

ENVIRONMENTAL COSTS AND FINANCIAL PERFORMANCE OF LISTED FOOD AND BEVERAGE FIRMS IN NIGERIA

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ABSTRACT

This study investigated the effect of environmental costs on financial performance of food and beverage firms in Nigeria. The objectives of the study were to ascertain; the effect of waste management costs, health and safety and community development costs respectively on return on capital employed of listed food and beverage firms in Nigeria. The study was anchored on the legitimacy theory. The population of this study was made up of eight (8) listed food and beverage firms on the Nigeria Exchange Group (NGX) and operating in Nigeria as at 1st January, 2013 -to-31st December, 2022. This study utilized purposive sampling technique to select six (6) listed food and beverage firms in Nigeria because the sampled food and beverage firms have all available and complete panel data. The cross-sections included in the study was six (6) food and beverage firms; sample period included ten (10) years, and total panel observation was sixty (60) spanning through from 2013 to 2022. The data for this study were sourced from the published annual reports and accounts of the sampled food and beverage firms on the Nigeria Exchange Group. The study utilized descriptive statistics, unit root test, diagnostic tests, Hausman Test and Panel Least Square (PLS) regression technique with the help of E-view 12. The study found that, waste management cost has significant effect on return on capital employed, health and safety cost has significant effect on return on capital employed, community development cost has significant effect on return on capital employed of listed food and beverage firms in Nigeria. Based on the foregoing, the study generally concluded that there is a positive and significant effect of environmental costs on financial performance of food and beverage firms in Nigeria for the period 2013 - 2022. The study recommended amongst others that management of listed food and beverage firms in Nigeria should ensure adequate compliance with the guidelines of waste management cost as this portrays a good image of their firm financial performance.

Keyword: Environmental Costs, Waste Management Costs, Health and Safety, Community Development cost and Return Capital Employed

INTRODUCTION

Businesses all over the world, especially food and beverage firm for many decades have ignored the impact of their activities on the natural and social environment in which they operated, unless it had direct repercussions on the profit and loss account. According to Egedegu et al (2024) and Ma et al (2024), the current global dilemma lies in the systematic degradation of the environment, which poses a significant threat to the entire world if not promptly addressed. In order to alleviate this adverse effect, a multitude of rules and regulations were implemented to regulate environmental issues in Nigeria. These rules and regulations require firms to be diligent and demonstrate a strong sense of accountability by addressing the adverse effects of their operations on the environment and society as a whole. Ilelaboye and Alade (2022) affirmed that business practices are destroying life on earth and there is no polite way to say that business is destroying the world. Businesses as part of modern society and part of the problem must also be part of the solution (Agbo & Gina, 2021). The organizations role as the solution provider is important because organizations are the primary players in economic development and have the financial backing, technological know-how, and the institutional capacity to implement sustainable solutions to protect the environment (Polycarp 2019; Fasua & Osifo 2020; Sari et al., 2020; Emuebie et al., 2021; Ibrahim & Kurfi, 2021;

Olusola et al., 2021; Major & Zarakpege, 2021; Clement & Oluwaseun, 2023; Osaloni & Oso, 2023; Ade, 2024; Etim et al., 2024; Dwi et al., 2024).

However, firms played pivotal roles in economic development of many nations. By so doing their economic activities constitute a great discomfort and degradation to their immediate environment. The production of goods and services by these firms caused serious health challenges that often culminate into social disputes, disruption, and pollution of economic activities of firms and by extension affect performance (Okegbe & Ofurum, 2019). In recent times corporate firms placed much emphasis on performance and profitability without recourse to depletion and other social environmental effects which has caused alteration to the chemical, physical and ecological quality of the environment (Oraka & Egbunike, 2018). The major challenge the world has now is systematic destruction of the environment. This has the capacity to destroy the entire world if urgent remedy is not put in place to mitigate the negative impact it has on the economy and its environment. Ijeoma (2019) documented that environmental costs consist of environmental measures and environmental losses. They include cleanup costs, costs of recycling materials or conserving energy, closure costs, capital expenditure and development expenditure. These costs are incurred in preventing, reducing or repairing damage to the environment and conserving resources (Giami, 2021; Steve, 2020; Seetharaman et al., 2017; Okafor; 2018; Lyndon & Bingilar, 2021). However, environmental accounting costs are losses which bring no benefits to the business. Such as, fines, penalties, compensation, and disposal losses relating to assets which have to be scrapped or abandoned because they damage the environment. Environmental costs are the environmental damage, an entity costs to the environment and its users as a result of its operations. There is also the general concern that environmental cost reduces operating flexibility, slow productivity of companies. Iliemena et al. (2023) averred that environmental cost accounting helps the firm to record all environmental costs incurred by the business thereby finding a way of reducing the cost (environmental expenses) so that the business can increase profit. Abbas et al. (2020) advanced that environmental accounting costs helps to disclose to the outside world the ability of the organization to be environmental friendly. The limited awareness of environmental costing principles and methodology has become an important issue to be addressed (Olasupo & Akinselure, 2019; Ezeagba et al., 2017). They further affirmed that, if environmental issues and activities that are vital are not disclosed, financial statement cannot be said to present a true and fair view of affairs. Sengonottuv el (2018) stated that several firms attitude towards environmental cost is not encouraging, and makes financial performance below expectation. In that vein, financial statements cannot be said to be fair and true state of affairs, if environmental cost issues and activities are not disclosed.

