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Environmental Conservation Cost and Financial Performance of Listed Oil and Gas Firms in Nigeria

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Abstract

The global economic landscape is increasingly shaped by environmental impact as businesses worldwide are face with heightened pressure to comply with environmental standards, thereby making environmental conservation costs essential for maintaining profitability and building stakeholder trust. This study examined the effect of environmental conservation costs on financial performance of listed oil and gas firms in Nigeria. Using a longitudinal research design, data from the seven oil and gas firms listed on the Nigerian Exchange Group as at 31st December, 2023, were collected from secondary sources, via the annual reports of the selected firms for a period of 2014 to 2023. Data collected were analysed using descriptive statistics and robust regression analysis. The results of the analysis showed that waste management cost as proxy of environmental conservation cost has significant positive effect on financial performance. Environmental remediation costs also showed a significant effect on financial performance, although the effect was negative. However, community development costs showed a positive effect, but it was found to be insignificant. Based on these findings, it is concluded that increased transparency in environmental cost disclosures can enhance financial outcomes, but some environmental liabilities may reduce profitability. The study recommends improving transparency in environmental reporting, strategic communication of environmental risk management, and maintaining strong community relations to enhance stakeholder trust and financial performance.

Keywords: Environmental conservation cost, waste management cost, community development costs, return on asset, financial performance

1. Introduction

Financial performance is increasingly influenced by the emphasis on sustainability and environmental impact. Globally, companies like Unilever and Tesla have shown that integrating environmental, social, and governance (ESG) criteria can enhance reputation, reduce risks, and potentially boost financial outcomes (Bamishe & Adegbie, 2024). Investors, regulators, and consumers demand greater transparency and accountability, pushing firms to adopt practices such as pollution control and waste management as strategic investments that influence financial health and long-term viability. However, significant obstacles remain. The economic landscape is marked by volatility and uncertainty, requiring companies to navigate complex regulations and market conditions. The oil and gas firms, for example, faces pressure to adopt sustainable practices amid fluctuating prices and geopolitical tensions. Investing in innovative technologies and sustainable practices can strain financial resources, especially for smaller firms. Thus, developing strategies that align short-term financial goals with long-term sustainability is crucial for resilience and adaptability in the global market (Enekwe et al., 2023).

Environmental conservation costs play a crucial role in addressing sustainability and financial performance. These costs, which include investments in pollution control, waste management, and environmental restoration, help reduce the environmental footprint and mitigate negative impacts such as oil spills and gas flaring (Oyedokun & Mary, 2022). By effectively managing these costs, companies can improve compliance with regulations, enhance their reputation and avoid legal penalties and operational disruptions. Additionally, investing in environmental conservation supports long-term financial performance by building better relationships with stakeholders, including local communities, governments, and investors. Companies committed to environmental sustainability are more likely to gain community support, leading to a more stable operating environment. These investments can also attract environmentally conscious investors and customers, providing a competitive advantage. However,

managing these costs effectively is crucial to avoid straining financial resources. When balanced properly, environmental conservation costs can lead to enhanced sustainability and improved financial outcomes, highlighting the importance of integrating environmental strategies into the core business model.

In attempts to address the highlighted challenges, Iliemena (2020) and Okudo and Nestor (2023) investigated the effect of environmental accounting practices on corporate performance of listed oil and gas firms in Nigeria. The findings indicated a positive effect of environmental accounting practices on financial performance. On the other hand, Horsfall and Womenazu (2022) found a negative effect. Polycarp (2019) however assessed a systematic approach in managing the environmental aspects of company activities; and revealed that lack of environmental reporting and disclosure standards significantly affects the reporting and disclosure uniformity of environmental information.

Most existing studies examined the environmental harm caused by profit-driven companies but have not specifically focused on how waste management costs impact financial performance. This study will address this gap by analyzing how investments in waste management affect the financial performance. By examining expenses related to the collection, treatment, and disposal of waste materials, the study will provide insights into how proper waste management can enhance a company's financial health. Effective waste management can reduce environmental fines, improve operational efficiency, and enhance the company's reputation, leading to increased profitability. By demonstrating that environmental responsibility can coexist with profitability, this research aims to encourage more firms to adopt sustainable practices, ultimately highlighting the importance of integrating waste management into core business strategies to achieve both economic and environmental goals.

