



## Assessing Financial Returns Through Environmental Responsibility Disclosure Among Listed Oil and Gas Firms in Nigeria

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### ABSTRACT

The research investigated how environmental responsibility disclosure influences the financial returns of oil and gas firms listed in Nigeria. Waste management disclosure served as the measure for environmental responsibility disclosure, while financial performance was indexed by return on equity, return on capital employed, and return on sales margin. Firm size was controlled for in the model. The study adopted an *ex-post facto* research design and selected six out of ten listed oil and gas firms in Nigeria as sample participants based on purposive sampling. Financial data spanning from 2013 to 2022 were collected from the sampled firms' financial statements and annual reports. Ordinary least square regression analysis was utilized to test the hypotheses. The results indicated that waste management disclosure had a positive but statistically insignificant impact on the return on equity (p-value = 0.8296) and return on capital employed (p-value = 0.9099) of the listed oil and gas firms. Additionally, waste management disclosure showed a negative but statistically insignificant effect on the return on sales margin (p-value = 0.9851) of these firms. The study concluded that firms implementing responsible waste management practices might enjoy improved investor perception and potentially enhanced financial performance. Consequently, it recommended that Nigerian listed oil and gas companies should adopt cost-effective waste management practices, investing in renewable energy, and reducing waste generation in order to improve their financial performance while also reducing their environmental footprint.

**Keywords:** Environmental Responsibility Disclosure, Financial Performance, Waste Management Disclosure, Financial Returns, Return on Equity, Return on Capital Employed, Return on Sales Margin

### 1.1 Introduction

Oil and gas firms are critical to the Nigerian economy, as they are one of the country's major sources of foreign exchange and revenue. However, the operations of these firms can also have significant negative impacts on the environment, including air and water pollution, deforestation, and biodiversity loss (Obiora, Onuora & Okoye 2022; Madawa & Ebiaghan, 2022). These environmental impacts can have both short-term and long-term consequences for human health, the natural environment, and the economy. As concerns about the environment have grown in recent years (Wu & Li, 2023), there has been increasing interest in environmental accounting as a tool for managing and reporting on environmental performance. Environmental accounting involves the identification, measurement, and reporting of a company's environmental impacts and costs, and it can provide valuable information for decision-making related to environmental management.

Historically, scholars have placed blame on capital markets for contributing to various environmental challenges due to their focus on profit maximization, insatiable demands, and indiscriminate consumption of natural resources during their operations. The severity of these environmental issues has a negative impact on both the quality of human life and environmental sustainability worldwide (Triyani, Astuti, Putri & Setyahuni, 2023). Sustainability accounting has been utilized as a remedy to address these issues by providing a means to disclose environmental and social responsibility for various entities, including industrial and commercial services, at all levels, ranging from micro to macro ((Nworie & Aniefuna, 2024; Hsu & Chen, 2023; Ukoh, Nduokafor & Nworie, 2024). Consequently, modern accounting reporting now incorporates new objectives, such as measuring and evaluating the potential or actual environmental impact of production activities on the natural environment (Norhasimah, Norhabibi, Nor, Sheh & Ali, 2016), waste management disclosure (Obiora & Omaliko, 2022), et cetera.

According to Emmanuel, Egberioyinemi, and Tonademukaila (2019), a comprehensive disclosure of environmental responsibility costs is likely to have an impact on the decisions of investors and lenders. This is because these parties evaluate risks and potential returns to determine the best investment opportunities, which ultimately enhances capital allocation efficiency and reduces capital costs (Suttipun, 2023). In addition, high-quality corporate environmental disclosure enhances transparency about a company's adherence to legal and ethical requirements (El Khoury, Nasrallah & Alareeni, 2023). The environmental responsibility aspect of accounting serves two purposes - providing information for internal use (enabling management to make

decisions about controlling costs, capital budgeting, and pricing) and external use (disclosing environmental information that is relevant to the government, public, and financial community) (Wang, H., Bao, X., & Wang, Y. (2023).

In the past decade, sustainability reporting advocates have asserted that companies with strong environmental performance can benefit financially, gaining corporate legitimacy, a positive reputation, and stakeholder support (Wu & Li, 2023). However, some scholars still oppose this view, arguing that all businesses prioritize profits and that environmental accounting places an unfair and undemocratic burden on shareholders (Onyebuanyi & Ofoegbu, 2022). Detractors also claim that the costs of implementing environmental accounting outweigh any potential benefits, resulting in a misallocation and misappropriation of company resources. To address these opposing views, academics in various fields have empirically investigated whether environmental accounting can lead to superior financial performance for firms (Saleh, Bappah, Orsaa & Saleh, 2022). Recently, the public's increased interest in environmental reporting and the growth of environmentally-responsible industries have further motivated academic exploration into the relationship between corporate environmental disclosure and financial performance (Kurawa & Shuaibu, 2022; Worimegbe, 2022).

Although natural resources are vital to economic development, the production activities of manufacturing firms and ceaseless consumption of natural resources have resulted in unpleasant environmental consequences such as environmental degradation and atmospheric pollution in Nigeria. The depletion of natural resources and the continued emission of greenhouse gases in Nigeria are increasing and causing concern among stakeholders. Therefore, there is a need for greater understanding of how the production activities of oil and gas firms impact the environment (Chukwudi, Uchechukwu & Enekwe, 2016).

