

Firm Leverage and Capital Intensity on Sustainability Reporting Of Listed Consumer and Industrial Goods Firms in Nigeria: The Moderating Role of Audit Firm Size

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ABSTRACT:- This study examines the moderating role of audit firm size in the relationship between firm leverage, capital intensity, and sustainability reporting among listed consumer and industrial goods firms in Nigeria. Firm leverage is proxied by the debt-to-equity ratio, capital intensity by the ratio of total assets to total sales, and sustainability reporting by an aggregate ESG disclosure score. Using an ex-post facto, longitudinal panel design, the study draws on a purposively selected sample of twenty-five of thirty-three listed consumer and industrial goods firms with consistent audited annual reports from 2013 to 2025. Panel multiple regression, estimated with E-Views 13, was used to test the hypothesised relationships. The results show that both the debt-to-equity ratio and the capital intensity ratio have a significant effect on ESG disclosure, and that audit firm size significantly moderates these relationships. The findings suggest that capital structure and asset-intensity decisions are important drivers of sustainability disclosure quality, and that the assurance credibility of high-tier (Big 4) audit firms strengthens this effect. The study contributes to the limited empirical evidence on the leverage-capital intensity-ESG nexus in an emerging-market context and extends legitimacy and signalling theory by identifying external assurance quality as a boundary condition. The findings carry implications for market regulators, audit oversight bodies, and corporate boards seeking to strengthen sustainability disclosure practices in Nigeria and comparable emerging economies.

Keywords: Firm Leverage, Capital intensity, Debt ratio, Capital intensity ratio, Sustainability reporting, ESG, Audit firm size, Firm Age.

I. INTRODUCTION

The consumer and industrial goods sector is crucial for global and local economic growth because it creates jobs, increases productivity, and stimulates development through exports, technological innovation, and the creation of wealth (World Bank statistics 2024). In Nigeria, the Consumer and industrial goods sectors have demonstrated exceptional growth and resilience, positioning itself as a vital component of the nation's economic diversification strategy, boosting incomes, and enhancing standards of living. According to the National Bureau of Statistics (2024), both the consumer and industrial goods sectors contributed an estimated 7.62% to 9.62% to the national real GDP across different quarters. The sector's contribution generally saw a slight decline through 2024 compared to the previous year, highlighting persistent challenges such as high energy costs and exchange rate volatility (NBS, 2024). The consumer sector frequently serves as a potent economic indicator, whereas the industrial sector builds basic capacity. However, both sectors are confronted with challenges such as high cost of raw materials, soaring capital costs, exchange rate volatility, high inflation, persistent supply chain disruptions, energy instability, and a critical skills gap in advanced technologies which require strategic management to thrive and changes in government policies. Businesses also face mounting pressure to meet ESG (Environmental, Social, and Governance) compliance. Consumer and industrial goods companies are important to Nigeria's economy because they reflect consumer confidence, purchasing power, and overall economic stability. Both sectors are critical for Nigeria's diversification from oil reliance as demonstrated by previous industrialisation programmes.

The concept of sustainable development globally has become more popular in relation to the global goals. Sustainability reporting is the global practice of transparently disclosing an organisation's performance and impacts across environmental, social, and governance (ESG) areas to a wide range of stakeholders. It has evolved from voluntary, ad-hoc environmental reports into a core component of modern business strategy, driven by increasing investor pressure, regulatory requirements, and growing consumer demand for transparency. Sustainability reporting is crucial as it enhances financial performance, attracts investment, ensures responsible resource use (like tackling pollution), and aligns with global goals, driving long-term, inclusive development beyond mere output. Sustainable practices, including proper waste management and clean production, are key to balancing industrial growth with environmental protection and social welfare in Nigeria.

According to Khan *et al.* (2017), sustainability reporting is a new trend in corporate reporting that combines the company's non-financial (social and environmental) and financial (economic) performance into a single report. In order to support the social and environmental facets of business, it is a corporate self-regulation technique that is integrated into business models (Carp *et al.*, 2019). The main goal of corporate sustainability reporting, according to Batista & Francisco (2018), is to promote and legitimise enterprises' operations. Businesses provide sustainability information to maintain positive connections with important stakeholders and demonstrate their concern for society. In this situation, companies must achieve an economic performance that guarantees a sufficient return on investment while taking into account the social repercussions of their actions. Therefore, it makes sense for firms to incorporate social efforts and the company's vision and aims into their business plan (Lambe *et al.*, 2023).

Sustainability reporting has grown in importance as a component of corporate reporting in recent years due to stakeholder demands for transparency and responsibility from businesses regarding their environmental, social, and governance (ESG) actions. Like their international counterparts, Nigerian listed companies are increasingly being pressured to reveal their sustainability performance and incorporate environmental, social, and governance (ESG) factors into their business planning. The degree of sustainability reporting provided by Nigerian listed firms is still problematic. According to Jasman *et al.* (2023), many listed businesses still trail behind in disclosing their ESG practices, despite the Nigerian Exchange group's attempts to encourage sustainability reporting through its sustainability reporting framework. According to Sobhani *et al.* (2017), who examined the extent of corporate sustainability reporting in emerging economies, found that corporate sustainability reporting lagged in most developing countries. Very little information is revealed in Nigeria, and sustainable reporting criteria are still mostly voluntary. Sustainability reporting draws attention to the impact of data on social, environmental, and economic issues. It is comparable to concepts such as Triple Bottom Line (TBL) reporting and Corporate Social Responsibility (CSR).

Financial leverage is the mix that exists within debt security with equity in its capital structure (Brigham & Houston, 2015). Financial leverage could refer to the quantity of debt to equity in the capital structure of a firm. The leveraging decision of a business influences the risk and returns of the shareholders as well as the market value of the organisation (Banafa, 2016). The financial leverage of a firm is commonly analysed using a leverage ratio. A leverage ratio is a financial indicator which is used to determine the quantity of debt a business or organisation incurs as opposed to numerous other accounts in the statements of financial position, statement of financial performance, or the statement of cash flows. The Leverage ratio displays the amount to which a corporation utilises its loans, as well as evaluating the capital structure and solvency of the company. Succinctly, it displays the extent to which the company's assets and operations is financed with either debt or equity. As such, a firm with increasing leverage is exposed to a bigger financial risk (Adenugba *et al.*, 2016). Firm leverage constitutes one of the core variables in this study and it is proxied using the debt-to-equity ratio.

Capital intensity refers to the extent a firm is willing to invest in fixed assets in financing its operations. It also explains a company's efforts in sacrificing funds allocated for operational activities and funding of assets to achieve and maximise profit. Essentially, it quantifies the proportion of fixed assets (such as machinery, equipment and infrastructure) in proportion to labour and other variable costs in a firm's operations. Oeta *et al.* (2019) stated that the extent to which a firm is capital-intensive is determined by its size, profitability ratios, capital structure and the degree of financial leverage. According to Murwaningsari and Rachmawati (2017), it is measured by the ratio of the total asset turnover of the capital turnover equal to the total assets to total sales, the higher the ratio, the higher the level of capital intensity.