This study attempts to fill the identified knowledge gap by examining the effect of environmental remediation costs on financial performance. The study specifically focuses on waste management cost, environmental remediation cost, and community development cost to understand their effects on financial performance in Nigerian oil and gas firms.

2. Literature Review

2.1 Conceptual Review

2.1.1 Financial performance

Financial performance encompasses the evaluation of companies' ability to generate profits and returns for their shareholders, reflecting their operational efficiency and financial health within the oil and gas industry (Oyedokun & Mary, 2022). This assessment is crucial for investors, analysts, and stakeholders seeking to understand the economic viability and sustainability of these firms. In the context of Nigeria's oil and gas firms, financial performance is primarily measured using key financial metrics, with Return on Assets (ROA) being a significant indicator. ROA calculates the profitability of a company by assessing how effectively it utilizes its assets to generate earnings (Okafor et al., 2022). It provides insight into management's efficiency in deploying resources and managing costs, making it a fundamental metric for evaluating the profitability and efficiency of oil and gas firms in Nigeria.

ROA is also essential for benchmarking and comparing the financial performance of oil and gas firms against industry peers and over time. It serves as a key indicator of management's ability to capitalize on investments and manage costs effectively, which are critical factors for sustainable growth and profitability. Furthermore, ROA influences decision-making processes such as capital allocation, financial planning, and operational improvements. (Major & Nwdighoha, 2023) affirmed that Companies with a higher ROA may have a competitive advantage, as they can generate more profit from their assets and achieve higher shareholder returns. Conversely, a declining ROA may signal inefficiencies that require management attention and corrective actions. It reflects how well these companies manage their assets to generate earnings and provides stakeholders with insights into their operational effectiveness and financial health.

2.1.2 Environmental Conservation Cost

Environmental conservation cost are the expenditures incurred by organizations to implement practices and technologies aimed at minimizing their environmental impact (Mukah, 2021). This includes costs related to waste management, pollution control, environmental remediation, and community development initiatives that promote sustainability and ecological balance. Environmental conservation cost encompasses the financial investments made by firms to comply with environmental regulations, reduce environmental footprints, and enhance sustainable operations (Enekwe et al., 2023). These costs cover a wide range of activities, such as reducing emissions, managing hazardous waste, restoring

damaged ecosystems, and supporting local communities through various environmental and social program (Nzekwe, 2022).

Environmental conservation cost is an integral to corporate social responsibility (CSR). By investing in sustainable practices, companies demonstrate their commitment to being responsible corporate citizens (Omaliko et al., 2020). This enhances their reputation and strengthens relationships with stakeholders, including customers, investors, and local communities. Consumers and investors are increasingly favoring companies that prioritize sustainability, and firms that make visible efforts in environmental conservation can attract more support and loyalty (Aremu & Adegbie, 2024). This not only benefits the environment but also contributes to the firm's market competitiveness and long-term sustainability. According to (Horsfall & Womenazu, 2022) environmental conservation cost is essential for the long-term viability of businesses, especially in industries like oil and gas that have significant environmental impacts. As global awareness and regulatory pressures around environmental issues increase, companies are compelled to integrate sustainable practices into their core operations. Environmental conservation costs are therefore not just about compliance but about strategic investment in the future.

2.1.2.1 Waste Management Cost

According to Kornom-Gbaraba et al. (2022), waste management cost refers to the financial resources allocated by companies to handle the various types of waste generated during their operations. This includes both hazardous and non-hazardous waste produced throughout exploration, drilling, production, transportation, and refining activities. Effective waste management is crucial for minimizing environmental impact, ensuring compliance with regulatory standards, and safeguarding the health and safety of workers and nearby communities (Agubosim et al., 2021). Oil and gas operations produce a significant amount of waste, including drilling muds, cuttings, produced water, and various chemical wastes. Managing these wastes involves several key steps, such as collection, transportation, treatment, and disposal. Each of these steps incurs costs, which can vary depending on the type and volume of waste, as well as the regulatory requirements and environmental conditions of the operating area (Nwanwu, 2022).