However, in Nigeria, companies are not obligated by any accounting standards, regulations or statutory guidelines to disclose environmental accounting information in their annual reports (Madawa & Ebiaghan, 2022). This has resulted in voluntary adoption of environmental disclosure practices mainly driven by good industrial practice, leading to numerous environmental hazards such as resource depletion, pollution, and environmental degradation from their production activities within the human environment.

Thus, the depletion of the ozone layer continue to cause an imbalance in the environmental system that supports human life, emphasizing the need for proper environmental accounting to account for the impact of corporate activities (Worimegbe, 2022). The lack of comprehensive and reliable information on the environmental practices of oil and gas firms allows companies to pollute the environment while appearing more economically efficient than others who incur costs to protect the environment. Without proper accounting records to monitor and manage environmental costs, the financial performance of firms may continue to decline.

The broad objective of the study is to examine the effect of environmental responsibility disclosure on the financial performance of listed oil and gas firms in Nigeria. The specific objectives are:

1. To determine the effect of waste management disclosure on return on equity of listed oil and gas firms in Nigeria.
2. To ascertain the influence of waste management disclosure on the return on capital employed of listed oil and gas firms in Nigeria.
3. To ascertain the effect of waste management disclosure on the return on sales margin of listed oil and gas firms in Nigeria.

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## **2.0 Literature Review**

### **2.1 Conceptual Review**

#### **2.1.1 Environmental Responsibility Disclosure**

Environmental responsibility disclosure involves the collection, analysis, and assessment of both environmental and financial performance data obtained from business management and financial accounting systems (Obiora, Onuora & Okoye, 2022). This process requires the incorporation of environmental costs and information into various accounting practices. Egbunike and Oraka (2016) define environmental accounting as the categorization of business activities based on their impact on the environment, the collection and analysis of this environment-related data, and the integration of this information into a business balance sheet to inform decision-making. Environmental responsibility disclosure is used to record and report the sum total of activities and programs in which a company engages in (Nworie, Obi, Anaike & Uchechukwu-Obi, 2022).

Environmental responsibility disclosure helps to quantify the impact of a company's activities on the environment, such as greenhouse gas emissions, water usage, waste generation, and pollution (Wu & Li, 2023). It also considers the costs and benefits associated with environmental management practices, such as investments in energy efficiency and renewable energy sources. Environmental responsibility accounting is essential in making informed decisions about resource allocation, risk management, and sustainable development. It provides information to stakeholders about the environmental performance of a company, which can help in building trust, improving transparency, and enhancing the company's reputation (Wang, Bao & Wang, 2023). Generally, environmental accounting is a tool for balancing economic growth with environmental protection, helping companies to operate in a more sustainable and responsible manner.

In the broader context of sustainability accounting, which involves the consideration of environment-related monetary and physical information (Saleh, Bappah, Orsaa & Saleh, 2022), environmental accounting is viewed as the aggregation and reporting of accounting information, including natural resource accounting, at the organization-level for natural accounting purposes (Oluwamayowa, 2020). Effiok, Basse, and Okon (2013) also conceptualized Environmental Accounting as involving the identification, measurement, and allocation of environmental costs, as well as the integration of these costs

into business operations and communication of this information to stakeholders. Similarly, Amin, Magara, and Momanyi (2015) describe Environmental Accounting as a system that aims to quantitatively assess the costs and benefits to an enterprise resulting from its environmental preservation activities, using either monetary or physical units.

According to Ezeagba, John-Akamelu, and Umeoduagu (2017) as well as Asuquo (2012), the awareness of the environment and the potential for human damage to it can be traced back to the 1850s, and environmental concerns have been repeatedly expressed in a series of international summits and agreements since the 1960s. Onyekachi, Ihendinihu, and Azubike (2020) argue that the pivotal moment in the growth of the global environmental movement occurred at the World Conference on the Human Environment held in Stockholm in June 1972, where heads of state from around the world came together for the first time.

### **2.1.1.1 Waste Management Disclosure**

Waste management disclosure refers to the process of providing information about an organization's waste management practices to its stakeholders. This can include shareholders, customers, employees, regulators, and the general public. The purpose of waste management disclosure is to provide transparency about an organization's environmental performance, and to allow stakeholders to assess the organization's impact on the environment and society (Obiora & Omaliko, 2022). Waste management disclosure can take many forms, such as sustainability reports, environmental impact assessments, and disclosures required by regulatory bodies (Meidiana & Gamse, 2010). These disclosures typically include information about the amount and type of waste generated by the organization, the methods used to manage and dispose of waste, and the organization's efforts to reduce waste and promote recycling (Hassan & Ibrahim, 2012).

In addition to providing information about waste management practices, waste management disclosure can also include information about an organization's sustainability initiatives and goals (Amahalu, 2020). This can help to demonstrate the organization's commitment to environmental stewardship and social responsibility. By providing waste management disclosure, organizations can improve their reputation and build trust with their stakeholders (Winit, Ekasingh & Sampet, 2023). It can also help to identify areas where the organization can improve its waste management practices, and promote accountability and responsible behavior (Benjamin, Regasa, Wellalage & Marathamuthu, 2020).

