

Impact of Intellectual and Natural Capital on Financial Performance of Listed Consumers Goods Firm in Nigeria

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Abstract

This research examines how intellectual and natural resources influence the financial success of consumer goods companies in Nigeria that are publicly traded. Intellectual capital includes intangible assets such as knowledge, experience, and intellectual property, while natural capital comprises environmental and natural resources supporting business operations. Data on intellectual capital utilization (ICU), natural capital utilization (NCU), and financial performance were collected from the value-added and income statements of 21 listed firms, covering 2016–2023. Given the small population size, a census approach was adopted. Heuristic modelling, incorporating Pearson correlation and moderated regression analysis, was employed. Results show that Human Capital Efficiency (HCE) and Relational Capital Efficiency (RCE) have a significant positive effect on financial performance. Structural Capital Efficiency (SCE) positively affects revenue growth but shows a negative relationship with Return on Equity (ROE) and Capital Adequacy (CADQ). Natural Capital Efficiency (NCE) positively relates to ROE, revenue growth (RGRT), and CADQ. Overall, ICU shows mixed effects on firms' financial performance. The study recommends strategic enhancement of ROE, RGRT, and CADQ to strengthen financial outcomes. Additionally, SCE should be improved to positively influence ROE and CADQ in the future.

Keywords: Intangible Assets, Environmental Resources Utilization, Value-Added Analysis, Corporate Performance Metrics, Heuristic Regression Model

1. Introduction

The subject matter intellectual and natural capital on the performance of consumer goods firms (PCGF) is of great interest and significance that has captured the interest of researchers. Intellectual capital (IC) refers to a firm's intangible assets, such as knowledge, experience, and intellectual property, whereas natural capital includes the environmental resources and natural resources that support a business's operations (Lambe & Zwingina, 2022). Making strategic decisions and implementing sustainable business practices require an understanding of how these forms of capital affect the (PCGF) in Nigeria. According to Ali et al. (2022), an organization's financial performance can be significantly subjective by the degree to which knowledge and IC are utilized efficiently in today's society.

In order to improve the PCGF in Nigeria, IC is essential. Numerous aspects of a firm's performance are positively impacted by intellectual capital, which includes relational, structural, and human capital, according to research. Employee knowledge, abilities, and experience collectively known as human capital support innovation, productivity, and general competitiveness in consumer goods companies. Furthermore, firms can generate value and keep a competitive benefit in the market thanks to operational capital, which consists of systems, processes, and intellectual property. Again, a brand's



reputation and customer loyalty are strengthened by interactive capital, which consists of relationships with suppliers, customers, and other stakeholders.

Intellectual capital (IC) can stimulate innovation in supply chain management, product development, and marketing tactics for publicly traded consumer goods firms in Nigeria. Businesses that successfully utilize their IC are in a better position to anticipate customer preferences, adjust to changes in the market, and maintain long-term growth (Ali et al., 2022). Also, financial performance metrics like profitability, market value and return on assets added are influenced by IC. Thus, consumer goods firms can boost their IC and eventually perform better in the Nigerian market by investing in knowledge management systems, staff training initiatives, and cooperative partnerships. This will eventually be synchronized with the natural capital to positively touch the firm's financial performance (FP).

Thus, the performance of Nigerian firms is also greatly impacted by natural capital (NC). The availability and sustainability of natural resources, such as forestry, agriculture, and minerals, have a direct impact on firms because these resources are essential to the nation's economy. For firms operating in Nigeria, long-term viability, resource efficiency, and risk mitigation all depend on workable management of natural capital (NC). In addition to improving operational effectiveness and cost-effectiveness for consumer goods companies, responsible use of natural resources also helps protect the environment. Businesses can reduce their environmental impact and increase their profitability by implementing energy-efficient manufacturing techniques, waste reduction programs, and sustainable sourcing practices. Additionally, consumers are becoming more and more interested in ethical business practices and environmentally friendly products. Because of this, consumer goods companies that place a high priority on protecting natural capital are better positioned to adapt to changing market demands and acquire a competitive edge in Nigeria's fast-paced business environment.