Strategically, effective waste management practices can lead to long-term cost savings and improved operational efficiency. By reducing waste volumes and enhancing resource recovery through recycling initiatives, companies can minimize disposal costs and environmental impact (Aremu & Adegbie, 2024). Moreover, demonstrating a commitment to sustainable waste management practices can enhance a company’s reputation and attractiveness to investors, consumers, and local community (Horsfall & womenazu, 2022). Waste management cost is a significant consideration for oil and gas companies aiming to operate responsibly and sustainably. By investing in effective waste management strategies and technologies, companies can mitigate environmental risks, ensure regulatory compliance, and enhance their overall operational efficiency and reputation. These efforts are crucial for maintaining a social license to operate and for contributing to environmental stewardship in the communities where they operate (Nzekwe, 2022).

2.1.2.2 Environmental Remediation Cost

Environmental remediation cost refers to the financial expenditures associated with cleaning up and restoring environmental damage caused by industrial activities, such as those in the oil and gas firms (Oraka, 2021). These costs are incurred to mitigate the negative impacts of pollution on ecosystems, human health, and surrounding communities, as well as to comply with environmental regulations and maintain a company's reputation and social license to operate. In the context of the oil and gas industry, environmental remediation costs can be substantial due to the potential for spills, leaks, and other forms of contamination from drilling, extraction, transportation, and refining processes (Horsfall & womenazu 2022). These activities can lead to soil contamination, groundwater pollution, and air quality degradation, necessitating remedial actions to prevent further harm and restore affected areas to their pre-impact conditions (Abdullahi & Muhammad, 2023).

Furthermore, investing in environmental remediation can yield long-term benefits beyond mere regulatory. According to (Baribefe, 2021), effective cleanup and restoration efforts can enhance a company's standing as a responsible corporate citizen and improve relations with stakeholders, including local communities, regulatory agencies, and environmental advocacy groups. Moreover, proactive remediation can help mitigate future liabilities and risks associated with ongoing pollution, reducing potential costs and liabilities over the long term. Companies can also mitigate the adverse effects of their

operations, protect human health and the environment, and ensure compliance with regulatory requirements (Ilelaboye &Alade, 2022). These efforts are essential for maintaining a positive reputation, securing regulatory approvals, and fostering long-term operational sustainability in a challenging regulatory and environmental landscape.

2.1.2.3 Community Development Cost

Community development cost refers to the expenses incurred by companies to positively impact the communities in which they operate. This cost represents the financial resources that oil and gas companies allocate to improve the social, economic, and environmental conditions of the communities in which they operate. These investments are crucial for fostering positive relationships with local populations and ensuring that the benefits of oil and gas activities extend beyond mere economic contributions. Companies often engage in community development to address the specific needs of local areas, ranging from building infrastructure to providing educational and healthcare services (Ilelaboye &Alade, 2022). Investing in community development can take various forms, including the construction of schools, healthcare facilities, and infrastructure projects like roads and bridges. Companies might also support local economic initiatives, such as funding small businesses, agricultural projects, and vocational training programs to enhance local employment opportunities. These initiatives aim to improve the quality of life for community members, promote economic stability, and reduce poverty levels (Chiamogu, 2020).

Enekwe et al (2023) affirmed that community development efforts can serve as a buffer against regulatory and environmental challenges, as companies that demonstrate a genuine commitment to improving local conditions are often viewed more favorably by regulatory bodies and policymakers. Companies must ensure that their development projects are sustainable and designed to provide long-term benefits (Iliemena, 2020). This involves collaborating with local governments, non-governmental organizations, and community leaders to create programs that are culturally appropriate and locally driven. By empowering communities to take ownership of development projects, oil and gas firms can ensure that their investments have a lasting positive impact, fostering resilience and self-sufficiency in the regions where they operate (Akinleye & Olaoye, 2021).

2.2 Theoretical Review

2.2.1 Stakeholders Theory

Stakeholders Theory was first propounded by Edward Freeman (1984) which assumes that companies should prioritize the interests of all its stakeholders, not just its shareholders, to achieve long-term success. Enekwe et al (2023) identifies stakeholders as any group or individual who can affect be affected by the achievement of the organization's objectives. This includes employees, customers, suppliers, communities, and shareholders. The central idea is that by considering and balancing the needs and interests of all stakeholders, a company can create value that benefits everyone involved, leading to more sustainable and ethical business (Bamishe & Adegbie, 2024; Omah & Chioma, 2023).

