

The Effect of Environmental Management Cost on Sustainable Development Goal 12: Responsible Consumption and Production in Nigeria

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ABSTRACT

Objective: This study examines the effect of environmental management cost on the achievement of Sustainable Development Goal 12 in Nigeria, with particular focus on waste reduction among listed oil and gas companies. **Method:** The study adopted an ex post facto research design because the variables investigated were based on historical financial data that could not be manipulated by the researcher. The population consisted of all oil and gas companies listed on the Nigerian Exchange Group as at 31 December 2025, from which seven companies were selected using the census sampling technique. Secondary data were obtained from the annual reports and financial statements of the sampled firms for the period 2015–2025. Data collected were analyzed using panel regression analysis with the aid of EViews. **Results:** The findings revealed that environmental protection cost has a positive and statistically significant effect on waste reduction among oil and gas companies in Nigeria. Similarly, environmental remediation cost was found to have a positive and significant impact on waste reduction. The results further indicated that environmental management costs collectively contribute significantly to improved environmental performance within the oil and gas sector. **Novelty:** These findings suggest that increased investment in environmental protection and remediation activities enhances responsible consumption and production practices among firms in line with Sustainable Development Goal 12.

INTRODUCTION

Environmental sustainability has become a critical concern in modern economic development due to the increasing impact of industrial activities on ecosystems and natural resources. Rapid industrialization and globalization have significantly accelerated economic growth across many nations; however, these developments have also intensified environmental degradation. Industrial activities contribute to various environmental problems such as air and water pollution, deforestation, soil degradation, biodiversity loss, and depletion of natural resources. As a result, there has been growing global attention toward sustainable development and the need for organizations to adopt environmentally responsible business practices [1].

Industries such as the oil and gas sector play a significant role in economic development, particularly in developing economies like Nigeria where petroleum resources contribute substantially to national revenue and economic growth. Despite these economic benefits, the sector is widely associated with environmental challenges including oil spills, gas flaring, land degradation, water contamination, and ecosystem destruction. These environmental issues have generated serious concerns regarding the

sustainability of industrial activities, especially in environmentally sensitive regions such as the Niger Delta [2].

In response to these environmental challenges, organizations and policymakers have increasingly recognized the importance of integrating environmental considerations into business operations and decision-making processes. One of the key mechanisms developed to achieve this integration is environmental accounting. Environmental accounting, sometimes referred to as green accounting, represents an extension of traditional accounting systems that incorporates environmental costs and environmental impacts into financial and managerial decision-making. It provides organizations with a systematic framework for identifying, measuring, and reporting environmental costs associated with their activities [3].

Through environmental accounting practices, organizations can better understand the financial implications of environmental impacts and adopt more sustainable operational strategies. Environmental accounting enables firms to track environmental expenditures, assess environmental risks, improve transparency in environmental reporting, and support corporate sustainability initiatives. By doing so, it serves as an important tool for balancing economic objectives with environmental responsibility.

A critical component of environmental accounting is environmental management cost, which refers to expenditures incurred by organizations to prevent, monitor, or remediate environmental damage resulting from their operational activities. Environmental management costs may include pollution prevention expenditures, environmental monitoring costs, waste management costs, environmental staff training, and environmental remediation costs. These investments are essential for minimizing environmental impacts and improving environmental performance. Empirical studies indicate that effective management of environmental costs contributes significantly to organizational sustainability and improved environmental outcomes [4]. Globally, sustainability efforts have been strengthened through the adoption of the United Nations 2030 Agenda for Sustainable Development, which outlines 17 Sustainable Development Goals (SDGs) aimed at addressing global economic, social, and environmental challenges. Among these goals is Sustainable Development Goal 12 (Responsible Consumption and Production), which focuses on promoting efficient resource utilization, waste reduction, environmentally responsible production systems, and sustainable corporate practices. Achieving SDG 12 requires organizations to adopt production processes that minimize environmental harm while maintaining economic efficiency [5].

