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### IMPACT EVALUATION OF CARBON AND ENERGY MANAGEMENT PRACTICES ON SUSTAINABLE INNOVATION OF MANUFACTURING FIRMS IN NIGERIA

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### ABSTRACT

The study ascertained the effect of Eco-Cost management on financial performance of Consumer Goods Firms listed on the Nigerian Exchange Group from 2012 to 2023. The Specific objective was to ascertain the effect of community development disclosure (CDD), waste management disclosure (WMD), on return on capital employed (ROCE) of Listed consumer goods firms. Ex-post facto research design was adopted in the study. Out of the population of 21 listed consumer goods firms in Nigerian as at 31st December 2023, a sample size of 16 was purposively selected. Secondary data were sourced. Descriptive analysis was used to summarise the data. Estimates from Robust Least Square regressions were used to test the hypotheses, which found that: Community Development Disclosure (CDD) has a significant and positive effect on return on capital employed of listed consumer goods firms in Nigeria ( $\beta = 0.032$ , p = 0.0000); Waste Management Disclosure (WMD) significantly and positively affects return on capital employed of listed consumer goods firms in Nigeria ( $\beta = 0.559$ , p = 0.0000. In conclusion, as the marketplace becomes more competitive, companies may benefit from adopting a more strategic approach to their environmental communication, emphasizing disclosures that yield positive financial outcomes while efficiently managing the costs associated with those that have adverse effects. The study recommends among others that Corporate Social Responsibility (CSR) teams within listed consumer goods firms should enhance their community development initiatives and disclosures by actively engaging in local projects that address community needs and transparently reporting on the outcomes and benefits of these initiatives to stakeholders.

*Key words:* Community development, Eco-cost Management, Environmental Cost, Financial PerformanceReturn on Capital Employed, Waste Management.

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### **1. INTRODUCTION**

Companies, whether in the developed or developing economy and whether in capitalist or socialist economy, play crucial roles in the economic prosperities of that nation (Lawrence & Bernard, 2023). Corporate organizations in the past thought that shareholders profitability and prosperity were its only concern without any regard to the people and the environment

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wherein it operate. However, centuries of business prosperities have been achieved at huge costs to the environment and to humanity alike. Just as knowledge has increased through scientific and technological advancement, so the world's population has also increased. The resultant effects of these are the various forms of environmental degradations witnessed today such as: land or soil, air, water, deforestation, overpopulation, noise pollution, ecosystem destruction, natural habitat destruction, wildlife extinction, loss of biodiversity, climate change, depletion of the ozone, et cetera (Oraka, 2021; Nwaimo, 2020; Oshiole, Elamah & Amahalu., 2020). Corporate organisations are tactically distorting the environments as a result of its economic activities which threaten the stability of the planet and of the economic system arising from air, water and land pollutions, dangerous wastes disposal, natural resources overexploitation, ozone depletion and climate change (Ofurum & Iwunna, 2022). The uncontrolled scientific, technological, economic and socio-cultural activities coupled with unsustainable exploitation of the natural resources pose great threats to human and natural habitats (Yahaya, Tukura, Madu, Saleh, Borori & Gav, 2021). The above situation, according to these scholars, called for urgent intervention from individuals, organizations and countries to look for prompt and appropriate solutions to protect and preserve the environment.

Environmental reporting issues have attracted the attention of companies and the public that are concerned about raising environmental standards, companies are forced to disclose environmental information in its annual reports (Ibrahim, Ibrahim & Hussain 2023). Understanding environmental management means that actions taken now affect the opportunities it may have in the future. Consequently, if resources are used today, it will not be available in the future, especially if the sources are limited (Ibrahim et al., 2023). Nigeria faces significant obstacles in containing environmental deterioration because it is a developing country with an abundance of natural resources (Korolo & Korolo, 2024). Despite the growing awareness and emphasis on environmental sustainability and cost management practices, many firms are facing challenges in effectively integrating eco cost management into its operations, which is negatively impacting on its financial performance (Ibrahim et al., 2023). This lack of integration readily leads to increased operating costs, lower profitability, and limited access to capital, ultimately hindering the ability of these firms to achieve sustainable growth in the long term. Hence, a pressing need to investigate and understand the factors hindering the effective integration of eco cost management practices in these firms and to develop strategies to improve its financial performance through better environmental management practices cannot be overemphasized. Furthermore, the prevalence of limited empirical research on how eco-cost management practices specifically impact the financial IROFS
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performance of companies in the consumer goods sector in Nigeria, lends credence to the emergence of this study.

### 1.1 Objectives

The main objective of the study is to ascertain the effect of Eco-Cost management on financial performance of Consumer Goods Firms listed on the Nigerian Exchange Group. The specific objectives were to:

- ascertain the effect of Community Development Disclosure (CDD) on Return on Capital Employed (ROCE) of consumer goods firms listed in Nigeria Exchange Group.
- 2. determine the extent of relationship between Waste Management Disclosure (WMD) and Return on Capital Employed (ROCE) of listed consumer goods firms in Nigeria.

### **1.2 Hypotheses**

To achieve the objectives of the study, the researchers formulated and tested the following research hypotheses.