Waste management is the process of collecting, transporting, processing, recycling, and disposing of waste materials in a way that minimizes their impact on the environment and human health (Obiora & Omaliko, 2022). The goal of waste management is to reduce the amount of waste produced, promote recycling and reuse, and ensure that any remaining waste is handled safely and efficiently. The process of waste management begins with waste generation (Bogdan, Sabău-Popa, Boloş, Popa & Beleneşi, 2022), which can be divided into two types: non-hazardous waste and hazardous waste. Non-hazardous waste includes household waste, industrial waste, and construction and demolition waste. Hazardous waste includes waste materials that can pose a threat to human health and the environment, such as chemicals, batteries, and electronic waste.

### **2.1.2 Financial Returns**

Financial return is a measure of how effectively a company can utilize its assets from its primary business operations to generate revenue (Aggreh, Abiahu & Nworie, 2023). The need to measure financial return is rooted in management's obligation to provide an account of their stewardship to the shareholders. Amin, Magara, and Momanyi (2015) further explained that measuring financial returns such as profitability, market value, and growth prospects are key aspects of this process. Accounting-based measures analyze the relationship between social performance indicators (such as reputation, disclosure of social information, environmental behavior, etc.) and a company's corporate performance, which is obtained from accounting information such as audited financial statements of the respective firms (Onyekachi, Ihendinihu, & Azubike, 2020).

The financial return of a company is essentially related to its financial health, which includes factors such as profitability, solvency, liquidity, gearing, and growth opportunities. Corporate financial performance refers to a monetary measure of how well a business enterprise conducts its corporate activities in an economically efficient manner (Nworie, Onyeka & Anaike, 2023). For profit-making companies, corporate financial performance is a crucial consideration and serves as a bottom-line for assessing the goals of the firm. In a broader sense, according to Onipe (2018), firm performance refers to the extent to which financial objectives are being achieved. This involves various financial metrics that are utilized to assess or measure the outcomes of a firm's policies and operations in monetary terms (Ezeagba, John-Akamelu & Umeoduagu, 2017).

#### **2.1.2.1 Return on Equity**

Return on Equity (ROE) is a financial metric that measures a company's profitability relative to the total amount of shareholder equity invested in the company. In other words, ROE indicates the return that shareholders receive on their investment (Andriani, Kusumastuti & Hernando, 2023). A company with a high ROE is likely to be proficient at generating internal cash flow. As a result, a higher ROE generally signifies better profitability. ROE is also the ratio of net income after taxes to total equity capital (Kusz, Bąk, Szczecińska, Wicki & Kusz, 2023). Return on Equity is a widely used financial ratio that measures a company's profitability by comparing the amount of net income generated to the total amount of shareholder equity invested in the company. In simpler terms, it indicates the percentage of profit that shareholders earn on their investment in the company (Almira & Wiagustini, 2020). To calculate ROE, the net income of a company is divided by the total shareholder equity, and then multiplied by 100 to get a percentage. Shareholder equity is the difference between a company's assets and liabilities, and represents the amount of money that would be returned to shareholders if all assets were sold and liabilities paid off.

### **2.1.2.2 Return on Capital Employed**

Return on capital employed (ROCE) is essential financial ratio that measures a company's efficiency in generating profits from its equity and noncurrent liabilities (Casielles, 2019). It provides insights into how effectively a company is using its capital employed to generate revenue and profits (Murtala, Ibrahim, Lawal & Abdullahi, 2018). ROCE is calculated by dividing the company's net income before interest by its total capital employed. Net income before interest is the total profit earned by the company before deducting all interest and taxes, while total capital employed represent the value of all equity and noncurrent debts owed by the company. Similar to ROE, a higher ROCE indicates that the company is generating more profits from its resources. This implies that the company is utilizing its borrowed funds and shareholders' equity efficiently to generate revenue and profits, which is beneficial for its long-term financial stability. ROCE is a crucial measure for investors as it indicates how much return they can expect to receive from their investment in the company (Umobong & Agburuga, 2019). A company with a higher ROCE is more attractive to investors, as it implies that the company is generating more profits per unit of capital employed.

### **2.1.2.3 Return on Sales Margin**

Return on sales margin is a financial ratio that measures a company's profitability by calculating the percentage of revenue that remains after deducting all of the expenses, including taxes, interest, and operating costs (Mahdi & Khaddafi, 2020). The ROS margin indicates how much profit a company earns for every naira of revenue it generates (Rika, 2016). A higher ROS margin indicates that a company is more efficient at controlling its expenses and generating profit, while a lower ROS margin may indicate that a company is struggling to control its costs or facing competitive pressures.

Return on sales margin provides insight into how well a company is generating profit from its operations, and how efficiently it is managing its costs (Wahyu & Mahfud, 2018). To calculate return on sales margin, a company's net profit is divided by its total revenue, and then multiplied by 100 to get a percentage (Lukić, 2018). The net profit is the amount of money that a company has left over after all expenses have been deducted, including cost of goods sold, operating expenses, interest payments, taxes, and other charges. Return on sales margin is an important metric for investors and analysts because it helps them understand how much profit a company is making on each naira of sales (Sunaryo, 2020).