When looking at how intellectual and natural resources impact the financial performance of Nigerian consumer goods companies listed on the Nigerian Exchange Group (NGX), it becomes evident that a well-thought-out plan is essential for achieving lasting prosperity. Businesses that manage both types of capital well can reap synergistic benefits that enhance their stakeholder relationships, market positioning, and FP. Consumer goods firms can maximize environmental impact while promoting innovation by fusing sustainable natural resource management techniques with intellectual capital strategies. This research study aims to explore how intellectual and natural capital can impact the performance of firms, highlighting a gap in knowledge as previous studies in Nigeria have mainly focused on consumer goods.

Consequently, by comprehending the relationship between natural and intellectual capital, businesses can find new ways to stand out in the Nigerian market and expand. For instance, using intellectual capital to design environmentally friendly products or putting in place sustainable supply chain procedures can benefit the firm and its stakeholders. In addition to improving financial performance, this integrated approach strengthens a company's resilience to environmental risks and its reputation. However, there is a complex and interrelated relationship between the performance of listed consumer goods firms in Nigeria and their intellectual and natural capital. These firms can attain justifiable growth and contribute to economic development and environmental stewardship in Nigeria by acknowledging the importance of both forms of capital and putting strategic initiatives in place to leverage them effectively.

2. Literature Review

2.1. Intellectual Capital

The concept of IC, has many facets. In particular, Sowaity (2022) defines IC as an intangible capital that falls into the categories of relational, structural, and human capital. The combination of relational capital efficiency (RCE), structural capital efficiency (SCE), and human capital efficiency (HCE) is how IC utilisation is defined in this study (Indriani & Setiany, 2024). HCE is specifically defined as the ratio of value added (VA) to the total amount of money spent by a company on employee salaries and wages (i.e. its human capital). SCE arrives at the value-added subtraction from human capital costs in the meantime (Edheku, 2023). Lastly, according to Gupta et al. (2020) RCE is the ratio of a company's relational (marketing) costs to value added.

The FP of non-financial firms is primarily driven by IC. Investing in both physical and intellectual capital can help businesses increase their efficiency, use resources more effectively, and enhance their financial outcomes (Ali et al., 2022). Cuozzo et al. (2017) claim that the IC is a value that encompasses social, economic, and environmental factors in addition to financial gain. According to Shahwan & Habib (2020), IC is the culmination of all employee abilities and proficiencies that produce revenue for the company.

The significance of IC cannot be understated, especially when it comes to Nigeria's consumer goods industry, where employment and effective IC utilization are currently thought to be the most important and crucial components of the industry's success (Ali et al., 2022). The consumer goods industry utilizes IC to provide top-notch services through consistent training, brand building, system improvements, updated processes, and strengthened partnerships. Therefore, for the consumer goods sector to remain competitive, IC's efficient and effective management becomes crucial. From a global standpoint, it is clear that the consumer goods sector is utilizing innovation and technology to the completest degree possible in imperative to optimize shareholder wealth (Asif et al., 2020). In Nigeria, in particular, this trend is not unusual right now. In a mandate to achieve better FP, the consumer goods sector is now placing more emphasis on IC and cultivating relationships with stakeholders than just hiring a large number of workers.

Thus, for IC to compete and create value for long-term success, globalization has transformed the economy from one based on industries to one based on knowledge (Gupta et al., 2020). An economy classified as knowledge-based is one in which the creation, production, and application of knowledge (Mensah & Enu-Kwesi, 2018) drives economic development and expansion. Intangible knowledge in the form of intellectual capital, made up of employee expertise, research and development, operational processes, and information repositories, offers a strategic edge to a company (Ahmad et al., 2018). Even though intellectual capital is essential for a company to generate profit, it is not formally reported on the balance sheet.

2.2. Natural Capital

Natural Capital (NC) resources such as soil, water, air, and geology, additionally, all living things, are collectively denoted to as the world's natural capital. With its vast array of goods and services that are vital to human welfare, it serves as the basis for all human life and economic activity (Power et al., 2022). For the benefit of present and future generations, the idea of natural capital highlights how crucial it is to protect and manage natural resources sustainably. As businesses go toward intellectual and natural capital because of the necessity of maintaining and protecting natural resources, additionally minimizing the externalities connected to the discovery and use of natural or environmental capital accounting and reporting is currently a global concern (Etim et al., 2022). This is

the reason behind the remarkable surge in research on sustainable capital reporting in the field of environmental, social, human, and intellectual capital in recent years.

