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CAPITAL INTENSITY AND FINANCIAL RETURNS OF LISTED DEPOSIT MONEY BANKS IN NIGERIA

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Abstract: The study is aimed at investigating the relationship between capital intensity proxy by property, plant and equipment ratio and investment property ratio and financial returns, which was measured using return on assets and return on equity. The study considered deposit money banks in Nigeria as the unit of study and the scope of study covers a period of 10 year (2021 to 2020). The choice of ten years period is premised on the availability of current data as a matter of interest to the researchers. Using an ex-post facto research strategy, the study drew its secondary data from the audited annual reports of the selected banks. The outcomes indicated that among Nigerian listed banks, property, plant, and equipment ratio significantly affects return on assets as well as return on equity of the studied banks. Also, return on assets and return on equity of Nigerian listed banks was significantly impacted by investment property ratio. All the null hypotheses were rejected as a result of this outcome. It was thus concluded that financial performance of banks listed on the Nigeria Exchange is positively, statistically and significantly affected by capital intensity. Based on the results, the study suggests that finance managers of banks listed on the Nigerian Exchange should invest in property, plant, and equipment and other investment properties to improve their financial performance and operational efficiencies. A solid capital structure should also be a top priority for them in order to boost their financial metrics like return on equity, return on assets, earnings per share, profit margin, and others.

Keywords: Capital intensity, financial performance, PPE ratio, Investment ratio, ROA, ROE

1. Introduction

Every serious enterprise requires adequate capital to operate, grow and achieve economic sustainability. Therefore, capital intensity is the proportion of capital spending to earnings that is required by business to operate profitably; and this ratio varies across sectors and industries. Some sectors of the economy such as the construction, manufacturing and mining sectors are inherently capital-intensive when compared to others, such as consulting firms and even the banking sector. Industries like aerospace, steel and rolling mills, automobile manufacturing plant among others tend to be more capital-intensive than banks due to large scale production lines and the nature of their operations, which requires more capital expenditures on heavy duty plants, machinery and equipment. Thus, the key focus of capital intensity is the extent to which companies have invested their capital in the acquisition of non-current assets. Major non-current assets such as property, plant and equipment constitute a bulk percentage of the aggregate assets for financial institutions such as banks and it assist banks a great deal in the generation of current assets as well as operation profit. Still, it is very important to find a middle ground as investing too much in long-term assets may hurt banks' liquidity and, in turn, their operational cash flows. A decrease in investments in long-term assets might have an effect on cash flow. Inadequate investment in non-current assets may deprive a company of the cash it needs to run its day-to-day operations, which in turn can cause financial losses (Oeta, Kisi & Muchiri, 2019). If banks and company

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managers want to increase their market share and market value, they should look into the best financing options before arguing that firms should increase their capital intensity (Irianto, Sudibyo & Wafirli, 2017). Although companies usually plan to raise their level of capital intensity to enhance quality and consequent flow of finances, it is quite essential to make a compromise with the right type of financing to fund that kind of rise. As the economic cycle changes, a capital intensive business is likely to respond to it differently as compared to a labor intensive business (Nangih & Onuora, 2020). Nonetheless, even though alterations in the economic climate can have a harmful effect on the business that relies on capital rather than labor, it is unlikely to cause effects on businesses that are capital-light.

The quality of an entity's noncurrent assets is an indicator of its competitive standing, according to Chukwu and Egbuhuzor (2017). To add insult to injury, they think that a company's product success is directly proportional to the amount of physical assets it has. Irianto, Sudibyo, and Wafirli (2017) state that when a corporation or industrial method is heavily invested with capital, it is said to have high capital intensity. This is why we say that a company's capital intensity is the sum of all six of its expenditures that contribute to the production of at least one naira worth of output from its non-current and tangible assets. The level of financial investment that a corporation or organization has made in its physical assets, such as property, plants, and equipment and other related assets, is known as capital intensity (Oeta, *et al*, 2019). Capital intensity is defined as the ratio of a company's fixed or real capital to other production inputs, particularly labour, as stated by Cette, Lopez, and Mairesse (2016). A higher capital intensity also indicates that a company's portfolio has a larger proportion of non-current assets. Apart from that, A higher percentage of non-current assets in a company's portfolio is associated with capital intensity, according to Cette, Lopez, and Mairesse (2016). Capital intensity varies among economic sectors; for example, mining and manufacturing tend to have higher capital intensity due to their unique characteristics (GRM and Yogendrarajah, 2013). Businesses that rely heavily on capital tend to be less risky, which means they pay less for equity capital. This strategy might increase their profits. Enterprise capital intensity will impact overall financial performance as, as stated by Nangih and Onuora (2020), it may distinguish a firm from its rivals. But academics have argued—and continue to argue—about whether or not capital intensity correlates with an entity's financial success. In order to provide stakeholders with more credible and value-relevant financial reporting, corporations incorporate their non-current assets and other essential assets in their financial statements. The capital intensity, or the rate of return on invested assets, might be better understood by stakeholders and investors in such a situation. Financial managers place a premium on capital intensity as it is a factor in the capital structure choice of businesses and institutions. Therefore, in order to maximize shareholder value and improve financial performance, financial managers (such as banks) should constantly work to keep the cost of capital as low as feasible.

