Intellectual Capital and Financial Performance of Listed Manufacturing Companies in Nigeria

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Abstract

This study was conducted to examine the influence of intellectual capital on financial performance of listed manufacturing companies in Nigeria. This was premised on the fact that continuous existence of listed manufacturing companies in Nigeria is guaranteed by the level of improvement in financial performance. Improvement in financial performance may depend upon the level of intellectual capital possessed by the entities. This necessitated the conduct of the present study to assess the direction of all the variables of intellectual capital on financial performance indicator. The ex-post facto research design was employed in the study. The population was made of thirty-three (33) listed manufacturing companies in Nigeria that cut across two sub-sectors on the floor of Nigerian Stock Exchange (NSE) as at December 2022 of which twenty-six (26) entities were sampled for the study. The dependent variable was Financial Performance (ROE) while the independent variable was Intellectual Capital (IC) measured by Human Capital (HC) and Relational Capital (RC). Panel data were collected

from annual reports and financial statements of the sampled entities from 2013 to 2021. The sourced data were analyzed using descriptive and inferential statistics. Fixed effect regression technique was used in the study. From the analyses, it was discovered that HC and RC had positive and significant influence on ROE of listed manufacturing companies in Nigeria. It was concluded, by the researcher, that intellectual capital had a positive and significant influence on financial performance of listed manufacturing companies in Nigeria. It was recommended that investments should be made on training and development programmes for employees of listed manufacturing companies in Nigeria by granting them with some funds to enable them further their academic and professional studies and relational capital should be improved by investing appropriately on marketing and distribution activities to create relationship with other companies and customers.

Key Words: Intellectual capital[1], financial performance[2] and listed manufacturing companies in Nigeria[3].

1.1 Introduction

Intellectual capital is an emerging concept in accounting that is associated with the level of knowledge acquired by an organization through development of human capital, investment in marketing to improve customers' relationship with the companies and improving upon organizational culture and database (Anik, Chariri & Isgiyarta, 2021). Thus, the total knowledge acquired by a company through human resources, relational capacity and structural competency is regarded as intellectual capital (Ahangar, 2020). In this case, intellectual capital is seen as a critical resource possessed by a company internally which could affect other accounting attributes reported on financial statements. For the purpose of growing the level of intellectual capital in an entity, adequate investments are required to be made by managers on the variables such as human capital and relational capital. For the improvement in human capital, managers are required to provide funds for training and development of employees for the purpose of raising their technical know-how and making them to be acquainted with the required skills needed in organization.

Managers are expected to commit funds on marketing and distribution activities to create more relationships with customers and other companies. Business-related facilities must be acquired in line with the level of technology and essential to the various tasks in the organization. The various investments on the components of intellectual capital are meant to improve the benefits of human and relational capital. This is because the improvement in human capital is capable of affecting the productivity of an organization positively, the improvement in relational capital is capable of marketing the products or services to the various customers or markets and the growth in structural capital could elevate the operating capacity of a company where tasks are discharged diligently with higher proficiency. On this note, higher level of intellectual capital could influence financial performance positively. According to Muchran (2020), a company with higher intellectual capacity is one that could achieve higher financial performance in an accounting period.

In assessing the financial performance of companies, different accounting ratios are used including stock price of companies. Some of the financial performance indicators derived from published accounting data are return on equity (ROE), return on assets (ROA), return on capital employed and earnings per share (EPS). According to Gadzo & Asiamah (2018), the magnitude of any of the financial performance indicators computed by managers of companies based on the operation of their companies usually provide different information to them which

could either be growth or decline observed in any accounting period. When there is growth in any financial performance indicator, it could be said that the efforts of managers in formulating sound decisions and policies yielded meaningful results and when there is decline, it could be said that the effort of managers does not yield meaningful result to their companies (Abubakar, Maishanu, Abubakar & Aliero, 2018, Etim & Idorenyin 2021).

The magnitude of financial performance of any company is affected by different attributes of which some are influenced by the decisions and policies of managers. This simply means that decline in financial performance of a company in one accounting period could be corrected in another accounting period only if the causes of the decline in financial performance of the company were solely attributed to internal factors that could be influenced by managers (Zarei, Shamszadeh & Zarei, 2014). The level of financial performance of companies in different accounting periods is influenced by intellectual capital maintained by the entities. This is the reason managers are always on the view to re-examine the various financial performance attributes in different accounting periods to properly appraise the extent to which their policies and decisions on various investments have yielded results. Of all the studies conducted in Nigeria in the area of intellectual capital and financial performance of entities, it seems that limited studies have been conducted in listed manufacturing companies in Nigeria from the available empirical literature. This necessitated the conduct of this study.

1.2 Statement of the Problem

Intellectual capital and financial performance of companies is an emerging area in the modern era where knowledge economy is crucial in transforming of business activities. From the previous studies, it appears that the influence of intellectual capital and financial performance have been investigated mostly by international researchers in various sectors including manufacturing companies but in Nigeria, limited published studies are found in this area of interest on listed manufacturing companies (Ahangar, 2020 and Daat, Sanggenafa & Larasati, 2021). From the previous studies both locally and internationally, it is obvious that most studies were not extended to the post-adoption period of IFRSs by listed companies where elements of financial statements have been reorganised in accordance with the respective standards. It is believed by the researcher of this study that the empirical results of this study will be different from other studies because of the consideration of only the post-adoption period of IFRSs in Nigerian manufacturing entities.

In modern companies, intellectual capital has become an important driver of financial growth (Anik *et al*., 2021). For this reason, managers of entities have discovered that one way of raising their financial performance indicators is to invest adequately and appropriately on the attributes of intellectual capital such as human capital and relational capital to improve upon the intellectual capacities of their entities. Listed manufacturing companies in Nigeria are some of the entities that usually invest on elements of intellectual capital to improve upon the value of the companies or financial performance. Intellectual capital of listed companies is improved by adequate investments in training and development of employees, marketing of the companies' products and services and improving upon the database and other management systems used in carrying out the operations of the entities. Investments made by managers of companies to improve upon the attributes of intellectual capital are expected to influence the various financial performance indicators of companies for the fact that the sole aim of raising intellectual capital in a company is to maximise value added.

Often times, the expected benefits to be derived from the level of investments committed by managers of companies to improve upon the attributes of intellectual capital do not yield as anticipated. Thus, an empirical study like this is very fundamental to ascertain the direction of variables of intellectual capital on financial performance indicators of companies

for possible decisions on further investments. From the financial statements of listed manufacturing companies in Nigeria, it is observed that adequate costs and expenses have been incurred on employees, marketing and distribution activities as well as acquisition of modern facilities in the entities. The essence of incurring all these costs and expenses is to raise profitability and other financial performance indicators but from the published financial statements of listed manufacturing companies in Nigeria, it is observed that in some years profit made is lower or loss despite the huge human resource costs incurred on employees as well as distribution activities in the entities. It is on this note that the researcher is in doubt whether the investments made on attributes of intellectual capital have any material influence on financial performance. Thus, the present study is conducted to ascertain the extent to which the variables of intellectual capital have affected return on equity (ROE) of listed manufacturing companies in Nigeria from 2013 to 2021.

1.3 Objectives of the Study

The main objective of the study was to evaluate the influence of intellectual capital on financial performance of listed manufacturing companies in Nigeria. The specific objectives of the study were to:

i. assess the influence of human capital on return on equity (ROE) of listed manufacturing companies in Nigeria.

ii. examine the influence of relational capital on return on equity (ROE) of listed manufacturing companies in Nigeria.

1.4 Research Questions

In accordance with the specific objective of the study, the research questions were raised:

i. What is the influence of human capital on return on equity (ROE) of listed manufacturing companies in Nigeria?

ii. How does relational capital influence return on equity (ROE) of listed manufacturing companies in Nigeria?

1.5 Hypotheses of the Study

The hypotheses of the study were formulated from the objectives and stated in null forms:

Ho_1: Human capital does not significantly influence return on equity (ROE) of listed manufacturing companies in Nigeria.

Ho_2: Relational capital does not significantly influence return on equity (ROE) of listed manufacturing companies in Nigeria.

2. Review of Related Literature

2.1 Conceptual Review

Related variables captured in the objectives of this study were reviewed extensively. These are fundamentally tied to intellectual capital and financial performance.

2.1.1 Overview of Financial Performance

Financial performance is made up of two key terms known as financial and performance. In management science, the two key terms could be explained accordingly. As the name indicates, the word financial is derived from finance which is associated with anticipation, acquisition and appropriation or allocation of financial resources to where they are needed most for maximum yield. The definition of finance is mostly in connection with how decision could be taken in monetary terms. Financial decision is in connection with corporate finance which is associated with capital structure of a company and management of short-term liquid assets (Oyedokun & Saidu, 2018)). Finance could be defined as decision often taken by managers of company in relation with what to invest, why the investment, when to

invest and how to invest available financial resources. The whole of the definition of finance is usually linked to how financial resources could be appropriately managed for maximum returns. In the management of financial resources of a company, the exact amount to invest is very crucial to determine. The essence of the investment should be appropriately ascertained.