Omaliko et al. (2020) indicate that stakeholder theory is essential for grasping how businesses can operate more sustainably and ethically. The theory emphasizes that businesses are part of a broader network of relationships, and their success depends on managing these relationships effectively. By considering the needs and interests of all stakeholders, companies can foster mutual trust and support, leading to more resilient and sustainable business practices (Aremu & Adegbie, 2024). Utilizing Stakeholder Theory to the context of environmental conservation costs in Nigeria’s oil and gas sector involves a comprehensive approach to management. Oil and gas firms can enhance their financial performance by integrating stakeholder interests into their strategies (Nkwoji, 2021). For instance, by addressing environmental concerns through better waste management, remediation efforts, and community development initiatives, these firms can build stronger relationships with local communities and regulators. This approach not only helps in mitigating environmental impact but also enhances the firms' reputation and operational stability. By adopting a stakeholder-centric strategy, oil and gas companies can achieve a balance that promotes long-term sustainability and profitability (Baribefe, 2021).

2.3 Empirical Review

Extant literature revealed various degree of relationships and effects that exist between the proxies of environmental conversation cost and financial performance. In a study conducted by Kim and Oh (2019) where the connection between environmental conservation expenses and business asset quality was explored. The study found that environmental conservation costs and stakeholder involvement affected

the financial health of selected Australian enterprises. Similarly, in Tanzania, Lotto (2019) examined how environmental preservation affects operational efficiency, asset quality, and company success. The study revealed from the descriptive statistics and multiple regression, that a negative correlation exists between company performance and sustainability.

However, contrary results were found in studies of Nwanwu (2022) where environmental management expenses and financial performance of Nigerian oil and gas firms for the period of nine years from 2011 to 2018. The explanatory research design of secondary data was used for the study. The regression result indicated that pollution costs have a positive and significant impact on the net profit of Nigerian oil and gas firms. In the same vein, Nzekwe (2022) evaluated the effect of environmental cost on financial performance of selected oil and gas firms in Nigeria for ten years period of 2009 to 2018. The study revealed environmental cost have positive effect on firm financial performance. The same positive result was found in the study of Lawrence and Bernard (2023) carried out research on the moderated regression analysis approach to environmental costs and financial performance of Nigerian industrial goods firms for the period of 11 years from 2011 to 2020.

Review from the perspective of environmental remediation perspective, Horsfall and Womenazu (2022) investigated cost of environmental degradation and financial performance of oil and gas companies in Nigeria. The research design used was the Ex-post Facto design. The findings indicated that environmental degradation cost is negatively related to financial performance. Although, conservation costs have a positive insignificant effect. Also, Okudo and Nestor (2023) examined the effect of environmental accounting on profitability of oil and gas between 2011 and 2021. The result of this study showed that waste management cost, community development cost, employee health and safety cost and environmental remediation cost have a significant positive effect on net profit margin.

In addition, Aremu and Adegbie (2024) attempted to determine how environmental conservation affects financial performance. Data were obtained from annual reports covering the years 2011 to 2022, and it employed an ex post facto research design. Regression analysis was used to test the hypotheses. The findings indicate that the costs associated with community development, pollution, and environmental remediation have a significant impact on the gross margin return on investment of the oil and gas companies' enterprises being analyzed.

Based on the outcome of existing studies and the assumption of theoretical underpinning, the hypothesis is stated in null form as;

Ho: Environmental conservation costs do not have significant positive effect on financial performance.