Statement of the Problem

It is necessary to state here the wreckages caused by the economic activities of Food and Beverage Firms in Nigeria with particular reference to their products which mostly are packaged in nylon sachets and cans (plastic and metal) or bottles to the immediate environment and beyond in our society. The attitude of the consumers in disposing the used sachets and cans, plastics and the unconcerned disposition of the firms and other stakeholders in sustaining the environment leaves little to be desired. A cursory look at our environment reveals a system where proper refuse disposal is lacking; the drainages and water ways appear to be moribund and in a state of disuse, resulting to over-flooding as the drainages/water ways are blocked by used rappers of sweets and other confectioneries such as Tom-Tom, Hacks, Trebor, Buttermint, Biscuits, Boumvita, cans and plastic bottles and breakable bottles which are indiscriminately disposed. Improper disposal of these used confectioneries disrupts the free-flow of drainages and water ways, constituting an eye-sore to the aesthetic value of our cities; various health challenges are the end-product of this practice.

Prior studies have explored and established that environmental cost have mix link with firm performance, some profess positive or significant, relationship and conversely others imply negative

or insignificant effect. For instance, Adebisi and Rangu (2024) investigated the impact of environmental accounting on the financial performance of quoted deposit money banks in Nigeria. The results indicate that environmental conservative cost disclosure has a significant positive effect on return on assets. Etim et al. (2024) examined the effect of green accounting practices on financial performance of oil and gas companies in Nigeria. Findings from the reviewed studies revealed that green accounting significantly influenced financial performance of quoted oil and gas firms in Nigeria over the period reviewed. Dwi et al. (2024) the results show that the adoption of green accounting positively affects environmental performance. Meanwhile, environmental performance positively affects CSR disclosure. Syarief and Julia (2023) examined the effect of environmental management accounting on financial performance and working capital management as a mediation variable in Textile Processing Industry in Bogor Regency. The results of the study found that environmental management accounting has a direct significant effect on financial performance and the role of working capital management as a mediator contributes to the indirect effect of environmental management accounting on financial performance. Chijioke and Nestor (2023) ascertained the effect of environmental accounting on profitability of oil and gas firms listed on Nigeria Stock Exchange. The result of the study showed that waste management cost, community development cost employee health and safety cost and remediation cost have a significant positive effect on net profit margin. Damieibi, (2023) investigated the effect of environmental accounting practices on profitability of quoted oil and gas companies in Nigeria. The study used pollution cost, waste management cost and drainage cost to represent environmental accounting practices. The study adopted ex-post facto research design. The results obtained from the study showed that that pollution cost accounting has positive significant effect net profit of quoted oil and gas companies; that waste management cost accounting has insignificant effect on net profit of quoted oil and gas companies; and that drainage cost accounting has negative significant effect on net profit of quoted oil and gas companies in Nigeria. The study concluded that environmental accounting practices affects net profit of quoted oil and gas companies. Iliemena et al. (2023) examined the effect of environmental disclosure on financial performance of manufacturing firms in Nigeria. The finding from the regression analysis showed there is significant positive effect of social disclosure on gross profit margin. Obiora et al. (2022) investigated the impact of environmental accounting practice on social responsibility disclosure on value of Oil and Gas firms in Nigeria. The findings in the study generally indicate that environmental accounting practice and social responsibility disclosures have significant and positive influence on firm's value measured by net assets per share. Ezenwaka et al. (2022) examined effect of pollution and health and safety cost on financial performance of listed oil and gas firms in Nigeria. The study concludes that the cost pollution and health safety have a significant positive effect on financial performance, (Revenue, Profit after tax and Cash flow from operation) of listed oil and gas companies in Nigeria. Ousmanou (2022) examined the effect of environmental accounting on the transparency of companies in Cameroon. The study finds that environmental accounting information disclosure affects positively and significantly at 1% the transparency of companies in Cameroon. From the foregoing, evidences are apt that prior research works are inconclusive and therefore has created a gap in Knowledge. For this reason, and to resolve this perceived gap left by the literature in terms of inconclusive outcome in previous studies, such as difference in scope, also to uncover specific and novel evidence that may account for the variability in earlier studies outcome, the researcher initiated this study aimed at analysing the effect of environmental costs and financial performance of listed food and beverage firms in Nigeria.

Aim and Objectives of the Study

The aim of this study was to determine the effect of environmental costs on financial performance of food and beverage firms in Nigeria. Specifically, the objectives of the study were to:

1. assess the effect of waste management cost on return on capital employed of listed food and beverage firms in Nigeria.
2. determine the effect of health and safety cost and return on capital employed of listed food and beverage firms in Nigeria.

3. determine the effect of community development cost on return on capital employed of listed food and beverage firms in Nigeria.

Research Questions

In line with the specific objectives of the study, the following questions were formulated and answered.

1. What is the effect of waste management cost on return on capital employed of listed food and beverage firms in Nigeria?
2. What is the effect of health and safety cost and return on capital employed of listed food and beverage firms in Nigeria?
3. What is the effect of community development cost on return on capital employed of listed food and beverage firms in Nigeria?

Hypotheses

The following null hypotheses were formulated and tested in the study

- H0₁:** Waste management cost has no significant effect on return on capital employed of listed food and beverage firms in Nigeria.
- H0₂:** Health and safety cost has no significant effect on return on capital employed of listed food and beverage firms in Nigeria.
- H0₃:** Community development cost has no significant effect on return on capital employed of listed food and beverage firms in Nigeria.