This simply means that before an investment is made, the purpose or the motive of such investment must be brought to the notice of the members of board in a company. The essence of the investment is expected to be debated among the members of the board of directors of a company in deliberating on the viability of such investment. Before an investment proposal is made known to board of directors of a company, appropriate analysis both qualitatively and quantitatively in support of such investment is expected to be performed to support the need for the investment (Daat *et al*., 2021). The qualitative and quantitative analysis of viability of an investment will help the board members to decide critically, having considered other factors that are outside their control, whether or not to invest. After the viability of such investment is ascertained, the appropriate time for the investment is expected to be determined. For instance, a company whose accounting period is 31st December is usually anticipated to embark on long-term investment in January which is the new accounting period other than investing in any month of the accounting period. This will help managers of the company to capture the appropriate inflows and outflows of such investment for proper recording.

Time of investment is very important as it helps managers to ascertain the appropriate period to invest their available funds for the purpose of realizing optimal returns (Wang, 2011). The avenue of the investment is very important to be determined by the managers. An investment could either be in form of loan granted to another company or acquisition of equity shares of other companies. Before any investment is made, the opportunities must be determined and the viability of the available investment. This requires the computation of net present value of each of the investment depending on the available funds of the company for the proposed investment and the cost of the investments. This allows managers to decide the type of investment to embark upon with the available funds. All the steps mentioned are associated with financial management. Thus, financing decision is defined as a decision taken by managers of companies during an accounting period based on historical facts expressed in monetary terms or in accordance with the financial performance of the entities achieved (Elfiswandi, Pratiwi & Melmusi, 2019). For any task to be associated with finance, it must be expressed in monetary terms. For this reason, finance does not really mean cash at hand but any activity that is related to money. For any activity to be financial, it must possess the attribute of measurement. This simply means that for any activity to be expressed in financial terms, it must possess quantitative attribute.

Performance is another term to be considered. Performance is defined as an increase or decrease in any activity. When the word performance is mentioned, two things often come to play, and they are increase and decrease. Performance cut across every aspect of business organization such as marketing, management, human resource, production and financial management. Mostly, when the word performance is mentioned, the expectation of managers is that the activities involved should experience some level of growth and not decline in an accounting period. Apart from accounting and finance, the word performance is also used in other discipline such as pure science and social science (Amin, Aslam & Makki, 2014). Performance in marketing, production, finance and accounting and human resource are different but there is one common goal which is expected to be achieved known as growth. For this reason, the level of sales in an accounting period could be regarded as increase or decline in performance from the view of marketing. The level of increase in quantity of goods produced

at a given period could be regarded as increase or decline in performance in an accounting period based on the view of production.

According to Soewarno & Tjahjadi (2020), performance of a company could be classified into qualitative and quantitative attributes. The quantitative aspect of performance is associated with those indicators that have measurable characteristics. On the other hand, the qualitative aspect of performance is associated with those indicators of performance that have no measurable attributes. The quantitative aspect of performance could be divided into two known as financial and non-financial performance. The financial performance is linked to those variables that could be expressed in monetary terms in a given accounting period while the non-financial performance is defined as those factors although quantitative in nature but could not be expressed in monetary terms. The focus in this study is on financial performance indicators which will be considered later appropriately (Ahangar, 2020). Efficiency of employees in an accounting period could be regarded as increase or decline in performance of employees in accordance with the view of human resource (HR). The level of revenue and profitability could be regarded as increase or decline in performance in accordance with the view of finance and accounting. For this reason, performance is understood to be a term that links every aspect of organizational activities for a common goal during an accounting period.

Performance could be defined as the productivity of employees in an organization. Performance could also be defined as the level of growth in an administrative activities' performance by managers. Performance could also be seen as the level of market shares for a company's product. Performance could also be seen as the level of growth in revenue and profitability during an accounting period. Performance is associated with the level of investment or returns from investment made by a company in an accounting period. In this study, performance is understood from the standpoint of accounting which is related to profitability of quoted manufacturing firms in Nigeria. For this reason, performance in this study will be based on the various factors or variables reported on financial statements of companies. Having understood the meaning of financial and performance, the two key words could be put together (Zarei et al., 2014). Financial performance is a dependent variable in this study. It is associated with the totality or overall health of an organization expressed in monetary term during an accounting period. Financial performance could be defined as the level of increase or decrease in various performance indicators in an accounting period.

Financial performance is said to be one of the components of performance of any organization in an accounting period. This is because aside from financial performance indicators, there are other performance yardstick both quantitative and qualitative existing in an organization. Financial performance indicators are quantitative measures of performance of an entity. This implies that for any financial performance to be computed, there must be quantifiable data made available by managers of companies (Muchran, 2020). Financial performance could be defined in terms of several accounting variables categorised into profitability, liquidity, leverage or capital structure, investment, working capital and efficiency ratios. This simply means that the various ratios of accounting computed by managers from the different categories of ratios could represent financial performance of companies at a given period.

Return on assets (ROA) is defined as total profit for the year made by a company by utilization of the accumulated assets in an accounting period. ROA is usually expressed in percentage which indicates that proportion of profit for the year made to the total assets of the company accumulated. According to Wiagustini, Artini & Ramantha (2019), ROA of a company is often targeted by managers to be raised in accordance with the proportional increase in the total assets accumulated. This is because if profit for the year is not increased

proportionally in line with the total assets acquired and accumulated, it could be described that managers of the companies are not efficient in designing policies for the entities. The magnitude of ROA is critically defined by two attributes regarded as profitability and total assets accumulated by a company. The magnitude of ROA could either be affected positively or negatively when either assets or profitability of a company increase or decrease.

When profitability made by a company in an accounting period is higher compared to proportional increase in the total assets, ROA will be higher and when profitability is lower compared to the proportional decrease in total assets, the ratio of ROA will be lower. In some cases, the total assets of an entity might increase while profitability made is reduced and not in line with the proportional increase in the assets (Nassar, 2020). In such a situation, it could be viewed that the total asset is either over accumulated or the composition of current assets is higher non-current assets in the total assets. Also, the assets accumulate by a company might not be effectively utilised by the managers and in such a situation, the proportion of profit realised from the total assets accumulated might be lower. When total assets are over accumulated by a company beyond the strength of revenue to be generated, limited profit could be realised from the operation. The proportion of non-current assets is often expected to be greater than current assets in an accounting period (Yilmaz & Acar, 2018).

This is because non-current assets have direct influence on revenue of the company than the current assets. Thus, higher level of non-current assets accumulated usually bring about larger revenue for an entity and vice versa. A company might generate larger revenue in an accounting period but the inefficiency of managers to cut down irrelevant costs and expenses might affect the revenue of the company where minimal profits are realised eventually. For this reason, the ability of managers to manage expenses and costs is usually required if a company wish to realise higher rate of ROA in an accounting period. ROA usually presents the status of financial performance of companies in an accounting period. The higher the ratio, the better the financial performance of an entity. ROA is usually influenced by other accounting variables which include the factors of intellectual capital. This simply means that the variables of intellectual capital of listed manufacturing companies in Nigeria could affect ROA of the entities either positively or negatively.

Return on Equity (ROE) is defined as a profitability ratio that indicates the level of profit made by a company using total equity (Wang, 2011). This is why it is computed as profit for the year divided by shareholders' funds or total equity of an entity in an accounting period. The higher the ratio of ROE, the better the financial performance of a company. Larger total equity accumulated by a company is often expected to be spent judiciously to raise adequate profit for the company. This simply means that certain amount of funds generated from shareholders are usually expected to be invested on assets that possess higher yield attributes. In an accounting period, ROE usually have higher magnitude compared to ROA. This is because in an accounting period, total assets accumulated by a company used in computing ROA are usually larger than total equity or shareholders' funds. When ROE is equal ROA in an accounting period, in such a situation, total equity is equal total assets of the company where liabilities are zero.

The determinants of magnitude of ROE are basically the profit made by a company and the shareholders' funds (Ozkan, Cakan & Kayacan, 2016). When profit for the year is higher than total equity compared to previous accounting periods, the magnitude of ROE will be higher and vice versa. When ROE is higher in an accounting period, it could be said that shareholders' funds have been used judiciously by managers to generate profit. As financial performance indicator, there are various attributes that usually influence the magnitude of ROE which include the variables of intellectual capital (Albertini & Berger-Remy, 2019). In this

study, ROE is adopted as the financial performance indicator believing to be influenced by the variables of intellectual capital of listed manufacturing companies in Nigeria.