According to Kalash (2020), stakeholders are now giving more significance to the environmental performance of companies because they are acknowledging the harmful impact that business operations can have on the environment. Industrial activities are considered the primary culprit behind climate change and global warming, which are leading to disastrous consequences. Thus, businesses are coming under increasing pressure from the government and society to release more information pertaining to the environment and devising a strategy that lowers pollution and greenhouse gas emissions, produces low-carbon products, and enhances environmental performance. Environmental concerns are being considered in business operations more and more as a result of these pressures (Kalash, 2020; Lu & Abeysekera, 2014).

Environmental, social, and governance (ESG) information is disclosed through sustainable capital reporting in relation to a company's performance, society, and economy (Kalash, 2020). They claim that this kind of reporting improves a company's reputation, lessens information asymmetry, and lowers capital and agency costs. All of these advantages motivate managers to act responsibly toward the environment and be open and forthcoming. According to the information cost theory, choices regarding environmental disclosure involve balancing the expenses and advantages of releasing information. If not carefully planned, this could impact the financial standing of the company (Ali et al., 2022). Thus, businesses will always incur costs associated with gathering, verifying, measuring, and disseminating information. They also stated that when benefits outweigh costs, businesses will reveal more information (Ali et al., 2022). Thus, to prevent any decrease in the value of the company, managers will refrain from disclosing confidential information to stakeholders that could potentially be harmful, as doing so may result in additional costs associated with sharing such information (Ali et al., 2022; Guidry & Patten, 2012).

2.3. Financial Performance

An essential component of any business's overall success is its financial performance. It entails evaluating a firm's efficiency, profitability, and stability using a range of financial metrics, indicators, and ratios (Tudose et al., 2022). According to Naz et al. (2016), financial performance explains how an organization's financial health is measured over time. One way that management reports stewardship to investors is through financial performance. Accordingly, the difference between a company's beginning and end points over time can be used to measure its FP (Ilelaboye & Alade, 2022). FP can be assessed using a variety of metrics, such as profitability, growth in market share, return on equity (ROE), return on investment (ROI), and liquidity, according to Magara et al. (2015). Once more, the Institute of Chartered Accountants of Nigeria Study Pact on Performance Management (2019) suggests that there are various ways to determine a company's financial performance, such as EPS, GPM, NPM, and other metrics. For this research, ROE was used as a substitute for FP.

According to Omondi & Muturi (2013), several factors contribute to a company's financial performance. Generating revenue is important for businesses as it relies on increasing sales and attracting new customers to ensure profitability. Additionally, managing operating costs—such as labor, materials, and production expenses—is essential for maintaining profit margins. Investment and financing also play a significant role; a firm's ability to raise capital and invest in assets that drive growth and profitability greatly influences its financial outcomes. Furthermore, external factors such as market conditions, competition within the industry, and the general economic situation can greatly affect how well a company is performing financially. Consequently, in order to accurately assess a company's financial well-being and make sound choices, investors and businesses alike need to carry out a

thorough analysis of its financial performance. By understanding the key factors affecting performance and relying on credible sources, one can gain comprehensive insight into a company's current standing and future growth potential.

2.4. Return on Equity

Return on Equity (ROE) is a financial indicator used to evaluate a company's effectiveness in generating returns on the capital invested by its shareholders. The ratio of a company's profits to the ownership stake of its shareholders is referred to as ROE. ROE serves as a gauge of a company's profit-making ability and how efficiently it converts investments into earnings. A company's capacity to utilize equity funding to generate profits improves as its ROE rises.

ROE is a popular profitability measuring tool for assessing a FP. Companies that have high return on equity (ROE) values are believed to run their operations more efficiently. Damayanti et al. (2014) states that Return on equity (ROE) is a measure utilized to determine the profitability of a company or the return on investment. Shareholders and financial analysts are often concerned about this ratio, as it indicates how a company's stock price is affected by its ROE. Referring to Cathelia & Sampurno (2016), ROE serves as a helpful measurement in evaluating how well investors are utilizing their capital. It depicts how effectively shareholders are managing their investments. ROE is typically shown as a percentage. There is a direct correlation between ROE and stock price; as ROE increases, so does the market price. A high ROE suggests that investors can expect significant returns, making the stock more appealing and causing the market price to increase.