REVIEW OF RELATED LITERATURE

Conceptual Review

Environmental Costs

Environmental costs are costs incurred by firms in order to protect the environment, prevent environmental degradation and minimize damages to the environment. They are those costs incurred in compliance with, or prevention of breach of environmental laws, regulations and company policies. However, the true environmental costs to a firm can be broader, including costs of resources both those directly related to production and those involved in general business operations, such as waste treatment and disposal costs, the costs of poor environmental reputation and the cost of paying an environmental cost liability. Naji and Hawkar (2022) acknowledged that environmental cost is a term that covers the financial and non-financial information regarding the environmental and ecological impact of company activities on humanity and resultant reactions to their impacts. The research article published by Mayndarto and Agustine (2021) opined that environmental cost is the identification, measurement and allocation of environmental costs and the integration of these costs into business and encompasses the way of communicating such information to the companies' stakeholders. Emuebie et al. (2021) advocated that environmental cost is the costing of the energy component of an organization activity and the efforts of preserving the environment and producing environmentally friendly products. Similarly, Ilelaboye and Alade (2022) averred that environmental cost is also regarded as green accounting that measures in economic terms the performance of natural resources firms in respect to the environment. Ihendinihu and Azubike (2020) stressed that environmental accounting is the modified system of accounting that incorporates the use or depletion of natural resources. It is an important management tool of environmental and operational costs of natural resources. In the same vein Iliemena et al. (2023) affirmed that environmental accounting is a system that attempts to make the best possible quantitative assessment in terms of either monetary or physical units of the costs and benefits to an enterprise due to the environmental preservation activities that it undertakes. Likewise, Lyndon and Harmony (2021) expressed that environmental accounting can more accurately identify true costs by clarifying the environmental impacts caused by material acquisition and processing, manufacturing, sales, distribution, use, maintenance, and disposal. Karakuş and

Erdirencelebi (2019) affirmed that environmental accounting encompasses the means of communicating the information to companies' stakeholders. In simpler terms, environmental accounting will translate into overall care for the human community, in particular helping to avoid pollution and deforestation (Lyndon & Bingilar, 2021; Ijeoma 2019; Owolabi & Solarin, 2019; Nicholas, 2021). However, Ibrahim and Kurfi (2021) advocated for the importance of implementing environmental accounting in the accounting system through the measurement of physical and monetary units.

Dimensions of Environmental Cost

This study used waste management cost, health and safety cost, and community development cost as dimensions of environmental cost. The dimensions of the independent variable environmental cost are comprehensively discussed below:

Waste Management Cost

The term waste management cost refers to all fees and expenses associated with taking steps to clean up or remove hazardous substances from the environment, preventing or reducing future spills or movements of hazardous chemicals, and adhering to all applicable environmental laws. Waste management cost is the cost associated with disposal of waste generated by the companies via their activities (both liquid and gaseous waste). Investments in production equipment might be made in order to reduce environmentally hazardous emissions. Such investments are considered environmental costs. Most investments however are not made solely for environmental purposes but also to increase the utilization capacity. These investments are not considered as entirely environmental but also as regular investments. In these cases the environmental costs only consist of the part of the investment considered an environmental investment (Nwanwu, 2022). Waste management therefore, means to prevent the negative effect of waste (Giami, 2021). It consists of; reduction of waste, reuse of waste, recycling of waste, compositing, energy recovery and final disposal. According to Kornom-Gbaraba and Chukwuemeka (2021) waste management involves sensing what is there, sorting, separating, transforming, returning to service what can be used and properly disposing what is left. Expenses incurred for proper disposition of toxic waste, hazardous gas or industrial waste in the environment. According to the United Nations Environment Program (UNEP), waste management is "the collection, transportation, processing, recycling or disposal of waste materials, usually produced by human activity, in an environmentally responsible manner (Kameri-Mbote et al., 2023) and Mattos & Calmon, 2023). This definition emphasizes the importance of managing waste in a way that minimizes harm to the environment. Consequently, the American Society of Civil Engineers (ASCE) defines waste management as the planning, design, construction, operation, and maintenance of facilities and systems for the collection, treatment, storage, and disposal of solid, liquid, and gaseous wastes (Lee, 2023). Finally, the International Solid Waste Association (ISWA) defines waste management as "the generation, prevention, characterization, monitoring, treatment, handling, reuse and residual disposition of solid wastes (Bockreis & Ragossnig, 2023)

Health and Safety Costs

Health, safety, and environmental (HSE) expenses are critical investments made by companies to ensure the well-being of their workforce and the protection of the environment while complying with regulatory standards (Chinedu et al., 2019). These expenses encompass various activities such as implementing safety measures, conducting environmental impact assessments, and providing employee training. In the conduct of business operations, employees are exposed to environmental pollution and other environmental health-related challenges. In view of this, firms are expected to make provisions for protection of human lives, avoidance of accidents, and preventions against all forms of disabilities within the environment. Environmental health and safety cost are the cost expended in caring for the safety and health of the workers, including the cost of cleaning and securing the environment (Chinedu et al., 2019). Health and safety cost hinges on securing and

promoting safety and health of staff, both physical and mental. Safe workplaces are profitable and, as such, activities should be carried out to preserve the health of employees, sub-contractors, and the general public (Oshiole et al., 2020). This assertion soon gave rise to stakeholders' theory.

Community Development Cost

Community development costs are incurred within and outside the host communities. Community development donation is the process of developing active and sustainable communities based on social justice and mutual respect. It is about influencing power structures to remove the barriers that prevent people from participating in the issues that affect their lives. Community development donation expresses values of fairness, equality, accountability, opportunity, choice, participation, mutuality, reciprocity, and continuous learning. Educating, enabling, and empowering are at the core of Community development. 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. Thus, organizations as corporate citizens are expected to give back to the society especially communities where they operate (Akinleye & Olaoye, 2021). Community developers must understand both how to work with individuals and how to affect communities' positions within the context of larger social institutions (Bradly, 2015). Community development aligns with the philanthropic expectation placed on organizations at any given time. Oti et al (2017) emphasized that community development is anchored on firm's initiative at cushioning the effect of their externalities on the host communities. Community development cost (CDC) refers to initiatives undertaken by a community with a partnership with external organizations or corporations to empower individuals and groups of people by providing these groups with the skills they need to effect change in their communities. These skills are often concentrated around making use of local resources and building political power through the formation of large social groups working for a common agenda.

