



Research Paper

Intellectual Capital and Financial Performance of Listed Non- Financial Companies in Nigeria

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ABSTRACT

The relevance of a knowledge-based economy with an emphasis on intellectual capital has been highlighted by scholars. The financial statement does not adequately represent this actual asset. So, this study studied the impact of intellectual capital on the financial performance of Nigerian non-financial enterprises that are publicly traded. For this study, the ex-post facto research design was utilized. The study's population consisted of the eighty-five (85) non-financial corporations listed in Nigeria, from which seventy-six (76) companies were selected based on the availability of data using the purposive selection approach. The study was founded on resource-based theory since its basic tenets strongly align with this theory. Return on assets (ROA) was used as a proxy for financial performance, while human capital, capital employed, and structural capital were used as proxies for intellectual capital efficiency, Capital employed Efficiency (CEE), and Structural Capital Efficiency (SCE), with Firm Size serving as a control variable. Seventy-six listed nonfinancial firms were picked to obtain secondary data for the ten-year period 2012 to 2021, which was then analyzed using panel regression and STATA 16 software. Capital employed Efficiency (CEE) and has a positive and substantial impact on return on asset of listed non-financial firms in Nigeria, whereas Human capital efficiency and structural capital has a negative and significant impact on return on asset of listed non-financial companies in Nigeria. In order to remedy the negative impact of structural capital to financial performance, the study suggests that the management of non-financial enterprises should spend more in capital employed and less in structural capital.

Keywords: Intellectual Capital, Capital employed, Structural capital, Return on Asset, and financial Performance.

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I. INTRODUCTION

Despite the trend towards a knowledge-based economy, the statement of financial position continues to prioritize tangible assets at the expense of increasingly crucial intellectual capital. A company's statement of financial status must reflect its historical performance in accordance with International Financial Reporting Standards (IFRS). Nevertheless, Lev and Gu (2016) stated that, despite the enormous changes in the firm model of the twenty-first century, modern financial statements are not much different from a typical financial statement from 1902. Intellectual capital reporting frequently disregarded during the compilation of financial statements, despite the fact that it is a fundamental component of financial statements. (Bayraktaroglu, et al 2019). Capital employed and structural capital comprise intangible assets like as knowledge, innovation, expertise, and organizational practices. Companies in the 21st century are placing a greater focus on intellectual capital as they seek to use their resources more efficiently and maintain a competitive edge in a rapidly changing market, resulting in a significant change from a production-based to a knowledge-based economy.

It is generally known that organizations with long-term success consistently invest in the training of their employees and the development of new tools and procedures. Increasingly, a company's ability to survive and thrive on the market rests on its expertise and other intangible assets (Latif, et al 2012). In today's fast-paced economy, businesses have transformed in response to the rapid expansion of information and technology. The efficacy of a company's intellectual capital influences its capacity to generate value in the markets in which it competes and maintain a competitive advantage.

According to Bontis (2001), intellectual capital has emerged as a crucial aspect in a company's long-term viability. The extent to which a company's financial objectives have been met is a measure of management productivity and one of the primary concerns of business organizations. The statistics presented in a company's financial statements, particularly those that represent income (i.e., the income statement), financial position (i.e., the balance sheet), and the flow of money, are essential for achieving financial goals.

Listed non-financial firms (NFCs) are primarily engaged in the production and sale of goods. In other words, NFCs generate, purchase, and sell previously made things and rely on consumers, suppliers, shareholders, and technology to conduct business. The enterprises need technology in the form of trademarks, copyrights, and computer software (structural capital) to produce money. These IC elements represent, in one way or another, an injection of cash or finances into the firm. While there are a significant number of empirical research in Nigeria tying intellectual capital to financial success, the majority of these studies were conducted on deposit money banks, consumer goods, insurance, information and communications technology, and industrial goods sectors. Little studies have been conducted on nonfinancial businesses in Nigeria. Therefore, it is necessary to identify the impact of intellectual capital and its implications for business success. Three hypotheses are created to lead this research:

H₀₁: Human capital efficiency has no significant effect on return on asset of listed non-financial companies in Nigeria.

H₀₂: Capital employed efficiency has no significant effect on return on asset of listed non-financial companies in Nigeria.

H₀₃: Structural capital efficiency has no significant effect on return on assets of listed non-financial companies in Nigeria.

II. LITERATURE REVIEW

2.1 Conceptual Framework

2.1.1 Intellectual Capital

In spite of the fact that we are increasingly operating in a knowledge-based economy, conventional financial statements still give disproportionate weight to material possessions at the expense of intangible assets like intellectual property. In accordance with the International Financial Reporting Standards, a company's financial statement should accurately reflect its historical performance (IFRS). Lev and Gu (2016) pointed out, however, that due to the static nature of accounting rules, modern financial statements don't differ much from a typical 1902 financial statement, despite the fact that the twenty-first century business model has undergone significant transformations. Although its importance, intellectual capital reporting is sometimes overlooked in the process of compiling financial accounts.

A group of researchers (Bayraktaroglu, et al., 2019) came to this conclusion. Intangible resources including know-how, creativity, expertise, and established procedures are a part of both employed and structural capital. There has been a major change from a production-based economy to a knowledge-based one, and as a result, modern businesses are placing a greater focus on intellectual capital in order to maximize their use of resources and keep up with the ever-evolving market. Companies that invest heavily in their employees' education and the development of new systems and methods tend to thrive over time. The ability of a business to thrive in the marketplace is increasingly dependent on intangible assets like expertise (Latif, et al 2012).

In today's fast-paced economy, where information and technology are constantly improving, the growth of businesses has changed. A company's competitiveness and value creation potential in its target markets are directly tied to the quality of its intellectual capital. According to Bontis (2001), this means that intellectual capital is more important than ever before to a company's long-term viability. One of the primary concerns of businesses is the degree to which their financial objectives have been met. The income (i.e., the profit and loss account), financial position (i.e., the balance sheet), and cash flow (i.e., the statement of cash flows) figures reported in a company's financial statements are particularly important for reaching financial goals.