2.5. Revenue Growth

Revenue growth is sales increases and declines over time as represented by the inflow of cash. It is used to measure the speed at which a company is expanding. Instead of just looking at one instance of revenue, investors find it more beneficial to analyze revenue growth over a period of time in order to identify patterns and evaluate the company's growth trajectory. Based on Okerekeoti (2021), revenue growth refers to the increase in a company's revenue over a specific period of time, often comparing one fiscal period to another. According to Charles and Muiyiwa (2022), revenue is the overall income generated from the exchange of goods or services related to the primary operations of a company. Known as the top line, revenue is listed at the forefront of the financial statement. The money a business makes before deducting any costs is known as its revenue in value. Revenue growth can be defined as the increase in a company's earnings over a predetermined period of time relative to the same period the prior year (Kasoga, 2020). Businesses always devise a revenue growth plan that gives them an advantage over rivals and boosts productivity. A strategy aimed at boosting revenue in both the short and long term is referred to as a revenue growth plan. As each business has its own distinct characteristics and requirements, the approach to expanding revenue will vary accordingly. The creation of a revenue growth strategy requires coordination, communication, and teamwork amongst all marketing, sales, and customer experience teams (Illelaboye & Alade, 2022).

"Revenue growth refers to the speed at which a business expands. A graph in an annual report displays the growth rate, both annual and compound, of a company's sales or revenue. This information can be utilized by stakeholders, shareholders, and financial experts to analyze the rate at which a company's revenue is increasing. Investors look for patterns in revenue growth to evaluate a company's growth over specific periods of time, despite fluctuations from fiscal year to fiscal year and fiscal quarter to fiscal quarter. Assuming all other factors remain the same, a company that experiences revenue growth should also witness enhancements in its net profit (Okerekeoti, 2021). The rate of revenue growth, shows the firm how much the rate of revenue growth is changing, is used to compute the rate of revenue growth. Investors use this indicator to forecast shifts in earnings growth in the future. When

a business that has been able to raise its sales steadily begins to observe slower revenue growth, there may be a problem (Okerekeoti, 2021).

2.6. Theoretical Framework

2.6.1. Resource Based Theory

Barney (2001) proposed the theory of resources. According to the Resource-Based Theory (RBT), a company's ability to maintain a competitive edge relies on its reputation and image by judiciously utilizing tangible and intangible resources (Baye et al., 2014). Recognizing value-added as a trustworthy metric for evaluating a company's success has become widely accepted. RBT in a portfolio of resources, according to Morris et al. (2010), is the RBT framework explores how the amount and effectiveness of resources within a company's portfolio impact its overall success. As a theoretical perspective on strategic management, the resource-based view adheres to a set of severely difficult-to-imitate firm qualities that are essential to organizational effectiveness (Schulze, 1992). The resource-based view takes a comprehensive approach to strategic analysis, aligning with integrated reporting principles based on the six capitals that a corporation can access: financial, manufactured, intellectual, human, social and relational, and natural (Abeywardana et al., 2021). The International Integrated Reporting Foundation (IIRF) states that capital, or the available resources, is what determines an organization's success. The business model process uses capital as its input, which it then transforms into outputs that decide performance levels and maybe market acceptance.

This study applies the RBT to explain what manner the performance of listed multinational corporations in Nigeria is influenced by the readiness of natural and IC. The Value Reporting foundation disseminates information on natural and IC to all stakeholders, as per the diffusion of innovation theory. In another dimension, the stakeholder theory, opined that, when a corporation makes and implements policies, all parties' interests are taken into account. Because the organization's resources natural capital, intellectual capital, and resources when properly utilized would benefit stakeholders in the short, medium, and long terms and advance integrated reporting a new innovation the study is based on the diffusion of innovation theory and resource-based theory.

2.6.2. Information Cost Theory

According to Bar-Gill & Ben-Shahar (2021), the development of optimal defaults is influenced by information costs. In circumstances where knowledge costs increase, people are said to remain ignorant, and if opting out will increase their projected benefit, they are free to do so. The requirements are satisfied in the most advantageous way when all parties are informed. a system designed to keep track of the informed preferences of the important participants. or the strategy that maximizes expected gains. When information costs were large, the study concentrated on ignorant opt-out, whereas the typical, low information costs analysis focused on informed opt-out. The goal is to lower the frequency of opt-out in both situations. Again, Brillouin & Hellwarth (1956) notes that more fields are utilizing information theory that has been created. Transaction cost theory is based on the fundamental tenet that companies want to conduct business through channels with lower transaction costs (Hsieh et al., 2016). The optimal organizational structure for a multinational corporation is determined by the degree of information costs and the volatility of the global environment (Casson, 2011).

