: Regression Analysis

Dependent Variable: Sales Growth

Variable	Pooled	Fixed	Random
C	6.7268	7.0166	6.7268
	(0.000)	(0.0000)	(0.000)
HCE	0.0001	0.0031	0.0001
	(0.9885)	(0.0536)***	(0.9887)
SCE	-0.0279	0.0009	-0.0279
	(0.4823)	(0.9702)	(0.0900)***
RCE	0.0027	0.00068	0.0027
	(0.2129)	(0.0208)**	(0.0210)**
LEV	0.0032	0.0022	0.0032
	(0.8605)	(0.4537)	(0.8629)
VA	2.4711	5.4111	2.4711
	(0.000)*	(0.0013)*	(0.0000)*
R^2	0.5899	0.9891	0.8899
Adjusted R^2	0.5652	0.9865	0.8652
Durbin Watson	0.073	1.6798	0.07
F-Statistics	11.75	377.18	11.75
Prob (F-statistics)	0.000	0.000	0.000
Chow Test	0.0000		
Hausman Test	0.6340		

Significant: 1%, 5%**, 10%****

SCE (Structural capital efficiency) has a negative relationship with SG (Sales growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically insignificant to SG (Sales growth) which implies that a percentage increase in SCE (Structural capital efficiency) will lead to -0.02 decrease in SG (Sales growth). RCE (Relational Capital efficiency) has a positive relationship with SG (Sales growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically insignificant to SG (Sales growth) which implies that a percentage increase in RCE (Relational Capital efficiency) will lead to 0.21 increase in SG (Sales growth). LEV (Leverage) has a positive relationship with SG (Sales growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically insignificant to SG (Sales growth) which implies that a percentage increase in LEV (Leverage)

will lead to 0.00 increase in SG (Sales growth). VA (Value added) has a positive relationship with SG (Sales growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically significant to SG (Sales growth) which implies that a percentage increase in VA (Value added) will lead to 0.00 increase in SG (Sales growth).

The coefficient of determination using r-squared shows that the explanatory variables (HCE, SCE, RCE, LEV, and VA) explained 58.99% variation in manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria. That is 56.92% explained by other variables not included in the model. The overall statistical level of the model depicts that the model is fit for forecasting giving the F-statistics of 11.75 and its probability of 0.00. Since the p-value is lower than 0.05, hence we conclude that that model is statistically significant and brings about the acceptance of the alternative hypothesis. This means the human capital efficiency, structural capital efficiency, relational capital efficiency, leverage, and value-added have a significant effect on sales growth of manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria.

The fixed effect regression depicts that HCE (Human capital efficiency) has a positive relationship with SG (Sales growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically significant to SG (Sales growth) which implies that a percentage increase in HCE (Human capital efficiency) will lead to 0.00 increase in SG (Sales growth). SCE (Structural capital efficiency) has a positive relationship with SG (Sales growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically insignificant to SG (Sales growth) which implies that a percentage increase in SCE (Structural capital efficiency) will lead to 0.00 increase in SG (Sales growth). RCE (Relational Capital efficiency) has a positive relationship with SG (Sales growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically significant to SG (Sales growth) which implies that a percentage increase in RCE (Relational Capital efficiency) will lead to 0.00 increase in SG (Sales growth). LEV (Leverage) has a positive relationship with SG (Sales growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically insignificant to SG (Sales growth) which implies that a percentage increase in LEV (Leverage) will lead to 0.00 increase in SG (Sales growth). VA (Value added) has a positive relationship with SG (Sales growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically significant to SG (Sales growth) which implies that a percentage increase in VA (Value added) will lead to 0.00 increase in SG (Sales growth).

The coefficient of determination using r-squared shows that the explanatory variables (HCE, SCE, RCE, LEV, and VA) explained 98.91% variation in manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria. That is 98.65% explained by other variables not included in the model.