## **2.2 Theoretical Framework**

### **2.2.1 Stakeholders Theory**

The concept of stakeholders as groups that have an interest in the actions of a corporation was first introduced by Freeman and Reed in the year 1983. In a subsequent study, Freeman (1984) reviewed stakeholder theory and redefined stakeholders as any individual or group that can affect or is affected by the activities of the company. The Stakeholder theory perspective posits that managers have an obligation to satisfy the interests of all groups that can influence the outcomes of the firm. Therefore, it is insufficient for managers to focus solely on the needs of shareholders or owners of the business. It could be financially beneficial for the company to engage in certain environmental activities that non-financial stakeholders view as important in order to gain the support or approval of these groups (Ezeagba, John-Akamelu & Umeoduagu, 2017).

The stakeholder theory emphasizes the importance of meeting the needs of various stakeholder groups to achieve strategic organizational objectives. Egbunike and Oraka (2016) argue that the theory promotes the integration of different stakeholder groups within society and advocates for their effective management, while taking into account the relationship between the organization and its internal and external environment. Environmental cost accounting facilitates the measurement, disclosure, and accountability of organizational performance towards the goal of sustainable development to both internal and external stakeholders, as defined by the Sustainability Reporting Guidelines (2011).

The Stakeholders theory posits that the success of a company is contingent on the effective management of relationships with all stakeholders. This theory is particularly pertinent to the current study because it advocates for heightened environmental consciousness, which necessitates that companies expand their planning to encompass non-traditional stakeholders such as regulatory agencies and adversarial groups, in order to adjust to evolving social expectations such as environmental disclosure. It is against this backdrop that the present study is grounded in the Stakeholders theory.

### **2.3 Empirical Review**

Several studies have explored the nexus between environmental disclosure and financial performance across different contexts. Wu and Li (2023) investigated heavy polluting enterprises in China from 2008 to 2019, utilizing a hierarchical linear model (HLM). They found a positive relationship between environmental disclosure and financial performance. Moreover, they discovered that economic development and information penetration at the provincial level influenced this relationship, with economic development reinforcing it while information penetration weakened it.

Wang, Bao, and Wang (2023) analyzed A-share listed companies in China's building materials industry from 2015 to 2019. Their regression analysis revealed a significant positive correlation between environmental information disclosure and corporate performance, suggesting that enhancing the quality of environmental information disclosure could enhance corporate performance.

El Khoury, Nasrallah, and Alareeni (2023) studied the impact of Environmental, Social, and Governance (ESG) factors on bank performance in the MENAT region from 2007 to 2019. Their non-linear regression analysis revealed a non-linear relationship between ESG factors and bank performance, indicating incremental benefits until reaching a turning point.

Kurawa and Shuaibu (2022) investigated the influence of environmental disclosure on the financial performance of non-financial companies in Nigeria from 2013 to 2020. They found a positive significant relationship between waste management disclosure and earnings per share (EPS), but a negative relationship with Tobin's Q.

Saleh, Bappah, Orsaa, and Saleh (2022) explored the effect of sustainability disclosure on the market value of Oil and Gas firms in Nigeria from 2016 to 2020. They found that legal/ethical activities and economic activities significantly and positively affect the market value of these firms.

Onyebuanyi and Ofoegbu (2022) examined the effect of environmental sustainability disclosure on financial performance of oil and gas companies in Nigeria, Namibia, and Kenya from 2011 to 2019. They found a statistically significant impact of effluent and hazardous waste disclosure on earnings per share.

Obiora, Onuora, and Okoye (2022) assessed the impact of environmental accounting practice and social responsibility disclosures on the value of Oil and Gas firms in Nigeria from 2016 to 2020. Their findings indicated a significant and positive influence on firms' value measured by net assets per share (NAPS).

Madawa and Ebiaghan (2022) focused on listed oil and gas firms in Nigeria from 2010 to 2020, finding a negative and significant effect of ROE on environmental cost disclosure, a positive relationship between NPM and environmental cost disclosure, and no significant effect of EPS on environmental cost disclosure.

Worimegbe (2022) explored the impact of environmental costs on the market share of listed manufacturing companies in Nigeria from 2007 to 2017, revealing a significant positive impact of environmental costs on market share.

Ilelaboye and Alade (2022) examined the effect of environmental accounting on the performance of family-owned companies in Nigeria from 2012 to 2020, showing that restoration costs had a negative and insignificant effect, community development costs had a negative and significant effect, and health safety costs had a positive and insignificant effect on financial performance.

Orshi, Barde, and Muhammad (2022) investigated the relationship between environmental performance disclosure and the value of listed manufacturing firms in Nigeria from 2013 to 2020, finding a significant and positive effect of environmental performance disclosure on firm value, moderated by ownership structure.

Onyekachi, Ihendinihu, and Azubike (2020) assessed the effect of environmental performance on the earnings of listed oil and gas firms in Nigeria from 2008 to 2017, revealing a significant association between firms' investments in the environment and their earnings.

Atang and Eyisi (2020) determined the determinants of environmental disclosures of listed manufacturing firms in Nigeria, showing a positive association between firm profitability and environmental disclosure.

Sharon, Iyoha, and Akintola (2020) examined the impact of environmental reputation management on the financial performance of environmentally sensitive companies in Nigeria from 2008 to 2017, revealing a significant positive relationship between environmental reporting quality and financial performance.

Falope and Offor (2019) studied the effect of environmental disclosure and performance of quoted Nigerian construction firms, finding that pollution control costs, environmental protection costs, and environmental recycling disclosure had effects on return on assets.

Ike and Iheduru (2019) investigated the effect of environmental and social costs on the performance of manufacturing companies in Nigeria, showing significant negative relationships between environmental and social costs and ROCE and EPS, and significant positive relationships between environmental and social costs and NPM and DPS.