2.1.2 The Meaning of Intellectual Capital

Intellectual capital is defined as the sum of knowledge acquired by a company from their investments in different aspects of operation conducted (Xu & Zhang, 2021). According to Adegbayibi (2021), intellectual capital is regarded as the unique knowledge of business possessed by a company different from other entities in the same industry or other entities operating in an economy. Intellectual capital is seen as an interesting area among the accountants and other management scientists. This is because in modern time, it has been observed that the knowledge-based economy is one of the key drivers of organizational performance.

In this case, intellectual capital is understood to be a fundamental resource of knowledge-based economy. In accordance with the view of Oyedokun & Saidu (2018), intellectual capital could exist in the operation of an entity without the knowledge of the managers. Before now, intellectual capital was not recognised in the literature of accounting because managers in those eras paid more attention to attributes that are seen and touched and not just the ones that could be perceived. The idea of intellectual capital came as a result of the fact that knowledge has been recognised in the modern business world to help in improving upon the value of companies or financial performance indicators (Zehri, Abdelbaki & Bouabdellah, 2012)

The critical way of developing intellectual capital is by making adequate investments to different areas of operation such as training and development of employees, advertising or marketing the products or services, developing intangible assets such as brand name, patent right, and so on. intellectual capital is also derived from adequate investments in developing the structure of a company in line with the modern facilities brought by the level of technological advancement (Albertini & Berger-Remy, 2019). For this reason, it could be said that the various areas in which intellectual capital could be developed in a company through adequate investments are training and developing of employees, marketing of company's products and services and installation of modern structure and facilities of business for effective and efficient operation. Based on this classification, intellectual capital is associated with human capital and relational capital.

Value added is a concept used in management science to refer to an improvement or progress in any activity as a result of costs incurred or effort made. When the word value added is mentioned, the conception by an individual is that there is an improvement on the costs incurred or effort used in any activity. The value added is always seen as the difference between what is been applied and the results obtained. When value is added to any activity, it is possible to say that the benefit obtained from a certain activity supersedes the effort applied or costs incurred on the activity. Every activity conducted is always expected to yield result greater than the effort put or applied. This is why value added is very essential in business operation for the fact that higher result is often anticipated. Value added is usually seen to be the positive difference between the benefit attained and the effort applied. This simply means that when the different between benefit attained and effort applied is negative, it is not possible to say that there is value added but value declined (Gallegos et al., 2021).

Value added is one of the concepts in intellectual capital that deals with improvement attained beyond costs or inputs. Value added could be defined as the difference between outputs and inputs in an accounting period (Adegbayibi, 2021). Adequate value added achieved by a company in an accounting period is believed to derived from adequate investments made on the variables of intellectual capital. Higher efficiency achieved from the attributes of

intellectual capital are expected to generate larger value added. This is in line with the view of Nassar (2020), who stated that positive value added is often anticipated when judicious spending is made by a company to generate more knowledge of business in different accounting periods. Intellectual capital is mostly concerned with value added not value declined. This simply means that the difference between outputs and inputs could either be positive or negative in an accounting period. According to Zhang, Duc, Mutuc, & Tsai (2021), when outputs generated in an accounting period by a company are greater than inputs, the value added must be positive and when the outputs made in an accounting period are less than inputs, the value added must be negative.

In accordance with the view of intellectual capital, revenue generated by a company in an accounting period is said to be caused by the level of knowledge possessed by a company derived from investments made by the company in training and developing the employees, marketing the products and services of the company and improving upon the structure as well. Revenue of a company made in an accounting period are usually regarded and the outputs in the view of intellectual capital while the total costs excluding personnel expenses or costs are regarded as the inputs. Total costs or expenses excluding personnel expenses are grouped into cost of sales, distribution costs and administrative expenses. According to Irmansyah & Andesto (2022), expenses or costs incurred on employees are usually regarded as part of administrative expenses reported on statement of profit or loss account of an entity. Thus, in the computation of value added made by a company, the costs and expenses incurred on employees should be deducted from administrative expenses to arrive at the inputs.

2.1.3 Human Capital

Human capital is defined as the benefits derived from the costs or investments made by managers of companies to improve upon the skills or knowledge of the employees (Rashid *et al*., 2020). Human capital is referred to as the outcomes expected from all the costs incurred or spent on employees in organization to improve upon the outputs provided by the workforce in the company. This simply means that the total personnel costs attributed to employees are regarded as human capital. The various costs incurred in developing or training employees in organization are usually aggregated and regarded as human capital. The various costs which an organization is expected to incur in different accounting period for employees are salaries and wages, training and development costs and welfare costs (Rufus, Festus & Dada, 2022). Salaries and wages are paid to employees for the services rendered. According to Iswatia & Anshori (2007), salaries and wages are regarded as short-term benefits paid to employees for services carried out in an existing entity. salaries and wages are instruments that could be used to influence the productivity of employees in an organization (Wiagustini *et al*., 2019).

This simply means that employees with certain skills to carry out tasks in an organization could only discharge the assigned responsibilities diligently when he/she is highly motivated by paying higher salaries and wages in some occasions (Yilmaz & Acar, 2018). Certain skills expected from employees might have been acquired due to experience in other organization(s) but for such skills to be put into practice in the present organization, adequate motivation is required for the managers to perform for such employees. This is why salaries and wages are regarded as tools that could either encourage or discourage employees to raise their productivities. The level of intellectual capacity acquired by an employee is only revealed when meaningful salaries and wages are paid to the employees for the service rendered otherwise, employees with adequate intellect might not really put them to use to raise the productivity of the organization because of the insignificant or irrelevant remunerations paid to them (Ahangar, 2020). According to Nassar (2020), an organization where the maximum

productivity of employees is attained in terms of the size of the market is not expected to use salaries and wages as a medium of achieving further growth in productivity.

This is because the anticipated productivity of employees has been attained whereby any motivation to raise the salaries and wages of employees could be seen as waste of resources other than raising the productivity. Salaries and wages are only adopted as means of influencing the attitudes of employees to bring out the best of their skills and put them to use in an organization only when the maximum productivity of employees, in terms of outputs, is not achieved by the organization. Training and development costs are forms of human capital that are more essential than salaries and wages as intellectual capital is concerned (Sardo & Serrasqueiro, 2017). This is because training and development costs are incurred by organizations on their employees to ensure that those employees acquire the desired skills and competencies required to carry out various tasks in the organization. In line with the opinion of Oyedokun & Saidu (2018), to improve upon intellectual capital of organization, certain investments must be made by the organization on key intellectual capital drivers. Employees in organization are seen as drivers of intellectual capital that could be properly managed to raise the intellectual capacity of organization.

Welfare costs are costs incurred by managers of companies to stimulate the wellbeing of employees. The essence of welfare costs is not to improve the intellectual capacity of employees but to motivate them by providing the necessary needs of lives to allow them to have focus on the assigned activities in organizations. Welfare costs are investments considered by modern managers are the tools to improve upon the wellbeing or health status of employees to allow them with stable mind in carrying out their assigned duties (Zehri *et al*., 2012). The various categories of welfare costs are medical expenses, rent allowance, security expenses paid to employees and entertainment expenses.

In line with the views of scholars, the best method of measuring human capital in the concept of intellectual capital is the efficiency approach where value added is divided by total costs incurred on employees (Albertini & Berger-Remy, 2019 and Nassar, 2020). The aggregate costs spent in training and developing total employees in organization might not really generate total value in line with the costs or expenses incurred. The efficiency approach used in measuring human capital states the actual value created by variables of intellectual capital in which the costs and expenses spent on employees are part and parcel. This is why the efficiency approach of measuring human capital is the best and it is adopted in this study.

2.1.4 Relational Capital

Relational capital is another fundamental variable of intellectual capital that could be used to influence the productivity of companies (Dogan & Kevser, 2020). Relational capital is defined as the benefits derived by firms from investments made to create relationship that could help to advertise the products or services provided by the entities to various markets or customers (Iswatia & Anshori, 2007). The products and services manufactured by a company are to be presented to customers through a medium regarded as advertisement or marketing. An entity must be known for the quality of services or products manufactured by other companies or different set of customers in the markets. The process of ensuring that the products or services provided by a company get to the final consumers is regarded as marketing which advertisement is one of the marketing tools. Thus, the benefits derived from investments made by a company to create awareness about the products or services manufactured as well as relationship is regarded as relational capital. In other words, the benefits achieved from the total costs incurred in distribution or marketing activities is regarded as relational capital.

It is often anticipated that the higher the investments made in creating relationship, the better the intellectual capital. In other words, the amount incurred in marketing activities in a

company is expected to create higher relationship between the company and the external parties that could help to generate larger value to the company (Wiagustini *et al*., 2019). The total costs incurred in distribution of goods and services including research and development is regarded as relational capital. According to Zehri *et al*. (2012), marketing and distribution costs should be incurred by a company with certain targets. These targets include the possibility of creating reputation in markets and increasing market share to raise adequate revenue in an accounting period. Investments in relational capital is to establish sound link between the company and individual customers and other companies. For the customers, the essence of incurring costs and expenses on distribution activities is to create awareness about products and services to the customers in various markets.