Financial Performance

Performance is a concept that varies among firms, and individuals. Thus, it is required for the firms to measure their performances in holistic terms, and be able to analyse their plans as per the determined criteria. For this reason, evaluation using the right parameters is important in terms of customers and service delivery to the general public (Yang, et al., 2022). Financial performance can be characterized as measure of financial capability of a company at any given period of time. Newstyle and Opuene (2022) established that financial performance is a subjective measure of how well a firm can use assets from its primary mode of business to generate revenues. It can be measured in terms of net profit and loss or asset utilization. Che-Ahmad et al. (2019) acknowledged that performance is the ability of an organization to gain and manage the resources in several different ways to develop a competitive advantage. In general, the financial performance of a firm is measured quantitatively and qualitatively determining the inputs and outputs obtained as a result of planned event. At firm level, the definition and measurement of performance are uncertain (Nwaimo, 2020). According to another definition, it is quantitatively and qualitatively revealing that a well-planned activity makes the firms attain their objectives (Agboola & Oroge. 2019). Performance requires a measurement; these measurements are anchored on objective and subjective issues. The measures used in ascertaining the performance of the firms are generally focused on issues such as profitability, sales and investments. Presently on the global front, performance is measured and evaluated from a broad perspective of international trade. As performance measurement affects the strategic decision making at the firm level, only the financial performance measurements seem to be recognized prominently in the financial statements (Utileet al., 2016). The performance of a firm provides the recognition, status position, and market share among committee of firms.

Measure of Financial Performance

Return on Capital Employed

Return on capital employed (ROCE) is a financial ratio that measures a company's profitability and the efficiency with which its capital is employed. Newstyle (2022) explained that return on capital employed is a financial ratio that measures the profitability and efficiency of a company's capital investments. It provides insights into how effectively a company utilizes its capital to generate profits. ROCE is widely used by investors, analysts, and management to assess the performance and value creation potential of a business. Return on capital measures the operating profit of the tangible investment (capital) that company management uses to generate that profit. In other words, return on capital measures how much profit a company earns on every naira invested in inventory and property, plant and equipment. The higher the return on capital, the greater the company's ability to expand in order to grow earnings. The return on capital employed (ROCE) ratio compares a firm's earnings from its primary operations with the capital invested in the company and can serve as a reliable measure of corporate performance (Sengottuvel, 2018). Return on capital employed provides a means of measure to determine how well a company invests funds in its basic business operation. The financial ratio used to express ROCE uses Operating Income as the numerator and Capital Employed as the denominator (Nwaimo, 2020). Operating profit refers to the earnings generated from the core operations of a company before deducting interest and taxes.

Empirical Review

Ezofade et al. (2024) investigated the relationship between environmental accounting and financial performance of Conoil. The ex-post facto research design was employed and a case study of the sampled oil gas giant in Nigeria due to its comprehensive disclosure of environmental expenditures in its annual reports. The study utilized secondary data obtained from annual reports and accounts, downloads from Nigerian Exchange Group (NXG), and the company websites covering the period 2008 to 2022. The study employed descriptive statistics, correlation analysis, and Ordinary Least Squares (OLS) regression using Eview 9 econometric software for data analysis. The correlation analysis result indicates that environmental restoration costs (ERC) are negatively correlated with profit after tax (PAT) and return on assets (ROA), while a positive correlation exists between PAT and ROA, providing insights into Conoil Plc's financial and environmental performance dynamics. The regression analyses reveal that while environmental restoration costs have a significant negative impact on return on assets (ROA), neither ERC nor health, safety, and environmental expenses (HSE) significantly influence profit after tax (PAT), indicating the nuanced relationship between environmental accounting metrics and financial performance in Conoil Plc's operations. The research recommended that the corporation should regularly carry out environmental audits to evaluate adherence to environmental rules and pinpoint opportunities for enhancing environmental performance. The company should allocate resources towards renewable energy projects to reduce reliance on fossil fuels, mitigate environmental impact, and enhance long-term financial sustainability.

Adebisi and Rangu (2024) investigated the impact of environmental accounting on the financial performance of quoted deposit money banks in Nigeria. The sample consisted of 14 banks, which were selected using census sampling techniques. A random effect regression model was used to test the hypotheses after conducting diagnostic tests. The results indicate that environmental conservative cost disclosure has a significant positive effect on return on assets, while environmental compliance cost disclosure has an insignificant positive effect on return on assets. Additionally, community development cost disclosure has an insignificant negative effect on return on assets. The study suggests that deposit money banks in Nigeria should prioritize environmental conservative cost disclosure in their financial reporting and continue to comply with environmental regulations by disclosing their environmental compliance costs to improve their financial performance. The study recommends specific actions for Nigerian banks to enhance their sustainability reporting and ultimately improve their financial performance.

Hussaini et al. (2024) explored environmental taxes impact on Nigerian oil and gas companies' disclosure of environmental accounting information. The study used auxiliary data by generating information on the outcome variable and the explanatory variable from the "Organization for Economic Cooperation and Development" (OECD) and yearly reports of the oil and gas corporations in Nigeria. The analysis included thirteen (13) companies as of December 31, 2021. Fixed-effects regression using Estimation using Driscoll and Kraay standard errors (DKSE) has been used in this study. The study revealed that an increase in total green taxes or transportation taxes will stimulate the disclosure of environmental accounting information by the oil and gas corporations in Nigeria. It is also documented that oil and gas companies that have high C2 intensity are less likely to disclose environmental accounting information. The study findings will be useful to the regulators and policymakers in Nigeria. This is because if the government enhances environmental taxes, it may inspire companies to enhance their environmental accounting procedures.

Nnamani et al. (2024) determined whether there is a relationship between sustainability accounting disclosure and financial performance of Nigerian firms. Specifically, the objectives of the study are; ascertain the effect of corporate social responsibility on return on equity determine the effect of research and development accounting on return on equity and to determine the effect of environmental protection accounting on return on equity of Nigerian oil and gas companies. Ex post facto research design and content analysis were employed for the study. Data for study was collected from annual reports and accounts of the company in Nigeria. Formulated hypotheses were tested using Pearson Correlation with the aid of SPSS Version 26. Based on the analysis, the study revealed that corporate social responsibility has effect on return on equity of Nigerian oil and gas companies, research and development accounting has effect on return on equity of Nigerian oil and gas companies and that environmental protection accounting has no significant effect on return on equity of Nigerian oil and gas companies. The study therefore recommends among other things that accounting regulatory bodies should introduce sustainable environmental accounting and reporting that will take care of environmental/sustainability information dissemination.