Within the Nigerian context, the oil and gas sector remains one of the most important contributors to national economic growth. However, the environmental consequences of oil exploration and production have been significant, particularly in the Niger Delta region where environmental degradation has affected ecosystems and local communities. Consequently, there is increasing emphasis on the adoption of environmental accounting practices and environmental cost management strategies to promote sustainable development within the sector. Studies have shown that

environmental protection expenditures, remediation costs, and waste management initiatives can significantly improve sustainability performance among oil and gas companies [6].

Despite the growing recognition of environmental sustainability and the increasing adoption of environmental accounting practices globally, environmental degradation remains a major challenge in many industrial sectors, particularly in developing economies. Industrial activities continue to generate significant environmental problems such as pollution, resource depletion, and ecological damage, which threaten the sustainability of natural ecosystems and the well-being of communities. In Nigeria, the oil and gas sector has contributed significantly to national economic development; however, its operations have also resulted in severe environmental consequences, especially in the Niger Delta region. Issues such as oil spills, gas flaring, land degradation, and water pollution have persisted for decades, leading to widespread environmental damage and social concerns among host communities [7]. These environmental challenges raise important questions regarding the effectiveness of environmental management practices within the sector.

Although environmental accounting has been introduced as a mechanism for improving environmental responsibility among corporations, the extent to which environmental management costs contribute to sustainable development outcomes remains insufficiently explored. In particular, there is limited empirical evidence on how environmental cost investments such as environmental protection costs, remediation costs, and waste reduction initiatives influence responsible consumption and production practices in the oil and gas industry.

Furthermore, while global sustainability frameworks such as Sustainable Development Goal 12 emphasize responsible production and efficient resource utilization, many organizations still face difficulties integrating environmental sustainability objectives into their operational and financial decision-making systems. As a result, environmental costs are sometimes treated as regulatory compliance expenses rather than strategic investments that support long-term sustainability. Therefore, the persistence of environmental degradation in industrial sectors, particularly within Nigeria's oil and gas industry, highlights the need to examine the role of environmental management costs in promoting sustainable production practices. This study therefore seeks to investigate how environmental management costs influence the achievement of sustainable development objectives, particularly responsible consumption and production, within the context of the Nigerian oil and gas sector.