2.4 Gap in Literature

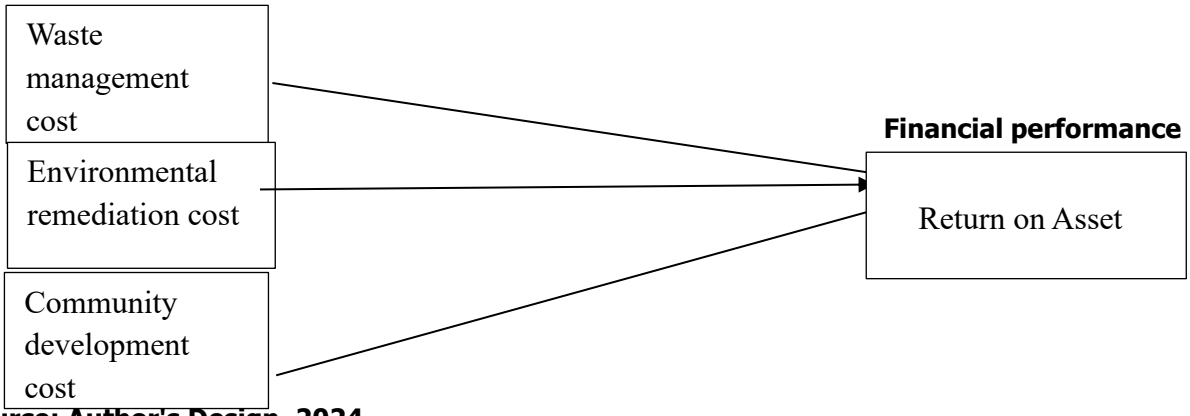
While previous studies have examined environmental accounting's impact on financial performance, they often overlook specific environmental remediation efforts. There is need to address this gap by analyzing how investments in environmental remediation affect financial outcomes. It will also differentiate between immediate and long-term impacts of environmental costs, which existing literature often neglects. By using a longitudinal approach, this study provides a detailed view of how continuous investments in environmental conservation can lead to sustained financial growth and stability. Additionally, the limited exploration of how environmental costs interact with factors like firm size, regulations, and market conditions. Most studies focus on immediate financial metrics, neglecting long-term business growth. This study addressed this by examining the strategic benefits of environmental investments, such as improved corporate reputation and risk management. Using a broader set of performance indicators, it will show how environmental costs align with overall business goals.

Lastly, existing studies sparingly captured the dynamic nature of environmental investments and their financial impacts over time. This study adopts a longitudinal design to better understand these complexities by analyzing historical data from financial reports and relevant government sources. This approach highlights the strategic importance of environmental and community investments, providing insights for enhancing both sustainability and profitability in Nigeria. By examining existing data, the study explores the relationship between environmental costs and financial performance, offering a comprehensive understanding of how these costs influence financial outcomes and guiding firms towards more effective and sustainable practices.

2.5 Conceptual Framework

The study is conceptualized to indicate the interactions the variables as shown in figure 1.

Figure 1: Conceptual framework showing the interaction between environmental conservation cost and financial performance



Source: Author's Design, 2024.

3. Methodology

The study used the longitudinal research design. The research design is found appropriate because it allows for the analysis of data collected over multiple time points, enabling the examination of trends and changes over a specific period. The population size of the study comprises the seven oil and gas firms listed on the Nigerian Exchange Group as at 31st December, 2023. The population size also constitutes the sample size in line with the census sampling technique. Data were obtained from secondary sources, via the annual reports of the selected firms for a period of 2014 to 2023. Data collected were analysed using descriptive statistics and robust regression analysis.

2.4 Model Specification

The model specification for this study was adapted from the study of Okudo and Nestor (2023) environmental accounting influences the profitability of oil and gas firms listed on the Nigeria Stock Exchange between 2011 and 2021. The original model evaluated the relationships between waste management cost, community development cost, employee health and safety cost, and environmental remediation cost with the net profit margin of these firms. The model was modified to suit the objectives of this study and is stated thus:

$NPMit = \beta_0 + \beta_1 WMC_{it} + \beta_2 CDC_{it} + \beta_3 EHSC_{it} + \beta_4 ERC_{it} + \beta_5 LEV_{it} + \beta_6 FSZ_{it} + \mu_{it}$ .....(i)

Where:

NPMit = Net Profit Margin of firm i in period t; WMCit = Waste Management Cost of firm i in period t; CDCit = Community Development Cost of firm i in period t; EHSCit = Employee Health and Safety Cost of firm i in period t; ERCit = Environmental Remedial Cost of firm i in period t; FSZit = Firm Size of firm i in period t; LEVit = Leverage of firm i in period t

This study, however, modified the model to capture environmental conservation dimensions to suit the objective of the study. The functional model is therefore stated thus:

FP= f(ECC).....(ii)

The presentation of the model in econometric form in line with the proxies of this study is stated thus;

$ROAit=\beta_0 +\beta_1 WMC_{it} + \beta_2 ERC_{it} +\beta_3 CDC_{it} + e_{it}$.....(iii)

Where;

ROAit = Return on Asset of firm i in time t; WMCit = Waste Management Cost of firm i in time t; ERCit = Environmental Remediation Cost of firm i in time t; CDCit = Community Development Cost of firm i in time t; β0 = intercept; β1 - β3 = coefficient of independent variables; Eit = error term of firm i in time t; i = Firm identifier (7 firms); t = Time variable (2014, 2015…2023).