The capital intensity of the company is an important consideration in capital structure choices since it limits the operational leverage of the organization. The primary duty of financial managers in such a case is to ensure that the business's financing is handled and controlled appropriately so that the capital intensity of the organization remains manageable. Banks risk seeing a decline in their financial performance if they are unable to rein in their capital intensity. There may be a direct or indirect relationship between capital intensity and business dimension, depending on the circumstances that lead to higher enterprise risk and value. There is a possibility that becoming more capital-intensive will increase the enterprise's exposure to business risk, considering that banks and other capital-intensive businesses are more likely to undergo substantial fluctuations in financial performance and profitability (Oeta, et al; 2019). Because businesses need to incur large or low amounts of fixed costs to be successful, having a high or low share of non-current assets might put them at risk. Because of this, profitability could be unstable due to a high or low fixed expenditure volume that is uncorrelated with sales. Research on bank financial performance is essential for scholars, banks, and regulatory bodies due to the crucial

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role that banks play in economic growth and sustainability. Therefore, financial institutions would do well to limit their holdings of non-current assets. A bank's capital-intensiveness is directly proportional to the amount of money it spends on non-current assets; this, in turn, has a major impact on the bank's bottom line. Because of its impact on banks' asset efficiency and consequences for financial performance, the idea of capital intensity is therefore critically important to banks. According to Chukwu and Egbuhuzor (2017), it is necessary and reasonable to regularly examine the financial performance resulting from the large investments made by banks and businesses in property, plant, and equipment, as well as other non-tangible non-current assets (their capital intensity).

This work is very necessary and it will be beneficial to various interest groups, individuals and body of individuals. For mangers of listed banks, the study will help them to make informed and data-driven investment, budgeting and financing decisions that in turn could place these banks on a good pedestal and to have competitive advantage as it will held them to comprehend the overall benefits and effect of having a well balanced portfolio of non-current assets. Such understanding will help the bank managers to know how to strategize, plan and control optimal levels of non-current assets to improve performance.

Second, the output of the work will assist business managers besides bank managers to understand how capital intensity affects their firms' going concern and operations. Additionally, it will help organizations' management team to prioritize the strengthening of their leverage, capital and cost structure so as to have a win-win influence on financial performance and gain competitive positions.

Third, the outcome of this study will help investors and shareholders in their strategic investment considerations and decisions as they will prefer to invest in a company that balanced capital investments with expected returns. It will help other stakeholders to gain insights into how financial institutions manage their assets and capital structure. Such insights could be very vital to them in making investment decisions.

Fourth, the conclusion that would been drawn from this research work and recommendations made could be a springboard for further research and a resource materials for students, researchers and other analysts to fall back on. It will also contribute to a pool of knowledge in the area of capital intensity and financial performance.

1.2 Statement of the problem

Financial performance reports from Nigerian banks listed on the Nigerian Exchange Group (NGX) have been inconsistent and contradictory over the years. Some NGX-listed companies have been producing impressive-sounding but dubious financial results, while others have not fared so well, citing falling financial results. Oeta et al. (2019) propose that finance managers' preoccupation with reorganizing and managing working capital, rather than the capital intensity of their business, may be to blame for the underperformance of listed enterprises on the Nigerian Exchange Group.

Banks chief finance officers have been too preoccupied with working capital management and financial restructuring to pay much attention to the capital intensity of their institutions, despite the fact that this has the potential to significantly impact their financial performance. One of the key obstacles to improving financial performance for firms is financial frictions caused by inadequate financing choices (Andreasen, Bauducco & Dardati, 2019). Since capital intensity necessitates that financial managers assess the optimal financing option that enables a corporation to attain consistent financial performance, it is an essential issue.

In Nigeria, deposit money banks have been the subject of little research on the relationships between capital intensity and their bottom lines. As far as we are aware, no studies have been conducted in Nigeria to study deposit money banks listed on the Nigerian Exchange Group (NGX) to find out how capital intensity relates to their financial success. Capital intensity and financial success of enterprises has been the subject of conflicting findings in the little earlier research on the topic. One study that looked at the link between capital intensity and the financial performance of listed manufacturing enterprises in Kenya was Oeta et al. (2019). The researchers found that

capital intensity did have a positive association with financial performance, but it wasn't statistically significant. To the contrary, using panel data, Lee (2010) investigated the US restaurant industry's relationship between capital intensity and performance. A corporation's financial performance is negatively affected by capital intensity, according to his results. Listed Nigerian banks' financial performance has been the subject of much debate, and this study aims to fill that knowledge gap by answering the central question—does capital intensity significantly correlate with financial performance?—and adding to the existing literature on the topic.

1.3 Objectives of the study

The core objective of this study was to investigate the association between capital intensity and financial performance of listed banks in Nigeria. The specific objectives include:

i. To investigate the effect of property, plant and equipment ratio on return on assets of listed banks in Nigeria.
ii. To investigate the effect of property, plant and equipment ratio on return on equity of listed banks in Nigeria.
iii. To investigate the effect of investment property ratio on returns on assets of listed banks in Nigeria.
iv. To investigate the effect of investment property ratio on returns on equity of listed banks in Nigeria.