The overall statistical level of the model depicts that the model is fit for forecasting giving the F-statistics of 377.18 and its probability of 0.00. Since the p-value is lower than 0.05, hence we conclude that that model is statistically significant and brings about the acceptance of the alternative hypothesis. This means that human capital efficiency, structural capital efficiency, relational capital efficiency, leverage, and value-added have a significant effect on sales growth of manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria.

The random effect regression depicts that HCE (Human capital efficiency) has a positive relationship with SG (Sales growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically insignificant to SG (Sales growth) which implies that a percentage increase in HCE (Human capital efficiency) will lead to 0.00 increase in SG (Sales growth). SCE (Structural capital efficiency) has a negative relationship with SG (Sales growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically significant to SG (Sales growth) which implies that a percentage increase in SCE (Structural capital efficiency) will lead to -0.02 decrease in SG (Sales growth). RCE (Relational Capital efficiency) has a positive relationship with SG (Sales growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically significant to SG (Sales growth) which implies that a percentage increase in RCE (Relational Capital efficiency) will lead to 0.00 increase in SG (Sales growth). LEV (Leverage) has a positive relationship with SG (Sales growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically insignificant to SG (Sales growth) which implies that a percentage increase in LEV (Leverage) will lead to 0.00 increase in SG (Sales growth). VA (Value added) has a positive relationship with SG (Sales growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically significant to SG (Sales growth) which implies that a percentage increase in VA (Value added) will lead to 0.00 increase in SG (Sales growth).

The coefficient of determination using r-squared shows that the explanatory variables (HCE, SCE, RCE, LEV, and VA) explained 88.99% variation in manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria. That is 86.52% explained by other variables not included in the model. The overall statistical level of the model depicts that the model is fit for forecasting giving the F-statistics of 11.75 and its probability of 0.00. Since the p-value is lower than 0.05, hence we conclude that that model is statistically significant and brings about the acceptance of the alternative hypothesis. This means that human capital efficiency, structural capital efficiency, relational capital efficiency, leverage, and value-added have a significant effect on sales growth of manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria.

The Chow test aided to determine which model between the pooled and fixed-effect models will be used to draw an inference. But the cross-section column probability is less than 0.05. The fixed-effect model is the valid model at a prob value of (P< 0.05), before the Hausman test. The Hausman test aided to depicts the appropriate model for drawing inference between the fixed and random effect model(Mercan 2019). The Hausman test with an F (p-value) of 0.6340 shows the acceptance of the random effect model for drawing inference for the objective.

Post Estimation Test

Test	Statistic	d.f	Prob
Breusch-Pagan LM	560.3019	300	0.4440
Pesaran scaled LM	9.606161		0.7500
Pesaran CD	8.016474		0.5600

The Breusch-pagan LM prob indicates that (p> 0.05), this indicates that there is no presence of heteroskedasticity in the model above. The Pesaran scaled LM prob indicates that (p> 0.05), this indicates there is no cross-dependency in the model above.

Table 4: Regression Analysis

Dependent Variable: Asset Growth

Variable	Pooled	Fixed	Random
C	7.0130	7.2766	7.0130
	(0.000)	(0.0000)	(0.000)
HCE	-0.0003	0.0003	-0.0003
	(0.0610)***	(0.0897)***	(0.9616)
SCE	-0.0618	-0.0163	-0.0618
	(0.0414)**	(0.3344)	(0.0449)**
RCE	0.0023	0.0005	0.0023
	(0.1605)	(0.0570)**	(0.0678)***
LEV	-0.0092	-0.0012	-0.0092
	(0.5061)	(0.5303)	(0.5134)
VA	2.4711	3.0112	2.4112
	(0.000)*	(0.0073)*	(0.0000)*
R^2	0.7814	0.9925	0.7810
Adjusted R^2	0.7595	0.9907	0.7595
Durbin Watson	0.0863	1.1094	0.08

F-Statistics	17.73	549.98	17.73
Prob (F-statistics)	0.000	0.000	0.000
Chow Test	0.0000		
Hausman Test	0.9997		