Emmanuel, Egberioyinemi, and Tonademukaila (2019) determined the effect of environmental accounting disclosure on the firm value of listed industrial goods companies in Nigeria from 2007 to 2016, revealing a positive significant effect of non-financial indicators on firm value and a negative significant effect of performance indicators on firm value, with no significant effect of financial indicators.

Onipe (2018) explored the effect of environmental disclosure practices on the financial performance of listed environmentally sensitive firms in Nigeria, revealing positive and significant relationships between environmental reporting practices and financial performance.

Arshad (2018) examined the effect of environmental accounting on the financial performance of selected companies in Erbil, finding that the effect of environmental accounting on financial performance was not statistically significant.

Oluka and Nwaiwu (2018) investigated the impact of environmental cost disclosure on the financial performance of quoted oil and gas companies in Nigeria. Employing a causal-comparative research design, they collected time series data from annual financial reports and economic reviews from the Central Bank of Nigeria. Using Pearson product moment correlation and multiple linear regression analysis via SPSS version 22, the study found a positive and significant effect of corporate environmental regulation compliance on financial performance measures. Additionally, there was a significant relationship observed between environmental cost disclosure and financial performance, particularly on earnings per share. The study recommended enhanced environmental reporting to ensure proper corporate environmental stewardship and advocated for precise cost allocation between environmental and other expenses to develop sustainability indicators.

Ezeagba, John-Akamelu, and Umeoduagu (2017) investigated the relationship between environmental accounting disclosures and financial performance of food and beverage companies in Nigeria. Through ex-post facto research design, they found a significant positive relationship between environmental accounting disclosures and return on equity, but a negative relationship with return on capital employed and net profit margin.

Egbunike and Oraka (2016) appraised environmental accounting information in the financial statements of consumer goods manufacturing companies in Nigeria. Utilizing descriptive research design, they identified significant differences in environmental disclosure themes among consumer goods manufacturing firms. Additionally, they observed a significant effect of environmental disclosure on total asset turnover and return on equity, though no significant effect on cash flow ratio, current ratio, and return on assets was found.

Norhasimah et al. (2016) assessed the effects of environmental disclosure on financial performance in Malaysia. Employing an ex-post facto research design, they sampled 100 Malaysian companies listed on Bursa Malaysia in 2011. Their analysis revealed a significant but negative relationship between environmental disclosure and profit margin, with no significant relationship found between environmental disclosure and earnings per share, return on assets, and return on equity.

### 3.0 Methodology

In order to examine the effect of environmental disclosure on return on equity, return on capital employed and return on sales margin, *Ex-Post Facto* research design was employed. This design entails the observation and analysis of numerical data related to company activities that have already occurred. The ex-post facto design is especially useful for analyzing relationships between variables that have been measured numerically. The population for this study consisted of the oil and gas companies listed on the Nigerian Exchange Group as of the end of the 2022 financial year. Table 3.3.1 below displays the number of firms that were included in the study's population, specifically those within the oil and gas sector of the Nigerian Exchange Group.

**Table 3.1 Population of the Study**

1	Ardova Plc
2	Capital Oil
3	Conoil Plc
4	Eterna Plc.
5	Japaul Gold & Ventures Plc
6	Mrs Oil Nigeria Plc.
7	Oando Plc
8	Rak Unity Pet. Comp. Plc.
9	Seplat Energy Plc
10	Total Energies Marketing Nigeria Plc

Source: Nigerian Exchange Group (2022)

The study employed a non-probability sampling technique, specifically purposive sampling, which involved selecting firms that met specific criteria. Only companies that were listed on the Nigerian Exchange Group during the entire study period (2013-2022) and had accessible data were included. Therefore, a total of six (6) firms were purposively sampled, including: Ardova Plc., Conoil Plc., Eterna Plc., Japaul Gold & Ventures Plc., Mrs Oil Nigeria Plc., and Total Energies Marketing Nigeria Plc.

Data for the study were collected from the annual reports and accounts of the 6 selected oil and gas firms in Nigeria. The study utilized 10 consecutive years' worth of data, covering the period from 2013 to 2022. The measurements of the variables are shown below in Table 3.2 and 3.3.

**Table 3.2 Variable Description/Operationalization of Variables**

Variables	Proxies (Operational Definitions)
Return on Equity (ROE)	Profit After Taxes/Total Equity
Return on Sales Margin (ROS)	Net Profit After Tax/Sales Revenue
Return on Capital Employed	Profit Before Interest and Taxes/Capital Employed
Waste Management Practices	Global Reporting Index (GRI) 306. <i>See table 3.6.2</i>
Firm Size	Natural logarithm of total assets

Source: Researcher's Compilation (2024)

**Table 3.3 Measurement of Waste Management Practices**

GRI 306: Waste Management Practices (WMPs)	Scale
Waste generation and significant waste-related impacts	“1” if disclosed or “0” if not disclosed
Management of significant waste-related impacts	“1” if disclosed or “0” if not disclosed
Waste generated	“1” if disclosed or “0” if not disclosed
Waste diverted from disposal	“1” if disclosed or “0” if not disclosed
Waste directed to disposal	“1” if disclosed or “0” if not disclosed
Grand WMP Score	Number of WMPs disclosed/5