1.4 Research questions

To achieve the objective of the study, the following research questions become appropriate:

i. To what extent does property, plant and equipment ratio affect return on assets of listed banks in Nigeria?
ii. To what extent does property, plant and equipment ratio affect return on equity of listed banks in Nigeria?
iii. To what extent does investment property ratio affects return on assets of listed banks in Nigeria?
iv. To what extent does investment property ratio affect returns on equity of listed banks in Nigeria?

1.5 Research hypotheses

The research hypotheses are formulated and empirically tested. The result will form the basis for recommendation and conclusion. The hypotheses were stated in a null form as follows:

H_{01}: Property, plant and equipment ratio do not significantly affect return on assets of listed banks in Nigeria.
H_{02}: Property, plant and equipment ratio do not significantly affect return on equity of listed banks in Nigeria.
H_{03}: Investment property ratio does not significantly affect return on assets of listed banks in Nigeria.
H_{04}: Investment property ratio does not significantly affect return on equity of listed banks in Nigeria.

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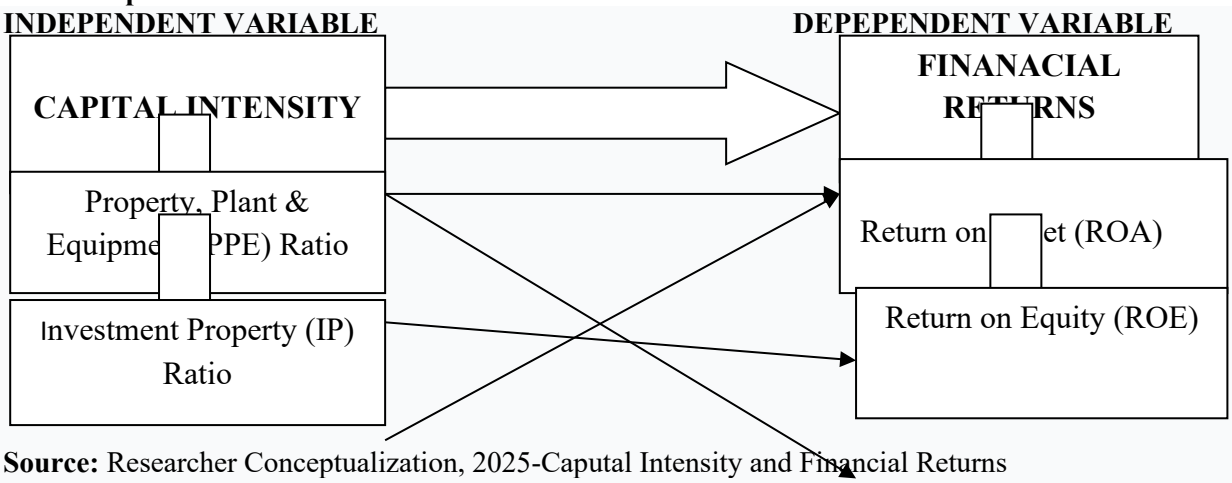
2. Literature Review

2.1 Conceptual Framework



Source: Researcher Conceptualization, 2025-Caputal Intensity and Financial Returns

2.1.1 Capital intensity

Capital intensity is a complex, dynamic and fundamental concept in the world of business and it lies at the intersection of investment decisions, overall business and investment strategy as it influences the cost structures, risk exposure and competitive positions of businesses. Shahean and Malik (2012) stated that capital intensity is "the value of total investment made by an enterprise in non-current assets and it is usually determined by dividing the value of total non-current assets in the statement of financial position by the value of the total assets of the enterprise".

According to Irianto, Sudibyo, and Wafirli (2017), capital intensity connotes" the infusion of high amounts of capital into a firm or industrial process". Capital intensity is the degree to which an enterprise has invested its financial resources in tangible assets such as property, plants and equipment (Oeta, et al, 2019). Capital intensity is defined by Cette, Lopez, and Mairesse (2016) as "the quantity of fixed or real capital present in an organization in relation to other components of production, particularly labor within an organization".

Capital intensity measures the extents to which an enterprise depends on capital or assets in the production processes. Importantly, it evaluates the ratio of non-current assets employed in generating returns output. High capital intensity ratio is an indication that a company depends heavily on capital requirement to operate and grow. While low capital intensity implies a more focus on labour and it further means the entity can generate more earnings with less capital. A company could estimate its capital requirements, sources of capital and plan their budget and financing accordingly if they project and ascertain their capital intensity percentage on the basis of its growth plans and objectives. Thus, capital intensity analysis is a useful parameter for evaluating and adjusting the capital demands of an entity. It helps entities to assess how efficiently an organization utilizes capital to generate revenue and earnings. It could also help banks and other enterprises to compare their performance with their competitors and industry benchmarks.

A clear understanding of capital intensity proportion can help organizations like banks to improve their capital allocation, minimize operational costs, and improve financial performance. Capital intensity can influence the growth, profitability and risk exposure of a company. For instance, a high capital intensity proportion could inhibit the cash flow, return on assets and return on equity of a company. It could also expose the entity to some kinds of vulnerable due to technological changes, market dynamism and economic upheavals. A low capital intensity ratio could improve cash flow depending on the goals of the organization. Capital intensity is very

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dynamic. It changes over time due to endogenous and exogenous factors. A business may decide to either increase or reduce its capital intensity depending on its intended goals and objectives.