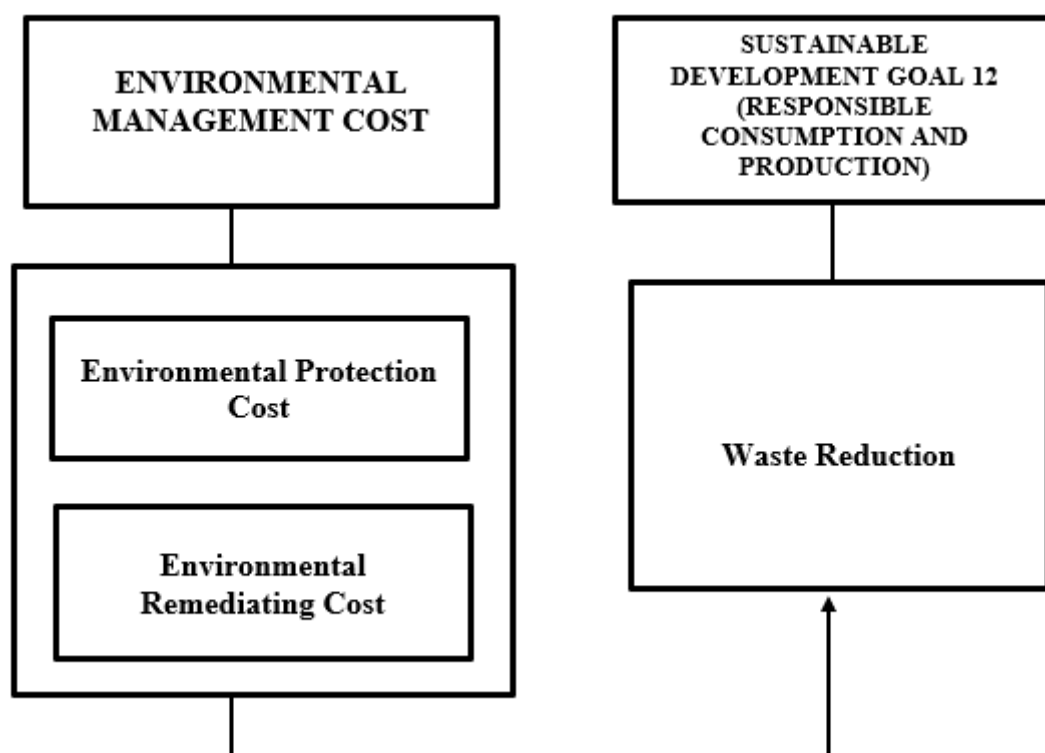


Figure 1. Conceptual framework on the effect of environmental management cost on sustainable Development Goal 12 Responsible Consumption and Production) in Nigeria.

Source: Iyoha, et al [8].

Aim and Objectives of The Study

1. Investigate the effect of environmental protection costs on waste reduction of oil and Gas companies in Nigeria.
2. Ascertain the effects of environmental remediating cost on waste reduction of oil and Gas companies in Nigeria.

Research Questions

1. What is the effect of environmental protection cost on waste reduction of oil and Gas companies in Nigeria?
2. What is the effect of environmental remediating cost on waste reduction of oil and Gas companies in Nigeria?

Research Hypotheses

To achieve the objective of this study, a number of hypotheses were proposed and are tested using data from listed oil and Gas companies in Nigeria.

H₀₁: environmental protection cost has no significant effects on waste reduction of oil and Gas companies in Nigeria.

H₀₂: environmental remediating cost has no significant effects on waste reduction of oil and Gas companies in Nigeria.

Environmental Management Cost (EMC) refers to the total financial resources committed by an organization to identify, prevent, monitor, and mitigate the environmental impacts generated by its operations. In contemporary environmental accounting and sustainability management, EMC represents a critical component of organizational strategies aimed at balancing economic performance with environmental responsibility. These costs arise from activities designed to reduce environmental degradation, ensure regulatory compliance, and support sustainable production and consumption patterns. Environmental management cost therefore encompasses both proactive expenditures aimed at preventing environmental damage and reactive expenditures associated with controlling or correcting environmental harm after it occurs [9].

Traditionally, environmental expenditures were viewed as unavoidable regulatory compliance costs that reduced corporate profitability. However, recent developments in environmental accounting and sustainability management have shifted this perception. Environmental management costs are increasingly regarded as strategic investments that can generate long-term economic and reputational benefits for organizations. Firms that integrate environmental cost management into their decision-making processes often achieve improved operational efficiency, enhanced resource utilization, reduced environmental risks, and stronger stakeholder trust. Consequently, environmental management cost management has become an important aspect of corporate sustainability strategies and responsible corporate governance.

Environmental management costs typically include expenditures on pollution prevention technologies, waste treatment and disposal systems, environmental monitoring and reporting mechanisms, environmental impact assessments, environmental auditing activities, staff training on environmental practices, and remediation of environmental damage. These costs enable organizations to minimize their environmental footprint while ensuring compliance with environmental regulations and international sustainability standards such as environmental management systems. Through effective environmental cost management, organizations can identify inefficiencies in resource use, reduce waste generation, and adopt cleaner production technologies that support sustainable industrial practices [10]. In environmental accounting literature, environmental management costs are commonly categorized into four major components. The first category is prevention costs, which represent expenditures incurred to prevent environmental damage before it occurs. These costs include investments in cleaner production technologies, renewable energy systems, eco-friendly raw materials, and environmentally sustainable production processes. Prevention costs are often considered the most desirable form of environmental expenditure because they reduce the likelihood of environmental damage and minimize future remediation costs.