Susi et al. (2024) aimed to analyze the profitability in mediating the influence of green accounting and corporate social responsibility disclosure on the firm value. The samples consisted of 220 manufacturing companies, while the moderating variable regression was used in data analysis. The effect of mediating variables was determined using the Sobel test. The study results showed that green accounting did not affect firm value; while CSR disclosure and profitability influenced firm value, but profitability was not able to mediate the effect of green accounting and CSR disclosure on the firm value. The unintegrated system and the company's inability to internalize green accounting and CSR disclosure hindered its non-financial goals to gain an advantage in a competitive market.

Ade (2024) analyzed the application of environmental accounting and environmental management strategies in improving financial performance from an Islamic perspective at the Buay Nyerupa Health Center, West Lampung Regency. The study used a qualitative research method that emphasizes the in-depth understanding of a problem. The results of the study show that the management and minimization of environmental damage at the Buay Nyerupa Health Center has been implemented quite well in accordance with the Statement of Financial Accounting Standards (PSAK) No.5. Although it is not yet detailed for the budget at the Puskesmas, there are already some, namely the general activity plan cost, operational cost, as well as planning cost and expenditure budget.

Etim et al. (2024) examined the effect of green accounting practices on financial performance of oil and gas companies in Nigeria. This was premised on the assumption that green accounting should increase the quality of corporate Services and products by increasing the efficiency of corporate operations and reduction of waste. Desktop approach was adopted to explore the review of existing

empirical studies conducted in Nigeria on green accounting practices of oil and gas firms between 2013 and 2022. Findings from the reviewed studies revealed that green accounting significantly influenced financial performance of quoted oil and gas firms in Nigeria over the period reviewed. It was, therefore, recommended that management of oil and gas companies pay attention to environmental cost and what their operational effects has on the social and environmental ecosystem.

Dwi et al. (2024) examined the impact of green accounting on the level of environmental performance and the impact of environmental performance on corporate social responsibility (CSR) disclosure. The study also tests the role of environmental performance as a mediating variable in the relationship between green accounting and CSR disclosure. The sample consists of 95 listed Indonesian firms during the period 2017–2021. The study adopted Descriptive statistics and PLS-SEM analysis. The results show that the adoption of green accounting positively affects environmental performance. Meanwhile, environmental performance positively affects CSR disclosure. The empirical evidence also shows that environmental performance has a critical role as a mediating variable in the effect of green accounting on CSR disclosure.

Adegboyega et al. (2024) explored the relationship between environmental accounting practices and the financial performance of listed oil and gas companies in Nigeria. The study investigated eight oil and gas companies that are publicly traded on the Nigerian Stock Exchange Market (NGX) as of January 17, 2022, from 2011 to 2022. The study employs DriscollKraay standard errors and reveals that environmental accounting had significant effects on returns on assets, earnings per share, and liquidity ratio. The study revealed that the implementation of environmental accounting practices had diverse effects on the performance oil and gas companies in Nigeria. The findings encourage policymakers and stakeholders in the sector to utilize the insights and design more effective regulations and incentives that promote environmental corporate responsibility. Also, valuable insights into the potential benefits and challenges associated with adopting environmental accounting practices, and influencing the decision-making processes of corporate stakeholders were provided to ensure sustainability in terms of improved financial performance of the oil and gas sector in Nigeria.

Gap in Empirical Review

Extensive review of previous literature showed a population gap as studies focused mainly on the oil and gas sector, manufacturing sector and financial services sector in Nigeria without given little or no considerations to the listed food and beverages firms in Nigeria. To the best of my knowledge, only Emmanuel and Ifeanyichukwu (2021), Adegbie et al. (2020) and Ezeagba et al. (2017) have investigated environmental cost disclosures and financial performance of listed food and beverage companies in Nigeria, and these were done three years ago which created time gap. To the best of knowledge, none of the prior studies have employed community development as a dimension of environmental cost in listed food and beverage companies in Nigeria. Hence, the present study attempted to change the domain focus on the effect of environmental cost on financial performance of listed food and beverage firms in Nigeria.

METHODOLOGY

Research Design

The research applied content analysis to examine the level of environmental costs on financial performance of listed food and beverage firms' in Nigeria. The study adopted ex-post-facto. It deals with the determination, evaluation and explanation of past events essentially for the purpose of gaining a better and more reliable prediction of the future. The "ex-post-facto" research design was found suitable for the purpose of this study as we cannot alter any existing data on the variables or control any of the independent and dependent variables but they were observed simultaneously.

Population for the Study

The targeted population of this study consists of all the listed eight (8) food and beverage firms in the Nigerian Exchange Group (NGX) and the time frame considered for this study was 2013-2022 for the purpose of secondary data collection. Table 1 presents a comprehensive list of the population members.

Table 1 List of Listed food and beverage firms as at December 31st 2022

S/N	Food and Beverage Firms	Year of Observation
1.	Cadbury Nigeria	10yrs
2.	Champion Breweries	10yrs
3.	Golden Guinea Breweries	10yrs
4.	Guinness Nigeria	10yrs
5.	International Breweries	10yrs
6.	Multi-Trex Integrated Foods	10yrs
7.	Nigerian Breweries	10yrs
8.	Nigerian Enamelware	10yrs

Source: www.nse.com.ng

Sample Size and Sampling Techniques

The sampling technique used in this study was purposive sampling technique. As the name implies, it is a sample "chosen purely on the basis of convenience. Six (6) listed food and beverages firms were chosen simply because as at the time of this research work and analysis, Only six food and beverages that are listed in Nigerian Exchange Group formally known as Nigeria Stock Exchange has complete data set that the study needed.