Listed NFCs are often engaged in the production, distribution, or retailing of goods. That is to say, NFCs rely on consumers, suppliers, shareholders, staff, and technology to make, buy, and sell produced items. Technology, such as trademarks, copyrights, and computer software (structural capital), is also required for the corporations to carry out the activities that might result in income generation for the companies. Each of these IC elements represents new financial resources for the company. There are a fair number of empirical studies linking intellectual capital to financial success in Nigeria, however the vast majority of them have focused on certain industries (deposit

money banks, consumer goods, insurance, IT, and IG). The research on Nigerian businesses outside of the banking sector is limited. Yet, research into the impact of intellectual capital and its implications for business performance is warranted. Three hypotheses are created to serve as the basis for this investigation.

2.1.2 Human Capital

Human capital is the most valuable asset a company can have. It reflects the human aspect in a company, where a combination of knowledge, intelligence, capabilities, talents, and competence provides the company its particular character, with those characteristics contributing to output and profitability, and therefore improving company financial performance (Bontis et al., 2000). Yusuf (2013) also asserted that a company's ability to successfully implement business strategy is wholly dependent on the effective utilization of human capital. Human capital, according to Edvinsson and Malone (1997), is defined as employees' knowledge, competence, new ideas, and ability to address challenges in the firm. Human capital is defined as leadership skills, employee motivation, employee satisfaction, years of experience in profession, proportion of challenging assignments, information technology, literacy of staff, turnover rate, amount of innovations per employee, proportion of employees with degrees, training expense per employee, cost per hire and ratio of managers to employees (Miller et al, 1999). Human capital, according to Becker et al (2002), is the productive efforts of an organization's workforce.

Ting and Lean (2009) defined Human capital as an organization's personnel expertise, creativity, innovation, capacity, employee flexibility, and prior experience, collaboration capacity, uncertainty tolerance, inspiration, satisfaction, learning capacity, loyalty, and education and training. Baron (2011) also agrees with the definition of Ting & Lean (2009) by defining human capital as an organization's personnel' expertise, competencies, ability to create, and ingenuity. Micah et al. (2012) referred to human capital as the energies, skills, talents and knowledge of people which are, or which potentially can be applied to the production of goods or rendering useful services.

2.1.3 Capital Employed

The term "capital employed" describes the sum of money invested in a company's working capital and fixed-assets. It includes both equity and long-term obligations, or the shareholders' fund. It corresponds to the sum of all liquid assets (working capitals and non-current assets) or total assets. Common sources of funding include net debt and shareholder equity financing. Assets are the things a company has, such money that is owed to it, or things like inventory and machinery and other physical assets (Nik Maheran et al, 2009).

Total value added to book value of assets will be determined by the capital employed efficiency (CEE) ratio, as predicted by Onyekwelu and Ubesie (2016). Value added (VA) is the end result of an economy's efforts, while capital employed (CE) is taken here to mean financial capital (CE). Value added (VA) divided by total capital employed gives us the efficiency of our capital use (Capital Employed Efficiency, or CEE) (CE). As a company's success is tied to its capacity to create revenue, optimizing the use of capital is one way to boost that performance.

2.1.4 Structural Capital

Structural capital refers to an organization's resources, such as its operational systems, manufacturing processes, organizational culture, management philosophy, and all types of intellectual property, that allow for optimal intellectual performance and total commercial success. Even if an employee has a high IQ, if the company has weak systems and procedures, that intelligence won't be put to good use. Employees' access to the market, the company's technology and software, its databases, its organizational structure, its patents and trademarks, and its capacity to organize itself effectively are all examples of structural capital that contribute to the company's success (Bontis, 2000).

To put it another way, intellectual capital can be created and human resources may be processed into intellectual capital because of the existence of structural capital. When human competence has contributed its fair share, a company's structural capital consists of the acquired knowledge (Bontis, 1998). In contrast to financial capital, which is owned by investors, structural capital is owned by businesses and includes things like intellectual property, client relationships, and the infrastructure of an organisation (Roos et al. 1997). The enabling mechanisms that let the organisation to harness the intellectual capital are what Nik Maheran et al. (2009) refer to as structural capital. Patents, trademarks, and databases are on one end of the spectrum, while intangible assets like company culture, open communication, and employee trust make up the other. This is the money made by the company through its goods or systems, which will stay with the business even if employees depart (Nik Maheran et al., 2009). Hence, businesses with high levels of structural capital will foster an environment where people feel safe taking risks and developing their skills (Bontis et al, 2000).

2.1.5 Financial Performance

The financial health of a business is critical to its investors, its stakeholders, and the economy as a whole. Obviously, financial returns are of paramount importance to investors. Investors stand to gain more from

a company that is successful. When a company does well financially, it boosts the income of its employees, improves the quality of its products and services, and earns the trust of its community. Better financial results for a business may pave the way for expansion and new possibilities that, in turn, boost economic growth and benefit society at large. Rahul (1997) defines company performance as the degree to which an organisation is able to meet its strategic goals within the constraints of its resources. According to Suleiman (2013), a company's performance is based on how well it evaluated and implemented its strategy to achieve its goals and objectives.

The efficiency with which a corporation turns its operating assets into cash flow is quantified by its financial performance. According to Yusuf and Abudulkarim (2021), financial performance is a "objective measure of how successfully a firm can utilize assets from its core method of operation and create revenues." This definition is based on work by Van Horn (2005). According to Pandey (2010), this word is used to assess a company's overall financial health. Organizational theory and strategic management are the theoretical foundations for studies of corporate profitability.