- H<sub>o1</sub>: Community development disclosure has no significant effect on return on capital employed of consumer goods firms in Nigeria.
- H<sub>o2</sub> Waste management disclosure has no significant effect on return on capital employed
   (ROCE) of consumer goods firm in Nigeria.

### 2. LITERATURE REVIEW

### 2.1 Conceptual Review

### 2.1.1 Eco Cost Management

From the field of environmental economics and sustainability; Eco-cost, also known as ecological cost or environmental cost refers to the impact that human activities have on the environment and the associated economic consequences. It is a concept that attempts to account for the full environmental cost of a product or activity, including the depletion of natural resources, pollution, ecosystem degradation, and other negative impacts. Eco costs are the costs which should be made to reduce the environmental pollution and materials depletion in our economy to a level which is in line with the carrying capacity of our earth (Vogtländer & Mestre 2017). As such, the eco-costs are virtual costs, since they are not yet integrated in the real life costs of current production chains (Life Cycle Costs).The eco-costs have been defined in terms of marginal prevention costs (´end of pipe´ as well as ´system integrated´) for pollution and materials depletion. The eco-costs are 'virtual' costs: these costs are related

to measures which have to be taken to reduce pollution to the 'No Effect Level' (Vogtländer & Mestre 2017) The idea behind eco-cost is to move beyond traditional economic measures, such as market prices, and incorporate the broader environmental costs into decision-making processes. By quantifying and incorporating these costs, policymakers, businesses, and consumers can make more informed choices that account for the true long-term sustainability of its actions.

#### 2.1.1.2 Environmental cost

According to an environmental protection agency (EPA) based in USA, environmental costs include costs of complying with environmental laws. EPA specifically stated that it includes environmental remediation costs, pollution control equipment costs and non-compliance penalty. Based on the meaning of environmental degradation, environmental cost could also cover the cost incurred to prevent degradation, cost of re-stating the environment to its original state, cost of restoring depleted environment to its normal position (EPA). Profit ascertainment requires the subtraction of recurrent costs from revenues. Most often, the costs that leads to changes in the environment, which affect people adversely and cause damages to the environment are not taken into consideration before profits are determined. In other words, the profits are wrongly determined. The result of this, in most cases, is reporting of wrong and excessive profits which will also mislead the decision makers (Okafor,2018).

#### 2.1.1.2 Community development costs

Community development, an aspect of organizations social responsiveness holds that companies have a duty towards the society and business decisions should be linked to ethical values and respect for individuals, society and environment (Akinleye & Olaoye 2021). Thus, organizations as corporate citizens are expected to give back to the society especially communities where they operate (ICAN, 2014). Community development is linked to the philanthropic expectation placed on organisations at any given time (Carroll, 1991). Also, Oti, Effiong & Tiesieh (2017) emphasized that the aim of community development placed on firms are mainly to cushion them on the effects of their externalities on the host communities resulting from the operating activities. Disclosing community developments costs of a business shows that the business entity is on the right path and assures stakeholders of the firm's ability ethical in its operations.

Dessy and Rosita, (2015) posited that utilizing local labour in a community as a form of job expansion strategy is very important as it reduces labour cost incurred by the company and impacts positively on the community. Firm's disclosure of its environmental and social effort

can be used as a tool to manage a firm's relationship with its host community leading to a stable business environment devoid of protest or conflicts influenced by major stakeholders (Banwarie, 2011).

### 2.1.1.3 Waste Management Cost

According to Nwanwu (2022), Waste Management Cost is the cost associated with disposal of waste generated by the companies via their activities (both liquid and gaseous waste).

Waste management cost encompasses expenses associated with recycling, waste collection, transportation, processing, and disposal, including labor, equipment, facilities, and regulatory compliance (Ubokudom, Akpan & Akinninyi 2024). According to EPA (2021), waste management cost encompasses expenses associated with waste collection, transportation, processing, and disposal, including labor, equipment, facilities, and regulatory compliance (EPA, 2022). In Nigeria, proper waste management is vital to mitigate health and environmental risks associated with improper practices (Federal Ministry of Environment, 2016). However, challenges such as inadequate funding, infrastructure, and public awareness contribute to the high cost of waste management in the country (Alao, Oloke, Ayeni & Aworinde 2021). To address these challenges, the Nigerian government has introduced initiatives like the Extended Producer Responsibility (EPR) program and the National Policy on Solid Waste Management (Federal Ministry of Environment, 2016). According to Amahalu, Okoye & Obi (2018) waste management costs has significant effect on the performance of companies in Nigeria while Majekobaje (2024) observed negative effect of waste management cost.