2.1.2 Measures of capital intensity

2.1.2.1 Property, plant and equipment

They represent tangible, long-term non-current assets with physical existence acquired not really for resale but to be utilized in the generation of earnings directly or indirectly to the firm. They include land, land improvements, buildings, buildings extension, plant, machinery, equipment, vehicles, among other groupings. Based on their functions and the wear and tear they experience over time, they are usually depreciated over their economic lives but land is not depreciated as it has infinite economic life.

In most cases, a company's statement of financial status will include PPE at its original cost less any impairment losses or accrued depreciation. According to Chukwu & Egbuhuzor (2017), the available stock of physical assets (property, plant, and equipment) dictates the performance of many organizations. In order for a piece of property, plant, or equipment to be considered an asset, certain conditions must be met. First, there must be a reasonable expectation that the entity will receive economic benefits or service potential from the item in the future. Second, the item's cost or fair value must be quantifiable. For more information on this, see IAS 18 and IPSAS 17.

2.1.2.2 Property, plant and equipment ratio

This is capital intensity metric that measures the quantum of an enterprise assets or capital invested in property, plant and equipment. The ratio is obtained by dividing the aggregate value of property, plant and equipment by the value of aggregate assets of the enterprise. It is an indicator of capital intensity and asset utilization by an enterprise. The higher the PPE ratio, the higher the value of PPE to aggregate assets, suggesting that property, plant and equipment constitute a big chunk of the enterprise aggregate assets and as such the business is highly capital-intensive. A lower ratio may indicate underutilization of the business assets. The property, plant and equipment (PPE) ratio is usually employed in assessing a company's including banks' asset structure, capital requirements, asset utilization and potentials for profitability.

2.1.2.3 Investment property

IAS 40 defined investment property as "land and buildings held to earn rentals or for capital appreciation or both, rather than for use in the production or supply of goods or services or for administrative purposes or sale in the ordinary course of operations". According to Osirim and Wadike (2016), investment property shall be recognized as an asset when there is the likelihood that it will generate future economic benefits or service potentials that are associated with the investment property to the entity and the cost or fair value of the investment property can be measured reliably. Most banks in Nigeria commits so much capital for the acquisition of land and building (rental properties, real estate investments) in order to generate rental income and also dispose it in ^{the} future upon appreciation in values. This could help to improve the financial performance of such a bank or company due to anticipated rental income and/or capital appreciation that may flow from to the entity from such investment.

2.1.2.4 Investment property ratio

It is a capital intensive metric for measuring the proportion of a firm's assets or capital invested in investment properties. The ratio is obtained by dividing the total value of investment property by the value of total assets of the enterprise. That is, Investment property ratio = Investment Property ÷ Total Assets x 100. It highlights the ratio of investment property to total assets and it is an indicator of capital intensity, investment strategy and asset utilization. A higher proportion of investment property implies that a significant amount of capital is invested in investment property. It indicates the percentage of assets dedicated to investment properties. And this could be used by stakeholders to assess the firm's investment strategy, asset allocation, potential returns/profits and risks connected with investment properties.

2.1.3 Financial performance/returns

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This term describes the process of figuring out how successfully a company can use its assets to make money and how much money it can make. According to Gartenberg, Prat, and Serafeim (2019), one of the most important indicators of a company's long-term financial health is its capacity to turn a profit. According to Shin and Konrad (2017), the three main components of financial performance for a corporation are market performance, profitability, and shareholder returns. According to Ishaya et al. (2014), business performance is all about how well a company does at reaching its goals, whether those goals are monetary or operational. These goals might include things like increasing the company's sales and market value, satisfying customers, and maximising profits. Conversely, according to Okpara and Ifurueze (2020), corporate financial performance establishes correlations between the elements of the financial position and statement of profit or loss, which in turn indicates the financial strengths and weaknesses of a corporation.

There are a number of ways to measure a business's financial health, including its profitability, liquidity, asset utilisation, and growth prospects and objectives. Property, plant, and equipment to total assets, total assets to revenue, depreciation to revenue, and property, plant, and equipment to total assets are some of the indicators that have been employed in the past as a measure of capital intensity (Hove, 2017).

Fixed asset turnover (FAT), capital-to-sales ratio (COSR), investment property ratio, property, plant, and equipment ratio (PPE), and capital-to-output ratio (COR) are among other metrics of capital intensity. Historically and in practice, accounting ratios have been used to assess how well businesses are doing financially. Profitability, market potential, and expansion ambitions have always been the determinants of an organization's financial success. However, accounting ratios are now widely used to provide a clearer picture of organizations' financial performance, which helps in making informed business choices (Irianto, et al., 2017).

Profit margin (net or gross), return on assets (ROA), return on equity (ROE), earnings per share (EPS), dividend per share (DP), return on capital employed (ROCE), and many more are common accounting ratios used as measures of financial success. Both return on equity and return on assets were used as measures of financial performance in this research. These ratios show how efficiently businesses and banks utilize their assets to generate profits.