2.1.6 Return on Asset

Calculated by dividing net profit by total assets, return on assets is one of the most essential profitability ratios, according to research by Nazishand Shehla (2017). Calculating a company's profitability in relation to its total asset investments is what return on assets does (Irala, 2007). According to Kesseven (2006), ROA is calculated by multiplying the net profit margin by the turnover of total assets. A system of planning and control for all operational choices inside a business, he said, had to be developed once it became clear that ROA was affected by both profitability and efficiency. The strongest financial statistic of a company's health and indicative of how its decisions play out is the long-term tragedictory of return on assets (ROA) (Anvar Avlokulov 2018). Thus, for businesses with a long-term outlook, a grasp of this trajectory plays a pivotal role in designing a winning strategy in operations. This follows from the fact that encompassing both assets and earnings, as ROA does, makes it the most trustworthy indicator of a company's financial health (Dalayeen) (2017). Returns on assets is determined by:

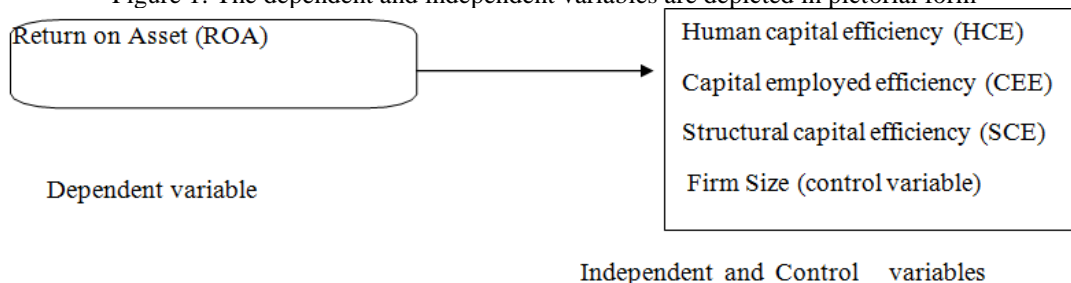
$$ROA = \text{Profit After Tax} / \text{Total Assets}$$

2.1.7 Firm Size

Due to economies of scale, a larger company is better able to compete with smaller ones by lowering its costs and seizing more possibilities. Experts agree that size matters when calculating a company's profitability, and that there is a positive correlation between the two. In their own contribution, Akinyomi and Olagunju (2013) noted that the influence of business size on profitability has been the subject of several research.

Similarly, Jasch (2013) argued that larger companies can earn more money thanks to their command of a larger portion of the market. So, it is clear that large corporations enjoy more profitability and lessened competition as a result of the aforementioned conditions. Empirical researchers in the field of corporate finance often focus on the "size effect," which shows that the size of a company has a significant impact on the dependent variables in a number of studies. Because of the foregoing, this investigation makes use of firm size as a control variable.

Figure 1: The dependent and independent variables are depicted in pictorial form



Source: Researcher's Conceptualization

2.2 Empirical review

Intellectual capital's impact on the bottom lines of Nigeria's publicly traded consumer products firms was studied by Enekwe et al. (2022). The study's primary goals were to analyze the impact of capital employed (CE), human capital (HC), and structural capital (SC) on the return on assets (ROA) of publicly traded consumer goods businesses in Nigeria. Human capital efficiency (HCE), structural capital efficiency (SCE), and capital employed efficiency (CEE) are proxies for intellectual capital, whereas return on assets is a proxy for financial success (ROA).

This study used an ex post facto research approach, compiling secondary data from the 2010–2019 annual reports and accounts of four (4) corporations in the listed consumer goods companies in the Nigerian economy. This research relied heavily on resource-based theory. For the study's Panel ordinary least square (OLS), researchers utilized the statistical program E-views, version 9.0. The significance of the relationship between the independent variable (intellectual capital) and the dependent variable (financial performance) of the organizations under investigation was calculated using the multiple regression model. In a regression study, human capital efficiency (HCE) was found to have a positive and significant influence on ROA, whereas structural capital efficiency (SCE) and capital employed efficiency (CEE) had a negative and negligible effect. Finding that human capital efficiency is the primary factor in value creation, particularly with regard to return on assets, the researcher concluded that companies should prioritize the recruitment, training, and motivation of highly qualified employees in order to increase their intellectual capital. To further improve their structural capital through the use of IT, businesses should also allocate funds to training and other pertinent programmes. A more straightforward approach would have been to employ conventional least square instead of a multiple regression model, which was used in this investigation but was not justified.

Using data collected from the non-financial companies that are traded on the floor of the Nigerian Exchange Group market, Aluwong (2022) examines intellectual capital performance in Nigeria from 2011 to 2020. The research set out to learn how several forms of capital efficiency — structural, capital employed, human, and value-added intellectual — affect the bottom lines of publicly traded Nigerian businesses outside of the banking sector. The researchers used a longitudinal strategy and 30 randomly chosen businesses as their samples. The study's dependent variable, financial performance as measured by return on asset, was analyzed alongside four independent variables—the efficiency with which structural capital was employed, the efficiency with which human capital was employed, and the efficiency with which leverage was used to increase the value of intellectual capital. The firm's financial statements were used as a secondary data source, and regression analysis was performed on the data. According to the study's empirical findings, just one of the four independent variables used—human capital efficiency—has a negligible impact on the performance of Nigeria's publicly traded non-financial companies. Yet, the results show that structural capital efficiency, capital used efficiency, and the value-added intellectual coefficient all considerably boost company performance. According to the results, managers should prioritize structural capital and increase their investment in its human capital instruments by way of on-going education and training. Because of the way the research was set up, variables were not tracked more than once. Hence, a longitudinal approach is inappropriate for this research.

Using a sample of 336 Czech enterprises, including 20 accredited by the European Foundation for Quality Management (EFQM) Excellence Model, Yousaf (2021) studied the effects of IC on company performance between 2015 and 2019. The research was conducted to see how having intellectual capital impacts a company's bottom line. Return on asset, return on equity, and asset turnover were utilized as measures of company performance, with human capital efficiency, structural capital efficiency, and capital employed efficiency serving as the independent variables. The research team utilized a pooled version of ordinary least squares regression to analyze secondary data. The study's findings demonstrated a favourable, statistically significant relationship between financial results and human use capital efficiency, structural capital efficiency, and capital employed efficiency. Businesses should start include information on their human assets and the effectiveness of their use of intellectual capital in their financial reports. Because of the differences in how each performance index is calculated, its findings are likely to vary. It would be preferable if only one performance index were presented.