According to the UNSD Glossary of Environment Statistics (2013), wastes are substances or things that must be disposed of either because they are intended to be disposed of or because they are mandated by national law. To determine the most cost-effective trash collection system, accurate cost estimation and monitoring are crucial (Dijkgraaf & Gradus, 2017). Waste is defined as any material that is thrown away after its intended use or that is worthless, broken, or useless. Examples include radioactive waste, wastewater (such as sewage, which comprises bodily wastes like faeces and urine) and surface runoff, hazardous waste, municipal solid waste (home trash/refuse), and others (Alpheaus & Nwankwo, 2024). Waste is part of the economy; it is a by-product of economic activity, by businesses, government and households; waste is also an input to economic activity, whether through material or energy recovery (Okeke, Ifurueze & Nwadiaro 2021). Moreso, according to UNSD Glossary of Environment Statistics (2013), wastes are substance or objects, which are disposed off or are

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intended to be disposed off or are required to be disposed off by the provisions of national law. Waste collection and transport can generate up to 70% of the total costs of the system. Separated collection of recyclables implies additional costs for which the sale of recycled waste often does not compensate, but there is increased pressure to reach the long-term recycling objectives set by law. The proper estimation and monitoring of waste collection costs are essential to define the most cost-effective waste collection system (Dijkgraaf & Gradus, 2017).

The management of waste has economic implications for productivity, government expenditure, and, of course, the environment (Yao-Jen & Min-Der, 2013). Firms' decisions over how to manage waste impact on their profitability. Where the benefits outweigh the costs, firms can reduce their overall costs and improve productivity by reducing the use of expensive raw materials, whether metal in industry, or paper in commerce. In 2013, Bea Johnson gave the world the five R's of environmental management to enable effective waste management, which she felt will be a perfect transformation from the three R's that was propounded about 1970s (Nnamani & Odo,2021).

#### 2.1.3 The Five R's of Environmental Waste Management

1. **Refuse:** Reducing waste is the most important we can do, by reducing waste, we avoid unnecessary use of resources such as materials, energy and water. It means there is less waste to manage.

How we can reduce waste:

- i. Buy in bulk to reduce packaging.
- ii. Buy reusable items rather than disposable ones.
- iii. Stick to no junk mail, stick to letter box electronically.
- 2. **Reduce:** it is all about reducing your use of harmful, wasteful and non-recyclable materials to save your money and the environment, by limiting your dependency on these types of products, this leads to lesser waste ending up in landfills.
- 3. **Reuse:** Reusing waste materials in that way it does not end up in landfill. It also means you do not have to buy a new product. It as well saves your money, energy and saves resources.

#### 2.1.3.1 How to Reuse Waste

Donate old books to schools and libraries rather than disposing them.

Use plastic materials for storing food items.

Take household items to your council's resource recovery centre.

- 4. **Recover:** this means recovering waste without any pre-processing. For example: waste oils that cannot be refined for reuse in vehicles can be burnt for energy recovery. Recovering the energy from waste oil reduces our dependence on coal and imported oil.
- 5. **Recycle:** it involves some form reprocessing of waste materials to produce another products. For example: recycling plastic bottle to make buckets. Materials that can be recycled are paper, cardboard, glass, aluminum, tin and plastic containers. Composting and warm farms are methods of recycling organic wastes.

#### 2.1.4 Financial Performance

Financial performance is a subjective measure of how well a firm can use assets from its primary mode of business and generate revenues (Ibrahim et al., 2023). It serves as a general measure of a firm's overall financial position over a period of time and can also be used to compare similar companies in the same industry or to aggregate and compare industries and sectors (Nworie & Ofoje, 2022). Furthermore, a sound financial performance is also known to be the reward for good decisions made by the stakeholders through the directors and managers (Goodluck, Okoye & Nwoye, 2022). Financial performance reflects management's effectiveness and efficiency in making use of company's resources (Mwendwa & Gatauwa, 2022). Moreso, Financial performance is the achievement of the company's financial performance for a certain period covering the collection and allocation of finance measured by capital adequacy, liquidity, solvency, efficiency, leverage and profitability. Financial performance, the company's ability to manage and control its own resources. Cash flow, balance sheet, profit-loss, capital change can be the basis of information for corporate managers to make decisions. However, as a result of this study, only Return on capital employed (ROCE) is used as proxies of financial performance. Furthermore, financial performance in the financial world is measured to provide shareholders a management account and a management team. These important aspects include: Measuring profitability, market value and corporate growth and liquidity prospects.

### 2.1.4.1 Return on Capital Employed (ROCE)

The term 'Return' means the profits available. Thus, the ROCE ratio points out the relation between the volume of capital invested and the amount of profits earned on such capital (Pradip, 2017). Speaking otherwise, this ratio explicit the profitability of a firm by establishing relationship between profits and capital invested. It is probably one of the most frequently used ratios for assessing the performance of organizations. Also Return on capital employed (ROCE) refers to a financial ratio that can be used to assess a company's profitability and capital efficiency. In other words, this ratio can help to understand how well a company is generating profits from its capital as it is put to use. ROCE is one of several profitability ratios financial managers, stakeholders, and potential investors may use when analyzing a company for investment (Hayes, 2024).

ROCE, a member of the Return On Investment ratio, can be determined taking profits and capital employed of a given firm. ROCE highlights the earning potentiality of a firm's assets indicating the nature of profit earning capacity of a firm in response to its long-term sources of capital employed in the acquisition of its assets. It provides substantial clues to the nature of utilisation of long-term funds made available to the firm by owners and creditors. It also helps in evaluating how efficiently the funds are being managed by the management. The higher the ratio, the more efficiently the funds have been used by the management. In other words, a high ROCE achieved for a consecutive years indicates that the firm has a stable financial position with sound future prospect. ROCE provides an indication of the economic productivity of capital. Thus, it provides a standard measure of operating efficiency, which is very often applied regardless of the type of business or sub-division within a single organization in as much as it is not affected by the long-term capital structure and other factors external to the influence and immediate management.