In the opinion of Nassar (2020), relational capital is expected to present the quality of products or services manufactured by a company at a given period. For an entity to create relationship with other entities operating in economy, investments in relational capital usually help to present the company to other entities based on the quality of products or services often provided. Relational capital could help other companies to patronise the products or services of an entity because of the durability of products or quality services usually produced. The avenue to be adopted by a company to achieve higher revenue with a given costs incurred is to invest more on marketing activities. Marketing activities include research and development whereby the producers of the products or services are meant to understand how the customers feel about the products purchased from them. In other words, managers are engaged in the activities of research and development by ensuring that quality products or services are provided to the target customers at a given period where higher patronage could be achieved in different accounting period (Irmansyah & Andesto, 2022).

Measurement of relational capital is the one regarded by scholars as the efficiency approach where the expected value derived from the total investments of companies on marketing activities is used to represent relational capital. According to (Zarei *et al*., 2014), efficiency of intellectual capital is appreciated when a certain amount of investments of variables of intellectual capital generate larger output and value to the company. Thus, relational capital represented by efficiency approach often measure the uniqueness of the relationship generated. Based on the efficiency approach, relational capital is calculated as value added divided by the total costs incurred in distribution and marketing activities in an organization (Soewarno & Tjahjadi, 2020). In other words, it could be said that the efficiency approach of measuring relational capital include the total costs regarded as relational capital. Value added is often regarded as the total revenue less costs or expenses other than the ones spent on employees regarded as human resource costs. The higher the magnitude of relational capital measured by efficiency approach, the better the intellectual capital and vice versa. In this study, relational capital measured by efficiency approach is used because it presents clearer knowledge of the return from investment in distribution and marketing activities engaged by a company.

2.1.5 Attributes that Influence Financial Performance

Aside from the variables of intellectual capital, there are other critical attributes that could influence financial performance of companies. Just like the data that could enable the computation of the factors of intellectual capital, data on other attributes that influence financial performance are usually presented on published financial statements of listed companies. Some of the variables that usually influence financial performance of entities include leverage and company size.

Leverage is defined as the debt capital or liabilities used in financing long-term projects of an entity identified as viable investments (Abubakar & Garba, 2019). This type of leverage

is regarded with financial leverage because it is associated with capital structure of a company. The higher the debt capital, the higher the financial risk faced by an entity. Thus, debt capital is expected not to be too high in a firm's capital structure because of the risk of servicing the debt. Usually, when debt capitals are properly managed, financial performance of companies are influenced positively. Leverage is usually measured by critical accounting ratios such as debt, debt-to-equity, long-term debt and interest coverage ratio (Abubakar *et al.,* 2018).

Company size is defined as the level of assets or revenue accumulated or made by an entity in an accounting period. This simply means that size of a company could be measured by assets or total revenue (Nassar, 2020). Company size could influence the financial performance of an entity positively or negatively especially the size measured by assets. In line with the views of scholars, company size is usually measured by taking the logarithm of total revenue or assets of an entity. It is usually stated that the higher the size of an entity, the better the financial performance of such organization and vice versa. Company size in terms of assets is one that a company is expected to have more non-current assets than current assets reported on its statements of financial position. This is because size of assets where the composition is made up of higher proportion of non-current assets to current assets could influence the growth in revenue faster than the composition with higher proportion of current assets to non-current assets.

2.2   Theoretical Review
2.2.1   Signalling Theory
This theory was developed and advanced by Spence (1973). Signalling theory is associated with the indicators or signals of performance provided by the operations of companies. The mode of operation of companies is expected to be one that attract investors and other stakeholders. This is because before the potential investors purchase shares of a company, there must be certain attributes or indicators that arouse their attention. This is why Wang (2011) stated that for investment decision to be taken, the anticipated benefits must be evaluated. The accounting attributes reported often indicate the strength of strategies and policies implemented by managers or directors. When the attributes reported do not present good performance to the stakeholders, the interest of potential investors might be reduced because every investment is expected to yield meaningful returns to the investor(s) and poor performance reported could be the reason a company might be unable to provide adequate returns to the investors (Wiagustini *et al.* 2019). In the opinion of Spence (1973), signals are necessary tools for sound decision making. This simply means that signals could either encourage or discourage an activity in an organization or by an individual.

The accounting data reported on financial statements of listed companies usually present different forms of signals to stakeholders. This simply means that published financial statements of listed companies usually provide signals to shareholders, managers or board of directors, government, suppliers, debt holders, customers, employees and general public. To shareholders, signals provided by financial statements could help them to understand how the funds provided by them through acquisition of equity shares are judiciously utilised. The financial statements of companies help both the existing and the potential shareholders to build confidence on the growth of their wealth and as well as their investment decision respectively. Financial statements presented usually help managers to put more effort in carrying out the operations of their entities by ensuring that the duties assigned to them are delivered diligently and efficiently (Ahangar, 2020). Financial statements presented usually provide signals of encouraging the skills possessed by managers especially when financial attributes reported are impressive. Thus, managers are said to be knowledgeable set of people that could formulate sound strategies and policies that could bring about growth to organizations (Jensen &

Meckling, 1976). Financial statements of companies presented are signals to government about the future revenue to be realised from income tax payments based on the performance of the entities.

Financial statements of entities usually help suppliers to decide whether to provide inputs or raw materials to entities on credit or not. This is because statements of financial position of entities usually reveal the liquidity position and liability status of the firms which helps suppliers to decide whether to grant further credit or not (Nassar, 2020). Financial statements of entities usually provide debt holders with some signals to enable them to decide whether or not to grant further loans to the companies to enable them carry out further activities. The liability position of companies usually serves as a good signal for both potential and existing debt holders to make effective decision. For instance, when larger liabilities have been accumulated by a company or when the capital structure of a company is highly geared, further debt is not expected to be given to such entity because the company might be unable to service the total debt as expected (Ahangar, 2020). Financial statements presented by companies usually help customers to build confidence on the products or services provided by the entities. This is because financial statements are included in the annual reports of organizations and are used to evaluate the level of products or services provided by the organization.

Financial statements often provide signals to employees about their job securities. This is because they help employees to assess the profitability level of the entities to determine the trend. They help employees to understand whether or not the companies in which they are hired are making profits as well as assessing the going concern status of the entities. Financial statements of companies presented usually show clearly the level of corporate social responsibility provided to create relationship between the communities and the entities. Adequate investments in intellectual capital are presented on financial statements of companies. For instance, the distribution costs incurred by a company are presented on statements of profit or loss accounts and human resource costs are included under administrative expenses. Revenue which is regarded as outputs in intellectual capital are presented on statements of profit or loss accounts. All the accounting attributes are of intellectual capital are signals to various stakeholders. Thus, this is how signalling theory is related to this study, hence, it is adopted.

2.3 Empirical Review

Ozkan *et al*. (2016) conducted a study on intellectual capital and financial performance: A study of the Turkish banking sector. The intention of the researchers was to investigate the influence of intellectual capital on financial performance of banking sector in Turkey. The period of the study was from 2005 to 2014. The population of the study was drawn from forty-four (44) banks in Turkey. The components of intellectual capital considered are human capital efficiency and capital employed efficiency. Secondary data were obtained from the audited annual reports of banks in Turkey and the data were analysed using regression techniques. The results asserted that human capital efficiency had positive and consequential influence on financial performance. Hence, capital employed efficiency showed higher influence on financial performance.

Ozkan, Cakan & Kayacan (2017) carried out a study on intellectual capital and financial performance: A study of the Turkish Banking sector. The intention of the researchers was to assess the influence of intellectual capital of financial performance of Turkish banking firms. The period of the study was from 2005 to 2014. VAIC was the model used to measure intellectual capital of the firms while the proxies for financial performance were human capital and capital employed efficiency. The study population was drawn from forty-four (44) banking firms in Turkey. Relevant data in relation to the variables of the study were extracted from the

published annual reports and financial statements of the firms. The data were analysed using panel regression techniques. The results asserted that human capital efficiency had a substantial influence on financial performance. Also, capital employed efficiency also had consequential influence on financial performance of banks in Turkey.

Sardo & Serrasqueiro (2017) in a study to examine intellectual capital and firms' financial performance: A European empirical study. The study sought to evaluate the impact of intellectual capital on the financial performance of European firms. The period of the study was from 2004 to 2015. The researchers selected non-financial listed firms from eight (8) European countries. Relevant data were obtained from the published annual reports and financial statements of the sampled entities and the data were analysed using panel regression technique. From the result of the analysis, it was shown that intellectual capital efficiency had a positive and significant impact on the financial performance on the current period. The three components of intellectual capital which include capital employed efficiency (CEE) and human capital efficiency (HCE) in the current period were seen to have positive and consequential influence on financial performance. While structural capital efficiency impacted negatively on the financial performance of the firms.