Source: (GRI #306)

The linear regression function for the analysis is presented below:

$$ROE, ROCE, ROS = f(WMP) \dots\dots\dots (i)$$

Where,

ROE = Return on Equity

ROCE =Return on Capital Employed

ROS = Return on sales margin

WMP = Waste Management Practices

The functional equation above was transformed into three linear regression models, using firm size as a control variable.

$$ROE_{it} = a_0 + b_1WMP_{it} + b_2FSZ_{it} + \mu_{it} \dots\dots\dots (ii)$$

$$ROCE_{it} = a_0 + b_1WMP_{it} + b_2FSZ_{it} + \mu_{it} \dots\dots\dots (iii)$$

$$ROS_{it} = a_0 + b_1WMP_{it} + b_2FSZ_{it} + \mu_{it} \dots\dots\dots (iv)$$

Where;

$a_0$  = constant

$b_{1,2}$  = coefficients of the independent variables

$\mu$  = Disturbance

$i$  = Firm of interest

$t$  = Period of interest

The study employed arithmetic mean, maximum value, minimum value, and standard deviation for descriptive analysis, while Ordinary Least Square regression analysis was utilized to test all hypotheses. The selection of Ordinary Least Square regression analysis was based on its suitability for predicting outcomes in a linear model. Additionally, it provides measures of goodness of fit that enable the assessment of the model's overall performance. Therefore, this statistical method was deemed appropriate for the study's hypotheses research questions and objectives. In the study, the statistical tests were performed with a significance level of 5%. Consequently, the null hypothesis would be accepted when the p-value is above 0.05, and the alternative hypothesis would be rejected, and vice versa.

**4.0 Data Analysis**

**4.1 Descriptive Statistics**

The ten year (2013 to 2022) data collected from the financial statements and annual reports of the firms are descriptively analysed below.

**Table 4.1 Descriptive Statistics**

	ROE	ROCE	ROS	ENVI	FSZ
Mean	0.183641	0.202654	6.398932	3.983333	7.732809
Median	0.092652	0.174732	0.012091	4.000000	7.773438

Maximum	4.337795	2.737083	473.9249	4.000000	8.319583
Minimum	-0.988298	-0.842402	-55.61977	3.000000	7.233574
Std. Dev.	0.618615	0.415862	62.00281	0.129099	0.238328
Skewness	5.180254	3.612121	7.304702	-7.550957	-0.066157
Kurtosis	35.65547	24.74406	55.74228	58.01695	2.785729
Jarque-Bera	2934.299	1312.485	7487.956	8137.331	0.158548
Probability	0.000000	0.000000	0.000000	0.000000	0.923787
Sum	11.01845	12.15927	383.9359	239.0000	463.9685
Sum Sq. Dev.	22.57838	10.20355	226816.5	0.983333	3.351203
Observations	60	60	60	60	60

*Source: Eviews 10 Statistical Output (2023)*

The mean for ROE is 0.183641, indicating an average return on equity of 18.36%. The maximum and minimum values are 4.337795 and -0.988298, respectively, suggesting that some firms had very high returns while others had negative returns. The standard deviation is 0.618615, which implies that the data points are dispersed around the mean by an average of 0.618615 units. The skewness of 5.180254 indicates that the distribution is positively skewed, meaning that there are more data points towards the lower end of the range. The kurtosis of 35.65547 shows that the distribution is leptokurtic, meaning that it has more outliers than a normal distribution. The Jarque-Bera test has a very low probability value (p-value) of 0.000000, indicating that the distribution is not normal.

The mean for ROCE is 0.202654, which indicates an average return on capital employed of 20.27%. The maximum and minimum values are 2.737083 and -0.842402, respectively, showing that there is a significant variation in the performance of firms. The standard deviation is 0.415862, indicating that the data points are dispersed around the mean by an average of 0.415862 units. The skewness of 3.612121 indicates that the distribution is positively skewed, meaning that there are more data points towards the lower end of the range. The kurtosis of 24.74406 shows that the distribution is leptokurtic, meaning that it has more outliers than a normal distribution. The Jarque-Bera test has a very low p-value of 0.000000, indicating that the distribution is not normal.

The mean for ROS is 6.398932, indicating an average return on sales margin of 6.40%. The maximum and minimum values are 473.9249 and -55.61977, respectively, suggesting that there is a wide variation in the profitability of firms. The standard deviation is 62.00281, indicating that the data points are dispersed around the mean by an average of 62.00281 units. The skewness of 7.304702 indicates that the distribution is positively skewed, meaning that there are more data points towards the lower end of the range. The kurtosis of 55.74228 shows that the distribution is very leptokurtic, meaning that it has many outliers. The Jarque-Bera test has a very low p-value of 0.000000, indicating that the distribution is not normal.

The mean for ENVI is 3.983333, indicating an average waste management disclosure score of 3.98 out of 4. The maximum and minimum values are 4.000000 and 3.000000, respectively, showing that all firms in the sample provided some level of waste management disclosure. The standard deviation is 0.129099, indicating that the data points are closely clustered around the mean. The skewness of -7.550957 indicates that the distribution is negatively skewed, meaning that there are more data points towards the higher end of the range. The kurtosis of 58.01695 shows that the distribution is very leptokurtic, meaning that it has many outliers. The Jarque-Bera test has a very low p-value of 0.000000, indicating that the distribution is not normal.