Sources and Method of Data Collection

The study used secondary data for the analysis. Secondary data was used and extracted from the annual reports of the sampled firms in the food and beverage industry for the period of 10 years, from 2013 to 2022. It is believed that the data has been authenticated by the internal and external auditors and that it presented the true condition of the companies through which a good deduction can be made.

Measurement of Variables

Table 2 Explanation of Variables

Variables	Measures/ Abbreviations	Mathematical Expression	Aprori Expectation	Sources
	Waste Management Cost (WMC)	Waste Management Cost are extracted direct from note to the accounts. In some firms it is refer to clean up expense while other refer as repair and maintenance expense.	+	Ade (2024), Damieibi (2023), Abubakar and Sadiq (2023), Akinadewo et al (2023), Ihenyen and Ikegima (2022),
Independent Variable	Health and Safety Cost (HSC)	Health and safety cost are extracted direct from note to the accounts. In some firms it is refer to medical expense while other refer as security expense	+	Thi et al. (2022), Okere et al. (2022).

	Community Development Cost (CDC)	Community development costs are extracted direct from corporate information of the business	+	Adebisi and Rangu (2024), Giami, (2021), Lawrence and Bernard (2023), James and Sylvester (2023), Oraka (2021), Kornom-Gbaraba et al (2020)
Dependent Variable	Return on capital employed (ROCE)	<u>Earnings Before Interest and Tax</u> Capital Employed	- +	Susi et al. (2024), Akinadewo et al (2023), Oshiole et al. (2020) and desk researcher (2024)

Model Specification

The model's specifications were made in a way that it answered the study's specific goals. Because of its straightforward computational process and the estimates, it produces, which have the best properties, including linearity, unbiasedness, minivariance, and mean square error estimation, panel least square (PLS) was chosen for this research project (Koutsoyianis, 2003). In carrying out this research work on the effect of environmental costs on the financial performance, we developed a compact form of our as follows:

Model: Return on Capital Employed (ROCE) Model

ROCE = f (WMC HSC, CDC)i

This can be written in Panel Least Square (PLS) form as:

ROCE_{it} = a₀ + a₁WMC_{it} + a₂HSC_{it} + a₃CDC_{it} + U_{it} ii
 $a_1 > 0; a_2 > 0; a_3 > 0; a_4 > 0$

Method of Data Analysis

This study employed descriptive statistics; unit root tests, Hausman Test and Panel Least Squares. The E-views version 12 was used for the descriptive statistics; unit root tests on the other hand were performed to ascertain the stationarity state of the dataset as well as the regression technique of Panel Least Squares (PLS). Nevertheless, other tests of significance which was used in the study were:

- i. T-test was used to test for the significance of the coefficient of the variables;
- ii. R² – coefficient of determination was used to test the explanatory power of the independent variable;
- iii. F-Ratio was used to test for the significance of the overall models;
- iv. Durbin-Watson (DW) test was used to test whether auto-correlation exist or not in error term (u).

ANALYSIS OF RESULTS AND DISCUSION OF FINDINGS

Data Analysis

Table 3: Descriptive analysis

	WMC	HSC	CDC	ROCE
Mean	5.697383	5.940456	6.964216	0.347614
Median	5.728436	6.023735	7.070961	0.156781
Maximum	7.238459	7.217599	8.802464	7.342419
Minimum	3.636187	3.022428	3.624179	0.015132
Std. Dev.	1.097141	1.188796	1.249844	0.977948
Skewness	0.334456	1.103897	1.143158	6.829349
Kurtosis	4.093631	3.381922	4.044119	4.368981
Jarque-Bera	2.908007	11.50468	14.47744	5354.806
Probability	0.233633	0.07175	0.071823	0.187722
Sum	313.3561	326.7251	383.0319	19.11877
Sum Sq. Dev.	65.00085	76.31480	84.35394	51.64464
Observations	60	60	60	60

Source: Author Computation, (2024) using E-Views 12

From the results in table 3 the study observed that the financial year in which the financial information has been extracted from six (6) listed food and beverage firms in Nigeria spanning for the period between 2013 - to - 2022. The study disclosed an observation period 60 implying (10 x 6) years. The waste management cost (WMC) shown a mean, median, standard deviation value as 5.697; 5.728; and 1.097 respectively that highlighted the minimum and maximum waste management cost (WMC) ranges from 3.2636 to 7.238 members for the time period observed among the sampled listed food and beverage firms in Nigeria. The health and safety cost (HSC) revealed a mean, median, standard deviation value as 5.940; 6.023; and 1.188 respectively whereby the minimum and maximum health and safety cost (HSC) ranges from 3.022 to 7.217 held for the time period observed among the sampled listed food and beverage firms in Nigeria. The community development cost (CDC) disclosed a mean, median, standard deviation value as 6.964; 7.070 and 1.249 respectively that highlighted the minimum and maximum community development cost ranges from 3.624 to 8.802 for the time period observed among the sampled listed food and beverage firms in Nigeria.

The return on capital employed (ROCE) reveals a mean, median, standard deviation value as 0.347; 0,156; and 0.977 respectively highlighted the minimum and maximum return on capital employed (ROCE) ranges from 0.015 to 7.342 capital for the time period observed among the sampled listed food and beverage firms in Nigeria. The skewness statistics indicated that all the three dimensions of environmental costs (WMC, HSC and CDC) are positively skewed which showed the variables has a long right tail. Also, the measure of financial performance (ROCE) are also positively skewed which shown the variables has a long right tail. The information provided by kurtosis result demonstrated that WMC, HSC, CDC and ROCE have a mesokurtic values 4.093; 3.381 and 4.044 respectively reported that the variables are greater the kurtosis value (3) for the time period observed among the sampled listed food and beverage firms in Nigeria. Finally, the Jarque-Bera test statistics disclosed that probability values (0.233; 0.0717; 0.0718 and 0.187) of the variables are greater than the 5% critical level implying that the panel data set is normally distributed.