ROCE = Return on capital employed indicates firms profitability and is calculated as the net profit after taxes plus interest on long term liabilities scaled by total capital employed (shareholders' equity plus long term liabilities) as at the end of the financial year under investigation (Okore, 2021). After all, equity owners and providers of long term liability combined have claims on the assets of the firm. This measure of financial performance is considered the best as it shows the earnings power of a firms taking into account the interest of all stakeholders.

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 $ROCE = \frac{EBIT}{Capital Employed}$ 

Where:

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EBIT=Earnings before interest and tax Capital Employed=Total assets – Current liabilities

#### **2.2 Theoretical Review**

#### 2.2.1 Stakeholder's Theory

The stakeholder theory was proposed and developed by R. Edward Freeman, a professor at the University of Virginia's Darden School of Business. This theory was first introduced by R. Edward Freeman in his 1984 book "Strategic Management: A Stakeholder Approach", published by Pitman and it was based on Freeman's doctoral dissertation work completed at the Wharton School of the University of Pennsylvania in 1978. In this seminal work, Freeman argued that a corporation should create value for all of its stakeholders, not just its shareholders. Stakeholders include employees, customers, suppliers, communities, and others who have a stake in the corporation. The core principle of the stakeholder theory is that a company's success depends on how well it manages the relationships with its key stakeholder groups, rather than just focusing on maximizing shareholder wealth.

Freeman's stakeholder theory provided an alternative to the prevailing shareholder primacy model, which held that a corporation's sole purpose was to maximize returns to its shareholders.

The theory asserted that, management must please a range of stakeholders such as employees, clients, vendors, the surrounding community and many others, who might otherwise affect the organizational survival. According to Freeman's viewpoint, it is insufficient for managers to concentrate solely on the interest of investors or company owners. Thus, it will be a great benefit for the corporate organization to participate in definite environmental deeds that add no financial benefit to the stakeholders but perceive to be important and enjoy the support of all groups for the business. However, before the emergence of this theory, Freeman (1983) incorporated the perception of stakeholders' into categories such as: business planning and policy model and business social responsibility model of stakeholder management.

From the first model, the stakeholder analysis focused on developing and evaluating the approval of corporate organization strategy on decisions by groups whose support is required and important for the organization's survival and continuous existence. In the model, the

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stakeholders are identified as the owners, customers, public groups and suppliers. Thus, the model enables managers and accountants to consider a strategic plan that is acceptable in changing the social demands of non-traditional stakeholders.

This study was anchored on stakeholders' theory because it encourages business managers to execute environmental practices for which the non-financial stakeholders are considered important for the maximization of stakeholders' value as well as minimization of environmental costs, also this theory helps to appreciate how the relative interest of various stakeholders such as shareholders, host communities, government and employees of the organization in the eco system management with emphasis on cost incurable, affects their various interest in the performance of the corporate organization; while the host communities and government are most concerned with the operations of the firms, ensuring that emissions are not discharged on the greener heritage of the host communities, the host communities goes further to lay claims to social responsibilities from the firms which is due to the host communities for accommodating the firms and their operations and these all constitute cost. The shareholders are also concerned on how consumers view their firms due to their eco system/environmental practices, this attitude, no doubt readily affects the attitude of consumers to the firms products and services. And this will reflect in the shareholders wealth on the long run.

#### 2.3 Empirical Review

Alpheaus and Nwankwo (2024) investigated the effect of environmental cost disclosure on the financial performance of 12 listed manufacturing firms in Nigeria from 2013 to 2022. Expost facto research design was adopted and secondary data were sourced from their annual reports of the sampled manufacturing firms listed on the Nigerian Exchange Group as at 31st December, 2022. Results on the assessment of the effect of independent variables (Pollution control cost (PCC), Waste management cost (WMC) and Employee health and safety cost (EHSC) on dependent variable (Earnings per share (EPS) were analyzed with the use of the statistics, correlation analysis, Panel Generalized Method of Moments as well as Arellono-Bond Serial Correlation test. The outcome of the analysis revealed that Pollution control cost effect on earnings per share of listed manufacturing firms in Nigeria is negative but significant. However, the effect of Waste management cost and Employee health and safety cost on earnings per share of listed manufacturing firms in Nigeria is positive and significant. The study concluded that environmental cost disclosure has significant effect on the financial performance of listed manufacturing firms in Nigeria. The study recommended that

Manufacturing firms should invest in environmental training, donations and charity, waste management and remain socially responsible to the host communities to ensure smooth and uninterrupted operations.