2.1.3.1 Return on assets

Return on assets is a proxy for financial performance which evaluates an enterprise's profitability in relation to its aggregate assets. It is obtained by dividing profit by aggregate assets multiplied by 100. It helps in weighing an enterprise's asset utilization and profitability and comparing such with other companies within an industry.

2.1.3.2 Return on equity

It evaluates profitability relative to owner's equity. It is obtained by dividing profit by owner's shares multiplied by 100. It indicates how well a firm has utilized owner's equity and is use to weigh a firm's level of efficiency and profitability in the use of capital. It shows the bank's capacity to turn over equity capital into profits. An improved and sustainable return on equity year to year could imply that the business has what it takes to generate equity holders' wealth because it knows how to reinvest its earnings prudently. The focus of return on asset is on returns generated on the total assets of the firm. Return on equity focus is on earnings generated on the shareholders' equity.

2.1.4 Capital intensity and financial performance

Financial performance assesses the financial health of organizations. It measures their ability and capacity to utilize the business non-current assets otherwise referred to as capital intensity to generate profitable returns as well as to maximize shareholders wealth. Thus, the capability of firms to generate revenue from their business operations is one of the key measures of a company's financial performance and such revenues are usually generated from the capital invested in non-current and other assets (capital intensity) of the business. As such, there is a link or a kind of interconnectivity between capital intensity and financial performance of firms.

Prior studies outcome like that of Oeta, Kiai, and Muchiri (2019) and others indicated that there is a positive and

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significant relationship between capital intensity and financial performance of firms. This implies that businesses that increase their spending on the acquisition of more noncurrent assets would tend to maximize the benefits for shareholders and improve their financial performance. Thus, a firm's financial performance is impacted by its capital intensity, which could also impact liquidity and profitability of such an enterprise.

2.2 Theoretical Review

2.2.1 Trade-off Theory

This work is built upon the foundation of trade-off theory which was a brain child of Myers who birthed the idea in 1984. The theory suggests that there is need for an enterprise to have optimal capital structure which could be identified and auctioned if the costs and benefits of equity and investment in assets are systematically gauged. It further states that to ascertain the best-fit ratio in enterprise's capital structure, first the costs and benefits of each are gauged and the optimal mix is eventually chosen. Inefficient management of capital structure excessive debt and assets procured by an enterprise could threaten the going concern of such enterprise and could lead to its eventual liquidation. It further posited that while debt capital has tax shelter benefits, it must be however be well managed.

2.3 Empirical Review

Oeta, Kiai, and Muchiri (2019) conducted a research in Kenya on nine manufacturing enterprise listed in the Nairobi Stock Exchange to ascertain if there is a significant association between capital intensity and financial performance of the studied firms adopting the explanatory research methods. The results of their research indicated that capital intensity has a positive but not much association with financial performance.

Hasan and Colleagues (2013) considered the key factors that determine capital intensity effectiveness in India from 1980 - 2004. The outcomes of their works indicate that the labour market influences capital intensity and India's capital intensity is found to exceed that of other countries having the same or similar levels of development and resources. Similarly, Lee (2010) carried out a study for the period 2000 - 2008 in the United States to ascertain association that exists between capital intensity and performance of 524 restaurants and related businesses using a regression method. Capital intensity was found to have a negative influence on the studied enterprises.

Nangih and Onuora (2020) carried out a study for the period 2014 – 2018 on the impact of capital intensity on the profitability of nine (9) listed oil and gas firms in Nigeria employing the ex-post factor research design technique.

The study's outcomes indicated that the tested variables had a positive and significant influence on the criterion variable. However, intangible non-current assets are found not to be significant. These findings led to the conclusion that companies having greater capital intensity in terms of assets could post an enhanced performance compared to businesses with very low capital intensity.

GRM and Yogendrarajah (2013) investigate how capital intensity and tangibility influence the financial performances of Sri Lankan banks and insurance firms listed on Colombo Stock Exchange from 2007 to 2011. The study findings showed that capital intensity and tangibility are significantly associated with financial performance of the enterprises surveyed. Implying that an enhanced capital intensity of an enterprise could culminate into enhanced financial performance overtime.

Chukwu and Egbuhuzor (2017) examined the influence of tangible assets on financial performance of ten (10) manufacturing firms listed on the Nigerian exchange using secondary data. The study measured the independent variable using plant and machinery, land and building while the criterion variable was proxy by return on assets and return on equity. Outcomes from the analysis showed that the association between land and building and return on assets is negative while that of plant and machinery and return on assets produced not just positive but a significant association.

During the years 2014–2016, Zhang (2017) examined seventeen (17) listed Chinese telecoms companies to determine the correlation between intangible assets and profit margins. Because intangible asset ratios have a favourable effect on return on assets, a measure of financial performance, the research discovered an empirical

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association between the two. Eleven (11) oil and gas companies (refineries and drilling and exploration enterprises) registered on the Bombay Stock Exchange were studied by Ansari and Gowda (2013) to determine the effect of tangibility of assets on financial performance. Capital structure was associated with financial success in a statistically significant positive way, while asset tangibility was associated with financial performance in a statistically significant negative way. Capital intensity, thus, influences liquidity and profitability, two key metrics for measuring a company's financial health.