Yilmaz & Acar (2018) carried out a study on the effects of intellectual capital on financial performance and market value: Evidence from Turkey. The period of the study was from 2011 to 2014. The study was quantitative in nature. Return on assets, return on equity and net profit margin were the proxies for financial performance of the companies listed in Borsa Istanbul 100 index (BIST-100). Panel data were obtained from the published annual reports and financial statements of the entities. The data were analysed using panel regression technique. The result of the analysis suggested that multi factor models are more effective than single factor model when trying to explain market performance and financial performance. Also, it was revealed that physical capital and human capital had significant influence on financial performance of the sampled firms in Turkey while physical and relational capital have significant influence on market performance.

Popoola, Edem & Agbi (2019) conducted a study on structural capital efficiency and financial performance of listed oil and gas firms in Nigeria. The intention of the researchers was to evaluate the influence of structural capital efficiency on financial performance taking a case from oil and gas firms in Nigeria. The study period was taken from 2006 to 2008. The study adopted purposive sampling technique to select nine (9) firms from oil and gas sector. The independent variable being structural capital was measured by internal capital efficiency and external capital efficiency. Financial performance being the dependent variable was proxied by return on assets while leverage was the control variable. Panel data were extracted from the audited annual reports of the sampled entities and the data were analysed using multiple regression technique. The result indicated that the components of structural capital efficiency used in the study both had positive and significant influence on financial performance of the entities. Thus, the study recommended that intangible structures such as systems, routines, procedures and others existing in oil and gas firms should be strengthened by the managers of oil and gas firms.

Muchran (2020) investigated the effect of intellectual capital on sustainable financial performance of Indonesian pharmaceutical firms with moderating role of knowledge management. The intention of the researcher was to investigate the role of intellectual capital on financial performance of Indonesian firms. The data were analysed using panel regression technique and the result showed that intellectual capital had substantial influence on financial performance of pharmaceutical firms. Thus, the study suggested that knowledge management had a moderating effect in establishing the influence of human capital and structural capital on

financial performance. Thus, knowledge management was found to have no moderating effect on the association of relational capital with sustainable financial performance of firms.

Soewarno & Tjahjadi (2020) carried out a study on measures that matter: An empirical investigation of intellectual capital and financial performance of banking firms in Indonesia. The researchers aimed to empirically evaluate the influence of intellectual capital on financial performance of banking firms in Indonesia. The study adopted two models which were conventional Value-Added Intellectual Coefficient model and the adjusted Value-Added Intellectual Coefficient to assess the influence. The study covered the period of sis (6) years from 2012 to 2017. The population of the study was made up of one hundred and fourteen (114) banking firms in Indonesia. Relevant data in relation to the variables of the study were collected from the published annual reports and financial statements if the sampled entities. Data analysis was carried out using panel regression technique. The results of the analysis asserted that intellectual capital positively influenced financial performance.

Xu & Liu (2020) carried out a study on the impact of intellectual capital on firm performance: A modified and extended VAIC model. The objective of the study was to investigate the impact of intellectual capital on firm performance of Korean firms. The period of the study was from 2013 to 2018. The components on intellectual capital employed in the study were physical capital, human capital, structural capital, relational capital and innovation capital. Panel data were collected from the audited annual reports of the entities. The data were analysed using panel regression technique. The results indicated that physical capital influence financial performance the most. Human capital was discovered to be the factor for enhancing firm performance. Structural capital was found to have no influence on firms' performance. Finally, innovation and relational capital had no significant influence on the performance of firms.

Anik *et al.* (2021) studied the effect of intellectual capital and good corporate governance on financial performance and corporate value: A case study in Indonesia. The study adopted purposive sampling method and the period of the study was from 2014 to 2016. Relevant data in relation to the variables of the study were obtained from the published annual reports and financial statements of the banking companies in IDX. The obtained data were analysed using path analysis. From the result obtained, it was discovered that financial performance of the sampled banking entities was seen to mediate the relationship between intellectual capital and good corporate governance.

Daat *et al.* (2021) investigated the role of intellectual capital on financial performance of SMEs. The researchers sought to investigate the role of intellectual capital on financial performance of small and medium enterprises in Indonesia. The components of intellectual capital were human capital, structural capital and relational capital. The sample size of the study was fifty-four (54) consisting of culinary businesses, fashion, day-care services, lodging services, and futsal fields. The results showed that the components of human capital and relational capital significantly influenced the financial performance of SMEs with a significance value of 0.042 and 0.044, respectively. Meanwhile, the hypothesis of the influence of the structural capital component on SME financial performance was not statistically supported with a significant value of 0.569.

Xu & Zhang (2021) examined whether intellectual capital measurement matter in financial performance: An investigation of Chinese agricultural listed companies. The aim of the study was to critically examine and analyse the influence of intellectual capital on financial performance of agricultural firms in Chinese. Intellectual capital was measured using value-added intellectual coefficient model, the adjusted value-added capital intellectual capital model, and modified intellectual capital model. The study was quantitative in nature and thus,

panel data were extracted from the published annual reports and financial statements of agricultural entities in Chinese. The data were analysed using multiple regression technique and the result showed a significant influence of intellectual capital on financial performance. Adjusted value-added capital intellectual capital showed a positive and insignificant influence on financial performance.

Xu & Zhang (2021) explored the non-linear effect of intellectual capital on financial performance: Evidence from listed shipping companies in China. The researchers sought to explore the influence of intellectual capital on financial performance of the listed shipping firms in China. The study covered the period of six (6) years from 2014 to 2019.The components of intellectual capital used include human, relational, structural, physical and innovation capitals. Value-Added Intellectual Coefficient model was used to measure intellectual capital. The panel data was extracted from the published annual reports and financial statements of the entities. From the analysis, the result showed a negative relationship intellectual capital and financial performance.

Zhang *et al*. (2021) conducted a study on intellectual capital and financial performance: Comparison with financial and pharmaceutical industries in Vietnam. The study population covered one hundred and forty-nine (149) of which one hundred and eight (108) firms and forty-one (41) pharmaceutical firms. Relevant data in relation to the variables of the study was extracted from the audited annual reports of the entities and the data were analysed using multiple regression technique. The results indicated a significant influence of human capital efficiency on return on asset and return on equity of the entities. Hence, structural capital efficiency showed negative and substantial influence on return on asset and return on equity while human capital efficiency indicated a significant influence on return on asset and return on equity on financial firms but an insignificant influence on pharmaceutical firms.

Irmansyah & Andesto (2022) empirically examined the effect of intellectual capital on financial performance: Case Study of Pharmaceutical industry sector companies in Indonesian Stock Exchange (IDX). The study covered that period of five (5) years from 2016 to 2020. The components of intellectual capital used in the study were human capital efficiency, structural capital efficiency and capital employed efficiency while the proxy for financial performance was return on asset. The researchers sampled forty (40) pharmaceutical companies in Indonesia. Relevant data were extracted from the published annual reports and financial statements of the companies. Regression technique was used to analyse the obtained data. From the result of the analysis, it was observed that human capital efficiency had a substantial influence on return on asset. Thus, the analysis indicated an insignificant influence of capital employed efficiency and structural capital efficiency on return on assets.

Rufus *et al*. (2022) conducted a study on intellectual capital and organisational performance of the financial sector: Evidence from Nigeria. Organizational performance was proxied by return on assets, return on equity, leverage, assets turnover and market to book ratio. The study was quantitative in nature and the period of the study was from 2010 to 2019. The population of the study consisted of fifty-three (53) financial entities listed on NSE. The sampled size of the study was thirty-five (35) financial companies selected using purposive approach. The obtained data were analysed using regression technique. From the analysis, it was discovered that intellectual capital had positive and significant impact on organizational performance of the sampled firms. Thus, firm size was found to have no significant influence on organizational performance.

Shubita (2022) assessed intellectual capital components and industrial firm's performance. The objective of the study was to examine the relationship between intellectual capital and financial performance of Jordan listed entities. The period of the study was from

2006 to 2020. The study was quantitative in nature. Total of seventy-seven (77) listed firms in Jordan were sampled for the study. Data were obtained from the audited annual reports of the entities and the data were analysed using panel regression technique. The results of the analysis showed that the components of intellectual capital which include human capital efficiency and capital employed efficiency had positive influence on return on equity while and structural Capital efficiency had a negative influence on firm performance.

3.   Methodology

3.1   Research Design

In this study, the *ex-post facto* research design was considered suitable because it allowed the researcher to appropriately assess the influence of intellectual capital on financial performance of listed manufacturing companies in Nigeria (Kothari & Garg, 2014). The nature of the study necessitated the adoption of *ex-post facto* research design which helped the researcher to ascertain the direction of the key variables of intellectual capital on financial performance of listed companies studied. According to Gujarati (2013), the adoption of *ex-post facto* research often help to provide information on the method of data collection which is secondary as well as the approaches for the data analysis.