Ubokudom, Akpan and Akinninyi (2024) examined the effect of environmental remediation costs on financial performance of listed oil and gas companies in Nigeria from 2013-2022. Specifically, the study examined the effect of waste management costs, environmental cleanup costs and environmental safety costs on return on assets of these companies. The research design adopted for this study was expost facto and secondary data used were obtained from the annual reports of ten (10) listed oil and gas companies in Nigeria. The ordinary least square regression technique was used to analyze the data and the statistical package employed was E-views version 10. The results of the analysis showed that waste management costs have insignificant negative effect on return on assets; environmental cleanup costs and environmental safety costs have significant positive effect on return on assets of the companies under study. Therefore, it was concluded that environmental remediation costs can in the long run enhance the profitability of listed oil and gas companies in Nigeria. Based on this, it was recommended among others that management of oil and gas companies in Nigeria should invest in innovative waste management practices to remediate and restore the environment as this can benefit the company in the long run. Also that the management of oil and gas companies in Nigeria should develop comprehensive contingency plans and set aside reserves specifically earmarked for environmental cleanup activities to ensure prompt and effective response to any incidence of environmental emergencies.

Ibeanu, Okwo and Nkwagu (2023) determined the impact of environmental cost on corporate performance of selected oil firms in Nigeria with emphasis on determining the extent to which environmental remediation and pollution control cost, environmental law compliance and penalty cost, and employee health and safety cost affect corporate performance. The result of the analysis showed that environmental remediation and pollution control cost has a significant and positive effect on return on assets of the sample d oil and gas firms in Nigeria.

Lawrence and Bernard (2023) carried out their research to investigate the relationship between environmental costs and financial performance of industrial goods firms in Nigeria. A sample of Ten (10) Industrial goods firms were drawn from the population of twelve (12) Industrial goods firms listed in the floor of Nigerian Exchange Group (NXG). The study covers the period between 2011 and 2020 and uses the Panel Estimated Generalized Least

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Squares (Panel EGLS) regression. Results show that waste management cost and communities development costs (CDC) as well as firm size (FSIZE) are positively significant while the moderated waste management costs (FS\*WMC) and moderated communities development costs (FS\*CDC) are negatively significant with NPM.

Jonah (2023) examined the link between environmental cost accounting and the profitability of consumer goods companies incorporated in Nigeria. The study population consisted of twenty-six (26) consumer goods companies, eighteen (18) of which were purposively selected for the period 2017-2021. Content analysis was used to obtain data on the environmental cost dimension. The data obtained were analysed by means of descriptive statistics and multiple regression aided by SPSS version 22.0. The result revealed a positive, non-significant relationship between social project costs and net profit margin along with return on asset. Pollution control cost had a positive, significant relationship on net profit margin but its relationship that is not significant with net profit margin and return on asset. The research concluded that environmental cost accounting had a positive, non-significant relationship with the profitability of publicly traded consumer goods companies in Nigeria. Among other things, the study recommends that corporate entities increase their spending on social projects aimed at ameliorating the suffering of host communities and that corporate organization should spend more on waste management and pollution control.

Jonah and Aaron (2023) an investigation of environmental disclosure and market value of food and beverage companies in Nigeria. Retrospective research design was used in the study. Secondary data collected from audited financial statements of ten(10) publicly traded food and beverage companies in Nigeria from 2010-2020 were analyzed using multivariate statistics, multiple regression and Pearson correlation supported by SPSS version 22.0. The results show a significant relationship between environmental accounting disclosure and market value of food and beverage companies in Nigeria in Nigeria. The study also shows that environmental pollution control and cost of environmental regulations have a positive and significant relationship with earnings per share and no relationship with equity book value per share. It is concluded that the company should disclose environmental accounting information to improve market value. The study suggests that management should adopt effective environmental reporting policies that will improve the company's market value.

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Nzekwe (2022) evaluated the effect of environmental cost on financial performance of selected oil and gas firms in Nigeria. Specifically, the study examined the effect of environmental pollution prevention cost, environmental protection cost, environmental remediation cost, and environmental recycling cost for the ten years period (2009 - 2018) using multiple regression analysis. The findings reveal that pollution prevention cost, environmental recycling cost have positive effect on firm's financial performance.

Junaidu and Kabiru (2022) studied the influence of environmental disclosure (ED) on financial performance of seventy-six (76) listed non-financial companies in Nigeria from 2013-2020. Data collected on Environmental Disclosure measured using environmental prevention expenditure disclosure, Waste disposal, emission treatment and remediation cost disclosure, Prevention and environmental management cost disclosure as well as on financial performances' accounting and market-based measures proxied by earnings per share and Tobin's Q was analyzed using descriptive statistics and multiple regressions. The study revealed that there is positive significant relationship between EPED, WDCD, PMCD and EPS while negative with TQ of listed Nigerian non-financial companies.

Muhammad and Shuaibu (2022), examine environmental disclosure and financial performance of listed non-financial companies in Nigeria from 2013 – 2020. A sample of seventy- six (76) companies listed as non-financial was drawn from the population of one hundred and thirteen (113) companies. Audited annual reports and accounts were used for data extraction. The analysis was done using descriptive statistics and multiple regressions. The study revealed that there is positive significant relationship between EPED, WDCD, PMCD and EPS while negative with TQ of listed Nigerian non-financial companies.