A study conducted by Yogendrarajah and Gamlath (2013) examined the capital mix of nine businesses operating in the Sri Lankan plantation sector. The researchers discovered that the amount of loan financing depends on the firms' profitability, size, and capital intensity. Capital intensity was determined to be a significant determinant in the financial performance of the restaurants that were part of the sample in Lee's (2014) analysis of the relationship between capital intensity and firm performance in the US restaurant industry. Between 2001 and 2009, 8,074 companies from six(6) EU member states had their return on assets examined by Svetland and Aaro (2012) in relation to the impact of enterprise's investment intensity. Their research showed that investment intensity did not significantly affect ROA in the future, either positively or negatively. Researchers Okwo et al. (2012) used regression analysis to determine how investments in non-current assets affected operational profit margins. Four companies operating in the Nigerian brewing industry between 1999 and 2009 form the basis of the research. Investment in fixed assets was positively associated with operational profit margin; however the link was not statistically significant.

3.1 Methodology

This study used an ex-post facto research design. The main objective is to assess the relationship between capital intensity and the financial performance of Nigerian deposit money banks that are listed. Since no effort was made to "cook the data," the decision to use an ex-post facto design was based on the fact that the study's data were already in existence. The study's population is made up of deposit money banks listed in the Nigeria Exchange Group (NGX), which is a multi asset exchange where securities such as bonds, stocks, etc are bought and sold. The study covered a period of ten years from 2011 to 2020. According to the Central Bank of Nigeria (CBN) publication retrieved from https://cbn.gov.ng, there are forty four (44) deposit money banks in Nigeria as at April 26, 2024. However there are only twelve (12) deposit money banks listed in the floor of the Nigeria Exchange Group. Data was generated from six (6) banks listed on the Nigeria Exchange Group out of the total of twelve (12) banks listed in the Nigeria Exchange. This sample size was selected using purposive sampling method and based on availability of complete financial statements. The Nigeria Exchange Group fact book shows that the exchange has 151 listed firms as at 2024, including 12 money deposit banks, which are commercial banks licensed to accept deposits from the public and provide other financial services. These deposit money banks are part of the broader financial industry operating in Nigeria. The research hypotheses were tested and analyzed using the ordinary least square (linear regression) method with the aid of SPSS (version 23). The ordinary least square was adopted because it is the most suitable as it expresses the relationship between the independent and dependent variables. In the linear regression model, the criterion variable is assumed to be a function of the predictor variables. The decision rule is to accept the null hypothesis if the p-value exceeds 0.05 significant level and reject the null hypothesis if p-value is less than 0.05 significant level (p-value< 0.005). The result indicates that the model and its data are dependable to form conclusive inferences.

3.2 Model Specification

Capital intensity models were adopted from prior studies of Chukwu and Egbuhuzor (2017) and Nangih and Onuora (20200. These models were modified and extended to meet the objective of this study. The model is first formulated in functional form as:

ROA= F (PPEr + INVPr) + μ……...(i)

ROE = F(PPEr + INVPr) + μ……(ii)

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It could also be restated in econometric form:
$ROA = \beta 0 + \beta 1PPEr + \beta 2INVPr + \mu$……(iii)
$ROE = \beta 0 + \beta 1PPEr + \beta 2INVPr + \mu$……(iv)
Where: ROA = Returns on Assets; ROE = Returns on Equity ; PPER = Plant, Property and Equipment Ratio; INVr = Investment Property Ratio; μ = Error term; β0 = Constant ; β = Coefficient or slope

A priori expectation: The study expects the sign of the coefficients of PPEr and INVr to be positive. This is due to the fact that an increase in the amount of PPE and INVP, ceteris paribus will culminate into an increase in return on assets and return on equity.

4.1 Data presentation and analysis

Data collected in the course of the study were presented in tabular forms in form of descriptive statistics, correlation analysis, and regression analysis as shown in the following tables.

Table 4.1: Descriptive statistics

	Min	Max	Mean	Std. Dev.	Skewness	Kurtosis
Return on asset	0.415	0.932	0.782	0.152	3.295	1.206
Return on equity	0.546	0.994	0.863	0.784	2.583	3.452
Property, plant & equipment ratio	1.634	3.678	2.127	0.195	3.136	2.811
Investment property ratio	0.588	2.244	6.764	0.655	4.004	2.241

The research outputs in respect of the descriptive statistics are shown in Table 4.1 above. The data in the table indicates that the mean of return on assets and return on equity of the listed companies are 0.782 (78%) and 0.863(86) respectively with the minimum and maximum values being 0.415 and 0.932 for return on assets and 0.546 and 0.994 for return on equity respectively. Table also indicates that the mean of property plant and equipment ratio was 2.127 and the minimum and maximum values ranging between 1.634 to 3.678. Furthermore, the mean of investment property ratio was 6.764, with minimum and maximum values of 0.588 and 2.244, respectively. The values of property, plant and equipment ratio and investment property ratio did not cluster around their respective mean as implied by their respective standard deviations which are quite lower than the mean. Final results showed that all of the skewness and kurtosis values fell between 1 and 4, indicating that the variables were regularly distributed and that the assumption of normality was not violated. In statistics, kurtosis value of 3 is considered typical for a normal distribution. As kurtosis of 2 to 4 is generally acceptable. Thus the skewness and kutosis for the distribution is not outside the range of normality and it can be considered normal for study.