Two hundred twenty-seven (227) listed enterprises in Vietnam were analyzed by Ngoc et al. (2020) to determine the impact of intellectual capital on financial performance from 2011 to 2018. The research set out to do just that by looking into how investments in people might boost a company's bottom line. The efficiency of human capital was utilized as a proxy for intellectual capital in the study. Firm size was used as a control variable and return on equity as a proxy for financial success. Secondary data were employed in conjunction with the generalized method of moments (GMM) methodology for data analysis. Human capital efficiency was found to have a favourable and statistically significant influence on business financial performance across all industries in Vietnam. Furthermore, the outcome suggested that the banking industry did not have the highest degree of human capital accumulation. Businesses with a public stock exchange listing in Vietnam should be urged by the country's regulators to increase spending on intellectual capital and to make complete disclosures about their IP holdings. Just why the GMM estimate method was used is not made clear. Both the kind of GMM and the results of a pre-estimation test are required.

The impact of intellectual capital on the financial performance of the banking industry and the service sector, two major industries listed on the Bahrain Bourse, was investigated by Abdelmohsen and Gehan (2020). Examining how intellectual capital affects a company's success was the study's overarching goal. Forty-three (43) listed enterprises from a variety of industries make up the study's population; from 2013 to 2017, a random sample of 29 firms was drawn using a judgemental sampling approach. It uses two sets of variables. Return on equity and return on assets are utilized to reflect the firm's financial performance in the first model, while human, customer, and structural capital are used to represent the independent variable in the second model. The analysis in this paper

makes use of the canonical correlation technique, and all data came from previously collected sources. All three types of intellectual capital (human capital, customer capital, and structural capital) were found to positively correlate with firm performance, with the exception of the sub-variable of human capital (labour costs), which was found to negatively correlate with firm performance in the financial sector. In addition, it is discovered that human capital is the most crucial element of intellectual capital, whereas structural capital is determined to have the least impact on the firm's performance. As the results for the services industry showed, intellectual capital also has a strong correlation with a company's success. Investment in intellectual capital has been shown to have a significant impact on the bottom line, thus board members should prioritize this expense. When many values of the dependent and independent variables are necessary, canonical correlation is adequate and acceptable. In addition, the outcome of a canonical regression analysis will be more reliable.

The influence of intellectual capital on the financial performance of non-financial enterprises in Nigeria was studied by Nnubia et al. (2019) between 2007 and 2016. The research set out to analyze the connection between the financial success of Nigeria's non-financial businesses and three key factors: capital employed efficiency, human capital efficiency, and structural capital efficiency. The sample for this research consisted of the 113 non-financial companies trading on the Nigerian Stock Exchange. Using a purposive selection strategy, twenty-one (21) businesses were chosen as the sample. After the fact analysis was used for this investigation. Using the Ordinary Least Squares regression technique to assess secondary data gleaned from the financial records of the sampled firms. Earnings per share and market to book value reflected financial success, while the Pulic 1958 Value Added Intellectual Coefficient (VAIC) technique measured intellectual capital. Financial performance of listed non-financial enterprises in conglomerates was found to be positively and significantly impacted by capital employed efficiency, human capital efficiency, and structural capital efficiency. The research concluded that in order to increase the value of stakeholders in the financial statement and the note to the accounts, the Regulatory Body should establish a minimum standard for disclosing human resource cost. An insufficient and unrepresentative sample of 113 listed non-financial enterprises in Nigeria was used (n = 21).

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2.3 Theoretical Framework

In order to account for some empirical data, a theory must provide an explanation based on previously observed regularities. Although several hypotheses have been developed to characterize intellectual capital, no one theory has gained widespread acceptance (Myers 2001). Several different hypotheses seek to establish a connection between intellectual capital and a company's bottom line.

2.3.1 Stakeholders Theory

Ian Mitroff first put out the concept of stakeholders when he wrote "Stakeholders of the Corporate Mind" in 1983. Edward R. Freeman published a piece on Stakeholder theory in California in late 1983. The idea seeks to respond to the "principle of who or what truly counts. According to the shareholder view, which is the more conventional one, a corporation has a legal obligation to prioritize the interests of its owners or shareholders and maximize profit for them.

The stakeholder theory counters this by arguing that there are other stakeholders outside the company itself. These stakeholders include the company's workers, consumers, suppliers, financiers, communities, governments, political groups, trade associations, and unions. A company's rivals might also be considered stakeholders if they pose a threat to the company or its stakeholders. By combining a resource-based perspective with a market-based perspective and a social-political viewpoint, we get the stakeholder view of strategy. The normative theory of stakeholder identification is one popular approach to identifying the many groups who have an interest in a firm and learning more about the circumstances under which managers choose to see them as stakeholders (the descriptive theory of stakeholder salience). Relational capital is a depiction of a company's relationships with and the interests of other stakeholders including customers, suppliers, rivals, the community, and government.

2.3.2 Knowledge-Based Theory

As a reaction to the Resource-Based theory's detractors, Nonaka and Takeuchi (1991) put out the Knowledge-Based Theory (KBT). According to Grant (1996), referenced by Stam (2006), KBT views knowledge as a company's most valuable asset. Knowledge-based resources are the major determinants of prolonged competitive advantage and financial success due to their static nature, difficulty of imitation, heterogeneity, and social complexity, according to proponents of this view (Fenwick, 2011). Yet, the knowledge-based viewpoint offered more precise definitions of knowledge, its nature, and its administration than the resource-based one.

KBT defines knowledge as a stockpile of information, whether human and otherwise (Stam, 2006). Instead, tacit knowledge and explicit knowledge were used to describe the two types of information. Human knowledge, according to the theory's proponents, comprises everything related to employees and their spheres of control. Yet, employees do not have any say over the use of non-human knowledge because it belongs to the company. Nonetheless, the availability of the non-human resource is necessary for the human resource to contribute to the organisation, demonstrating the reciprocal nature of the interaction between tacit and explicit knowledge. The hypothesis concluded that distinctive knowledge assets are essential for organizations to gain an advantage and succeed. Scholars like Grant (1996) and Ariely (2003), as cited by Fenwick (2011), argue that knowledge-based theory is an extension of resource-based theory (RBT) because it treats knowledge as a resource and treats organizations as heterogeneous entities dependent on particular knowledge assets. Proponents of the knowledge-based theory, however, view it as a theory in the formal sense.