A priori expectation

The expectation based on the outcome of previous studies and theoretical underpinning is that there will be a significant positive effect between the dependent and independent variables.

3.2 Measurement of Variables

The summary of Variable, description and source is shown in Table 1:

Table 1
Measurement of Variables

S/N	Variables	Description	Measurement	Source
1.	Waste Management Cost	The cost incurred in managing waste materials	Total annual expenditure on waste management activities	Damieibi (2023)
2.	Environmental Remediation Cost	The cost associated with cleaning up environmental damage	Annual costs for environmental remediation efforts	Aremu & Adegbie (2024)
3.	Community Development Cost	The expenditure on projects aimed at community development	Annual investments in community development projects	Okudo and Nestor (2023)
4.	Financial Performance	The efficiency with which a firm utilizes its assets to generate returns	Net income divided by average total assets	Enekwe et al (2023)

Source: Author's Computation (2024)

4. Data Analysis and Discussion of Findings

4.1 Descriptive Statistics

Table 2
Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Reta	70	0.433	26.535	-71.360	176.270
Wads	70	0.086	0.282	0.000	1.000
Enrds	70	0.057	0.234	0.000	1.000
Comd	70	0.600	0.493	0.000	1.000
Eaps	70	6.820	21.489	-20.230	136.820

Source: Author's Computation (2024)

The descriptive statistics in Table 2 provide an overview of the key variables under study, reflecting their central tendencies and variations across the sample of listed oil and gas firms in Nigeria between 2014 and 2023. The mean of return on assets (RETA) is 0.433, indicating that, on average, firms have a low return on assets, but the high standard deviation of 26.535 suggests substantial variability in financial performance across the firms. The mean of waste management cost disclosure (WADS) is 0.086, showing that, on average, waste management cost disclosure is relatively low among these firms. Community development cost disclosure (COMD) has a mean of 0.600 and a standard deviation of 0.493, suggesting that community development cost disclosure is relatively more prevalent compared to waste management and environmental remediation disclosures.

4.1.2 Data Normality

Table 3
Normality Test

Variable	Obs	W	V	z	Prob>z
reta	70	0.542	28.169	7.259	0.000
wads	70	0.774	13.899	5.723	0.000
enrds	70	1.000	0.031	-7.580	1.000
comd	70	0.995	0.290	-2.690	0.996
eaps	70	0.498	30.895	7.460	0.000

Source: Author's Computation (2024)

From Table 3, the study finds that the dependent variable of return on assets (RETA) (prob>z = 0.000) is not normally distributed since the probability of the z-statistic, as revealed by the Shapiro-Wilk test, is significant at the 1% significance level. The same is true for the independent variables of waste management cost disclosure (WADS) (prob>z = 0.000) and the control variable of earnings per share (EAPS) (prob>z = 0.000), as their z-statistic probabilities are also significant at the 1% significance level. This suggests that these variables do not follow a normal distribution. However, the independent variables of environmental remediation cost disclosure (ENRDS) (prob>z = 1.000) and community development cost disclosure (COMD) (prob>z = 0.996) are found to follow a normal distribution since the probabilities of the z-statistics, as indicated by the Shapiro-Wilk test, are insignificant at the 5% or 1% significance level.

4.2 Test of Variables

4.2.1 Correlation Analysis

Table 4
Correlation analysis

Variables	(1)	(2)	(3)	(4)	(5)
(1) reta	1.000				
(2) wads	0.088	1.000			
(3) enrds	0.277	-0.075	1.000		
(4) comd	0.222	-0.063	0.201	1.000	
(5) eaps	0.865	-0.124	0.295	0.172	1.000

Source: Author's Computation (2024)

The results of the Spearman Rank Correlation analysis in Table 4 show that there is a weak positive association between the independent variable of waste management cost disclosure (WADS) (0.088) and the dependent variable of return on assets (RETA). Additionally, the results indicate a moderate positive association between environmental remediation cost disclosure (ENRDS) (0.277) and return on assets (RETA). The correlation analysis also reveals a weak positive association between community development cost disclosure (COMD) (0.222) and return on assets (RETA). In the case of the control variable, earnings per share (EAPS) is strongly positively associated with the dependent variable of return on assets (RETA) (0.865). There is a weak negative association between waste management cost disclosure (WADS) and earnings per share (EAPS) (-0.124) and a moderate positive association between environmental remediation cost disclosure (ENRDS) (0.295) and earnings per share (EAPS).