The second category is detection costs, which refer to expenses associated with monitoring and evaluating environmental performance. Detection costs include

environmental audits, environmental impact assessments, environmental monitoring systems, compliance inspections, and environmental reporting mechanisms. These activities enable organizations to identify potential environmental risks and ensure adherence to regulatory requirements and sustainability standards. The third category is internal failure costs, which arise when environmental damage occurs within the organization but is detected and managed before it affects external stakeholders or the surrounding environment. Examples include waste recycling programs, treatment of industrial effluents, pollution control activities, and the handling of hazardous materials within the production process. Although these costs represent failures in environmental prevention, they remain internal to the organization and help prevent wider environmental consequences. The fourth category is external failure costs, which occur when environmental damage extends beyond the organization and affects external stakeholders, ecosystems, or surrounding communities. External failure costs may include environmental fines, legal penalties, compensation for environmental damages, and environmental remediation or restoration expenses [11]. These costs are typically the most severe and financially burdensome because they involve regulatory sanctions and reputational damage. Proper identification, measurement, and management of environmental costs are therefore essential for organizations seeking to improve environmental performance and achieve sustainable production practices. By integrating environmental management cost systems into their accounting and management processes, organizations can enhance transparency, support strategic decision-making, and contribute to long-term environmental sustainability.

Sustainable Development Goal 12 (Responsible Consumption and Production)

Sustainable Development Goal 12 (SDG 12) focuses on ensuring sustainable consumption and production patterns across industries, governments, and societies. It is one of the key goals of the global sustainable development agenda established by the United Nations in the 2030 Agenda for Sustainable Development. SDG 12 recognizes that prevailing patterns of production and consumption in many parts of the world are characterized by excessive resource extraction, inefficient utilization of natural resources, environmental degradation, and increasing volumes of waste. Consequently, the goal emphasizes the need to transform economic systems toward more sustainable practices that support long-term environmental protection, economic growth, and social well-being [12].

The central objective of SDG 12 is to encourage industries and societies to adopt production and consumption practices that minimize environmental impact while maintaining economic productivity. Sustainable production involves improving the efficiency with which natural resources such as water, energy, and raw materials are utilized during manufacturing and service delivery processes. At the same time, sustainable consumption emphasizes responsible use of goods and services by individuals and organizations in ways that reduce waste generation and environmental pollution. Achieving these objectives requires the adoption of environmentally friendly

technologies, improved resource management strategies, and stronger institutional frameworks that guide responsible production and consumption practices.

SDG 12 outlines several targets aimed at transforming current production and consumption systems into more sustainable and resource-efficient models. These targets include improving resource efficiency across industries, significantly reducing food waste and industrial waste along production and supply chains, promoting recycling and reuse of materials, and strengthening corporate sustainability reporting and environmental disclosure. Collectively, these initiatives contribute to the development of a circular economy in which materials and resources are reused, recycled, and maintained within the production cycle for as long as possible. The circular economy approach reduces pressure on natural resources, minimizes waste generation, and enhances environmental sustainability while supporting economic development.

In environmentally sensitive sectors such as the oil and gas industry, the implementation of responsible production practices is particularly critical due to the significant environmental risks associated with exploration, extraction, refining, and transportation activities. These operations often generate environmental challenges including greenhouse gas emissions, oil spills, gas flaring, water contamination, and ecological degradation. Consequently, aligning industrial operations with the principles of SDG 12 requires the adoption of cleaner production technologies, improved waste management systems, and effective environmental monitoring mechanisms [13]. Such measures help reduce the environmental footprint of industrial activities while promoting sustainable resource management [14].

Environmental accounting plays an important role in facilitating the implementation of SDG 12 by providing organizations with a systematic framework for identifying, measuring, and reporting environmental costs associated with production activities. Through environmental accounting systems, firms can monitor environmental expenditures, assess the financial implications of environmental impacts, and incorporate sustainability considerations into corporate decision-making processes. This approach not only enhances transparency and accountability but also encourages organizations to adopt production methods that align with broader sustainability objectives. As a result, environmental accounting has become a critical tool for supporting responsible consumption and production practices in line with the targets of SDG 12.