2.3.3 Human Capital Theory

In 1961, Theodore Schultz presented the human capital hypothesis, which was further refined by "Gary Stanley Becker in 1964. Human capital theory was established by economist Gary Schultz and economist Gary Becker as a modern extension of Adam Smith's explanation of pay differentials between various occupations. Other things being equal, personal earnings change according to the amount of investment in human capital; that is, the education and training performed by individuals or groups of employees. This is according to the theories of economists such as Becker and Jacob Mincer. Human capital investment on a large scale is also expected to provide a workforce with the requisite skills for economic expansion. A source of human capital is any factor that increases the productivity of the individual worker. All too often in actual life, full-time schooling is used as the benchmark. Investment in human capital has both immediate and indirect financial consequences for workers. When deciding where to put their money, workers weigh the pros and drawbacks of various income and consumption streams in the future. Some of these streams promise higher future income, but require the worker to pay more for training now and put off some of their current needs. Human capital investment returns are theoretically comparable to financial capital investment returns. Critics of human-capital theory, even in economics, refer to the difficulties of quantifying important notions like future income and the core concept of human capital. It's not always the case that more money put into school results in more" output in the workplace or on the market.

2.3.4 Resource-Based Theory (RBT)

Wernerfelt (1984) proposed the resource-based theory (RBT), which was further refined by Barney in 1991 and heavily borrows on Penrose's earlier work (1959). The core idea behind RBT is that a business is nothing more than the sum of its valuable, scarce, non-substitutable, and difficult-to-replicate resources and abilities (Barney, 1991). A company, in this view, is a hodgepodge of dissimilar, flawed, and fixed capacities. According to this theory, which is supported by studies of successful business strategies, a company's success is more likely to stem from its own unique set of assets than from any particular industry's structure (Guthrie, et al. 2004). Hall (1992) and Grant (1996) divided resources into three categories: tangible assets, intangible assets, and human resources, with human beings being considered the most valuable asset. The study is grounded in two theories: the knowledge-based theory and the resource-based theory.

In terms of potential investment and effective resource usage, RBT elucidates the study's underlying issues. The core idea behind resource-based theory is that every company has its own special collection of assets that provide it an edge over rivals in the long run. Edom et al. (2015) provided a useful framework by classifying an organization's assets as either material or human. Human resources include of employees' experience, knowledge, skills, and social interactions, whereas physical assets include plants, technical equipment, land, and buildings. Organizations are heterogeneous entities that rely on particular knowledge assets to improve their financial and nonfinancial performance, and advocates of the Resource-Based Theory argue that efficient utilization of intangible assets can lead to competitive advantage and improved financial performance (Lazzolino & Laise, 2013). This research is based on the resource basis idea.

III. METHODOLOGY

Researching the impact of intellectual capital efficiency on the bottom lines of Nigeria's publicly traded, non-financial enterprises, this study makes use of an ex-post facto research approach. Eighty-five (85) corporations that are not financial institutions but are listed on the Nigerian Exchange Group served as the study's population; from this pool, seventy-six (76) NFCs were chosen for the study's sample. Secondary data were gathered from the selected firms' published annual reports for the time period given, and regression analysis was performed with the use of STATA version 16. Using measurements like mean, median, and mode, descriptive statistics may help find data set flaws. To examine the connection between the variables, a Pearson correlation analysis was performed. After running the panel regression tests under both the fixed effect and random effect models, the Hausman specification test was used to pick the model that was best suited to the data. Finally, the robustness test was run on the specified regression models to look for multicollinearity, heteroskedasticity, and serial correlation.

Model Specification

In other to analyze capital employed and structural capital on financial performance of listed non-financial companies in Nigeria, the study adopted with modification the model used by Aluwony (2022) as follows:

$$ROA = B_0 + \beta_1 HCE_{it} + \beta_2 CEE_{it} + \beta_3 SCE_{it} + \beta_4 FSIZE_{it} + \varepsilon_{it} \dots (1)$$

Where:

ROA = Return on Asset
HCE = Human capital efficiency
CEE = Capital Employed capital efficiency
SCE = Structural capital efficiency

Control Variables

FSIZE = Size of firm
B₀ = constant or intercept of the regression.
B₁.B₂ = coefficients of the explanatory variables
ε = error term.
i = firm
t = time

The a priori expectation is that human capital, capital employed, and structural capital have positive and significant effect on financial performance

Table 1
Study Variables and their Measurement

Variable Acronym	Variable Name	Measurement	Source(s)
ROA	Return on Asset	Profit after tax divided by total asset	Aluwony (2022)
HCE	Human capital efficiency	Revenue minus Cost of Revenue divided by Staff Cost (HCE=R-CR/SC).	Aluwony (2022)
CEE	Capital employed efficiency	Value added divided by capital employed = VA/CE CE = Total assets less Intangible assets	Enekwe et al (2022)
SCE	Structural capital efficiency	Structural capital / Value added SC/ VA where SC = VA – HC SCE = SC/VA HC = Staff cost VA = Value added	Nnubia et al. (2021)
FSIZE	Firm Size	Log of total Assets	Yusuf & Abudukarim, (2021)

Source: Author’s Compilation, 2022

IV. RESULTS AND DISCUSSION

Descriptive Statistics

The descriptive Statistics presents the Mean, Standard Deviation, Minimum, and Maximum values of the study variables (return on asset, human capital efficiency, structural capital efficiency and firm size). Descriptive statistics shows the level of Deviation, the variables are from the mean and the Minimum and Maximum values of the variables. The table and results are presented below.