Several studies have linked sustainability reporting to firm leverage and capital intensity, such as (Kajola *et al.*, 2023; Pinheiro *et al.*, 2023). Larger firms tend to engage in more comprehensive sustainability reporting to maintain legitimacy and enhance corporate reputation (Kenny & Luqman 2019). The role of leverage in sustainability disclosures is mixed, with some studies suggesting that highly leveraged firms may prioritize financial performance over sustainability (Osuji & Okwuagwu 2022), while others highlight creditors' growing demand for sustainability reporting. Profitability is also a key determinant, as profitable firms have greater financial capacity to engage in sustainability initiatives (Egbunike & Okerekeoti, 2018).

Stakeholders now demand better knowledge about how businesses must follow daily reporting requirements and take into account the effects on the economy, society, and environment. Businesses usually reveal information about social and environmental issues in their regular annual reports. However, independent sustainability reports have become increasingly important as a way to share information about sustainability

projects and issues. Large, publicly traded companies are increasingly using sustainability reports and other standalone reports. According to Modozie and Amahalu (2022), several stakeholders, including shareholders, consumers, governments, financial regulators, and stock exchanges, are becoming more interested in an organisation's success due to its non-financial effects.

Despite the increased awareness and need for companies in Nigeria to disclose at a sustainable level, few Nigerian business entities can be said to be complying. This does not provide a true and fair view of the company's financial performance since it leaves out the sustainability reporting components of listed consumer and industrial goods firms (Joseph *et al.*, 2021). The majority of listed consumer and industrial goods firms in Nigeria did not incorporate sustainability reporting into their financial statements. According to Modozie and Amahalu (2022), sustainability reporting is a crucial reporting tool for providing listed firms with a competitive advantage. Companies that give ESG reporting a high priority in their financial reports are at a competitive advantage over those that don't. Due to the aforementioned, an empirical study was necessary to examine the nexus between firm leverage and capital intensity on sustainability reporting of listed consumer and industrial goods firms in Nigeria using the moderating role of audit firm size

The motivation for this research is in twofold. The first is the lack of consistency in empirical data about the factors influencing sustainability reporting and the need for research that thoroughly incorporates a range of variables. The second is the lack of usage of the Nigerian exchange group SDG indicators to examine the sustainable reporting practices of Nigerian listed firms. Nigeria offers the appropriate focal point because it is one of Africa's fastest-growing emerging economies. Therefore, this study investigates the nexus between firm leverage and capital intensity on sustainability reporting of listed consumer and industrial goods firms in Nigeria for the period 2013 to 2025, with the moderating effect of audit firm size. The basic hypotheses underlying this study are stated thus.

H₀₁: Debt to equity ratio has no significant effect on ESG of listed consumer and industrial goods firms in Nigeria when moderated by audit firm size.

H₀₂: Capital intensity ratio does not significantly affect the ESG reporting of listed consumer and industrial goods firms in Nigeria when moderated by audit firm size.

II. LITERATURE REVIEW

2.1 Conceptual Framework

2.1.1 Firm Leverage

Financial leverage is the mix that exists within debt security with equity in its capital structure (Aimuyedo *et al.*, 2022). Financial leverage could refer to the quantity of debt to equity in the capital structure of a firm. The leveraging decision of a business influences the risk and returns of the shareholders as well as the market value of the organisation (Banafa, 2016). The financial leverage of a firm is commonly analysed using a leverage ratio. A leverage ratio is a financial indicator which is used to determine the quantity of debt a business or organisation incurs as opposed to numerous other accounts in the statements of financial position, statement of financial performance, or the statement of cash flows. The leverage ratio displays the amount to which a corporation utilises its loans, as well as evaluating the capital structure and solvency of the company. Succinctly, it displays the extent to which the company's assets and operations are financed with either debt or equity. As such, a firm with increasing leverage is exposed to a bigger financial risk (Adenugba *et al.*, 2016).

Financial leverage describes the firm's use of fixed financial costs to amplify the effect of variations on its profitability, or using the term fixed interest-bearing debt and preference share capital, along with share capital. Financial leverage also refers to the amount of debt to equity in the capital structure of a firm; the decision on financial leverage of a firm is also crucial to the management of the firm, as it influences the risk and returns of the shareholders as well as the market value of the firm (Carlson, 2020)

2.1.2 Debt to Equity Ratio

Debt-Equity Ratio (DER) is a ratio that is established by dividing the company's total liabilities by its shareholder equity. According to Carlson (2020), DER is a measure of the degree to which a corporation is financing its activities through debt vs equity. In addition, DER indicates the ability of the shareholder equity to satisfy all outstanding obligations in the event of a business downturn. A good DER is somewhere around 1 to 1.5 (Etim *et al.*, 2025). However, the appropriate debt-to-equity ratio would vary depending on the industry because some companies require more debt financing than others. Capital-intensive industries like the finance and manufacturing industries generally have higher ratios that might be larger than 2.

The debt-to-equity ratio (D/E ratio) is an important financial statistic that represents the amount of a company's debt compared to its assets. In other words, it informs you how much of a company's funding comes from borrowing money (debt) and how much comes from investor funds (equity). Audi & Henryanto (2025)

stated that the debt-to-equity ratio, or D/E ratio, is specifically critical for firms planning when day one to go public. It is a valuable tool for understanding a company's financial health. Lenders apply the D/E ratio when analysing new loans, and investors rely on it to gauge a business's performance. This can be mathematically expressed as follows:

$$\text{DER} = \frac{\text{Total Debt} \times 100}{\text{Total Equity} \times 1}$$

2.1.3 Capital intensity

Capital intensity refers to the extent to which a firm is willing to invest in fixed assets in financing its operations. It also explains a company's efforts in sacrificing funds allocated for operational activities and funding of assets to achieve and maximise profit. Essentially, it quantifies the proportion of fixed assets (such as machinery, equipment and infrastructure) in proportion to labour and other variable costs in a firm's operations. Oeta *et al* (2019) stated that the extent to which a firm is capital-intensive is determined by its size, profitability ratios, capital structure and the degree of financial leverage. According to Murwaningsari and Rachmawati (2017), it is measured by the ratio of the total asset turnover to capital turnover, equal to the total assets to total sales. The higher the ratio, the higher the level of capital intensity. It plays a key role in achieving sustained labour productivity growth, which makes room for enhancing efficiency and competitiveness in the long run as a result of labour substitution, particularly in developed economies (Rathnayake & Middleton, 2023). These investments have positively affected productivity levels, the adaptability and outcomes of such expenditures vary in developing economies where less stability of market regulations tends to be rife. Developed nations, on the other hand, benefit from steady institutional aid for capital investments, thereby fostering productivity. There are ongoing arguments in the literature as to the impact of capital intensity on financial performance.