The pooled regression model results depict that HCE (Human capital efficiency) has a negative relationship with AG (Asset growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically significant to AG (Asset growth) which implies that a percentage increase in HCE (Human capital efficiency) will lead to -0.00 decrease in AG (Asset growth). SCE (Structural capital efficiency) has a negative relationship with AG (Asset growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically insignificant to AG (Asset growth) which implies that a percentage increase in SCE (Structural capital efficiency) will lead to -0.06 decrease in AG (Asset growth). RCE (Relational Capital efficiency) has a positive relationship with AG (Asset growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically insignificant to AG (Asset growth) which implies that a percentage increase in RCE (Relational Capital efficiency) will lead to 0.00 increase in AG (Asset growth). LEV (Leverage) has a positive relationship with AG (Asset growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically insignificant to AG (Asset growth) which implies that a percentage increase in LEV (Leverage) will lead to 0.00 increase in AG (Asset growth).VA (Value added) has a positive relationship with AG (Asset growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically significant to AG (Asset growth) which implies that a percentage increase in VA (Value added) will lead to 0.00 increase in AG (Asset growth). The coefficient of determination using r-squared shows that the explanatory variables (HCE, SCE, RCE, LEV, and VA) explained 78.14% variation in manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria. That is 75.95% explained by other variables not included in the model. The overall statistical level of the model depicts that the model is fit for forecasting giving the F-statistics of 17.73 and its probability of 0.00. Since the p-value is lower than 0.05, hence we conclude that that model is statistically significant and brings about the acceptance of the alternative hypothesis. This means that human capital efficiency, structural capital efficiency, relational capital efficiency, leverage, and value-added have a significant effect on sales growth of manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria.

The fixed effect regression depicts that HCE (Human capital efficiency) has a positive relationship with AG (Asset growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically significant to AG (Asset growth) which implies that a percentage

increase in HCE (Human capital efficiency) will lead to 0.00 increase in AG (Asset growth). SCE (Structural capital efficiency) has a negative relationship with AG (Asset growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically insignificant to AG (Asset growth) which implies that a percentage increase in SCE (Structural capital efficiency) will lead to -0.00 decrease in AG (Asset growth). RCE (Relational Capital efficiency) has a positive relationship with AG (Asset growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically significant to AG (Asset growth) which implies that a percentage increase in RCE (Relational Capital efficiency) will lead to 0.00 increase in AG (Asset growth). LEV (Leverage) has a positive relationship with has a negative relationship with AG (Asset growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically insignificant to AG (Asset growth) which implies that a percentage increase in LEV (Leverage) will lead to -0.00 decrease in AG (Asset growth). VA (Value added) has a positive relationship with AG (Asset growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically significant to AG (Asset growth) which implies that a percentage increase in VA (Value added) will lead to 0.00 increase in AG (Asset growth). The coefficient of determination using r-squared shows that the explanatory variables (HCE, SCE, RCE, LEV, and VA) explained 99.25% variation in manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria. That is 99.07% explained by other variables not included in the model. The overall statistical level of the model depicts that the model is fit for forecasting giving the F-statistics of 549.98 and its probability of 0.00. Since the p-value is lower than 0.05, hence we conclude that that model is statistically significant and brings about the acceptance of the alternative hypothesis. This means that human capital efficiency, structural capital efficiency, relational capital efficiency, leverage, and value-added have a significant effect on sales growth of manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria.

The random effect regression depicts that HCE (Human capital efficiency) has a negative relationship with AG (Asset growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically insignificant to AG (Asset growth) which implies that a percentage increase in HCE (Human capital efficiency) will lead to -0.00 decrease in AG (Asset growth). SCE (Structural capital efficiency) has a negative relationship with AG (Asset growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically significant to AG (Asset growth) which implies that a percentage increase in SCE (Structural capital efficiency) will lead to -0.00 decrease in AG (Asset growth). RCE (Relational Capital efficiency) has a positive relationship with AG (Asset growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically significant to AG (Asset growth) which