Ofurum and Iwunna (2022) empirically tested the impact of environmental cost disclosure on the financial performance of listed oil and gas companies in Nigeria. The study made use of sampled 13 listed oil and gas companies on the floor of the Nigerian Exchange Group (NXG) for 12 years staring from 2008 to 2019 financial years. The results of the ordinary least squares (OLS) showed that waste management costs (WMC) positively and significantly impacted return on assets (ROA) while pollution control costs (PCC) had a negatively significant relationship for the period the study covered.

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Ilelaboye and Alade (2022) carried out a research on the extent to which environmental accounting on the performance of family-owned companies in Nigeria Secondary panel data which covered the period 2012 to 2020 collected from 6 out of 12 of such family-owned firms quoted on the Nigerian Exchange Group (NXG) was used in this study. The OLS regression results showed that community development cost (CDC) had a negative and significant impact on return on capital employed (ROCE) while environmental restoration or management costs (ERMC) and employee health and safety costs (EHSC) were insignificant.

Obiora and Omaliko, (2022) empirically examined the effect of environmental reporting on corporate liquidity in Nigeria. An ex post facto design was used and the data for the study comes from the published annual financial reports of all 41 companies listed on the sectors of Nigerian Exchange Group ranging from Consumer Goods Sector, Oil & Gas Sector and Industrial Goods Sector, with the data covering the period of 2015-2021. However, the study found that employee health and safety disclosure, pollution control disclosure and environmental remediation disclosure have significant impact on companies' liquidity proxy, as the current ratio at 1% significant level. On this basis, the study concludes that environmental reporting has positively improved companies' liquidity over the years. In lieu of the study results, it was recommended that companies disclose more of this information in their annual reports, as the level of disclosure of environmental practices over the years has a significant impact on companies' liquidity.

Okeke et al. (2021) carried out a research to determine the effect which carbon emission disclosure has had on economic value added (EVA) of Oil and Gas companies in Nigeria. The study uses annual secondary panel data obtained from the annual reports of eleven out of a population of twelve (12) companies covering the period 2008 to 2020. The OLS regression results indicated that effluent and waste treatment cost disclosure (EWTCD) otherwise known as waste management costs (WMC); revenue growth (RVG) and firm size (FSIZE) positively and statistically impacted EVA.

Okore (2021) studied whether there is any relationship between environmental cost and performance of some selected manufacturing firms in Nigeria. The researcher used secondary panel data over the period from 2011 to 2020 obtained from the annual financial statement of the five (5) sampled manufacturing firms. The OLS results showed that waste management cost (WMC), corporate social responsibility (CSR), donation/charity contribution (DCC) and asset turnover (ATOV) positively and statistically influenced ROA.

Oshiole, Elamah and Amahalu (2020) focused on the relationship between environmental cost and profitability of oil and gas firms listed on Nigeria Stock Exchange between 2010 to 2019. Eleven(11) listed oil and gas firms were purposively sampled. The proxies for environmental cost disclosures include waste management cost disclosure, employee Health and Safety cost disclosure and environmental remediation cost, while net profit margin was employed as profitability measure. Content Analysis via STATA 13statistical software were used to test the hypotheses of the study. The result of this study showed that waste management, employee Health and Safety, and environmental remedial costs have a significant positive effect on net profit margin at 5% level of significance respectively.

Nwaimo (2020), in his research, investigated the effect which environmental cost had on the performances of firms in Sub-Sahara African countries. Secondarily sourced panel data over the period from 2007 to 2016 obtained from the Stock Exchanges in Nigeria, South Africa, Tanzania and Ghana were used in this study. The results of the OLS showed that waste management costs, community development costs and employee health and safety costs were positively significant with profitability especially in Ghana.

Chiamogu and Okoye (2020) attempted an empirical examination of how environmental cost affects financial performance of oil and gas companies in Nigeria. The study used secondary panel data over the period between 2011 and 2019 obtained from 11 Oil and Gas firms audited annual accounts. The OLS regression results indicated that environmental remediation cost and community development cost positively and statistically impacted Tobin's Q.

### **3. MATERIAL AND METHODS**

Ex-post facto research design was adopted in this study to determine the effect of eco cost management on the financial performance of listed consumer goods firms. Also the study used content analysis methodology by using Global Reporting Initiative (GRI) guidelines that was provided in Appendix 11. This study covered all the Consumer goods firms listed in Nigerian Exchange group as at 31<sup>st</sup> December, 2023. The population of the study comprised of Twenty-one (21) Consumer Goods Firms listed in Nigeria Exchange Group (NGX Fact book)) as of December 31, 2023. They are provided in appendix 1. From the population above, sixteen (16) Consumer-Goods Firms were selected because they were consistently listed and actively trading on the floor of Nigeria Exchange Group from January 1, 2012 to December 31, 2023. This study relied on secondary data obtained from various sources.

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The Independent variables for the study are Community Development Disclosure (CDD) and Waste Management Disclosure (WMD) as proxies eco-Cost Management and for the dependent variable financial Performance proxied by Return on Capital Employed (ROCE). Data for the period of twelve years from 2012 to 2023 were collected from audited annual report and account of the sampled firms. Variable, measurement and definition are in Appendix III. This study adapts the model by Lawrence and Bernard (2023) that studied Environmental Costs and Financial Performance of Selected Industrial Goods Firms in Nigeria. The model is estimated as follows to achieve the objectives of the study:

 $ROCE_{it} = \alpha_{it} + \beta_1 CDD_{it} + \beta_2 WMD_{it} + \epsilon \underline{\qquad} Eqn \ 1$ 

Where:

ROCE: Return on Capital Employed

CDD: Community Development Disclosure.