2.1.4 Capital Intensity Ratio

The term "Capital Intensity" describes the amount of cash or its equivalent invested in property, plant and equipment and other non-current assets of a business entity. The more capital invested, the more the firm is said to be capital-intensive, and this will affect the firm either positively or negatively. Ime *et al* (2023) opined that capital intensity is the value of total investment made by an entity in non-current assets and 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 firm. The concept of capital intensity is very important to a firm, as it shows the ratio between non-current assets and the total assets of the firm. It is of great importance, not only because it impacts the financial situation of the company, but also affects the efficiency of its assets and its performance. Chukwu and Egbuhuzor (2017) posit that given the huge investments mostly made by companies in tangible non-current assets (that is, their capital intensity), it is reasonable and necessary to evaluate the returns from these investments periodically.

$$\text{Capital Intensity Ratio} = \text{Total Assets/Total Sales}$$

2.1.5 Sustainability Reporting

Sustainability is described as providing the requirements of today without compromising the ability of future generations to meet their own needs (Pobbi *et al.*, 2020). The GRI Standards represent global best practice for reporting publicly on a range of economic, environmental and social consequences. Sustainability reporting based on the Standards gives information about an organisation's positive or negative contributions to sustainable development (United Nations Environment Programme, 2020). Sustainability reporting is not merely reporting production from collected data; instead, it is a technique to internalise and strengthen an organisation's commitment to sustainable development in a way that can be proved to both internal and external stakeholders. Sustainability is a holistic approach that aims to meet the needs of the present without compromising the ability of future generations to meet their own needs. It involves the responsible use of resources, environmental conservation, social equity, and economic development. Sustainability addresses the interconnectedness of ecological, social, and economic systems, recognising that they are interdependent (Uwuigbe *et al.* 2018). This concept is grounded in the understanding that human activities have far-reaching consequences on the environment and society, and a sustainable approach seeks to minimise negative impacts while promoting long-term resilience.

Sustainability reporting enables businesses to assess the implications of a wide range of sustainability concerns, enabling them to be more transparent about the risks and opportunities they face (KPMG, 2015). Sustainability disclosure is a tale disseminated by a company about the environmental, economic and societal

impacts of its daily activities (Uwuigbe *et al.* 2018). Sustainability reporting relates to the statements made by businesses in their financial reports describing the policies of the organisation, the commitment and the implementation of sustainability activities. The disclosure of sustainability practices can be seen as a tool for achieving sustainable development, but also as a result of society pressures for greater accountability and corporate transparency (Minguel, 2017).

2.1.6 Environmental, Social and Governance (ESG)

Environmental, social and governance (ESG) is a framework used to assess an organization's business policies and performance on several sustainability and ethical grounds. It also supplies a method to measure business risks and prospects in such domains. In capital markets, some investors utilize ESG criteria to evaluate organizations and formulate their investment strategies, a process known as ESG investing. While sustainability, ethics and corporate governance are generally considered to be non-financial performance indicators, the role of an ESG program is to ensure accountability and the implementation of systems and processes to manage a company's impact, such as its carbon footprint and how it treats employees, suppliers and other stakeholders (Benjamin *et al.*, 2017).

ESG initiatives also contribute to broader business sustainability efforts that try to position firms for long-term success based on ethical corporate management and business strategies. Environmental, Social, and Governance (ESG) is a collection of principles that measure a company's influence on the environment, society, and its transparency and accountability. It's also known as sustainability ESG is a technique to analyze a company's non-financial risks and potential. It's used by investors to analyze a company's sustainability initiatives and decide whether to invest in it. ESG may help firms prosper while simultaneously improving the society and environment (Tarus, 2020). ESG has three primary issue areas, or pillars, that firms report on.

2.1.7 Audit Firm Size

Firm size is considered a set of indicators related to the condition and characteristics of a business. Typically, for ease of management, state agencies classify enterprise size based on industry, capital, revenue, and workforce. Based on this study, Suryani *et al.* (2023) identified audit firm size through total revenue, number of partners, number of professional staff, and number of offices. Firm size can also be measured by the value of assets or total revenue (Ali *et al.*, 2020; Yousaf *et al.*, 2019). In the field of auditing, some authors argue that the size of an audit firm can also be measured by its reputation. Following this perspective, El Guindy and Trabelsi (2020), Ernstberger *et al.* (2020), Salehi *et al.* (2019), and Suryani *et al.* (2023) categorized audit firm size into Big 4/Big 5/Big 6 and Non-Big 4. This research classified audit firm size according to the reputation of the audit firm (Big 4 and Non-Big 4).

Audit firm size is considered the most important determinant of audit choice. The impact is that auditing large clients requires more resources (human and technical), which are usually provided by large audit firms (Virginus, 2020). Audit firm size measures audit quality, and the quality of audit is expected to minimize the extent of a firm's manipulations of reported income, but the majority of the findings appear to suffer from inconsistencies and contradictions (Okolie, 2014). Audit firm size is supposed to be one of the issues that could affect auditor's reputation because it is assumed that the larger audit firms are considered to be more independent (Asma'u, *et al.*, 2023). Audit firm size signifies various types of qualities. It is assumed that size (Big 4 or Big 5, Big 6 Big 8) of audit firms suggest reputation, international affiliation, and integrity, which are reflected in the audit report on the accounts of their clients. It has been argued that the large audit firms significantly determine the disclosure of policies of the companies they audit. For this study, a dummy variable that takes the value of 1 if the company is audited by Big4 and 0 otherwise

2.1.8 Board Composition

According to Ado *et al.* (2024), a company's board composition includes the number of directors, the proportion of independent directors, and the presence or absence of other significant qualities, including gender diversity. The number and structure of board members, the board's demographics, its structure, its education, its frequency of meetings and assessments, and its leadership all make up what is known as the board's composition, which is identical to board qualities or structure (Ongore *et al.*, 2015). According to some authors, a board's composition is defined by the proportion of independent directors to all board members (Falaye, 2017). According to Ramaiah *et al.* (2022), board composition refers to the board's size; that is, the total number of directors on the board in a particular financial year, their ratio and classification into executive, non-executive and independent directors. Similarly, Ongore *et al.* (2015) define board composition as the board's size, the mix between executive, non-executive (independent) directors and other desirable attributes including gender diversity. Alashe and Raheed, (2021) see board composition as the measurement in terms of different

degree of heterogeneity. Common assessments of board composition are usually, inside/outside ratio, executive/non-executive director ratio, age and gender diversity among members and board size.

2.2. Empirical Review

This section examines various articles that are germane to this study in line with the objective of the study

2.2.1 Firm leverage and Sustainability Reporting

Etim *et al.* (2025) examined the influence of financial leverage on sustainability of listed consumer goods entities in Nigeria. The design adopted in this study was an ex-post facto research design. The population of this study consists of twenty-three (23) consumer goods entities listed on the floor of Nigerian Exchange Group (NGX) Plc as at 31st December, 2023, while the sample size of the study was seventeen (17) listed consumer goods entities in Nigeria. Judgmental sampling technique was adopted in the study. Data were collected from the financial statements of the sample entities in Nigeria. The data collected were analysed using descriptive and inferential statistics with the aid of E-View version 10. Findings from the study revealed that Debt-to-Asset Ratio, Cash Coverage Ratio, and Long-Term Debt Ratio had a positive and significant influence on the earnings quality of listed consumer goods entities in Nigeria. It was concluded from the findings of this study that financial leverage is a good source of funding a business investment and the expansion of the business, and that entities should seek loans when they need them. Based on the institutional gap, the findings and recommendations of consumer goods firms might not apply to listed consumer and industrial goods companies in Nigeria.