Unit Root Test

Stationarity implies that the mean, variance and covariance are constant across different periods. Existence of unit roots can lead to serious issues such as; spurious regressions and errant behaviour variables due to econometric assumptions for analysis not being valid. This study tested for the stationarity of all variables used by applying two different panel unit root test namely; the Im, fPesaran & Shin Test and Levin, fLin & ChufTest. According to table 4 below, all variables were stationary at levels; thereby indicating that all variables were integrated of order zero, i.e. I(0).

Table 4 Unit Root Test Results

Variable	ADF FISHER				Order of integration	Remark
	ADF - Fisher Chi-square Statistics	ADF - Fisher Chi-square Prob	ADF - Choi Z-stat Statistics	ADF - Choi Z-stat Pro		
WMC	27.3952	0.0068	-2.13844	0.0162	I(0)	Stationary
HSC	22.3215	0.0341	-1.68342	0.0461	I(0)	Stationary
CDC	41.3152	0.0000	-4.23656	0.0000	I(0)	Stationary
ROCE	41.3362	0.0000	-3.89416	0.0000	I(0)	Stationary

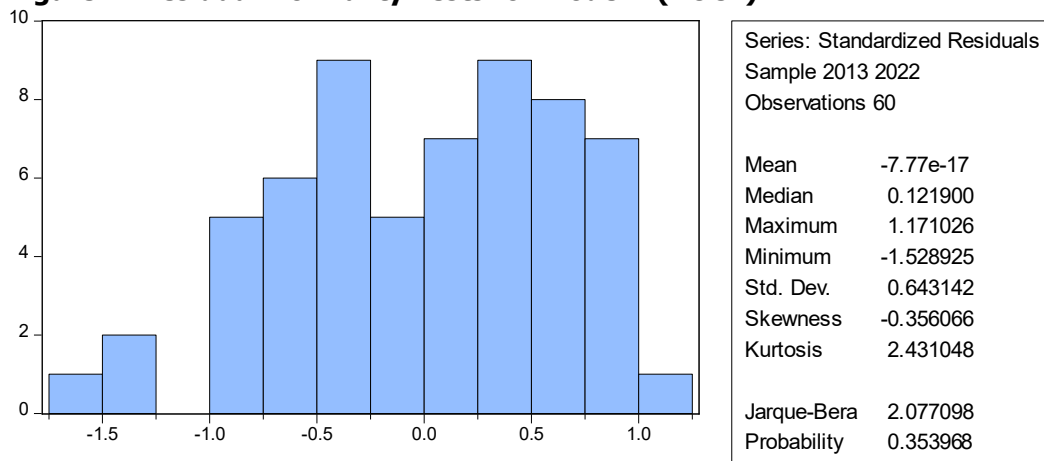
Source: Author Computation, (2024) using E-Views 12

The empirical results of the ADF - Fisher unit root test at 5 percent critical levels in table 4 above shows that all the variables of interest are I(0), that is, stationary at levels. Their p-values are less than 5% with respect to ADF - Fisher Chi-square Prob and ADF - Choi Z-stat Pro.

Diagnostic Test Results

The following sections discuss the results of the diagnostic tests that were conducted to ensure whether the data fits the basic assumptions of the classical linear regression model. The implication of the test, limits therein, test results and their discussion are also presented.

Figure 1: Residual Normality Tests for model I (ROCE)



Source: Author Computation, (2024) using E-Views 12

The Jarque-Bera is a statistical process used to determine if a sample or any group of data fits a standard normal distribution. The result of the Jarque-Bera normality test (2.077) with a probability value of 0.353 indicates that the model residuals are normally distributed.

Multivariate Data Analysis

The panel data collected from the five agricultural companies and for ten years lead to a total sample size of 60 company-years. Random effects and fixed effect regression model has been developed to verify the cause and-effect relationship between the dependent and independent variables. Table 5 discloses Hausman Test for the choice of Random effects and fixed effect regression.

Table 5 Hausman Test for Model I (ROCE)

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	0.186572	4	0.9959

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
WMC	0.162997	0.149252	0.109306	0.9668
HSC	0.167412	0.292566	0.125522	0.7239
CDC	0.292418	0.282673	0.107557	0.9763
FS	0.000802	-0.046490	0.024941	0.7646

Source: Author Computation, (2024) using E-Views 12

Hausman test is a test the consistency of an estimator, in so doing, evaluating the fitness of the statistical model to the data gathered. With this test, the study identified if the Random-effect or Fixed-effect model should be adopted for further analysis. From table 5, the Hausman test shows that individual effects is independent of the explanatory variable given that the probability value of 0.9959 is above the 5% significant level, thereby accepting the null hypothesis. Accordingly, the study adopts the Random-effect multiple regression for model 1 estimation.

Table 6 Regression Analysis of Model I (ROCE)

Dependent Variable: ROEC

Method: Panel EGLS (Cross-section random effects)

Date: 01/23/24 Time: 06:41

Sample: 2013 2022

Periods included: 10

Cross-sections included: 6

Total panel (balanced) observations: 60

Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
WMC	0.156833	0.064343	2.437435	0.0181
HSC	-0.191022	0.070252	-2.719073	0.0087
CDC	0.277494	0.065031	4.267113	0.0001
FS	0.462339	0.110871	4.170078	0.0001
C	1.334499	0.588376	2.268106	0.0273

Effects Specification		S.D.	Rho
Cross-section random		0.000000	0.0000
Idiosyncratic random		0.405156	1.0000

Weighted Statistics			
R-squared	0.691678	Mean dependent var	6.472817
Adjusted R-squared	0.669255	S.D. dependent var	0.786811
S.E. of regression	0.452498	Sum squared resid	11.26150
F-statistic	30.84629	Durbin-Watson stat	1.867351
Prob(F-statistic)	0.000000		