WMD: Waste Management Disclosure.

 $\alpha$ : Intercept of the model.

 $\beta$ 1, $\beta$ 2, : Coefficients for each independent variable

 $\epsilon$ : Error term representing unexplained variance.

### 4. RESULT AND DISCUSSIONS

#### 4.1 Descriptive Analysis

This section presents the results of the analysis of the collected data from the annual report and accounts of the sampled firms in Nigeria. The descriptive statistics and regression analysis are presented below:

#### Table 1 Descriptive Analysis

	ROCE	CDD	WMD
Mean	0.162333	0.781250	0.361979
Median	0.146217	1.000000	0.000000
Maximum	1.333687	1.000000	1.000000
Minimum	-1.366108	0.000000	0.000000
Std. Dev.	0.297742	0.374673	0.438449
Skewness	-0.617869	-1.486523	0.559850
Kurtosis	9.201584	3.459778	1.486623
Jarque-Bera	319.8935	72.40314	28.35233
Probability	0.000000	0.000000	0.000001

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Sum	31.16794	150.0000	69.50000
Sum Sq. Dev.	16.93218	26.81250	36.71745
Observations	192	192	192

Source: Eviews 10 Output

Table 1 shows the results of descriptive statistics, the number of observations for the sampled 16 listed consumer goods firm stand at 192. The Return on Capital Employed (ROCE), with an average value of 0.162, suggests moderate capital efficiency among the sampled firms. The maximum ROCE of 1.334 implies that some firms exhibit high capital efficiency, while the minimum of -1.366 reveals instances of negative returns, indicating possible capital losses in certain cases. The standard deviation of 0.298 reflects variability in capital employed returns across firms, and skewness at -0.618, coupled with a kurtosis of 9.202, implies that ROCE has a left-skewed distribution with a higher peak, indicating some firms experience extreme negative ROCE values. The Jarque-Bera probability of 0.000 indicates non-normality in the ROCE data distribution.

Secondly, the mean CDD score is 0.781, suggesting that firms actively engage in community development, although to varying extents. The maximum CDD of 1.000 reflects that some firms comprehensively disclose community involvement efforts, while a minimum score of 0.000 shows that others might not disclose any such efforts. A standard deviation of 0.375 suggests moderate variability in CDD practices. CDD skewness at -1.487 indicates a left-skewed distribution, suggesting more firms with high disclosure levels than low, and the kurtosis of 3.460 indicates a distribution closer to normal. Jarque-Bera probability of 0.000 implies non-normality.

Lastly, Waste Management Disclosure (WMD) score of 0.362 indicates that, on average, firms partially disclose their waste management efforts. The maximum score of 1.000 shows some firms provide complete disclosure, while a minimum of 0.000 implies that others may not disclose any waste management initiatives. The standard deviation of 0.438 reflects a wide variance in WMD practices, with a skewness of 0.560 indicating slight right-skewness, where more firms disclose fewer waste management practices. Kurtosis at 1.487 suggests a flatter distribution than normal, confirmed by the Jarque-Bera probability of 0.000001, indicating a deviation from normality.

### 4.1.2 Heteroskedasticity Test

The Heteroskedasticity Test using the Breusch-Pagan-Godfrey method evaluates whether the error variance in the regression model is constant across observations, which is a critical assumption in linear regression. A lack of heteroskedasticity (constant variance) indicates that the variability in the data is stable, meaning the model's predictions are reliable across different levels of the independent variables.

 Table 2 Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic 0.77853	5 Prob. F(5,186)	0.5663
Obs*R-squared 3.93587	3 Prob. Chi-Square(5)	0.5587
Scaled explained SS 18.9024	6 Prob. Chi-Square(5)	0.0020

#### Source: Eviews 10 Output

In this analysis shown in Table 2, the p-value for the F-statistic is 0.5663, which is greater than the typical significance threshold of 0.05. This result implies that there is no significant heteroskedasticity in the model, suggesting that the variance of the errors is constant and that the model meets the assumption of homoskedasticity. With homoskedasticity confirmed, the regression estimates are likely unbiased and efficient, meaning that the interpretation of the relationships between eco-cost management practices (CDD, WMD) can be considered reliable. The absence of heteroskedasticity strengthens the model's validity, indicating that the effects of the eco-cost management disclosures on ROCE are consistent and unaffected by unequal variance, thus enhancing the robustness of the study's findings on the financial performance of consumer goods firms in Nigeria.





Figure 2.1 Normality Test

Source: Eviews 10 Output

The normality test, indicated by the Jarque-Bera probability of 0.0000, shows a significant deviation from normality in the residuals of the data. A Jarque-Bera probability of 0.0000 suggests that the distribution of the residuals is not normal, which violates a key assumption of ordinary least squares (OLS) regression. When residuals are non-normally distributed, OLS estimates may become biased and inefficient, which can impact the accuracy of the results and the validity of inferences drawn from the data.