Lawani, *et al.* (2023) studied the effect of financial leverage on sustainability reporting of listed consumer goods firms in Nigeria. Data were collected from audited annual reports and accounts of 8 listed industrial goods firms in Nigeria from 2013-2022. Ex-post facto research design was adopted. Data were analyzed using Random Effect Regression. Results found that the debt-equity ratio and long-term debt ratio had a significant negative effect on financial performance, while the short-term debt ratio had a negative and insignificant effect on financial performance. The study found that financial leverage hurts the cash value added of listed industrial goods firms in Nigeria. The sample size used in this study is too small; 8 companies cannot be used to generalize to almost 21 listed consumer and 13 industrial goods firms.

Arhinful, and Radmehr (2023) investigated the effect of financial leverage on sustainability reporting in Japan. The study adopts a survey research design. The study selected 257 automotive, construction, electronic, metal, and telecommunications companies between 2000 and 2021. To find the effect of financial leverage on financial performance, the study used the random effect to estimate the effect of the firms' leverage on financial performance. The study found that interest coverage has a positive and statistically significant effect on ROA, ROE, and Tobin's Q. The study recommends that management should ensure debt service obligations as a result of the statistically significant effect on financial performance. This study was carried out in Japan, and based on the geographical gap, the findings and recommendations might not apply to Nigerian listed consumer and industrial goods firms.

Aimuyedo *et al.* (2022) examined the effect of leverage on sustainability reporting, with moderating effect of firm size in the Industrial goods sector in Nigeria. The study period was 11 years (2009 - 2019). The population of the study consisted of the 14 listed industrial firms in Nigeria, of which 2 companies were filtered out due to a lack of comprehensive data for the period of study, resulting in a sample size of 12 listed companies. The study adopted an ex post facto research design and used panel data collected from the annual and sustainability reports of the sampled firms. One hundred and thirty-two (132) sets of reports were analysed using multiple regression analysis and content analysis of the Global Reporting Initiative (GRI G4 index. Results of data analysis revealed a significant positive effect of leverage on sustainability reporting. A further analysis revealed that the direction of the effect of LEV on SR was increased or strengthened with firm size as the moderating variable. This present study combined listed consumer and industrial goods firms with the use of the ESG reporting index so as to make an appropriate generalisation.

Kenneth and Ibobo (2022) examined the determinants of financial leverage in a selected public company in Nigeria for the period of six years from 2015 to 2020. An ex-post facto research design was employed. Secondary data from the annual reports of the sample firm was use and analysed using multiple regression. The result reveals that size and profitability are negatively related to leverage, while age, growth, and assets tangibility are positively related to leverage, which implies they are strong determinants of leverage in the Nigerian public companies. Based on the timing gap, this present study intends to cover the period from 2010-2024 to make the study timely and relevant to today's world.

2.2.2 Capital intensity ratio and Sustainability Reporting

Okeke and Adegbite (2025) examined the nexus existing between capital intensity and the financial performance of the five publicly traded agricultural companies on the Nigerian Exchange Group. The research specifically investigated how the proxies of capital intensity connect and influence the determinant of financial performance (return on assets). The study embraced the ex post facto design, employing a ten year (2014-2024) period of panel data collated from the annual financial reports of the firms. The findings reveal a negative and insignificant relationship between the intangible ratio and return on assets indicating that in investments in intangibles does not translate to higher returns on assets. Conversely, the connection between investment ratio and return on assets was found to be positive and statistically significant suggesting that investments in properties lead to improved financial performance. In the same vein, the property, plant and equipment ratio had a positive and significant relationship confirming that tangible fixed assets enhances return on assets. The findings and recommendations of five publicly traded agricultural companies cannot be apply to listed consumer and industrial goods firms in Nigeria due to different institutional and operating activities.

Abdulazeez *et al.* (2025) investigated the relationship between capital intensity, debt financing, and profitability in non-financial firms in Oman over the period 2012–2022. Using a descriptive research design and a robust panel dataset of 76 firms. The findings reveal that capital intensity significantly enhances profitability, and debt financing further strengthens this effect, with variations observed across firm size and sector. The analysis also identifies a non-linear (concave) relationship between capital intensity and profitability, indicating that while moderate capital investment improves firm performance, excessive capital accumulation may lead to diminishing returns. Larger firms, with better access to financial resources, exhibit a stronger positive relationship between debt financing and profitability, while smaller firms face more challenges due to limited access to capital. Industry-specific results indicate that capital-intensive sectors, such as Energy and Industrials, demonstrate a more pronounced effect of capital intensity on profitability compared to less capital-intensive sectors. This review study was carried out outside of Nigeria, and based on the geographical gap, the findings might not apply to consumer and industrial goods firms in Nigeria.

Wijayanti and Arifin (2025) investigated the effect of capital intensity and environmental costs on firm value, with profitability as a control variable. Panel data of companies from the energy, industry, and transportation sectors listed on the Indonesia Stock Exchange (IDX) for the 2021-2023 period was utilised, 186 observations were obtained from 62 companies that had been determined using the purposive sampling method. The results of the analysis proved that capital intensity does not have a significant effect on firm value. Meanwhile, environmental costs show a significant positive effect, and profitability as a control variable also contributes significantly to strengthening this relationship. Overall, these findings emphasise the importance of the right environmental investment strategy to increase firm value, especially amidst global demands for sustainability. This present study was carried out in Nigeria using sample data from listed consumer and industrial goods firms as against panel data of companies from the energy, industry, and transportation sectors listed on the Indonesia Stock Exchange which might not apply to Nigeria due to geographical gap.

2.3 Theoretical Framework

2.3.1 Agency Theory

Agency theory, credited to Jensen and Meckling (1976), propounded the existence of an employer-employee relationship within every organisation. The shareholders who invest in and own the business are the employer or principal, while the managers employed for the day-to-day oversight of the affairs of the organization are regarded as the employees or agents. The theory submits that managers have tendencies to promote and actuate their self-aggrandizing inclinations by using the organization's resources for activities that are most likely beneficial to them and serve their interests rather than the owners' (Adegboyegun *et al.*, 2020). Additionally, agency theory posits that an organization is faced with the problem of conflict of interests such as increased agency overheads and information disequilibrium etc. between the parties. According to Frias-Aceituno, *et al.* (2014), these conflicts of interest can be reduced when companies are prepared to publish a great deal of information with sustainability reporting. Therefore, agency theory provides explanations as to why sustainability reporting can affect corporate performance either positively or negatively. To adopt sustainability reporting, companies need be concerned and focus on reporting on indicators of short- and long-term performance by providing both quantitative and qualitative information as against only financial information which only relates to short-term performance.