Table 2 Descriptive statistics for roa huce sce cee fsiz

	stats	roa	hce	sce	cee	fsize
N		756	756	756	756	756
mean		1.8107	3.9814	-5.8183	0.2343	7.1084
variance	289.0411	26.1073	30880.79	0.0773	0.6730	
sd		17.0012	5.1095	175.7293	0.2780	0.8203
max		176.27	73.38	18.68	5.85	9.3059
min		-179.92	-16.33	-0.4831	-1.22	5.2394
skewness		-1.1776	5.4255	-27.4377	10.9797	0.1946
kurtosis		42.4891	61.8467	753.886	223.8547	2.5644

Source: STATA 16 output Results based on study data

The average return on assets (ROA) for listed nonfinancial enterprises in Nigeria is N1.8107, with a standard deviation (SD) of 17.0012 and a variance of 289.0411. This indicates that the ROA of the sampled companies deviates from the mean by N17.0012, indicating that the data is highly distributed around the mean. The ROA has a minimum value of -N179.92 and a high value of N176.27. ROA data are negatively skewed with a coefficient of -1.1776, indicating that the majority of the data lie to the left of the normal curve. The value of 42.4891 for the kurtosis coefficient indicates that the data were not regularly distributed. Human capital efficiency (HCE) of the listed non-financial firms in Nigeria was 3.9814 on average, with a standard deviation (SD) of 5.1095 and a variance of 26.1073. This indicates that HCE of the sampled firms deviates from the mean by 5.1095 on both sides, indicating that the data is highly dispersed around the mean. -16.33 and 73.38 are the minimum and highest values of HCE, respectively. With a coefficient of 5.4255, the data for HCE are positively skewed, indicating that the majority of the data lie on the right side of the normal curve. The coefficient of kurtosis, 61.8467, indicates that the data were not regularly distributed.

Similarly, the sampled enterprises' mean structural capital efficiency (SCE) for the research period was -5.8183, with a standard deviation of 175.7293 and a variance of 30880.79. This indicates that the SCE is 175.7293 standard deviations from the mean, indicating that the data is highly distributed from the mean. The minimum and highest values for the SCE are -0.4831 and 18.68, respectively. With a value of -27.4377, the data for SCE are negatively skewed, indicating that the majority of the data lie to the left of the normal curve. The coefficient of kurtosis, 753.886, indicates that the data are not regularly distributed.

During the research period, the capital employed efficiency of the studied enterprises was 0.2343 with a standard deviation of 0.2780 and a variance of 0.773. This indicates that the CEE is 0.2343 standard deviations off the mean, indicating that the data is highly distributed from the mean. In addition, the CEE has minimum and maximum values of -1.22 and 5.85, respectively. With a coefficient of 10.9797, the data for CEE are positively skewed, indicating that the

majority of the data lie to the right of the normal curve. The coefficient of kurtosis, 223.8547, indicates that the data are not regularly distributed.

In addition, Table 2 reveals that the average firm size (FIRM SIZE) of the studied businesses is 7.1084, with a standard deviation of 0.8203 and a variance of 0.6730. This demonstrates that FIZE deviates from the mean on both sides by 0.8203, indicating that the data is not significantly distributed from the mean. The lowest and maximum values for FIZE are 5.2394 and 9.3059 respectively. The FIZE data were positively skewed with a coefficient of 0.1946, indicating that the majority of the data lie to the right of the normal curve. The value of 2.5644 for the kurtosis coefficient indicates that the data were regularly distributed. The type and degree of dispersion of this study's data indicate that it is neither normally nor asymmetrically distributed.

Correlation Matrix

The correlation matrix displays the results of the relationship between human capital, capital employed, structural capital, and financial performance, as proxied by human capital efficiency, capital employed efficiency, structural capital efficiency, and return on asset, with firm size serving as the control variable. It includes the Pearson pairwise correlation coefficients of the investigated variables. The correlation between the independent and dependent variables is anticipated to be strong, however the correlation between the independent variables is not anticipated to be particularly high. Table 3 below presents the correlation matrix.

Table 3 Results of correlation analysis for roa hce sce cee fsize

roa	hce	sce	cee	fsize
roa	1.0000			
hce	0.2141*	1.0000		
	0.0000			
sce	-0.2289*		1.0000	
	0.0000			
cee	0.3052*	0.6004*		1.0000
	0.0000	0.0000		
fsize	0.1771*	0.2535*	0.0718*	
	0.0000	0.0000	0.0483	1.0000

Source: STATA 16 output Results based on study data

Correlation quantifies the strength of the relationship between two variables. The correlation between the dependent and independent variables of the research is displayed in Table 3 above. There is a weak positive correlation of 0.2141 (21.41%) between return on asset (ROA) and human capital efficiency (HCE), which is significant at the 5% level as indicated by the p value of 0.0000; this indicates that an increase of one unit in HCE will result in an increase of 0.2141 units in return on asset. Structural capital efficiency, on the other hand, has a weak negative association of -0.2289 (22.89%) with return on asset, which is significant at the 5% level as indicated by the p value of 0.0000; this suggests that a unit increase in structural capital efficiency results in a 0.2289 unit decrease in return on asset; additionally, there is a weak positive association of 0.3052 (30.52%) between Capital employed efficiency and return on asset, which is significant at the 5% level as While and firm size (FSIZE) have a positive connection of 0.1771 (17.71%) with return on asset, a unit increase in FSIZE causes a 0.1771 unit rise in ROA, which is statistically significant at the 5% level, as indicated by the p value of 0.0000.

Multicollinearity Test

The results of the multicollinearity test done to establish the link between the independent variables to determine if there is significant multicollinearity between one explanatory variable and another explanatory variable are presented in Table 4.

Table 4 Results of VIF Test (Multicollinearity Test)

Variable	VIF	1/VIF
Hce	1.73	0.576986
cee	1.62	0.616096
sce	1.01	0.993783
fsize	1.11	0.897669

Mean VIF 1.37

Source: STATA 16 output Results based on study data

Table 4 shows the VIF and tolerance value of the independent variables, in each case, VIF is less than 10 and tolerance level is less than 1 respectively, showing that there was absence of Multicollinearity among the independent variables. The mean VIF of 1.37 also attests to the fact that there is no problem of Multicollinearity among the variables.

Heteroskedasticity Test

The results of the heteroskedasticity test undertaken to determine if the data exhibit uneven variance are shown in Table 5. The null hypothesis of the test is that the variance is homoscedastic, whereas the alternative hypothesis is that it is heteroskedastic. If the P value is more than 5% (0.05), the null hypothesis is not rejected; otherwise, accept the alternative hypothesis if the P value is less than 5%. (0.05).