Given this finding, it is appropriate to apply a robust least squares regression. Robust regression methods are designed to handle violations of normality and outlier influences, making them more reliable for estimating relationships when standard assumptions are not met. By using robust least squares, the study aims to improve the accuracy and reliability of its findings, allowing for more trustworthy conclusions about the effect of eco-cost management disclosures on financial performance in the consumer goods sector in Nigeria.

The estimates from the Robust Least Square regression was used to test the hypotheses of the study, as shown below in Table 3.

Table 3: Regression Results for Hypotheses Testing Dependent Variable: ROCE Method: Robust Least Squares Date: 10/21/24 Time: 17:42 Sample: 2012 2023 Included observations: 192 Method: M-estimation M settings: weight=Fair, tuning=1.4, scale=MAD (median centered)

Variable Coefficient Std. Error z-Statistic Prob. CDD 0.032233 0.003322 9.702764 0.0000 WMD 0.559531 0.013315 42.02215 0.0000 С 0.225969 0.003014 74.97762 0.0000 **Robust Statistics** 

Huber Type I Standard Errors & Covariance

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R-squared	0.614975	Adjust R-squared	0.514975
Scale	0.792632	Rn-squared statistic	9511.992
Prob(Rn-squared stat.)	0.000000		

Source: Eviews 10 Output

The study's findings based on the robust least squares regression reveal how eco-cost management disclosures impact the financial performance of consumer goods firms, as measured by Return on Capital Employed (ROCE). With an R-squared value of 0.614975, the model explains approximately 61.5% of the variance in ROCE, indicating that eco-cost management variables significantly influence financial performance. The probability of the R-squared statistic, Prob(Rn-squared stat.) = 0.000000, indicates that the overall regression model is statistically significant at the 5% level (p < 0.05). This suggests a strong likelihood that the relationship observed between the eco-cost management disclosures and financial performance (ROCE) is not due to chance. Consequently, the model is robust, meaning that eco-cost management variables collectively have a significant effect on the financial performance of consumer goods firms.

This highly significant Prob(Rn-squared stat.) value reinforces the model's validity, confirming that the eco-cost management disclosures—Community Development Disclosure (CDD) and Waste Management Disclosure (WMD) play a crucial role in explaining variations in Return on Capital Employed (ROCE) across the sampled firms. Thus, this finding underlines the importance of eco-cost management practices in influencing financial outcomes in the consumer goods sector.

### 4.2 Test of Hypotheses

#### 4.2.1 Hypothesis I

H<sub>o</sub>: Community development disclosure has no significant effect on return on capital employed of consumer goods firms in Nigeria.

The outcome of Table 3 shows that Community Development Disclosure (CDD) has a positive coefficient (0.032233), indicating a marginal positive effect on ROCE. For every unit increase in CDD, ROCE is expected to rise by 0.032, which is statistically significant with a p-value of 0.0000 (p < 0.05). This result suggests that community development disclosure positively impacts financial performance, aligning with the hypothesis that engaging in community-based activities boosts corporate goodwill and consequently, capital efficiency.

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The alternate hypothesis was accepted since the p-value is less than 0.05. Thus, Community Development Disclosure (CDD) has a significant and positive effect on return on capital employed of listed consumer goods firms in Nigeria ( $\beta = 0.032$ , p = 0.0000).

### 4.2.2 Hypothesis II

H<sub>o</sub>: Waste management disclosure has no significant effect on return on capital employed (ROCE) of consumer goods firm in Nigeria.

Table 3 shows that the coefficient of Waste Management Disclosure (WMD), at 0.559531, shows a substantial positive marginal effect on ROCE. This means that with a unit increase in waste management disclosure, ROCE increases by 0.559, a significant effect with a p-value of 0.0000 (p < 0.05). This finding suggests that firms that transparently manage waste are likely to experience higher returns on capital employed, possibly due to cost savings and enhanced environmental reputation. The alternate hypothesis was accepted since the p-value is less than 0.05. Thus, Waste Management Disclosure (WMD) significantly and positively affects return on capital employed of listed consumer goods firms in Nigeria ( $\beta = 0.559$ , p = 0.0000).

### 5. CONCLUSION AND RECOMMENDATIONS

The findings made in this study implied that stakeholders, including investors and consumers, are increasingly valuing corporate social responsibility initiatives and sustainability practices. This trend indicates that firms that actively engage in community development and demonstrate effective waste management practices may experience enhanced financial performance, as these actions can improve brand reputation and attract socially conscious investors. Consequently, companies should consider integrating robust sustainability frameworks into their core operations to leverage these potential benefits.

Based on the conclusion of this study, the following measures are recommended:

- 1. Corporate Social Responsibility (CSR) teams within listed consumer goods firms should enhance their community development initiatives and disclosures by actively engaging in local projects that address community needs and transparently reporting on the outcomes and benefits of these initiatives to stakeholders.
- 2. Sustainability Managers should focus on optimizing waste management practices within the organization. This can be achieved by adopting circular economy principles, reducing waste generation, and increasing recycling efforts, while also

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ensuring that these initiatives are effectively communicated to stakeholders to enhance corporate reputation and financial performance.

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