Moreover, sustainability reporting can reduce information asymmetry and conflicts of interest between managers and business owners by reporting on long term corporate performance. Therefore, companies who are able to meet the information needs of both parties stand to gain the benefits of better financial performance. Consequently, it is assumed that the theory buttresses the adoption of sustainability reporting by organizations in their reports. However, there are some flaws against the agency theory. For example, agency theory only

considers the managers' aspect of being opportunistic and overlooks the competence of the managers which could lead to decreasing their commitment to creation of economic value and ignore interest of other stakeholders. More so, the control mechanisms suggested are not only expensive but are also ineffective economically because mechanisms protecting the interest of shareholders may interfere with the strategic decision realization like distorting investment plans.

2.3.2 Stakeholder's theory

Freeman (1998) as cited in (Branco and Rodrigues, 2007) defined stakeholders as groups and individuals who benefit from, or are harmed by, and whose right are violated or respected by corporate actions. Stakeholder theory and legitimacy theory are the two prevailing theories concerning the necessity of sustainability reporting in firm value. Stakeholder hypothesis is the most widely applied theory of sustainability reporting among scholars. Carroll (1999) defines stakeholders as any person or entity who may be influenced or affected by the organization's activities, decisions, strategies, processes, or objectives. The theory emphasizes the involvement of the concern of the relevant stakeholders before deciding, including those related to disclosure, as the case may be (Jensen, 2002). Consequently, there should be harmony between organizations and stakeholders in the activities of those organizations. There is great pressure on the demand for sustainability reporting by many stakeholders as a result of their concern for the responsibilities of companies with respect to environmental issues and problems, along with their associated cost.

According to stakeholder theory, a company can react to the needs and demands of influential stakeholders, with strategic disclosures being a part of the response. According to stakeholder theory, the disclosure of environmental concerns is called a process or mechanism that addresses disputes between the groups concerned, that is, corporations and stakeholders (Gray *et al.*, 1995). Managing the relationship of the key corporate stakeholder is a critical instrument for increasing firm value (Hamman *et al.*, 2010). Tantalo and Priem (2016) argue that several possible sources of value generation exist for each critical stakeholder. Corporate firm attributes and sustainability reporting reflects the concerns of different stakeholder groups about sustainability problems. According to stakeholder theory, corporate sustainability practices may build a positive reputation among workers, customers, and other public groups, which not only increases company value but also improves the business's market share and competitive edge (Dixon-Fowler *et al.*, 2017).

Donaldson and Preston (1995) contribute to the understanding of the stakeholder theory's conceptual foundations, empirical evidence, and practical implications. They argue that stakeholder theory represents a significant shift from traditional shareholder-centric views of the corporation. They emphasize that stakeholders, including employees, customers, suppliers, and the community, have legitimate claims on the organization. The authors discuss the various ways in which stakeholders can influence and are influenced by the corporation, shaping the organization's decisions and actions. Their work provides empirical evidence supporting the importance of considering a broader set of stakeholders in corporate decision-making. Donaldson and Preston underscore the relevance of stakeholder theory in providing a more realistic and ethical framework for understanding corporate behavior.

This study was anchored on stakeholder theory simply because, according to the perspective of stakeholder theory, the company, in carrying out all its business activities, is responsible for meeting and protecting the interests of stakeholders. The availability of non-financial information is one of the things needed by stakeholders. Sustainability reports can increase transparency, accountability, and increase stakeholder confidence, which will have an impact on shareholders wealth and other stakeholders. Moreover, a company can attain long-term support from its stakeholders when it adopts firm specific attributes variables coupled with a firm's long-term value. Based on stakeholder and legitimacy theory, corporate sustainability reporting is a means of gaining firm legitimacy and stakeholders' support.

III. METHODOLOGY

This study adopts the ex-post facto research design with longitudinal panel regression analysis. The population of this study consist of all thirty-three (33) listed consumer and industrial goods firms as compiled from the official list of the Nigerian Exchange group as at December 31, 2025. A sample size of twenty-five (25) listed consumer and industrial goods firms was selected for this study using a purposive sampling technique. The study period covered 2013-2025 years and this period was selected for the study to present a clear picture of the problem in a determinable period. The choice of 2013 was based on the post-IFRS adoptions in Nigeria, the availability of data, and the relevance of the study to today's economic reality.

The selection will be based on the following criteria:

Availability of data

Any consumer and industrial goods firms that do not publish their financial statement online are excluded.

The firms were not delisted throughout the study period

The firms must be active participants in the Nigerian exchange group over the term of the study. Panel regression technique was used to analyse the data collected with the aid of E-View 13 statistical package. This study adapts the model of Okoba and Chukwu (2025) with a few modifications

$$ROAi\ t = \psi_0 + \psi_1 FMZi\ t + \psi_2 FAGEi\ t + \psi_3 FLEVit + \mu i\ t \text{-----(1)}$$

Where:

ROA= return on assets

FMSZ : Firm Size

FAGE : Firm Age

FLEV : Financial Leverage

ψ_0 = value of the intercept

Direct Effect (model).....3.1

$$ESG = \alpha_0 + \beta_1 LEV_{it} + \beta_2 CIR_{it} + \beta_3 BC_{it} + \varepsilon_{it} \text{.....(ii)}$$

Where:

ESG = Environmental expenditure Social and community expenses And Governance expenditure

LEV = Leverage

CIR = Capital Intensity Ratio

BC= Board Composition

β_0 = Intercept

β_1 to β_3 = coefficient of slope or regression coefficient

ε = error term

i = cross-sectional

t = time

Moderating Effect (model)(3.2)

$$ESG = \alpha_0 + \beta_1 LEV * AFS_{it} + \beta_2 CIR * AFS_{it} + \beta_3 BC * AFS_{it} + \varepsilon_{it} \text{.....(ii)}$$

Where:

ESG = Environmental expenditure Social and community expenses And Governance expenditure

β_1 to β_3 = coefficient of slope or regression coefficient

LEV*AFS = Leverage interacting with audit firm size

CIR*AFS =Capital Intensity Ratio interacting with audit firm size

BC*AFS =Board composition interacting with audit firm size

ε = error term

it = i cross-sectional, t time

Table 3.1: Measurements of Variables

S/N	Variables	Measurement	Source
	Dependent Variable		
1	ESG	Aggregate ESG Disclosure (Expenditure)	Igbinovia & Agbadua (2023)
	Independent Variable		
3	LEV =	Debt-to-Equity Ratio	Aimuyedo et al (2022)
4.	CIR =	Total Assets/Total Sales	Wijayanti and Arifin (2025)
	(Moderating Variable)		
7.	AFS:	A dummy variable that takes the value of 1 if the company is audited by Big4 and 0 otherwise	Baba <i>et al.</i> (2025)
8.	BC (control) =	<u>Number of Non-Independent Directors</u> Total Number of Directors	Oyewobi & Balarabe

Source: Researcher Compilation (2026)

A Priori expectation

A priori expectation: The moderating effect of board size on financial management decisions is expected to have a positive and significant effect on the market value of listed manufacturing firms in Nigeria. i.e. $\beta_1, \beta_2, \beta_3$, is greater or less than 0. $B_1 - \beta_3 > 0$

IV. RESULT AND DISCUSSION

4.1 Descriptive Statistics

To gain a glimpse of the data used in the study, a first pass at the data, in the form of descriptive statistics, was conducted. This gives us a good idea of the patterns in the data used for the analysis. The summary statistics are presented in Table 4.1 below.