Environmental Protection Cost

Environmental protection cost refers to the expenditures incurred by organizations to prevent, control, or minimize environmental pollution arising from their operational activities. These costs are associated with proactive environmental management measures designed to protect natural resources, reduce emissions, and ensure compliance with environmental regulations. Within the framework of environmental accounting, environmental protection costs are recognized as essential investments that support sustainable production practices and reduce the environmental footprint of industrial operations. Environmental protection costs typically include

expenditures on pollution control equipment, emission reduction technologies, wastewater treatment systems, environmental monitoring systems, and investments in cleaner production processes. Organizations also incur costs related to environmental training programs, environmental impact assessments, and compliance with environmental regulations. These expenditures enable firms to reduce harmful emissions, manage hazardous waste, and adopt environmentally friendly technologies that support long-term sustainability [15].

In environmentally sensitive industries such as oil and gas, environmental protection costs are particularly significant due to the potential environmental risks associated with exploration, drilling, refining, and transportation activities. Oil spills, gas flaring, water contamination, and air pollution are common environmental challenges within the sector. As a result, oil and gas companies must invest heavily in environmental protection measures such as spill prevention technologies, gas recovery systems, and environmental monitoring infrastructure. These investments not only reduce environmental risks but also improve corporate reputation and regulatory compliance.

Environmental Remediation Cost

Environmental remediation cost refers to the financial resources expended by organizations to restore or rehabilitate environments that have been damaged as a result of industrial activities. Unlike environmental protection costs, which are preventive in nature, remediation costs arise after environmental damage has occurred and must be corrected to restore ecological balance. Environmental remediation activities are therefore considered reactive environmental management measures aimed at mitigating the negative consequences of pollution or environmental degradation. Environmental remediation costs may include expenditures related to cleaning up oil spills, restoring contaminated land, rehabilitating polluted water bodies, removing hazardous waste, and compensating communities affected by environmental damage. These costs also involve environmental restoration projects, ecological rehabilitation programs, and the treatment of contaminated soil and groundwater. In many jurisdictions, companies responsible for environmental damage are legally required to bear the costs associated with environmental remediation.

The oil and gas industry provides a clear illustration of the importance of environmental remediation costs. Extraction and refining activities sometimes result in oil spills, gas leaks, and contamination of soil and water resources. When such environmental incidents occur, companies must undertake remediation efforts to restore affected ecosystems and compensate impacted communities. In Nigeria, particularly in the Niger Delta region, environmental remediation activities have become a critical aspect of environmental management due to the historical impact of oil exploration on the local environment.

Waste Reduction

Waste reduction refers to strategies and practices implemented by organizations to minimize the generation of waste during production processes. It involves improving

the efficiency of resource utilization, reducing material consumption, and promoting recycling and reuse of materials. Waste reduction is a key component of sustainable production and is closely aligned with the objectives of Sustainable Development Goal 12, which emphasizes responsible consumption and production patterns. Waste reduction practices include the adoption of cleaner production technologies, process optimization, recycling programs, reuse of by-products, and improved waste management systems. These initiatives enable organizations to reduce the volume of industrial waste generated during production while simultaneously improving resource efficiency and lowering operational costs. By minimizing waste generation, organizations can reduce environmental pollution and conserve natural resources.