The mean for FSZ is 7.732809, indicating that the average size of the listed oil and gas firms in Nigeria is relatively large. The maximum value for FSZ is 8.319583, while the minimum is 7.233574, showing that the range of firm sizes among the selected sample of firms is relatively small. The standard deviation of FSZ is 0.238328, suggesting that the size of firms varies moderately around the mean. The skewness for FSZ is -0.066157, indicating that the distribution of firm sizes is approximately symmetric. The kurtosis for FSZ is 2.785729, which is greater than 3, indicating that the distribution of firm sizes is leptokurtic or has heavier tails than a normal distribution. The Jarque-Bera value for FSZ is 0.158548, and the probability value is 0.923787. Since the probability value is greater than 0.05, we fail to reject the null hypothesis that FSZ is normally distributed.

### 4.3 Test of Hypotheses

#### 4.3.1 Test of Hypothesis I

$H_{01}$ : Waste management disclosure has no significant effect on return on equity of listed oil and gas firms in Nigeria.

**Table 4.2 Test of Hypothesis I**

Dependent Variable: ROE

Method: Least Squares

Date: 04/21/23 Time: 23:01

Sample: 1 60

Included observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ENVI	0.138111	0.638681	0.216244	0.8296
FSZ	0.019149	0.345966	0.055350	0.9561
C	-0.514579	3.899462	-0.131961	0.8955
R-squared	0.000836	Mean dependent var		0.183641
Adjusted R-squared	-0.034222	S.D. dependent var		0.618615
S.E. of regression	0.629111	Akaike info criterion		1.959689
Sum squared resid	22.55950	Schwarz criterion		2.064406
Log likelihood	-55.79066	Hannan-Quinn criter.		2.000649
F-statistic	0.023850	Durbin-Watson stat		2.193856
Prob(F-statistic)	0.976442			

**Source: Eviews 10 Statistical Output (2023)**

The regression analysis shows the effect of waste management disclosure (ENVI) on return on equity (ROE) of listed oil and gas firms in Nigeria, while controlling for the effect of firm size (FSZ). The R-squared value of the regression is 0.000836, which indicates that the independent variables (ENVI and FSZ) explain only a very small proportion of the variation in the dependent variable (ROE).

The F-statistic is 0.023850 with a probability value of 0.976442. Since the probability value is greater than 0.05, we accept the null hypothesis that the coefficients of ENVI and FSZ are equal to zero, indicating that the regression model does not fit the data well. The Durbin-Watson statistic is 2.193856, which is within the range of 1.5 to 2.5, indicating that there is no significant autocorrelation in the model residuals. The coefficient of FSZ is 0.019149, indicating that there is a positive but insignificant relationship between firm size and return on equity. This means that as firm size increases, return on equity also tends to increase, but not significantly.

The coefficient of ENVI is 0.138111, indicating that waste management disclosure positively affects ROE. This means that as waste management disclosure increases, return on equity also tends to increase. However, this effect is not significant since the  $p$ -value (0.8296) is greater than 0.05. In conclusion, Waste management disclosure has a positive but non-significant effect on return on equity of listed oil and gas firms in Nigeria ( $p$ -value = 0.8296).

The positive effect suggests that when firms disclose their waste management practices, investors may perceive them as socially responsible and environmentally conscious, which could positively affect their perception of the firm's value and may translate into higher return on equity. However, the non-significant effect means that other factors may have a more significant impact on the return on equity than waste management disclosure alone. The findings agree with the results by Wu and Li (2023) but contradicts the results by Wang, Bao and Wang (2023).

#### 4.2.1.2 Test of Hypothesis II

H<sub>02</sub>: Waste management disclosure does not significantly affect the return on capital employed of listed oil and gas firms in Nigeria.

**Table 4.3 Test of Hypothesis II**

Dependent Variable: ROCE

Method: Least Squares

Date: 04/21/23 Time: 23:08

Sample: 1 60

Included observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ENVI	0.048099	0.423110	0.113679	0.9099
FSZ	0.302470	0.229194	1.319709	0.1922
C	-2.327879	2.583298	-0.901127	0.3713
R-squared	0.029674	Mean dependent var		0.202654
Adjusted R-squared	-0.004373	S.D. dependent var		0.415862
S.E. of regression	0.416771	Akaike info criterion		1.136145
Sum squared resid	9.900767	Schwarz criterion		1.240862
Log likelihood	-31.08434	Hannan-Quinn criter.		1.177105
F-statistic	0.871568	Durbin-Watson stat		1.857644
Prob(F-statistic)	0.423795			

Source: *Eviews 10 Statistical Output (2023)*

The regression analysis shows the effect of waste management disclosure (ENVI) on return on capital employed (ROCE) of listed oil and gas firms in Nigeria, while controlling for the effect of firm size (FSZ). The R-squared value of the regression is 0.029674, which indicates that the independent variables (ENVI and FSZ) explain 2.97% of the variation in the dependent variable (ROCE).

The F-statistic is 0.871568 with a probability value of 0.423795. Since the probability value is greater than 0.05, we accept the null hypothesis that the coefficients of ENVI and FSZ are equal to zero, indicating that the regression model does not fit the data well. The Durbin-Watson statistic is 1.857644, which is within the range of 1.5 to 2.5, indicating that there is no significant autocorrelation in the model residuals. The coefficient of FSZ is 0.302470, indicating that there is a positive but insignificant relationship between firm size and return on capital employed. This means that as firm size increases, return on capital employed also tends to increase, but not significantly.