Table 4.1: Descriptive Analysis Result

	ESG	LEV	CIR	BC
Mean	2.294051	0.000405	0.196744	1.501456
Median	2.433333	8.033205	0.081652	1.115682
Maximum	3.000000	0.004179	7.927615	58.36539
Minimum	0.966667	0.000007	0.000425	0.446238
Std. Dev.	0.609081	0.000616	0.734927	3.257556
Skewness	-0.334710	2.060690	8.426809	16.46386
Kurtosis	1.648973	8.180691	78.30982	287.4893
Jarque-Bera	30.78557	593.4681	80648.92	1110666.
Probability	0.000000	0.000000	0.000000	0.000000
Sum	745.5667	0.131556	63.94178	487.9732
Sum Sq. Dev.	120.1974	0.000123	174.9981	3438.182
Observations	325	325	325	325

Source: E-View 13 Output (2026)

After moderation

	ESG	LEV	CIR	BC
Mean	2.294051	0.000151	0.312245	1.182718
Median	2.433333	1.49E-05	0.106013	1.000000
Maximum	3.000000	0.001778	1.000000	3.769463
Minimum	0.966667	0.000000	0.471210	0.446238
Std. Dev.	0.609081	0.000318	0.419182	0.526627
Skewness	-0.334710	2.828632	0.901556	1.739085
Kurtosis	1.648973	11.01588	2.127241	6.318930
Jarque-Bera	30.78557	1303.508	54.34166	312.9880
Probability	0.000000	0.000000	0.000000	0.000000
Sum	745.5667	0.049153	101.4795	384.3833
Sum Sq. Dev.	120.1974	3.27E-05	56.93121	89.85685
Observations	325	325	325	325

Table 4.1 presents a summary of descriptive statistics for the variables included in the model. It shows the mean values of 2.294051, 0.000405, 0.196744, and 1.501456 for ESG, LEV, CIR, and BC, respectively. The standard deviation from the mean is 0.609081, 0.000616, 0.734927 and 3.257556 for ESG, LEV, CIR, and BC respectively, during the 2013 to 2025 study period. Further analysis shows the minimum values of 0.966667, 0.000007, 0.000425, 0.446238 and maximum values of 3.000000, 0.004179, 7.927615 and 58.36539, respectively. This implies that the debt-to-equity ratio and capital intensity ratios do not witness a substantial increase during the study period, as the standard deviation is moderately low compared to the mean. Kurtosis value measures the peakness and flatness of the distribution of the series. If the Kurtosis value is less than 3, it means the distribution of the variable is normal, but when it is more than 3, the distribution of the variable is said to be abnormal. The above table also shows the descriptive statistics after moderating with audit firm size.

4.2 Correlation Analysis

Table 4.2 presents correlation values between dependent and independent variables and the correlation among the independent variables themselves. These values are generated from the Pearson Correlation output. The Table contains a correlation matrix showing the Pearson correlation coefficients between the dependent and independent variables and among the independent variables of the study. Generally, a high correlation is expected between dependent and independent variables, while a low correlation is expected among independent variables.

Decision Rule: The correlation between two variables must be between -1 and 1.

Table 4.2: Correlation Analysis Result

Covariance Analysis: Ordinary

Date: 05/16/26 Time: 22:12

Sample: 2013 2025

Included observations: 325

Balanced sample (listwise missing value deletion)

Correlation

Probability	ESGR	DER	CAPR	BOCD
ESG	1.000000 -----			
LEV	-0.424977 0.0000	1.000000 -----		
CIR	0.139070 0.0121	-0.094398 0.0893	1.000000 -----	
BC	0.115364 0.0376	0.227654 0.0000	0.014754 0.7910	1.000000 -----

Source: E-View 13 Output (2026)

After moderation

Covariance Analysis: Ordinary
Date: 05/16/26 Time: 22:25
Sample: 2013 2025
Included observations: 325
Balanced sample (listwise missing value deletion)

Correlation Probability	ESG	LEV	CIR	BC
ESG	1.000000 -----			
LEV	-0.267111 0.0000	1.000000 -----		
CIR	0.333673 0.0000	-0.221092 0.0001	1.000000 -----	
BC	0.123944 0.0255	-0.023675 0.6707	-0.224447 0.0000	1.000000 -----

Table 2 shows the correlation between the dependent variable, ESG and the independent variables of LEV and CIR and also among the independent variables themselves on the other hand. According to Gujarati (2004), a correlation coefficient between two independent variables of 0.80 is considered excessive, and thus, certain measures are required to correct that anomaly in the data. From the table, it can be seen that all the correlation coefficients among the independent variables are below 0.80. This points to the absence of possible multicollinearity among the independent variables, and the correlation between the variables shows that there is a mix of both positive and negative correlation among the dependent and independent variables. There exists a positive and significant 13.9% correlation between ESG and CIR, respectively, indicating that the higher the ESG, the higher the CIR. Furthermore, it is notable from the analysis that all the associations between and within the variables of studies are weak, thus signifying the absence of possible multicollinearity before and after moderation.

4.3 Diagnostic Test (Multicollinearity Test (VIF))

To ensure the rigidity of the measurements, multicollinearity tests were performed, using the Variance Inflation Factor (VIF) as the rigidity test. Multicollinearity occurs when one or more independent variables have a stronger influence on others, and this condition is a violation of the linear regression model, which may affect the validity of the outcome in any analysis. Multicollinearity tests are performed to test whether there is a strong correlation between independent variables that may result in misleading results. However, collinearity diagnostics tests were performed using the variance inflation factor (VIF) to further confirm the absence of a multicollinearity problem between independent mutations. The results of the collinearity diagnostic test are presented in Table 4.3 below:

***Decision rule:** Medium VIF less than 10 indicates the absence of multi-collinearity, while VIF intermediate over 10 is a sign of multi-collinearity.

Table 4.3: Multicollinearity Test (VIF) Table

Variance Inflation Factors

Date: 05/16/26 Time: 22:13

Sample: 2013 2025

Included observations: 325

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.001431	1.535215	NA
DER	2621.493	1.526244	1.065399
CAPR	9.624305	1.013787	1.010403
BOCD	9.315305	1.281196	1.056135

Source: E-View 13 Output (2026)

After moderation

Variance Inflation Factors

Date: 05/16/26 Time: 22:26

Sample: 2013 2025

Included observations: 325

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.007441	8.432340	NA
LEV	9268.684	1.297929	1.057685
CIR	0.005608	1.732732	1.113170
BC	0.003381	6.418972	1.059350

As noted above, the law of multicollinearity test rule uses a variance inflation factor that a VIF below 10 indicates a lack of multicollinearity, while a VIF over 10 indicates the presence of multicollinearity. Table 4.3 above shows the absence of multicollinearity between independent variables, as all independent variables (LEV, CIR, and BC) have VIF centres less than 10. Table 4.3 above also shows the absence of multicollinearity after moderation.