Denti et al. (2022) asserts that the cost of acquiring knowledge changes depending on the kind of experiment conducted. Information costs are the costs incurred by an individual or organization in the process of obtaining information for a financial decision. These expenses might affect a company's profitability or the value of a customer's purchase if they are significant enough (Zhang, 2020). The price of obtaining natural and IC may affect the FP of internationally listed businesses in Nigeria. This

could mean that the theory is not valid in the near term because integrated reporting adds costs in the short term but may help the company's medium- and long-term operations.

2.7. Empirical Review

Shafi'u et al. (2017) conducted a study on the impact of IC on the FP of listed Nigerian food products companies. Using the publicly available value-added intellectual coefficient (VAIC) model of intellectual capital (IC), this study looks at how listed Nigerian food product companies' financial performance is affected by IC over a five-year period from 2010 to 2014. The study's hypotheses are tested using regression models, and the findings indicate that IC had a favorable and significant impact on FP. The findings specifically demonstrated that the FP of Nigerian food product companies is influenced by both structural capital (SC) and capital employed (CE). The resource-based hypothesis explains the results, which show that organizations can improve their financial performance by prioritizing innovation and creativity, particularly in the food goods industry.

Nkechi & Nath (2022) conducted research on to examine the impact of IC on the corporate performance of a subset of Nigerian companies that manufacture CGs between 2010 and 2019. For the study, two research questions and two hypotheses were developed. In this study, an ex-post facto research design was used. Sixteen (16) randomly selected consumer products manufacturing companies were included in the study's sample size, which consisted of all manufacturing firms traded on the Nigerian Stock Exchange (NSE) as of June 30, 2020. The NXG website and the annual reports of the sampled companies, as provided by each company, served as secondary sources of data for the study. The hypothesis was validated using fixed effect panel least square regression analysis. The results of the study showed that human capital significantly increases ROA. The results also showed that structural capital had a major impact on ROA, which served as a stand-in for corporate success. As a result of the findings, the study makes several recommendations, including that company executives and all other stakeholders start to recognize and value IC as a crucial resource because it directly affects the corporate performance of the companies.

Etim et al. (2022) in their study that asserted that, with the focus on the green economy and reporting framework, reporting environmental/NC and its impact on business profitability has become a modern worldwide corporate reporting challenge. The aim of the study was to find out how Nigerian manufacturing enterprises' profitability was impacted by their reporting on environmental and natural capital. Regarding the research, twenty-three (23) companies that process natural resources and industrial materials were chosen. The study utilized the ex-post facto research design and generated data utilizing a content analysis checklist from these companies' annual reports. The years of study were 2009–2018. Seven items were used to create the environmental/natural capital index (scores) in accordance with the International Initiative on Integrated Reporting Council (IIRC). The ordinary least squares (OLS) method of descriptive and basic linear regression was used to analyze the data. ROA served as a stand-in for manufacturing companies' profitability (ROA). The more numbers of the examined firms did not report environmental/natural capital, with an average reporting index of less than 5%. The findings showed that environmental/natural capital reporting (ER) has a considerable negative impact on ROA. ($\beta = 0.168$, $SE = 0.598$, $t\text{-cal} = -2.222$, $p\text{-value} = 0.027$, $p < 0.05$) was the regression coefficient. It was determined and advised that Nigerian regulatory bodies establish reporting guidelines that would require the reporting of all sustainable capital items, including environmental and natural capital, in accordance with international best practices.

Ofurum & Aliyu (2018), in their study conducted an empirical investigation of the correlation between the FP of Nigerian listed banks and their IC. An ex post facto research design was utilized in the study. The Nigeria Stock Exchange and the published annual financial statements of fifteen (15)

commercial banks as of December 31, 2016, were the sources of the data used in the study. The Pulic (1998) Value Added Intellectual Coefficient (VAIC) Model, which measured intellectual capital indices (HCEI) in connection to FP, was also adopted and modified by the researchers. Using E-view version 9 and SPSS version 23, we used the OLS regression tool to examine the data. The study's conclusions were not entirely consistent with the data, as certain components of IC did not significantly correlate with increases in revenue or return on investment. It also showed that return on investment and the Human Capital Efficiency Index were highly correlated. According to the study's findings, there is a partial relationship between IC and the financial success of Nigeria's listed commercial banks. It is suggested that rather than just being expensed in the income statement, IC components should be included in standards by the International Accounting Standards Board (IASBs) as capital investments. In order to prevent false information and improve the caliber of FP, the study also supported the International Integrated Reporting Council's (IIRC) requirement for full disclosure of IC in financial statements.