4.1.1 Correlation analysis

Table 4.2

	ROA	PPE RATIO	INV. P. RATIO
ROA	1.000	0.487*	0.394*
		0.003	0.001

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PPE RATIO	0.487*	1.000	0.466*
	0.003		0.001
INV. P. RATIO	0.394	0.466	1.000
	0.001	0.001	

	ROE	PPE RATIO	INV. P. RATIO
ROE	1.000	0.495*	0.402*
		0.002	0.000
PPE RATIO	0.495*	1.000	0.455*
	0.002		0.000
INV. P. RATIO	0.402*	0.455*	1.000
	0.000	0.000	

Table 4 indicates positive and significant association between the criterion and predictor variables as their p-values are less than the alpha level at 5% (p=0.000<0.05). All the correlation coefficients are below the threshold of 0,8 (did not exceed the 0.8 cap) which suggests multicollinearity is of no issue to the outcomes of the regression analysis (Belsley, et al. 1980)

4.1.3 Regression analysis

Regression analysis was performed to investigate the impact of the variables and the outputs are stated below:

4.1.4 Model summary

Regression analysis showing the relationship between property plant and equipment ratio, investment property ratio, return on assets and return on equity.

Table 4.3 Regression analysis

Model	R	R. Square	Adj. R. Square	S.E. of Estimate
1	.656a	0.430	0.400	1.4721

a. Predictors: (Constant), Capital Intensity

Table 4.3 results indicate that the R^2 was 0.43. This indicates that 43% variation in financial performance proxy by return on assets and return on equity of quoted banks in Nigeria is explained by their capital intensity measured using PPE and Investment property ratio. Other factors not included in the model explain the remaining 67%.

Table 4.4 : ANOVA

Model		Sum of Squares	DF	Mean Square	F	Sig.
1	Regression	140.984	1	140.984	24.875	0.000[b]
	Residual	288.869	32	0.827		
	Total	429.853	33			

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The analysis of variance in the table above reveal showed a significance of 0.000 (F= 24.875, p=0.000 < 0.005). The result indicates that the model and its data are dependable to form conclusive inferences. Furthermore, it shows that the predictor variables had a statistically significant influence on the financial performance of banks listed on the Nigeria Exchange Group.

Table 4.5 Regression coefficients

Model		Unstandardized Coefficients B	Std. Error S.E.	Standardized coefficients Beta	T	Sig.
1	(Constant)	1.674	0.209		8.148	.000
	PPE ratio	0.722	0.295	0.676	12.541	.000
	INV.Ratio	0.692	0.361	0.645	15.103	0.000

a. Criterion variable: ROA

$ROA = \beta_0 + \beta_1 PPE_r + \beta_2 INVP_r$

ROA = 1.674 + 0.722PPE + 0.692INVP
T = (8.148) (12.541) (15.103)
Pv = (0.000) (0.000) (0.000)

Aproriri expectation is meant as the coefficients are positive

The results of the t-statistics indicate that the coefficient is statistically significant (p=0.000 < 0.05). It was shown in table 4.5 that property, plant and equipment ratio (p=0.000, r=0.722) had a positive and statistically significant impact on the financial performance (ROA) of listed banks in Nigeria. Investment property ratio (0.692, p=0.000) also had a positive and statistically significant impact on the financial performance (ROA) of listed banks in Nigeria

Table 4.6: Regression Coefficients-ROE

Model		Unstandardized Coefficients B	Std. Error S.E.	Standardized coefficients Beta	T	Sig.
1	(Constant)	1.801	0.301		9.849	.000
	PPE ratio	0.700	0.332	0.681	13.033	.000
	INV.ratio	0.575	0.383	0.564	15.224	0.000

a. Criterion variable: ROE

$ROE = \beta_0 + \beta_1 PPE_r + \beta_2 INVP_r$
ROE = 1.801+ 0.700 + 0.575
T = (9.849) (13.033) (15.224)
Pv = (0.000) (0.000) (0.000)

4.2 Data Interpretation

The aprori expectation earlier highlighted under methodology was achieved as all coefficients produced positive signs. It could be observed in Table 4 that property, plant and equipment ratio (=0.700, p=0.000) has a positive and statistically significant impact on the return on equity of of banks listed on the National Exchange Group (NGX). It was also shown that investment property ratio (p=0.000, r=0.575) had a positive and statistically significant impact on return on equity banks listed

4.3 Discussion of findings

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Investigating how capital intensity affects the financial performance of listed banks in Nigeria was the primary goal of the research. The dependent variables used in this research only explained 43% of the variance in capital intensity across time, according to the regression analysis findings. This suggests that the model's assumptions about the relationship between capital intensity and the financial performance of Nigeria's listed banks are flawed. Analyses of correlation and regression show that capital intensity positively affects the financial performance of NGX-listed banks in a statistically meaningful way. This was anticipated, as mentioned in the aprori anticipation before. This is because, with wise investment in property, plant, and equipment, as well as other investment properties, banks and other businesses can boost their financial performance, increase their market share, and earn rental income.