4.4 Heteroskedasticity Test

A heteroskedasticity test was performed as a diagnostic check to verify the robustness of the estimates. Heterogeneous variance occurs when the standard error of the variable being monitored is not constant over time. Heteroscedasticity violates linear regression modelling assumptions and can affect the validity of analytical results. On the other hand, heteroscedasticity does not cause any bias in the coefficient estimates, but it reduces the precision, and less precise coefficients are more likely to be estimated. The estimates are far from the correct population values that have been removed.

***Decision Rule: Accept the null hypothesis if the P-value is greater than 5% level of Significance, otherwise do not reject H_0**

Hypothesis

H_0 : The Error Variances are all Equal (Homoskedastic)

H_1 : The Error Variances are not Equal (Heteroskedasticity)

Table 4.4 Heteroskedasticity Test

Panel Cross-section Heteroskedasticity LR Test

Equation: UNTITLED

Specification: ESG C LEV CIR BC

Null hypothesis: Residuals are homoscedastic

	Value	df	Probability
Likelihood ratio	40.27477	25	0.0273
LR test summary:			
	Value	Df	
Restricted LogL	-265.0736	321	
Unrestricted LogL	-244.9362	321	

Source: E-View 13 Output (2026)

After moderation

Panel Cross-section Heteroskedasticity LR Test

Equation: UNTITLED

Specification: ESG C LEV_AUFS CIR_AUFS BC_AUFS

Null hypothesis: Residuals are homoscedastic

	Value	df	Probability
Likelihood ratio	24.38976	25	0.4970
LR test summary:			
	Value	df	
Restricted LogL	-256.1867	321	
Unrestricted LogL	-243.9919	321	

The table above presents the results of the heteroskedasticity test conducted using the likelihood ratio (LR) method. The LR value of 40.27477 with 25 degrees of freedom was associated with a probability value of 0.0273, which is less than 5% significance level. These results indicate that the null hypothesis of homoskedasticity was rejected, suggesting the presence of heteroskedasticity in the regression model. The LR summary further shows that the restricted log-likelihood was -265.0736 while the unrestricted log-likelihood was -244.9362, confirming that the variance of the residuals was not constant across observations. To address these issues and ensure the reliability of the regression results, the heteroskedasticity problem was corrected by employing the fixed-effects robust standard error estimator, as presented in Table 4.7. This method adjusts the standard errors to account for heteroskedasticity, thereby producing consistent and efficient coefficient estimates and ensuring that the statistical inferences drawn from the model remain valid and robust. However, when the audit firm size was moderated with LEV and CIR, there was no presence of heteroskedasticity in the regression model as indicated by the p-value above.

Model selection

4.5 Hausman Test

The Hausmann specification test is a model specification test used in panel data analysis to select between fixed and random effects models. Fixed and random effects regressions were performed because the datasets utilised in this investigation were panel. A Hausmann specification test was then used to choose between the fixed-effects and random-effects regression models. This test determined if the error term was connected to the regressor. As a result, the decision rule for the Hausmann specification test is presented at a 5% level of significance:

H_0 : Random effect is more appropriate for the Panel Regression analysis

H_1 : Fixed effect is more appropriate for the Panel Regression analysis

***Decision Rule:** Reject H_0 if the cross-section random probability value is less than 5% level of Significance. Otherwise, do not reject H_0 .

Table 4.5: Hausman Specification Test

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	25.583462	3	0.0000

Source: E-View 13 Output (2026)

After moderation

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	20.545629	3	0.0001

The Result of the above Hausman test shows that the cross-section chi-square statistics value is 25.583462, while the probability value is 0.0000. This implies that there is enough evidence to reject the null hypothesis, which states that the random effect is more appropriate for the Panel Regression analysis. The study therefore upholds that the Fixed Effect Model (Estimate) is the more appropriate model before and after moderation.

4.6 Fixed Effect Likelihood Ratio Test

The Fixed Effect Likelihood Ratio test is a test for model specification in panel data analysis, and this test is employed to choose between the pooled effect model and the fixed effects model. Due to the panel nature of the data set, both pooled effect and fixed effect regressions were run. A fixed effect likelihood ratio specification test was then conducted to choose the preferred model between the pooled effect and the fixed effect regression models. The test basically checked if the error terms were correlated with the regressors. Thus, the decision rule for the fixed effect likelihood ratio specification is stated; thus, at 5% Level of significance:

Hypothesis

H₀: Pooled effect is most appropriate for the Panel Regression analysis

H₁: Fixed effect is more appropriate for the Panel Regression analysis

***Decision Rule:**

H₀: Reject the null if the p-value is less than 5% if otherwise, do not reject

H₁: Do not reject the null if the p-value is greater than 5%; otherwise, do not accept

Table 4.6: Fixed Effect Likelihood Ratio Table

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	2.626163	(24,297)	0.0001
Cross-section Chi-square	62.546056	24	0.0000

Source: E-View 13 Output (2026)

After moderation

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	3.849852	(24,297)	0.0000
Cross-section Chi-square	88.031397	24	0.0000

The Result of the fixed effect likelihood ratio test shows that the chi-square statistic value is 62.546056 with a probability value of 0.0000. This implies that there is enough evidence to reject the null hypothesis, which states that the pooled effect is most appropriate for the Panel Regression analysis. It thus stands that the error component model (pooled effect) estimator is not appropriate because the pooled effects are probably correlated with one or more regressors. Thus, the most consistent and efficient estimation for the study, given the options of a pooled effect analysis and a fixed effect analysis, is the fixed effect model of regression analysis before and after moderation.

Test of Research Hypotheses

In panel regression analysis, the ultimate goal is the estimation of the relationship between dependent and independent variables. The sign of the coefficients of independent variables indicates their relationship with the dependent variable, while the magnitude of the coefficients implies the responses of the dependent variables to the independent variables.

Decision Rule: If the PV is less than 5% or 0.05 (that is, if $PV < 0.05$), it implies that the regressor in question is statistically significant at 5% level; and if the PV is more than 5% or 0.05 (that is, if $PV > 0.05$), it is categorised as not significant at that level.