Anifowose et al. (2018), they aim to investigate the value relevance of IC through an analysis of the correlation between ICE and corporate book value of enterprises listed on the Nigeria Stock Exchange main board. Two hypotheses that direct the outcomes analysis are developed in this study using the RBT. In this study, the relationship between ICE and corporate book value that is, cash flow from operations and economic value added (EVA) is examined using data from the 2010 to 2014 financial years for a sample of 91 listed firms on the main board of the Nigeria Stock Exchange. A two-step dynamic system generalized method of moments (GMMs) is used to account for the potential endogeneity effect on the parameters estimated. The findings indicate a strong positive correlation between corporate book value (EVA) and total ICE (cash flow from operations). This study adds to the body of recent research on the value and relevance of investor and other interested stakeholder information included in IC.

Sulaiman (2019) observed over a 12-year period (2006-2017), the study assesses the impact of business size, capital structure, and financial performance on the value of listed consumer products companies in Nigeria. The study looks at proxy FP measured by ROE and ROA. It also takes into account proxy financial leverage measured by short- and long-term debt, natural logarithm of total assets, and Tobin's Q proxy firms' value, with firm growth acting as a control. Ex-post facto Pooled Ordinary Least Squares and panel data estimators, which include Fixed Effects Model and Random Effects Model, are employed in the study. The study found that while ROE has a negative significant influence on Tobin's Q, company size and firm growth have an insignificant effect on Tobin's Q, ROA, short- and long-term debt, and both have positive significant effects. According to the study's findings, the independent variables influence the dependent variables. According to the study, management of the companies should continue to employ debt in their capital structure since it increases the value of the company; management should also continue to increase the amount of total assets in their company since it increases the value of the company.

Sulaiman et al. (2021) their interest was to study the relationship between the effectiveness of value-added intellectual coefficient (VAIC) and market-based FP of listed Nigerian conglomerate companies was sparked by the rate at which market and book value diverge and management ignorance regarding the impact intellectual capital disclosure has on companies' values. Secondary data were used in this study to achieve its objectives, and they were taken from the yearly audited reports of listed conglomerate firms in Nigeria between 2010 and 2018. Regression analysis using static panel data was applied to the acquired data. The random-effects model was selected over the fixed-effects model because to its superior performance, as demonstrated by the empirical findings from the Hausman tests and the Breusch and Pagan Lagrangian multiplier (BP-LM). The drivers of IC in the conglomerate industry, according to this study, are the value-added efficiency of structural capital (STVA), value-

added efficiency of human capital (VAHU), and value-added efficiency of capital employed (VACA). This study findings indicate that, there is a significant influence of IC components on market-based FP. This study suggests that by creating an IC disclosure model that complies with the International Accounting Standard Board (IASB), information on IC components should be published in any way the researcher sees fit.

3. Methods

ICU, NCU and consumer goods financial performance data were both sourced mainly from the value-added statement and income statement of the targeted firms from 2016 to 2023. The data used for the study was collected from the annual reports after the observations have occurred. As at 31st December 2023, there were twenty-one (21) listed consumer goods firm. Since the population size is relatively small, the census approach (which involves complete notation of the aggregate sampling units) was used. The analyses were conducted using the Heuristic Modelling which combined both Pearson Correlation; and moderated regression analysis. The study adopted the model proposed by Edheku and Akan (2023). The Pearson Correlation is represented as follows:

$$r_{xy} = \frac{\Sigma(X_1 - \bar{X})(Y_1 - \bar{Y})}{\sqrt{\Sigma(X_1 - \bar{X})^2 \Sigma(Y_1 - \bar{Y})^2}} \dots\dots\dots \text{Model 1}$$

Where:

r_{xy} = the coefficient from the correlation of two variables x and y

X_1 = Regressor

\bar{X} = Mean of the Regressor

Y_1 = Regressor

\bar{Y} = Mean of Regressor

To ensure that the model captures the moderator (firm size) into the model, moderated regression analysis was introduced. This is mathematically expressed as:

$$FP_{it} = \Psi_o + \Psi_1 ICU_{it} + \Psi_2 FZ_{it} + \Psi_3 ICUFZ_{it} + \varepsilon_{it} \dots\dots\dots \text{Model 2}$$

Where:

FP = financial performance

ICU = intellectual capital utilisation

FZ = firm size

ICUFZ = Interaction terms which covers the product of ICE and FZ, (ICU*FZ).