3.2   Population of the Study

The population of any empirical study is simply regarded as the total objects or respondents under consideration in the study (Gujarati, 2013). The population of this study was made up of thirty-three (33) listed manufacturing companies in Nigeria drawn from both industrial and consumer goods entities. The companies whose shares were traded under the industrial and consumer goods entities on the floor of Nigerian Stock Exchange (NSE) as at 31st December, 2022 constituted the listed manufacturing companies in this study. The choice of these two (2) sub-sectors to represent the listed manufacturing companies in Nigeria was because both industrial and consumer goods entities in Nigeria often consider the intellect of employees and managers as essential business resources that could drive the growth of their companies in rapid pace more than any other resources. This is the reason human resource costs in the two sectors are often incurred more in different accounting periods. Research and development costs are usually incurred by the companies more in different accounting periods. All these activities are performed by the managers of both industrial and consumer goods entities to raise intellectual capacity of their companies. As at 31st December 2022, the listed industrial goods were thirteen (13) and that of consumer goods were twenty (20). The aggregate of companies in the two sectors constituted the population of this study as presented in Appendix One (i).

3.3   Sample Size of the Study

The sample size of this study was drawn from the total manufacturing companies whose shares were traded on the floor of Nigerian Stock Exchange (NSE) under industrial and consumer goods firms. In an empirical study, the sample size should be ideal that could represent the entire population in the study (Kothari & Garg, 2014). For the sample size of a study to represent the entire population in an empirical study, it is expected that the sample size is not too low nor too high but optimal to provide accurate empirical results without any degree of spuriousness. Based on the availability of annual reports and financial statements published by listed manufacturing companies in Nigeria as at 31st December, 2022, the manufacturing companies in Nigeria sampled for this study was twenty-six (26) companies consisted of eleven (11) industrial goods companies and fifteen (15) consumer goods entities whose shares were traded on the floor of NSE.

In line with empirical studies conducted by researchers in this area of interest, a sample size that make up fifty percent (50%) of the total population is considered ideal to make up the

population (Nassar, 2020; Rashid *et al*., 2020). In this study, the number of listed manufacturing companies that considered as the sample size was more than fifty percent (50%), hence, it could represent the entire population of thirty-three (33) listed manufacturing companies from industrial and consumer goods companies in Nigeria. On this note, purposive sampling approach was adopted to select only the listed manufacturing companies from both industrial and consumer goods subsectors in which annual reports and financial statements were made available by the management.

3.4   Source and Nature of Data

The data for this were collected from the sampled listed manufacturing companies in Nigeria. Specifically, and in line with the variables of this study, the data were collected from the presented accounting data on financial statements of the selected companies. The type of data used in this study were regarded as panel data because the year and the number of companies were put together to arrive at the total observations for the study. The study covered the period of 2013 to 2021. The justification for the choice of this period was to enable the researcher to clearly investigate the influence of intellectual capital on financial performance of listed manufacturing companies in Nigeria for only the period after the adoption of international financial reporting standards (IFRSs) by public companies in Nigeria. The choice of this period helped the researcher to ascertain clearly the direction of the variables of intellectual capital on financial performance after the adoption of IFRSs.

3.5   Method of Data Collection

The approach of data collection in the study was secondary method because the essential data collected had been presented on financial statements of the selected manufacturing companies in Nigeria studied.

3.6   Variable Description

This was presented on Table 3.1:

Table 3.1: Variable Description

S/N	Variable	Abbr.	Measurement	*Apriori* **Expectation**
1.	Financial Performance	ROE	Profit for the year divided by total equity of listed manufacturing companies in Nigeria (Yilmaz & Acar, 2018).	
2.	Human Capital	HC	The difference between revenue and costs excluding human capital costs divided by human capital costs of listed manufacturing companies in Nigeria (Sardo & Serrasqueiro, 2017)	Positive
3.	Relational Capital	RC	The difference between revenue and costs excluding human capital costs divided by total selling and distribution costs of listed manufacturing companies in Nigeria (Xu & Zhang, 2021).	Positive
4.	Company Size	CS	Logarithm of total assets accumulated by listed manufacturing companies in	Positive

			Nigeria (Ozkan *et al*., 2017; Daat *et al*., 2021).	
5.	Leverage	LV	Total debts or liabilities divided by total assets of listed manufacturing companies in Nigeria (Gadzo & Asiamah, 2018; Abubakar & Garba, 2019).	Negative

Source: Researcher's Compilation (2022)

3.7 Specification of Models

The models were formulated based on the objectives of the study as presented:

$$ROE_{ij}=\beta_o+\beta_1HC_{ij}+\beta_2CS_{ij}+\beta_3LV_{ij}+e_t \qquad \text{Equation (3.1)}$$
$$ROE_{ij}=\beta_o+\beta_1RC_{ij}+\beta_2CS_{ij}+\beta_3LV_{ij}+e_t \qquad \text{Equation (3.2)}$$

where: i=Number of companies; j=Number of years; β_o =Intercept of ROE; β_1 and β_2 and β_5=Coefficient of each of the independent variables; e_t=Random error terms.

All the models formulated were adapted from the models of Ozkan *et al*. (2017), Soewarno & Tjahjadi (2020). They were adapted models in this study because the present study was different from other studies conducted in this area in terms of variables, sectors used and the country of study.

3.8 Method of Data Analysis

The influence of intellectual capital on financial performance of listed manufacturing companies in Nigeria could be established by adopting appropriate statistical analytical tool to evaluate this influence. Before the assessment of the influence of intellectual capital on financial performance of the companies in Nigeria, the nature of the data collected was expected to be examined. Thus, the data of this study collected were analysed by both descriptive and inferential statistics. As stated earlier, the descriptive statistics was used to examine the nature of the data collected regarded as return on equity (ROE), human capital (HC), relational capital (RC), company size (CS) and leverage (LV). On the other hand, the inferential statistics used was regarded as multiple regression because in each of the models, there was more than one independent variables (including control variables).

Panel regression approach was employed in the study for the fact that the data collected was cross-sectional from different manufacturing companies. The various statistical tools of regression used in this study were R^2, Adjusted R^2, t-statistics, p-value, F-statistics, correlation, variance inflation factor (VIF) and Durbin-Watson (DW) statistics. Both R^2 and Adjusted R^2 were used to assess the variations in financial performance of listed manufacturing companies in Nigeria attributed to the variables of intellectual capital. Both t-statistics and p-value were used to test the level of significance of each of the variables of intellectual capital on financial performance of listed manufacturing companies in Nigeria.

F-statistics was used to confirm the significance of the entire model in this study and correlation was used to examine the relationship between one variable and the other. Variance inflation factor (VIF) and Durbin-Watson (DW) statistics were used to resolve the econometric issues in the models. The decision rules for the hypothesis were accept null hypothesis (H_o) and reject alternative hypothesis (H_1) when p-value>0.05 and t-statistics<1.966 and accept alternative hypothesis (H_1) and reject null hypothesis (H_o) when p-value<0.05 and t-statistics>1.966.

4. Data Analysis and Discussion

4.1 Data Analysis

The various statistical tools stated in chapter three of the study were used to determine empirical evidence from the presented data.

4.1.1 Descriptive Statistics

For the purpose of describing the nature of the sourced data, the descriptive statistics for each of the variables were computed and presented on the Table 4.1:

Table 4.1: Descriptive Statistics

Statistics	ROE	HC	RC	CS	LV
Mean	0.133654	2.596073	18.13995	7.452932	0.563226
Median	0.104500	1.781000	3.863500	7.584500	0.559500
Maximum	4.368000	22.63500	655.2390	9.412000	2.230000
Minimum	-3.723000	-8.546000	-235.8360	5.239000	-2.662000
Std. Dev.	0.564302	3.590741	66.72414	0.978127	0.388648
Skewness	0.984518	2.329633	5.824332	-0.315778	-1.958179
Kurtosis	28.28316	11.97248	49.52391	2.233817	26.11958
Jarque-Bera	6270.372	996.5883	22426.62	9.612520	5361.064
Probability	0.000000	0.000000	0.000000	0.008178	0.000000
Sum	31.27500	607.4810	4244.749	1743.986	131.7950
Sum Sq. Dev.	74.19575	3004.166	1037342.	222.9186	35.19398
Observations	234	234	234	234	234

Source: Researcher's Computation (2022)

From Table 4.1, for Financial Performance (ROE) measured by profits after taxes divided by total equity, had mean value (average) of 13.365% (0.133654), median of 10.45% (0.104500), maximum value of 436.8% (4.368), minimum value of -372.3% (-3.723) and standard deviation of 56.43% (0.564302). This showed that the deviation from the mean value was high for the relevant data collected for the study. Skewness of 0.98452 showed that the obtained data for ROE were positively skewed (moving towards right-hand side). Kurtosis value of 28.2832 compared with the value of 3.0, which is the basis for assessing the peak of a distribution, showed that the relevant data obtained for ROE were highly above normal curve (leptokurtic). The Jarque-Bera statistical value of 6270.37 compared with its probability value of 0.0000 suggested the rejection of null hypothesis and accepted the alternative hypothesis. The observations of 234 was obtained by multiplying the number of the companies with the number of years chosen for the study in relation to ROE.