Furthermore, there is a weak positive association between community development cost disclosure (COMD) (0.172) and earnings per share (EAPS). The results also show that waste management cost disclosure (WADS) is weakly negatively associated with environmental remediation cost disclosure (ENRDS) (-0.075) and community development cost disclosure (COMD) (-0.063), while environmental remediation cost disclosure (ENRDS) and community development cost disclosure (COMD) exhibit a weak positive association (0.201). The results indicate the absence of multicollinearity since all the associations are seen to be weak to moderate. However, to confirm the absence of multicollinearity among the variables, a more robust check, such as the Variance Inflation Factor (VIF) test, will be employed, the results of which will be presented in the next sections.

4.2.2 Test for Multicollinearity

The analysis also includes a test for multicollinearity using the Variance Inflation Factor (VIF).

Table 5
VIF Test for Multicollinearity

Variable	VIF	1/VIF
enrds	2.21	0.452156
eaps	2.16	0.462390
comd	1.05	0.956517
wads	1.01	0.989845
Mean VIF	1.61	

Source: Author's Computation (2024)

The mean VIF for the variables in the OLS regression model is 1.61, which is well below the commonly accepted threshold of 10. The result in Table 5 indicates that there is no severe multicollinearity among the independent variables, suggesting that they do not have high intercorrelations that would necessitate their exclusion from the model. The absence of multicollinearity enhances the reliability of the estimated coefficients.

4.2.3 Test for Heteroscedasticity

The assumption of homoscedasticity was tested using the Breusch-Pagan test, with the result shown in Table 6 indicating a significant p-value (Hettest = 6.41, p=0.011).