Unweighted Statistics			
R-squared	0.691678	Mean dependent var	6.472817
Sum squared resid	11.26150	Durbin-Watson stat	1.867351

Source: Author Computation, (2024) using E-Views 12

The results in table 6 disclosed the regression coefficients ($R^2 = 0.691$, Adjusted $R^2 = 0.669$, F-statistic = 30.846, DW = 1.867). The results of the regression model disclosed the effect of the independent variables waste management cost (WMC), health and safety cost (HSC), and community development cost (CDC) as well as firm size (FS) on the dependent variable return on capital employed (ROCE). The coefficient of determination R^2 represented the proportion of variance of return on capital employed (ROCE) that has been explained by waste management cost (WMC), health and safety cost (HSC), and community development cost (CDC) as well as firm size (FS) in the regression model. The Adjusted R^2 provides an insight of goodness of fit of the model. This implied that 66.9% changes in return on capital employed (ROCE) contributed to changes in waste management cost (WMC), health and safety cost (HSC), and community development cost (CDC) as well as firm size (FS) among the listed food and beverage firms in Nigeria while 33.1% was explained by unknown variables that were not included in the regression model. The Durbin-Watson statistic test discovered that there is a positive evidence of autocorrelation in the time series data set. The F-statistic and its corresponding probability value disclosed that the regression model satisfies the overall goodness-of-fit statistical test.

Statement of Hypotheses

- H0₁: Waste management cost has no significant effect on return on capital employed of listed food and beverage firms in Nigeria.
- H0₂: Health and safety cost has no significant effect on return on capital employed of listed food and beverage firms in Nigeria.
- H0₃: Community development cost has no significant effect on return on capital employed of listed food and beverage firms in Nigeria.

Decision 1: The results in table 6 reported the effect of waste management cost (WMC) on return on capital employed. The waste management cost (WMC) coefficient (0.156) and T-statistics 2.437 disclosed a positive effect. The Prob. ** value 0.018 < 5% chosen significant level. Given the above result, the study rejected the null hypothesis one and accepted the alternative hypothesis one. Hence, the study concluded that waste management cost has positive and significant effect on return on capital employed of listed food and beverage firms in Nigeria.

Decision 2: The results in table 6 reported the effect of health and safety cost (HSC) on return on capital employed. The health and safety cost (HSC) coefficient (-0.191) and T-statistics -2.070 disclosed a negative effect. The Prob. ** value 0.008 < 5% chosen significant level. Given the above result, the study rejected the null hypothesis two and accepted the alternative hypothesis two. Hence, the study concluded that health and safety cost has negative and significant effect on return on capital employed of listed food and beverage firms in Nigeria.

Decision 3: The results in table 6 reported the effect of community development cost (CDC) on return on capital employed. The community development cost (CDC) coefficient (0.277) and T-statistics 4.267 disclosed a positive effect. The Prob. ** value 0.000 < 5% chosen significant level. Given the above result, the study rejected the null hypothesis three and accepted the alternative hypothesis three. Hence, the study concluded that community development cost has significant effect on return on capital employed of listed food and beverage firms in Nigeria.

CONCLUSIONS AND RECOMMENDATIONS

This study determined the effect of environmental costs on financial performance of food and beverage firms in Nigeria. Based on the data analysis, and discussion of findings, and summary of findings above, the study concluded that;

1. Waste management cost positively affect return on capital employed of listed food and beverage firms in Nigeria.
2. Health and safety cost negatively affect return on capital employed of listed food and beverage firms in Nigeria.
3. Community development cost positively affect return on capital employed of listed food and beverage firms in Nigeria.

Note: The study generally concluded that there is a positive and significant effect of environmental costs on financial performance of food and beverage firms in Nigeria for the period 2013 - 2022.

In line with the objectives of this study, findings and conclusions which facilitate for the following recommendations:

1. Management of listed food and beverage firms in Nigeria should ensure adequate compliance with the guidelines of waste management cost as this portrays a good image of their firm financial performance.
2. Environmental waste management cost and financial performance are positively related. The firms in the Nigerian Exchange Group should be environmentally friendly to enable them gain competitive advantage, high liquidity and reduced environmental cost in the long run.

3. Firms in the Nigerian Exchange Group should continue with their environmentally friendly strategies in term health and safety costs since the higher the environmental cost of health and safety, the higher their return on capital employed.

Implications/Contribution to Scholarship: The study has contributed to the body of knowledge in accessing the environmental cost reporting heterogeneity across food and beverage firms and equally shows the complexity by which the overall environmental cost reporting affects their financial performance in terms of change in return on capital employed, earnings per shares and net profit margin. The study also enables firms to have full knowledge of what environmental cost practice is and its effect on man and the overall environment. The findings also assist firms to improve on their support for waste management cost reporting, health and safety cost reporting and community development cost reporting. The econometric model established also aids future researchers in environmental cost reporting practice measurement

Practical implications: The research and practical implications of the study's findings and interpretations are summed up here. Implications for theory highlight the study's contributions to the expanding amount of literature on the pervasive use of environmental cost by food and beverage firms. Under the implications for researchers, the study's contributions to improving the methodology of past studies on environmental accounting are explored. Moreover, food and beverage enterprises can be encouraged and assisted in their transition to environmental cost employing proper governmental guidelines. Firms can use the study's findings to evaluate how their level of adoption stacks up against that of competing oil and gas companies; this information is also applicable to the broader manufacturing sector. Benefits from using environmental accounting methods are expected to improve if owners and managers apply the paradigm established in this study.

Policy implications: The study calls for the establishment of policies, encouraging the adoption of environmentally friendly bookkeeping techniques by food and beverage firms, and fostering understanding of these concepts which lead to greater sustainability. Environmental impact and sustainability capacity education must be prioritized in public policy and general public interventions. Based on this, policy implications below are suggested:

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