Table 5 Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

chi2 (1) = 0.23
 Prob>chi2 = 0.6279

Source: STATA 16 Output Results based on study data

All fitted values in Table 5 have a Hetest Chi2 of 0.23, which is not statistically significant at 5% (P-Value = 0.6279). As a consequence, the alternative hypothesis was rejected and the null hypothesis that the data for fitted values of ROA are homoscedastic was accepted.

The F test result presented in Table 6 was used to decide whether Pooled OLS regression or fixed effect regression was more acceptable. The null hypothesis of the test is that the Pooled OLS Model is the most suitable, whereas the alternative hypothesis is that the fixed effect model is the most suitable. Accept the null hypothesis if the P value is more than 5% (0.05), and the alternative hypothesis if the P value is less than 5%. (0.05).

Table 6: Results of F test

	Chibar ²	Prob.> chi ²
F test	2.63	0.0000

Source: STATA 16 Output Results based on study data

Table 6 reveals a F value of 2.63 and a matching P value of 0.000, which is less than 5% (0.05). Thus, the study rejects the null hypothesis and accepts the alternative hypothesis, concluding that fixed effect regression is most suitable.

Breusch and Pagan Lagrangian Multiplier Test

The results of the Breusch and Pagan LM test, which was done to assess which of the pooled OLS regression and Random effect regression is more appropriate, are shown in Table 7. This test's null hypothesis is that Pooled OLS is most suitable, whereas the alternative hypothesis is that random effect regression is most appropriate. Accept the null hypothesis if the PV is larger than 0.05 percent; otherwise, accept the alternative hypothesis if the P value is less than 5 percent (0.05).

Table 7: Breusch and Pagan Lagrangian multiplier test for random effects

	Var	sd = sqrt(Var)
roa	291.3389	17.06865
e	204.2312	14.29095
u	23.32587	4.829686

Test: Var(u) = 0
 chibar2(01) = 53.95
 Prob > chibar2 = 0.0000

Source: STATA 16 Output Results based on study data

A chi2 value of 53.95 corresponds to a probability value of 0.0000, as seen in Table 7 above. This indicates that the null hypothesis is rejected, and the study concludes that the random effect model is the most suitable.

Serial Correlation Test

Table 8 displays the results of the Wooldridge test for autocorrelation in panel data, which was performed to detect if serial correlation exists. The null hypothesis of this test is that serial correlation does not exist, whereas the alternative hypothesis is that serial correlation does exist. If the PV is larger than 0.05%, the null hypothesis is not rejected; otherwise, the alternative hypothesis is accepted if the P value is less than 5%. (0.05).

Table 8 Wooldridge test for autocorrelation in panel data

F(1, 75) = 0.956
 Prob > F = 0.3313

Source: STATA 16 Output Results based on study data

The data shown in Table 8 reveal a f value of 0.956 and a probability value of 0.3313. This indicates that the null hypothesis is not rejected, and the analysis concludes that there is no association of the first order.

Hausman Taylor Test

The findings of the Hausman test done to evaluate whether of random effect regression and fixed effect regression is more suited are presented in Table 9 below. The null hypothesis of the test is that the Random Effect Model is most suitable, whereas the alternative hypothesis is that the Fixed Effect Model is most suitable. The rule of choice is to not reject the null hypothesis if the P value is larger than 5% (0.05), and to accept the alternative hypothesis if the P value is less than 5%. (0.05).

Table 9: Results of Hausman test

	Coefficients		(b-B)	sqrt(diag(V_b-V_B))
	(b)	(B)		
	fe	re	Difference	S.E.
hce	-.2863489	-.1837383	-.1026106	.1098707
sce	-.0273461	-.025902	-.0014441	.0004623
cee	16.03965	18.30961	-2.269955	1.969193
fsize	3.848579	4.303759	-.4551797	3.416722

Source: STATA 16 Output Results based on study data

chi2 (4) = 33.40
 Prob>chi2 = 0.0000

The result of the Hausman test in table 8 with a chi2 value of 23.40 and associated probability values of 0.0000, which is less than 5%, is presented in the following table (0.05). This suggests that the fixed effect regression model is the most suitable for the investigation.

Hypothesis Testing

Table 10 below present the results of the fixed effect regression which was used to explain the relationship and effect of the capital employed and structural capital on financial performance

Table 10 Fixed effect Regression Results

Fixed-effects (within) regression	Number of obs =	750			
Group variable: cross	Number of groups =	76			
R-sq: within = 0.1381	Obs per group: min =	7			
between = 0.2828	avg =	9.9			
overall = 0.1749	max =	10			
		F (4,670) =	26.83		
corr(u_i, Xb) = 0.0841	Prob > F =	0.0000			

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
hce	-.2863489	.1936555	-1.48	0.140	-.6665937	.0938959
sce	-.0273461	.0031231	-8.76	0.000	-.0334783	-.0212138
cee	16.03965	3.447827	4.65	0.000	9.269807	22.8095
fsize	3.848579	3.548797	1.08	0.279	-3.119522	10.81668
_cons	-28.31746	25.22526	-1.12	0.262	-77.84753	21.21261

sigma_u	7.6544049
sigma_e	14.290947
rho	.22292699 (fraction of variance due to u_i)
F test that all u_i=0:	F(75, 670) = 2.63 Prob > F = 0.0000

Source: STATA 16 Output Results based on study data

The F statistics of 36.83 and a corresponding Prob.>F of 0.0000 indicated that the model is fit to explain the relationship expressed in the study. The nature and extent of the relationship between the dependent variable and each of the independent variables of the study in terms of coefficients, z- values, and p- values are explained further:

Ho₁; Human capital efficiency has no significant effect on return on asset of listed non-financial companies in Nigeria.