For Human Capital (HC) measured by the difference between outputs and inputs, excluding human resource costs, divided by human resource costs had mean value (average) of 259.6% (2.596073), median of 178.1% (1.781), maximum value of 2263.5% (22.635), minimum value of -854.6% (-8.546) and standard deviation of 359.1% (3.590741). This showed that the deviation from the mean value was high for the sourced data obtained for the study. Skewness of 2.32963 showed that the obtained data for HC were positively skewed (moving towards right-hand side). Kurtosis value of 11.9725 compared with the value of 3.0, which is the basis for assessing the peak of a distribution, showed that the relevant data obtained for HC were above normal curve (leptokurtic). The Jarque-Bera statistical value of 996.59 compared with its probability value of 0.0000 suggested the rejection of null hypothesis and accepted the alternative hypothesis. The observations of 234 was obtained by multiplying the number of the companies with the number of years chosen for the study in relation to HC.

For Relational Capital (RC) measured by the difference between outputs and inputs, excluding human resource costs, divided by distribution costs (relational costs) had mean value (average) of 1813.995% (18.13995), median of 386.35% (3.8635), maximum value of 65523.9% (655.2390), minimum value of -23583.6% (-235.836) and standard deviation of

6672.41% (66.72414). This indicated that the variation from the mean value was high for the sourced data obtained for the study. Skewness of 5.82433 indicated that the obtained data for RC were positively skewed (moving towards right-hand side). Kurtosis value of 49.5239 compared with the value of 3.0, which is the basis for assessing the peak of a distribution, showed that the data obtained for RC were highly above the normal curve (leptokurtic). The Jarque-Bera statistical value of 22426.62 compared with its probability value of 0.0000 suggested the rejection of null hypothesis and accepted the alternative hypothesis. The observations of 234 was obtained by multiplying the number of the companies with the number of years used in the study in relation to RC.

For Company Size (CS) measured by taking the logarithm of total assets had mean value (average) of 7.4529, median of 7.5845, maximum value of 9.4120, minimum value of 5.2390 and standard deviation of 0.97813. This indicated that the variation from the mean value was not high for the sourced data obtained for the study. Skewness of -0.31578 indicated that the collected data for CS were positively skewed (moving towards right-hand side). Kurtosis value of 2.2338 compared with the value of 3.0, which is the basis for assessing the peak of a distribution, showed that the data obtained for CS were below the normal curve (platykurtic). The Jarque-Bera statistical value of 9.6125 compared with its probability value of 0.0000 indicated that the null hypothesis should be rejected, and the alternative hypothesis accepted. The observations of 234 was obtained by multiplying the number of the firms with the number of years used in the study in relation to CS.

For Leverage (LV) measured by total liabilities or debts divided by total assets had mean value (average) of 56.323% (0.56323), median of 55.95% (0.55950), maximum value of 223% (2.230), minimum value of -266.2% (-2.662) and standard deviation of 38.865% (0.38865). This showed that the deviation from the mean value was not high for the sourced data obtained for the study. Skewness of -1.95818 indicated that the obtained data for LV were negatively skewed (moving towards left-hand side). Kurtosis value of 26.1196 compared with the value of 3.0, which is the basis for assessing the peak of a distribution, showed that the data obtained for LV were highly above the normal curve (leptokurtic). The Jarque-Bera statistical value of 5361.064 compared with its probability value of 0.0000 gave rise to the decision that the null hypothesis should be rejected, and the alternative hypothesis accepted. The observations of 234 was obtained by multiplying the number of the companies with the number of years used in the study in relation to LV.

4.1.2 Test for Multi-Collinearity

In order to test for the existence of multi-collinearity in the independent variables, the correlation coefficient between two pairs of independent variables were computed and presented as shown on the Table 4.2:

Table 4.2: Correlation Matrix

Correlation	CS	HC	LV	RC	ROE
CS	1.000000				
HC	0.409493	1.000000			
LV	-0.149030	-0.140834	1.000000		
RC	-0.061284	0.070356	-0.063729	1.000000	
ROE	0.117882	0.518108	0.044466	0.576709	1.000000
Probability	**CS**	**HC**	**LV**	**RC**	**ROE**
CS	-----				
HC	0.0000	-----			
LV	0.0226	0.0313	-----		
RC	0.3507	0.2838	0.3317	-----	
ROE	0.0719	0.0001	0.4985	0.0098	-----
Observations	**CS**	**HC**	**LV**	**RC**	**ROE**
CS	234				
HC	234	234			
LV	234	234	234		
RC	234	234	234	234	
ROE	234	234	234	234	234

Source: Researcher's Computation (2022)

Multi-collinearity usually exists in a data set of independent variables when the correlation coefficient between pairs of independent variables is from 80% and above (Kothari & Garg, 2014). From the correlation matrix on the Table 4.2, it was observed that there was no multi-collinearity in all the independent variables because the correlation coefficient with between one independent variable and the other were less than 0.8 (80%). The significance of the coefficient of the correlation between variables was ascertained with the help of the probability value (p-value) computed. The relationship between HC and ROE was 51.81% and significant (p-value<0.05); the relationship between RC and ROE was 57.67% and significant (p-value<0.05); the relationship between CS and ROE was 11.79% and insignificant (p-value>0.05); the relationship between LV and ROE was 4.45% and insignificant (p-value>0.05).

4.1.3 Variance Inflation Factor (VIF)
The computation was presented on the Table 4.3:

Table 4.3: Variance Inflation Factor (VIF)

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.099752	74.20809	NA
HC	0.000128	1.867632	1.224709
RC	3.09E-07	1.094958	1.019298
CS	0.001754	73.73746	1.243309
LV	0.009311	3.239172	1.041809

Source: Researcher's Computation (2022)

The value of VIF that is equal or greater than ten (10) for an independent variable is often regarded as a variable with high level of association with other independent variables when compared together (Gujarati, 2013). From the Table 4.3, the centered VIF indicated values for all the independent variables of less than ten (10), which explained that there was no

multi-collinearity in the variables of interest. The indicated that the variables of human resource accounting had no multi-collinearity.

4.1.4 Regression Analysis for Test of Hypotheses

Test of Hypothesis One

The assessment of the panel regression approach showed clearly that the fixed effect linear regression was suitable in this study using correlated Hausman test. This was because the p-value of the chi square computed was less than 5% (p<value). The regression analysis was conducted to test the model and the results were presented on the Table 4.4:

Table 4.4: Fixed Effect Linear Regression Output

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.755948	1.081174	1.624112	0.1059
HC	0.462640	0.135409	3.416612	0.0002
CS	0.221415	0.145714	1.519516	0.1302
LV	0.028210	0.109342	0.257996	0.7967
	Effects Specification			
Cross-section fixed (dummy variables)				
R-squared	0.264299			
Adjusted R-squared	0.243813			
F-statistic	4.630213	Durbin-Watson stat		2.071139
Prob(F-statistic)	0.000052			

Source: Researcher's Computation (2022)

From Table 4.4, Human Capital (HC) had a positive and significant influence on Financial Performance (ROE) (t-stat.>1.966 and p-value<0.05) of listed manufacturing companies in Nigeria. This was because the t-statistic and p-value indicated that HC was significant on ROE, where the positive implication was derived from the coefficient of HC (beta-value) in the model. The direction of HC on ROE was in compliance with the *apriori* expectation stated by the researcher. The Durbin-Watson (DW) statistics of 2.07114 indicated the absence of first order autocorrelation in the model. The constant value of 175.5948% showed the level of ROE as HC, CS and LV were held constant and was insignificant (t-stat.<1.966 and p-value>0.05). CS had a positive and insignificant influence on ROE (t-stat.<1.966 and p-value>0.05) and LV had a positive and insignificant influence on ROE of listed manufacturing companies in Nigeria (t-stat.<1.966 and p-value>0.05). LV deviated from the *apriori* expectation and CS complied with *apriori* expectation.