Ψ_o = Slope

Ψ_1, Ψ_2 and Ψ_3 = coefficients

ε = error term

The study formulated the following model for Heuristic study as:

$$FP_{it} = \Psi_o + \Psi_1 ICU_{it} + \Psi_2 NCU + \Psi_3 FSize_{it} + \Psi_4 ICUNCUFZ_{it} + \varepsilon_{it} \dots\dots\dots \text{Model 3}$$

Where:

FP = financial performance

ICU = intellectual capital utilization

NCU = Natural capital utilization

FSize = firm size

ICUNCUFZ = Interaction terms which covers the product of ICE, NCU and FZ, (ICU*FZ).

Ψ_o = Slope

Ψ_1, Ψ_2, Ψ_3 and Ψ_4 = coefficients

ε = error term

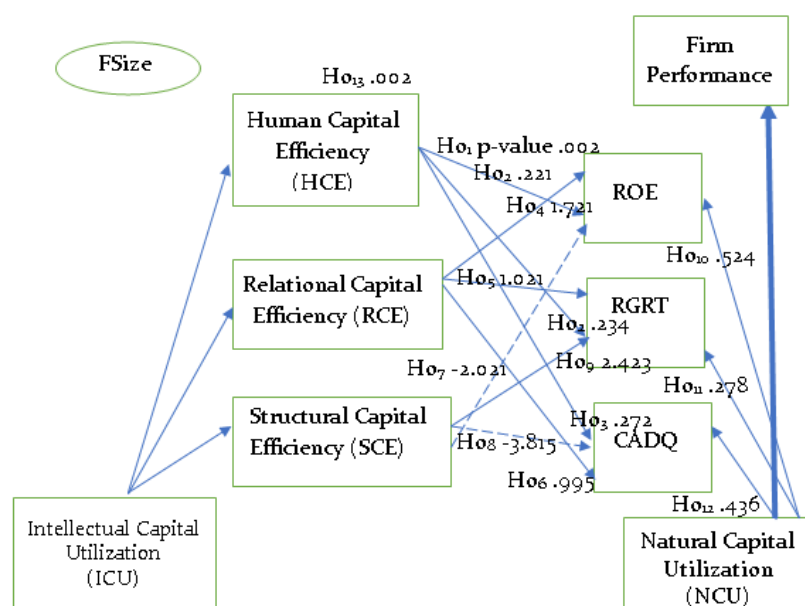
Table 1. Variables and their descriptions and sources

Variable	Measures	Source of Data
HCE	VA divided by human capital (HC). Where: HC is total salaries and wages. $HCE = VA/HC$	Value added statement-VAS of selected Consumer goods firm.
RCE	$RCE = RC/VA$ RC = Advertising expenses recognised in the income statement.	Income statement and VAS of selected Consumer goods firm
SCE	$SCE = SC / VA$ $SC = VA - HC$.	VAS of selected Consumer goods firm
CADQ	Computed by each firm and disclosed in the financial statement	Computed by the researcher
RGRT	Subtract Previous Period revenue from current periods revenue. Divide the result by the previous revenue and multiply by 100	Computed by the researcher
ICU	Sum of HCE + SCE + RCE	Computed by the researcher
NCU	Price of natural capital assets equals the marginal ecosystem service flow	Computed by the researcher
FP	Average of the sum of ROE + CA + GRH	Computed by the researcher
FSize	Natural logarithm total assets of the firm	Computed by the researcher
FZICUNCU	Product of ICU, NCU and FSize	Computed by the researcher

Source: Researcher's Compilation (2024)

The study utilizes several key variables to examine the relationship between capital efficiency and financial performance. Human Capital Efficiency (HCE), Relational Capital Efficiency (RCE), and Structural Capital Efficiency (SCE) represent the components of intellectual capital, collectively referred to as Intellectual Capital Utilization (ICU). Natural Capital Utilization (NCU) captures the firm's use of environmental and natural resources. Financial performance (FP) is assessed using indicators such as Capital Adequacy (CADQ) and Revenue Growth (RGRT). Additionally, Firm Size (FSize) is included as a control variable to account for the scale of operations. These variables form the basis for analyzing how different dimensions of capital efficiency influence the financial outcomes of consumer goods firms.