The coefficient of -0.02863 demonstrates a negative association between human capital efficiency (HCE) and return on assets for the sampled nonfinancial enterprises over the research period. This indicates that for each unit increase in human capital (HCE), the return on assets decreases by 0.2863 units. The results also indicated that the human capital of the selected organizations had a negligible impact on the financial performance of Nigerian non-financial enterprises that are publicly traded. This was demonstrated by a t-value of -1.48 and a P-value of 0.140 , none of which are statistically significant at the 5% level. As a consequence, the null hypothesis was rejected and the alternative hypothesis was accepted, leading to the conclusion that HCE has a negative and minor influence on the return on assets of listed non-financial enterprises in Nigeria. Similar results were obtained by Aluwong (2002), who also discovered that HCE has a little impact on financial performance. Enekwe et al. (2022) and Ngoc et al. (2020) found that HCE had a substantial impact on performance.

Ho₂; capital employed efficiency has no significant effect on return on asset of listed non-financial companies in Nigeria.

Capital employed efficiency (CEE) of the sampled nonfinancial enterprises during the research period shows a positive correlation with return on asset, as demonstrated by the coefficient of 16.0397 . This indicates that the return on assets increases by 16.0397 units for each unit increase in capital employed (CE). In addition, the results demonstrated that capital used by the selected enterprises had a considerable impact on the financial performance of Nigerian non-financial companies that are publicly traded. This was demonstrated by a t-value of 4.65 and a P-value of 0.000 , which is statistically significant at the 5% level. As a result, the study rejects the null hypothesis and accepts the alternative hypothesis, leading to the conclusion that CEE has a positive and statistically significant influence on the return on assets of listed non-financial enterprises in Nigeria. Ho₃; Structural capital efficiency has no significant effect on return on asset of listed non-financial companies in Nigeria.

As indicated by the coefficient of -0.0273 , structural capital efficiency (SCE) of the sampled non-financial enterprises throughout the research period shows a negative association with return on assets. This indicates that for each unit improvement in structural capital efficiency (SCE), return on assets decreases by 0.0273 unit. The results also demonstrated that the selected firms' structural capital has a considerable impact on the financial performance of Nigerian non-financial enterprises that are publicly traded. This was demonstrated by a t-value of -8.76 and a P-value of 0.000 , both of which are statistically significant at the 5% level. As a consequence, the alternative hypothesis was rejected and the null hypothesis was accepted, leading to the conclusion that structural capital has a substantial influence on return on asset of listed non-financial enterprises in Nigeria. Similar findings were made by Aluwang et al. (2022), Yousaf (2021), and Nnubia et al. (2019), who discovered that SCE had a considerable impact on financial performance. The results were in stark contrast to those of Enekwe et al. (2022), who found that CEE has no influence on performance.

V. Discussion of Findings

This study investigated the impact of intellectual capital on the financial performance of Nigerian nonfinancial enterprises that are publicly traded. This study specifically aimed to assess the impact of human capital, employed capital, and structural factors on the financial performance of listed non-financial enterprises in Nigeria. Consequently, the outcomes of this study are based on hypotheses established, models constructed, and analysis performed. Human capital, employed capital, and structural capital were all anticipated to have a favourable and considerable impact on financial performance.

The study demonstrated, at a significance level of 5% (0.05), that the human capital efficiency of the sampled nonfinancial enterprises during the study period had a negative correlation with return on assets, as indicated by the coefficient of -0.2863 . This indicates that for each unit increase in human capital (HCE), the return on assets decreases by 0.2863 units. The results also indicated that the human capital of the selected organizations had a negligible impact on the financial performance of Nigerian non-financial enterprises that are publicly traded. This was demonstrated by a t-value of -1.48 and a P-value of 0.140 , none of which are statistically significant at the 5% level. As a consequence, the null hypothesis was rejected and the alternative hypothesis was accepted, leading to the conclusion that HCE has a negative and minor influence on the return on assets of listed non-financial enterprises in Nigeria. Similar results were obtained by Aluwong (2002), who also discovered that HCE has a little impact on financial performance. Enekwe et al. (2022) and Ngoc et al. (2020) found that HCE had a substantial impact on performance. The discrepancy in the findings was attributable to the variation in analytic methods. Enekwe et al. (2022) assessed performance using ROA and ROE and using pooled OLS regression, whereas the current study employed fixed effect regression.

At a significance level of 5% (0.05), the study discovered that capital employed efficiency has a positive and significant influence on the financial performance of listed non-financial enterprises in Nigeria. The

results are consistent with past assumptions. A unit increase in capital employed will result in a 16.0397-unit rise in financial performance, according to the preceding data. This study's conclusions concur with those of Yousaf (2021) and Nnubia et al (2019), who also discovered that CEE had a substantial impact on financial success. The results were in stark contrast to those of Enekwe et al. (2022), who found that CEE has no influence on performance. The contradiction in the findings was due to the disparity in the analytic methods. Enekwe et al. (2022) assessed performance using ROA and ROE and using pooled OLS regression, whereas the current study employed fixed effect regression.

In addition, the study discovered that structural capital efficiency has a considerable impact on the financial performance of listed non-financial enterprises in Nigeria, contrary to what was anticipated beforehand. A unit increase in structural capital is associated with a 0.0273 unit decrease in the financial performance of listed non-financial firms in Nigeria. These findings are consistent with those of Aluwang et al (2022), Yousaf (2021), and Nnubia et al (2019), who also found that SCE has a significant effect on financial performance. The results were in stark contrast to those of Enekwe et al. (2022), who found that CEE has no influence on performance. The differences in the findings are a result of the analytic methods and research timeframe.

VI. CONCLUSION AND RECOMMENDATIONS

From the result of the analysis, the study concluded that capital employed (CE) and structural capital (SC) have a negative significant effect on financial performance. This depicts that progressive increase in capital employed and structural capital brings about a decrease in financial performance of non-financial companies in Nigeria. The following recommendations were made:

- i. That management of non-financial firms should invest more on human capital as this will create value and increase its financial performance.
- ii. Listed non-financial companies should implement policies that will reduce investment in capital employed and structural capital such as patents, computer software, trademarks, and copyrights to an acceptable threshold as this could be used to create revenue for the businesses there by improving the negative contribution of capital employed and structural capital to financial performance.

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