A percentage increase in HC brought about 46.264% increase in ROE of listed manufacturing companies in Nigeria, a percentage increase in CS brought about 22.142% increase in ROE and a percentage increase in LV brought about 2.821% increase in ROE of quoted manufacturing companies in Nigeria. R^2 showed that 26.4299% variation in the ROE was attributed to the influence of HC, CS and LV. Adjusted R^2 showed that exact 24.38% variation in the ROE was attributed to the influence of HC. The F-ratio of 4.6302 (p<0.05) indicated that Adjusted R^2 was significant in explaining the model. The null hypothesis, which states that human capital (HC) does not significantly influence return on equity (ROE) of listed manufacturing companies in Nigeria, was rejected and the alternative hypothesis, which states that human capital (HC) significantly influence return on equity (ROE) of listed manufacturing companies in Nigeria, was accepted on the basis of t-statistic and p-value computed (t-stat.>1.966 and p-value<0.05).

Test of Hypothesis Two

The assessment of the panel regression approach showed clearly that the fixed effect linear regression was suitable in this study using correlated Hausman test. This was because

the p-value of the chi square computed was less than 5% (p<value). The regression analysis was conducted to test the model and the results were presented on the Table 4.5:

Table 4.5: Fixed Effect Linear Regression Output

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.812477	1.084970	1.670531	0.0963
RC	0.356210	0.069901	5.095921	0.0005
CS	0.228764	0.146505	1.561473	0.1200
LV	0.034944	0.110194	0.317113	0.7515
	Effects Specification			
Cross-section fixed (dummy variables)				
R-squared	0.264810			
Adjusted R-squared	0.244393			
F-statistic	4.637120	Durbin-Watson stat		2.062909
Prob(F-statistic)	0.000050			

Source: Researcher's Computation (2022)

From Table 4.5, Relational Capital (RC) had a positive and significant influence on Financial Performance (ROE) (t-stat.>1.966 and p-value<0.05) of listed manufacturing companies in Nigeria. This was because the t-statistic and p-value indicated that RC was significant on ROE, where the positive implication was derived from the coefficient of RC (beta-value) in the model. The direction of RC on ROE was in compliance with the *apriori* expectation stated by the researcher. The Durbin-Watson (DW) statistics of 2.062901 indicated the absence of first order autocorrelation in the model. The constant value of 181.248% showed the level of ROE as RC, CS and LV were held constant and was insignificant (t-stat.<1.966 and p-value>0.05). CS had a positive and insignificant influence on ROE of quoted manufacturing companies in Nigeria (t-stat.<1.966 and p-value>0.05). LV had a positive and insignificant influence on ROE of listed manufacturing companies in Nigeria (t-stat.<1.966 and p-value>0.05). LV deviated from the *apriori* expectation and CS complied with *apriori* expectation.

A percentage increase in RC brought about 35.62% increase in ROE of quoted manufacturing companies in Nigeria, a percentage increase in CS brought about 22.876% increase in ROE and a percentage increase in LV brought about 3.494% increase in ROE of quoted manufacturing companies in Nigeria. R^2 showed that 26.48% variation in the ROE was attributed to the influence of RC, CS and LV. Adjusted R^2 showed that exact 24.44% variation in the ROE was attributed to the influence of RC. The F-ratio of 4.6371 (p<0.05) indicated that Adjusted R^2 was significant in explaining the model. The null hypothesis, which states that relational capital (RC) does not significantly influence return on equity (ROE) of listed manufacturing companies in Nigeria, was rejected and the alternative hypothesis, which states that relational capital (RC) significantly influence return on equity (ROE) of listed manufacturing companies in Nigeria, was accepted on the basis of t-statistic and p-value computed (t-stat.>1.966 and p-value<0.05).

4.2   Discussion of the Findings

From Table 4.4, Human Capital (HC) had a positive and significant influence on Financial Performance (ROE) of quoted manufacturing companies in Nigeria. The positive and significance of HC on ROE of the companies studied was tested by the coefficient of HC as well as the p-value of the variable computed which was less than the error level of 5%. The result of HC on ROE was in line with the *apriori* expectation stated for the model. Human strength and skill are necessary resources in any organization especially in the modern business world. The anticipated strength and skills needed to drive performance of companies are

obtained from the total workforce in the organization that is made up of the aggregate employees as well as directors. The skills of employees must be elevated through trainings which could either be about the job or formal education. Thus, for the improvement of human capital, adequate investment is needed to improve upon the skills of the employees in companies.

When adequate policies of trainings employees are maintained in entities continuously, the strength and technical know-how of the workforce must be improved as well. In this case, managers are required to set aside certain amount of money to invest on their employees to raise their intellectual capacity that could affect the growth of companies positively. The improvement in the intellectual capacity of employees is influenced by the level of trainings acquired by such employees and how the trainings are delivered. For the purpose of raising human capital, employees and directors must be technically sound based on the job as well as academically sound. In this case, human capital is an integration of the total skills, knowledge and experiences possessed by an employee or a director. When human capital in an organization is high, it could be said that intellectual capital of such company is also high and a company with higher level of human capital is certain to influence upon financial performance positively and significantly. The continuous investment in training of employees in companies is encouraged when human capital is improved as a result of the trainings acquired.

The improvement in human capital is usually validated by the level of value-added achieved which is often regarded as the difference between revenue (outputs) and total costs (inputs) excluding human resource costs. When value-added is improved as a result of human capital generated, managers must be encouraged to incur further costs (invest) on employees training and development programmes. Thus, the positive and significant influence of HC on ROE of quoted manufacturing companies in Nigeria is substantiated by the fact that quoted manufacturing companies in Nigeria in average have been maintaining standard policies of improving upon the skills and knowledge of their employees to raise their intellectual capacity. The study was in line with the study of Shubita (2022) who assessed intellectual capital components and industrial firm's performance. It was also in line with the study of Irmansyah & Andesto (2022) who examined the effect of intellectual capital on financial performance: Case Study of Pharmaceutical industry sector companies in Indonesian Stock Exchange (IDX).

From Table 4.5, Relational Capital (RC) had a positive and significant influence on Financial Performance (ROE) of quoted manufacturing companies in Nigeria. The positive and significance of RC on ROE of the companies studied was tested by the coefficient of RC as well as the p-value of the variable computed which was less than the error level of 5%. The result of RC on ROE was in line with the *apriori* expectation stated for the model. Relational capital is derived when the reputation of a company is high. For an entity to achieve higher reputation, it must be known for providing quality products or services to consumers or buyers. An entity that wishes to be reputed higher must be one that is ready to provide quality products or services to the markets. The entity on its own without creating awareness cannot be reputed in terms of the durability of the products or services provided. This is because an entity that wishes to maximise turnover or revenue is expected to engage in meaningful marketing strategy or policy.

In conducting effective marketing, the buyers or customers should not be deceived about the products or services of the company advertised. This is because when there is any deception about the products or services of a company and perceived by the buyers, there must be long-run negative effect that will be seen on the total revenue of the entity as well as the value-added to be generated. For this reason, to improve upon relational capital of a company,

the entity is required to inform the markets about what could be offered meaningfully and not deception. For the improvement of relational capital, marketing and distribution costs must be incurred continuously by a company to create awareness in the markets. Managers have the obligation of ensuring that the costs incurred in marketing and distribution continuously are affecting the intellectual capacity of the company positively as well as improving upon the financial performance indices.

This is because when costs are incurred on marketing and distribution and the anticipated benefits are not optimal, managers must be discouraged on further investment in marketing and distribution expenses to raise relational capital. The positive and significant influence of RC on ROE of quoted manufacturing companies in Nigeria could be substantiated by the fact that marketing and distribution costs of the entities over the years have been raising relational capital meaningfully and influencing upon financial performance positively. Also, it could be said that quoted manufacturing companies in Nigeria in average have high reputation of providing essential products. This study was in line study of Daat *et al*. (2021) who investigated the role of intellectual capital on financial performance of SMEs. Thus, the result of the study negated the study of Xu and Zhang (2021) who explored the non-linear effect of intellectual capital on financial performance: Evidence from listed shipping companies in China.

5. Conclusion and Recommendations

5.1 Conclusion

The study was conducted to ascertain the influence of intellectual capital on financial performance of listed manufacturing companies in Nigeria. Data for the core variables were obtained and analyse using descriptive statistics and inferential statistics. From the analyses, it was concluded that intellectual capital had positive and significant influence on financial performance of listed manufacturing companies in Nigeria.

5.2 Recommendations

In line with the empirical results presented, the following recommendations were suggested appropriately:

i. More investments should be made on training and development programmes for employees of listed manufacturing companies in Nigeria by granting them with some funds to enable them further their academic and professional studies.

ii. The salaries of employees as well as other incentives should be improved to motivate them to enrol of various programmes in which the companies could not finance for them for the purpose of raising their intellectual capacities.

iii. Marketing and distribution costs should be improved for the purpose of creating more awareness in the markets about the various products manufactured by the companies to achieve higher reputation.

iv. More investments should be made in marketing the companies' products to other entities or externalities about the quality of products provided for the purpose of improving upon the relational capital of the entities.

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