Table 6:
Test for Heteroscedasticity

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of reta

         chi2(1)      =     6.41
         Prob > chi2  =   0.0114
```

This indicates that the assumption of homoscedasticity is violated, implying the presence of heteroscedasticity in the OLS regression model. As a result, the standard errors of the estimates may be unreliable, potentially leading to biased statistical inferences.

4.3 Robust Regression

To address the issue of heteroscedasticity, the study re-estimated the model using robust regression techniques, as recommended by Wooldridge (2010). The results from the robust regression are presented in the second column of Table 7. The robust regression model shows a higher R-Square value of 0.408, indicating that approximately 40.8% of the systematic variation in the dependent variable is explained by the independent variables. This improvement suggests that the robust regression provides a more accurate and reliable estimation of the model, accounting for the heteroscedasticity observed in the OLS results. The robust regression results confirm the statistical significance of several variables, further validating the findings of the study and ensuring more robust statistical inferences.

4.4 Environmental Conservation Cost and Financial Performance

Table 7
Regression Result of Environmental Conservation Cost and Financial Performance

	(1)	(2)
Variables	OLS	Robust
Wads	5.253	1.889***
	(0.256)	(0.000)
Enrds	-16.666	-5.306
	(0.175)	(0.009)**
Comd	4.421	0.785
	(0.577)	(0.516)
Eaps	0.405**	0.217***
	(0.005)	(0.000)
Intercept	-4.482	0.903
	(0.586)	(0.344)
Observations	70	70
R^2	0.168	0.408
Hettest	6.41{0.011}	
VIF	1.61	

*Notes: p-values are in parentheses. *** p<.01, ** p<.05*
Source: Author's Computation (2024)

Table 7 represents the results obtained from the estimation of the models using the OLS regression method. The results indicate that the dependent variable, as captured by the regression model, has an R-Square value of 0.168. This suggests that the independent and control variables in the study account for approximately 16.8% of the systematic variation in the dependent variable during the period under study. The remaining 83.2% of the variation is explained by other factors not included in the model, as indicated by the error term. The significance of the OLS model is further supported by the p-values associated with some variables, particularly the control variable earnings per share (EAPS), which is significant at the 5% level (p=0.005). This underscores the relevance of the model in explaining the dependent variable. However, to further validate the estimates of the OLS results, this study also tests for multicollinearity and heteroscedasticity.

Following the outcomes, the discussion of the robust regression results became imperative in testing the study's hypotheses. Below is a specific analysis for each of the independent variables using the robust regression.

The results obtained from the robust regression model presented in Table 7 revealed that waste management cost disclosure (WADS) [coef. = 1.889 (0.000)] has a significant positive effect on the return on assets measure of firm performance of the listed oil and gas firms in Nigeria during the period under study. The results obtained from the robust regression model presented in Table 7 show that environmental remediation cost disclosure (ENRDS) [coef. = -5.306 (0.009)] has a significant negative effect on the return on assets measure of firm performance of the listed oil and gas firms in Nigeria during the period under study. Also, indicate that community development cost disclosure (COMD) [coef. = 0.785 (0.516)] does not have a significant effect on the return on assets measure of firm performance of the listed oil and gas firms in Nigeria during the period under study.

4.5 Discussion of Findings

The finding that waste management cost disclosure has a significant positive effect on the return on assets of listed oil and gas firms in Nigeria suggests that greater transparency in disclosing these costs is associated with improved financial performance. The positive effect aligns with the findings of Lawrence and Bernard (2023), who argue that transparent reporting on environmental practices enhances investor confidence and can lead to better financial outcomes. Similarly, Nwaubani (2019) and Kim and Oh (2019) found that firms that are open about their environmental impacts and invest in sustainable practices tend to perform better financially, as they attract socially responsible investors and customers. However, this finding contrasts with the results of Damieibi (2023), who found no significant relationship between waste management cost disclosure and firm performance, suggesting that the impact of such disclosures may be context-dependent or influenced by other factors such as regulatory environments and public awareness. Adesina (2020) and Nzekwe (2022) also identified mixed results, indicating that while some firms benefit from increased disclosure, others do not experience a notable impact, possibly due to differences in stakeholder priorities or the firm's overall sustainability strategy.

The finding that environmental remediation cost disclosure has a significant negative effect on the return on assets of listed oil and gas firms in Nigeria suggests that firms disclosing higher costs related to remediation activities tend to experience lower financial performance. The negative relationship aligns with the findings of Oraka (2021) and Nzekwe (2022), who noted that firms disclosing high environmental remediation costs often signal financial strain due to the substantial expenses required to address environmental damages. Similarly, Oshiole et al. (2020) argue that remediation activities, while necessary, often involve high costs that can negatively impact a firm's bottom line, especially in the short term. This result contradicts the findings of Horsfall & Womenazu (2022) and Nwanwu (2022), who observed a positive relationship between environmental remediation disclosure and financial performance. However, Chiamogu and Okoye (2020) and Ilelaboye and Alade (2022) highlighted that the negative impact might be more pronounced in sectors with high pollution levels, such as oil and gas, where remediation activities are frequent and costly. In contrast, the findings differ from Adesina (2020), who observed that community development disclosures positively impacted firm performance, arguing that such disclosures help build trust and goodwill with local communities, which can indirectly enhance profitability.

5. Conclusion and Recommendations

This study explores how environmental conservation cost disclosures impact the financial performance of listed oil and gas firms in Nigeria. The study aimed to assess whether disclosures related to waste management, environmental remediation, and community development costs have significant effects on the return on assets of these firms. The key findings reveal a nuanced relationship between environmental cost disclosures and financial performance. The study concluded that not all environmental cost disclosures are equally valued by the market or stakeholders. Waste management disclosures appear to align with investor and stakeholder interests, enhancing firm value. Conversely, remediation costs may represent a financial burden that outweighs any reputational gains from disclosure. Meanwhile, community development efforts, while important for maintaining local goodwill, do not have a significant direct financial impact. These findings highlight the importance for firms to carefully consider which environmental disclosures to prioritize, depending on their strategic objectives and stakeholder expectations.

The study recommends that listed oil and gas firms in Nigeria and other similar markets enhance their environmental disclosure practices to align with stakeholders' interests and regulatory expectations. For waste management cost disclosure, corporate managers and directors should ensure clear, comprehensive, and consistent reporting on waste management activities. Regarding environmental

remediation cost disclosure, firms should aim to balance transparency with strategic communication. While disclosures are necessary to meet regulatory requirements and stakeholder expectations, they should be presented in a way that also highlights the firm's proactive measures in managing and mitigating environmental risks. For community development cost disclosure, it is recommended that firms continue to engage in community development activities and transparently report these efforts, even though the direct financial impact may not be immediately apparent. Such disclosures help in maintaining social license and fostering good community relations, which are crucial for long-term operations.

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