Table 4.7 Fixed Effect Robust Standard Error

Dependent Variable: ESGR
 Method: Panel EGLS (Cross-section weights)
 Date: 05/16/26 Time: 22:16
 Sample: 2013 2025
 Periods included: 13
 Cross-sections included: 25
 Total panel (balanced) observations: 325
 Linear estimation after one-step weighting matrix
 White diagonal standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.599659	0.049059	52.99007	0.0000
DER	813.2726	93.34257	8.712772	0.0000
CAPR	0.006698	0.002126	3.150251	0.0018
BOCD	0.016523	0.001535	10.76676	0.0000
Effects Specification				
Cross-section fixed (dummy variables)				
Weighted Statistics				
R-squared	0.708926	Mean dependent var	2.744667	
Adjusted R-squared	0.682464	S.D. dependent var	1.183412	
S.E. of regression	0.515438	Sum squared resid	78.90594	
F-statistic	26.79104	Durbin-Watson stat	1.824472	
Prob(F-statistic)	0.000000			

Source: E-View 13 Output (2026)

After moderation

Dependent Variable: ESGR
 Method: Panel EGLS (Cross-section weights)
 Date: 06/03/26 Time: 07:16
 Sample: 2013 2025
 Periods included: 13
 Cross-sections included: 25
 Total panel (balanced) observations: 325
 Linear estimation after one-step weighting matrix
 White diagonal standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.630016	0.153569	17.12594	0.0000
LEV_AUFS	1324.708	134.6323	9.839447	0.0000
CIR_AUFS	0.768750	0.156233	4.920523	0.0000
BC_AUFS	0.088290	0.085692	1.030317	0.3037
Effects Specification				
Cross-section fixed (dummy variables)				
Weighted Statistics				
R-squared	0.789044	Mean dependent var	2.477005	
Adjusted R-squared	0.751684	S.D. dependent var	0.881812	
S.E. of regression	0.486108	Sum squared resid	70.18139	
F-statistic	15.76685	Durbin-Watson stat	1.749940	
Prob(F-statistic)	0.000000			

Research Hypotheses

H₀₁ Debt-to-equity ratio has no significant effect on the ESG value of listed consumer and industrial goods firms in Nigeria when moderated by audit firm size.

The result, as shown in Table 4.7 above, shows that the debt-to-equity ratio has a coefficient value of 813.2726 and a probability value of 0.000 ($p < 0.05$). This finding shows that debt to equity ratio, as a measurement of firm leverage, has a positive and significant effect on ESG of listed consumer and industrial goods firms in Nigeria. This shows that the null hypothesis stated above should be rejected. Thus, based on this study period, the debt-to-equity ratio has a significant effect on the ESG value of consumer and industrial goods firms in Nigeria. Likewise, when moderated by audit firm size, it has a positive and significant effect on ESG value.

H₀₂: Capital intensity ratio has no significant effect on ESG value of listed consumer and industrial goods firms in Nigeria when moderated by audit firm size.

The second hypothesis shows that the capital intensity ratio, as a measurement of capital intensity, has a coefficient value of 0.006698 and a probability value of 0.018 ($p < 0.05$), which reveals a positive and significant relationship with ESG value. This evidence, therefore, leads to the acceptance of the alternative hypothesis and rejection of the null. The finding, therefore, means that capital intensity ratio has a significant effect on ESG value of listed consumer and industrial goods firms in Nigeria. Likewise, when moderated by audit firm size, it has a positive and significant effect on ESG value.

Discussion of Findings

This study examined firm leverage and capital intensity on the sustainability reporting of listed consumer and industrial goods firms in Nigeria. The study revealed that the debt-to-equity ratio, as a measurement of firm leverage, has a significant relationship with sustainability reporting, indicating that firm leverage contributes significantly to sustainability reporting measured by ESG during the reporting period. Likewise, when moderated by audit firm size it has a significant effect on sustainability reporting. This finding aligns with the position of Etim *et al.* (2025) and Effiong and Eno (2024), while negating the finding of Lawani, *et al.* (2023). The study therefore agreed with the *a priori* expectation.

The second hypothesis also revealed that capital intensity ratio has a positive and significant relationship effect on ESG, indicating that capital intensity ratio has a positive effect on ESG reporting within the study period. It also has a significant effect on ESG when moderated by audit firm size. This position is consistent with the findings of Okeke and Adegbite (2025) and Nangih and Onuora (2020), while disagreeing with the findings of Essien *et al.*, 2025.

V. CONCLUSION AND RECOMMENDATIONS

This study investigates relationship between firm leverage and capital intensity on sustainability reporting of listed consumer and industrial goods firms in Nigeria. Based on the study findings reached through the study objectives guided by the study hypotheses, the following conclusions were made: the study affirmed that before the introduction of audit firm size as moderating variable, firm leverage and capital intensity have a significant effect on sustainability reporting of listed consumer and industrial goods firms. Likewise, when moderated by audit firm size, firm leverage and capital intensity also have a significant effect on sustainability reporting of listed consumer and industrial goods firms in Nigeria. Based on the findings of this study, the following recommendations are made for effective management of listed consumer and industrial goods firms on the Nigerian Exchange Group;

Based on the findings of this study, here are two actionable recommendations:

- i. Management of consumer and industrial goods firms should continue to balance the debt-to-equity mix to ensure that high leverage does not crowd out ESG, and use robust sustainability reporting as a strategic signalling tool and retain Big 4 or top-tier high-capacity audit firms to provide external assurance on sustainability reports
- ii. Since Capital Intensity significantly impacts sustainability reporting, management of listed consumer and industrial goods firms should continue to leverage their capital intensity ratio by reporting on new capital acquisitions, adopting cleaner technologies, optimising energy consumption, or reducing emissions, and retain Big 4 or top-tier high-capacity audit firms to provide external assurance on sustainability reports.

Policy Recommendations

Beyond the general recommendations to firm management above, the following findings-based recommendations are directed at specific regulatory and market entities responsible for sustainability disclosure and audit oversight in Nigeria:

NGX Regulation Limited: Elevate the Nigerian Exchange Group's existing voluntary Sustainability Reporting Guidelines to a mandatory listing requirement for consumer and industrial goods firms, with minimum ESG disclosure and external-assurance thresholds tied to firm leverage and capital intensity, given their demonstrated significant effect on ESG reporting.

Financial Reporting Council of Nigeria (FRCN): Issue a dedicated sustainability assurance standard specifying minimum audit-firm competence and tier requirements for ESG assurance engagements of listed companies, in view of the significant moderating effect of audit firm size established in this study.

Securities and Exchange Commission (SEC) Nigeria: Amend the Corporate Governance Code to require listed firms to disclose the identity and tier of their external sustainability assurance provider alongside ESG reports, improving comparability for investors assessing disclosure credibility.

Boards and management of listed consumer and industrial goods firms: Maintain a prudent debt-to-equity mix that does not crowd out ESG financing, direct capital expenditure toward higher-capacity and cleaner assets, and engage Big 4 or other top-tier audit firms to assure sustainability reports.

Institute of Chartered Accountants of Nigeria (ICAN) and mid-tier audit firms: Invest in sustainability assurance training and certification to broaden the pool of credible ESG assurance providers beyond the Big 4, reducing assurance-market concentration risk while preserving assurance quality.

Institutional investors and fund managers operating in the Nigerian market: Incorporate firm leverage, capital intensity, and external auditor tier as screening signals when evaluating the credibility of ESG disclosures made by Nigerian consumer and industrial goods equities.

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