One of the most important ways to evaluate a bank's financial health is to look at its income generation capabilities. This is often achieved via the capital intensity of the firm, which includes things like property, plant, and equipment. Return on equity (ROA) increases by 1.801 percentage points and return on assets (ROA) increases by 1.674 percentage points when banks invest more in PPE and other investment properties, indicating a strong and meaningful relationship between capital intensity and financial performance.

Previous research has shown a positive and statistically significant correlation between capital intensity and financial success of enterprises (Oeta, Kiai, and Muchiri, 2019; others have found the same thing). Korir (2021) also discovered that capital intensity significantly affects profitability in a good way, therefore these findings are in line with his findings. This suggests that companies would maximise profits for shareholders and other interested parties by increasing expenditure on the purchase of property, plant, and equipment, as well as other non-current assets. Therefore, capital intensity affects liquidity and profitability, two key metrics for measuring a company's financial health. On the other hand, Lee (2010) looked at the United States restaurant business and discovered that capital intensity negatively affects a corporation's performance; this contradicts the study's conclusions.

5.1 Summary of findings

The aim of the study was to gauge through empirical evaluation the relationship between capital intensity and financial performance of listed banks in Nigeria. Secondary data were gathered over five years period and the study's outcomes were analyzed with the aid of both descriptive and regression analysis method. According to the analyzed descriptive statistics, investment property ratio of listed banks on the Nigeria exchange was the top most factor affecting banks financial performance, followed by property, plant and equipment ratio. Correlation analysis conducted showed that property, plant and equipment have a coefficient of 0.49 and a pv of 0.000; investment property has a coefficient of 0.39 and a pv of 0.000 for return on assets and 49.5 and 40.2 for return on equity and a p-value of 0.000. Thus it could be summarized on the strength of the study's results that:

1. Property, plant and equipment ratio have a significant impact on return on assets of listed banks in Nigeria leading to the rejection of (Ho1).
2. Property, plant and equipment ratio had a significant impact on return on equity of listed banks in Nigeria; leading to the non-acceptance of (Ho2)
3. Investment property ratio had a significant impact on returns on assets of listed banks in Nigeria; leading to the rejection of (Ho3).
4. Investment property ratio had a significant influence on returns on equity of listed banks in Nigeria, which led to the rejection (Ho4).

In overall, outcome of the study indicates that capital intensity represented by property, plant and equipment (PPE) ratio is significantly and positively associated with financial performance. This implies that the more capital intensive the banking institutions are, the more improved financial performance in terms of improved return on assets and return on equity they would become, all things being equal.

5.2 Conclusion and Recommendations

On the bases of the study's outcomes, conclusion is drawn that capital intensity had a positive and statistically significant influence on the financial performance of banks listed on the Nigeria Exchange Group (NGX). This implies that more investment in long term assets such as property, plant and equipment and other investment properties such as land and building held for capital appreciation, etc could have a better, positive and significant impact on the return on assets and return on the equity of such banks especially if such investments in those assets are well managed. On the strength of the study findings, the following recommendations become very necessary:

In order to positively impact her financial performance and other operational efficiencies, finance managers of banks listed on the Nigerian Exchange should seek for good and optimum investment in property, plant and equipment as well as in other investment property. They should also prioritize having a good capital structure so as to improve their return on assets, return on equity and other financial performance indices.

In addition, regulatory agencies and policy-makers should develop a functional and idea regulation code to increase the capital intensity of banks and other companies listed on the Nigerian Exchange. The outcome of the work implies that it is imperative for businesses including bank managers to manage their capital intensity effectively and efficiently as they manage their liquidity.

This is because management efficiency is determined by how efficiently current assets and current liabilities as well as non-current assets are planned and controlled. Therefore, efficient management of non-current, current assets and current liabilities should be articulated and prioritized.

5.4 Limitations of the Study

Many factors limited this study thus restricting it from generalization; among these factors is the restriction of unit of study to only listed banks in the Nigerian Exchange. Related to this is the limitation of the scope of the work to capital intensity and financial performance. Besides capital intensity, liquidity management, capital structure and other variables could affect financial performance of banks. Besides, other measures of banks could include earnings per share, dividend per shares, net profit margin, and so on and not only return on assets and equity as used in the study. The population of the study is a limitation on itself as only six banks out of the twelve banks listed on the Nigerian Exchange were studied. The result may be different if more listed banks are studied. Another limitation was the use of only secondary data that was collected using data collection sheets for just a ten (10) years period – 2011 to 2020. A longer period of 20 to 30 years might produce different findings and conclusion.

The study was further limited to investment in plant, machinery and equipment and investment in property as the predictor variables and return on assets and return on equity as criterion variables. The independent variable could be expanded to include other non-current assets, intangibles assets and so on.

The study assumed that the relationship between the variables is strictly linear which in reality might be false. The outcomes are therefore informed by a supposed linear association between the variables of interest. There are possibilities of cyclic and curvilinear associations. And other proxies such as capital structure, leverage, and firm size and so on could be used as dimensions of the independent variables among others.

Conflict of interest: The authors hereby declare that there is no conflict of interest in this manuscript.

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