implies that a percentage increase in RCE (Relational Capital efficiency) will lead to 0.00 increase in AG (Asset growth). LEV (Leverage) has a positive relationship with has a negative relationship with AG (Asset growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically insignificant to AG (Asset growth) which implies that a percentage increase in LEV (Leverage) will lead to -0.00 decrease in AG (Asset growth). VA (Value added) has a positive relationship with AG (Asset growth) of selected manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria and is statistically significant to AG (Asset growth) which implies that a percentage increase in VA (Value added) will lead to 0.00 increase in AG (Asset growth). The coefficient of determination using r-squared shows that the explanatory variables (HCE, SCE, RCE, LEV, and VA) explained 78.18% variation in manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria. That is 75.95% explained by other variables not included in the model. The overall statistical level of the model depicts that the model is fit for forecasting giving the F-statistics of 17.73 and its probability of 0.00. Since the p-value is lower than 0.05, hence we conclude that that model is statistically significant and brings about the acceptance of the alternative hypothesis. This means that human capital efficiency, structural capital efficiency, relational capital efficiency, leverage, and value-added have a significant effect on sales growth of manufacturing, pharmaceutical, ICT, health, Oil and Gas, and Service companies in Nigeria.

The Chow test aided to determine which model between the pooled and fixed-effect models will be used to draw an inference. But the cross-section column probability is less than 0.05. The fixed-effect model is the valid model at a prob value of (P< 0.05), before the Hausman test. The Hausman test aided to depicts the appropriate model for drawing inference between the fixed and random effect model. The Hausman test with an F (p-value) of 0.9997 shows the acceptance of the random effect model for drawing inference for the objective.

Post Estimation Test

Test	Statistic	d.f	Prob
Breusch-Pagan LM	560.3019	300	0.2300
Pesaran scaled LM	9.606161		0.5510
Pesaran CD	8.016474		0.3810

The Breusch-pagan LM prob indicates that (p> 0.05), this indicates that there is no presence of heteroskedasticity in the model above. The Pesaran scaled LM prob indicates that (p> 0.05), this indicates there is no cross-dependency in the model above.

5. Conclusions and Recommendations

The study investigated the effect of intellectual capital on the performance of quoted companies in Nigeria. Based on model one and the random effect model revealed that structural and relational capital efficiency has negative and positive significant effects on sales growth in Nigeria and also value-added having a significant effect on sales growth. The findings agree with the findings of Emmanuel, Okorocha, and Chinenye, (2017), Isola, and Akanni (2019) but disagree with Anifowose and Garba (2020) and Adedeji, Ong, and Rahman, (2020). Model two, the random effect model revealed that structural and relational capital efficiency as a negative and positive effect on asset growth in Nigeria. The findings agree with the findings of Adegbayibi (2021), Rashid, Farooq, Liaqat, Qadeer, and Younas (2020), and Prasojo and Hadinata (2020). The findings validate the position of the resource-based view theory that the internal resources of an organization as the capacity to improve the level of performance of the organization and debunk its operation from liquidation. Since the inferences from the first model is deduced from the random effect model, it is concluded that human capital efficiency (HCE) and relational capital efficiency (RCE) should be laid emphasis on invest on and improved upon by the management as this will enhance the performance and sale growth of the firm. More so, the inference from the second model was deduced from the random effect model aiding the conclusion that relational capital efficiency (RCE) should be invested on so as to improve the level of performance of the organization. It is concluded that the structural and relational; capital efficiency has the internal capacity to enhance financial performance. It is therefore recommended that the organization should invest in the structural and relational capital efficiency in the organization because it has the intrinsic capacity to improve the level of performance in the organization.

6. Policy implication

Corporate entities should take cognizance of intellectual capital as an important resource and capability. It should be noted that human capital development should be considered paramount as it has a multiplier effect on the overall gross domestic product (GDP) of the country. Also, countries that prefer certifications over intellect and skills can benefit from the viewpoint of this study. Authorities should bring forward policies that enables firm and businesses not to put ahead certifications over intellect and skills. Corporate entity regulators in countries should make it mandatory that entities set aside funds to aid intellectual capital development. This can be in form of manpower development or skill acquisition.

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