The coefficient of ENVI is 0.048099, indicating that waste management disclosure positively affects ROCE. This means that as waste management disclosure increases, return on capital employed also tends to increase. However, this effect is not significant since the  $p$ -value (0.9099) is greater than 0.05. In conclusion, Waste management disclosure has a positive but non-significant effect on return on capital employed of listed oil and gas firms in Nigeria ( $p$ -value = 0.9099).

The positive effect implies that when firms disclose their waste management practices, they may be perceived as having better environmental management practices, which could increase their efficiency and lead to higher returns on capital employed. However, the non-significant effect suggests that other factors, such as operating efficiency or capital structure, may be more significant drivers of return on capital employed than waste management disclosure alone.

#### 4.2.1.3 Test of Hypothesis III

H<sub>03</sub>: Waste management disclosure has no significant effect on the return on sales margin of listed oil and gas firms in Nigeria.

**Table 4.4 Test of Hypothesis III**

Dependent Variable: ROS

Method: Least Squares

Date: 04/21/23 Time: 23:14

Sample: 1 60

Included observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ENVI	-1.188618	63.42285	-0.018741	0.9851
FSZ	-36.12085	34.35546	-1.051386	0.2975

C	290.4492	387.2280	0.750073	0.4563
R-squared	0.019204	Mean dependent var		6.398932
Adjusted R-squared	-0.015210	S.D. dependent var		62.00281
S.E. of regression	62.47255	Akaike info criterion		11.15604
Sum squared resid	222460.7	Schwarz criterion		11.26076
Log likelihood	-331.6812	Hannan-Quinn criter.		11.19700
F-statistic	0.558030	Durbin-Watson stat		2.027663
Prob(F-statistic)	0.575430			

Source: *Eviews 10 Statistical Output (2023)*

The regression analysis shows the effect of waste management disclosure (ENVI) on return on sales margin (ROS) of listed oil and gas firms in Nigeria, while controlling for the effect of firm size (FSZ). The R-squared value of the regression is 0.019204, which indicates that the independent variables (ENVI and FSZ) explain 1.92% of the variation in the dependent variable (ROS).

The F-statistic is 0.558030 with a probability value of 0.575430. Since the probability value is greater than 0.05, we accept the null hypothesis that the coefficients of ENVI and FSZ are equal to zero, indicating that the regression model does not fit the data well. The Durbin-Watson statistic is 2.027663, which is within the range of 1.5 to 2.5, indicating that there is no significant autocorrelation in the model residuals. The coefficient of FSZ is -36.12085, indicating that there is a negative but insignificant relationship between firm size and return on sales margin. This means that as firm size increases, return on sales margin tends to decrease, but not significantly.

The coefficient of ENVI is -1.188618, indicating that waste management disclosure negatively affects ROS. This means that as waste management disclosure increases, return on sales margin tends to decrease. However, this effect is not significant since the  $p$ -value (0.9851) is greater than 0.05. In conclusion, Waste management disclosure has a negative but non-significant effect on return on sales margin of listed oil and gas firms in Nigeria ( $p$ -value = 0.9851).

The negative effect implies that firms that disclose their waste management practices may incur additional costs associated with environmental management that could negatively impact their profitability. However, the non-significant effect means that waste management disclosure alone may not be a significant driver of return on sale margin and that other factors, such as market competition or industry-specific challenges, may be more influential. Ilelaboye and Alade (2022) and Norhasimah, Norhabibi, Nor, Sheh and Ali (2016) equally found similar results unlike the study by Atang and Eyisi (2020) and Ike and Iheduru (2019) which realised that waste management disclosure positively affects firm profitability.

## 5.0 Conclusion and Recommendation

Based on the results of the regression analysis, it can be concluded that waste management disclosure has a positive but non-significant effect on the return on equity and return on capital employed of listed oil and gas firms in Nigeria. The coefficient of waste management disclosure (ENVI) suggests that as waste management disclosure increases, return on equity and return on capital employed tend to increase as well, but the relationship is not statistically significant. This implies that while disclosing waste management practices could enhance a firm's perceived environmental responsibility, it may not be the primary driver of financial success. It is possible that other factors such as efficient operations, effective marketing strategies, and technological innovations may play a more significant role in determining a firm's financial performance.

However, the negative but non-significant effect on return on sales margin suggests that disclosing waste management practices may result in additional costs that could impact a firm's profitability. It is possible that the cost of implementing and maintaining waste management practices may outweigh the benefits of enhanced investor perception and potential financial gains. Generally, the study emphasises the importance of sustainable business practices, particularly in the oil and gas industry, where environmental and social responsibility are critical issues. The findings imply that firms that engage in responsible waste management practices may benefit from enhanced investor perception and potentially improved financial performance. This underscores the need for oil and gas firms to adopt sustainable business practices to not only protect the environment but also improve their financial bottom line. We therefore recommend that listed oil and gas firms in Nigeria should increase their waste management disclosure and provide investors with more transparency on their environmental practices. This can be done by adopting cost-effective waste management practices, investing in renewable energy, and reducing waste generation. By doing so, they can improve their financial performance while also reducing their environmental footprint.

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