4. Results and Discussion

**Figure 1. ICU, NCU and FP Heuristic Model**

The heuristic model employed in this comprehensive analysis provides detailed insights into the relationships between intellectual capital components and financial performance metrics of consumer goods firms listed on the Nigeria Exchange Group (NGX). The findings reveal complex patterns of influence that vary significantly depending on the specific financial performance measure examined.

The model demonstrates that Invested Capital Utilization (ICU) does not exhibit a statistically significant impact on the financial performance of consumer goods firms operating within the Nigerian market context. This finding suggests that the efficiency with which these firms utilize their invested capital may not serve as a primary determinant of their overall financial performance outcomes within the study parameters.

Natural Capital Utilization (NCU) reveals consistently positive relationships across multiple financial performance dimensions. The analysis indicates that NCU demonstrates positive correlation with Return on Equity (ROE) at a p-value of 0.524, positive effects on Revenue Growth Rate (RGRT) with a p-value of 0.278, and maintains positive influence on Corporate Annual Disclosure Quality (CADQ) with a p-value of 0.436. These findings collectively suggest that firms employing more effective natural capital utilization strategies tend to experience enhanced financial performance across these critical metrics, though the relationship strength varies considerably.

Human Capital Efficiency (HCE) emerges as a particularly significant driver of financial performance improvement across the consumer goods sector. The model reveals substantial enhancement of consumer goods firm financial performance across all measured dimensions. The relationship between HCE and ROE demonstrates high statistical significance with a p-value of 0.002, indicating strong positive correlation. The impact on RGRT shows moderate significance with a p-value of 0.221, while the relationship with CADQ registers a p-value of 0.272, maintaining positive trends across all performance measures. These results underscore the critical importance of human capital efficiency in driving superior financial outcomes for consumer goods firms.

Relational Capital Efficiency (RCE) demonstrates remarkably consistent positive impacts across all examined financial performance indicators. The model shows that RCE significantly improves ROE with a p-value of 1.721, enhances RGRT with a p-value of 1.021, and positively impacts CADQ with a p-value of 0.995. These findings suggest that firms with stronger stakeholder relationships and more efficient relational capital management achieve superior performance outcomes across multiple financial dimensions.

Structural Capital Efficiency (SCE) presents the most complex relationship with financial performance, exhibiting both positive and negative effects depending on the specific measure examined. When financial performance is measured through ROE, serving as a profitability measure, SCE demonstrates negative and statistically significant relationship with a p-value of -2.021. However, when examining RGRT, which measures performance based on comparison between previous and current revenue, SCE exhibits positive relationship with a p-value of 2.423. The relationship between SCE and CADQ, measuring performance based on firm disclosure quality in financial statements, reveals negative correlation with a p-value of -3.815. This pattern indicates that structural capital efficiency may primarily benefit revenue growth initiatives rather than overall profitability or disclosure quality.

The comprehensive analysis reveals that financial performance of consumer goods firms demonstrates significant positive relationships with both Human Capital Efficiency and Relational Capital Efficiency across ROE, RGRT, and CADQ measures. In contrast, Structural Capital Efficiency shows significant positive correlation only with RGRT while demonstrating insignificant or negative relationships with ROE and CADQ respectively. Furthermore, the analysis reveals that firm size moderates these relationships negatively, suggesting that larger consumer goods firms may experience

diminished returns from intellectual capital investments, possibly due to organizational complexity or challenges in scaling intellectual capital benefits across larger operational structures.

5. Conclusion

The study examined impact of intellectual and natural capital on FP on listed consumers' goods firm in Nigeria. The study employed the Heuristic model approach. The result of the study indicates that HCE and RCE is positively significant to the financial performance of consumer goods firm. While SCE is positive on firms' performance with revenue growth while the result shows a negative significance of ROE and CADQ respectively. The results also indicates that NCE as a positive relationship with ROE, RGRT and CADQ on FP of consumer goods firms. The ICU indicate that there is a mix effect on consumer goods firm as it relates to FP of firms. The study therefore recommends that ROE, RGRT and CADQ should be channelled toward improving the firm's FP while SCE should be improved in relation to ROE and CADQ to improve future FP of consumer goods firms.

6. References

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