Stakeholder Theory

Stakeholder Theory was introduced by Edward Freeman as a framework for understanding how organizations should manage their relationships with various groups that influence or are influenced by their activities. The theory posits that organizations are not solely accountable to shareholders but must consider the interests of a wide range of stakeholders, including customers, employees, investors, suppliers, regulators, local communities, and the broader society. According to this perspective, the success and long-term sustainability of an organization depend on its ability to create value for all stakeholders rather than focusing exclusively on profit maximization. In the context of environmental accounting and sustainability, stakeholder theory emphasizes that organizations must address environmental concerns because various stakeholders increasingly demand responsible environmental behavior. Governments and regulatory bodies expect companies to comply with environmental laws and standards, investors are increasingly interested in sustainable investment practices, and communities expect organizations to minimize environmental damage resulting from their operations. Consequently, firms are under growing pressure to adopt environmental management strategies that demonstrate commitment to environmental protection and sustainable development. Environmental management cost plays a crucial role in fulfilling these stakeholder expectations. Investments in pollution control technologies, environmental monitoring systems, waste management programs, and environmental training initiatives enable organizations to reduce the environmental impacts of their operations. Such expenditures not only improve environmental performance but also enhance the trust and confidence of stakeholders. By proactively managing environmental costs, organizations demonstrate accountability and responsiveness to stakeholder concerns regarding environmental sustainability.

Empirical Model

Sani et al investigated the methodologies of associating environmental accounting with sustainability reporting within the Nigerian context, emphasizing on the challenges, levels of adoption, and implications pertinent to sustainable development. It was grounded in an analysis of extant literature regarding environmental accounting and sustainable reporting. This desktop research utilizes

theoretical framework covering stakeholder theory, legitimacy theory, and the Triple Bottom Line (TBL) to examine the incorporation of environmental accountability into corporate practices. An extensive review of both empirical and conceptual literature was conducted to assess the efficacy of sustainability reporting in mitigating environmental challenges and promoting transparency among enterprises in Nigeria. The results indicate notable deficiencies in regulatory enforcement: a lack of corporate commitment and the absence of standardized reporting framework. Moreover, economic and operational impediments such as elevated implementation costs and inadequate access to green financing obstruct the widespread acceptance of these practices. This research advocates for a series of actions that encompass the fortification of regulatory framework, the provision of financial incentives, and the utilization of technology for real-time environmental monitoring and the enhancement of stakeholder awareness. It further underscores the necessity of embedding sustainability within corporate strategies and aligning them with the United Nations' Sustainable Development Goals (SDGs).

The goal of this article is to analyze the relationship between environmental management costs and the sustainability of listed oil and gas firms in Nigeria. Specifically, it employed the Global Reporting Initiative's (GRI) sustainable environmental disclosure index as a measure of sustainability and environmental protection expenses, environmental remediation costs, and staff training costs as proxies for environmental costs. Using the ex-post facto research design, data was obtained from the chosen companies' yearly financial statements covering the period from 2014 to 2023. We utilized E-views 9.0, a statistical tool, to execute three independent analyses on the data set: Pooled Regression, Random Effect Model, and Fixed Effect Model. The idea was to establish which model functioned best. The results of the Hausman test showed that the Fixed Effect Model was the best match for the given data. All three independent variables - "Environmental Protection Costs" (EPC), "Environmental Remediation Costs" (ERC), and "Staff Training Costs" (STC) had considerable and favorable implications on the organizational sustainability index, according to the results. Therefore, the study reveals that oil and gas businesses in Nigeria may ensure more sustainable operations and a better environment by efficiently managing their environmental expenses. The report suggests that Nigerian oil and gas corporations should put more money into environmental protection, environmental studies, and worker training to keep their operations functioning smoothly and prevent having to pay to clean up pollution.

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RESEARCH METHOD

The study adopted an ex post facto research design. The population comprised of all oil and gas companies in Nigeria listed on the Nigerian Exchange Group as at 31 Dec 2025. In view of the above, seven (7) emerged as the sample of the study using census sampling method in its selection.

For the purpose of this study, secondary data is exploited, while the sources of data were collected from the issued annual reports of the sampled oil and gas companies for the period 2015-2025. The use of secondary data in this study is justified based on the fact that the study is based on the quantitative research methodology, and hence requires quantitative data.

$$WRD = b_0 + b_1EPC + b_2ERC + u \dots\dots\dots \text{Model 1}$$

Where:

WRD = Waste Reduction

EPC = Environmental protection cost

ERC = Environmental remediation cost

β_0 = Intercept

$\beta_1 - \beta_2$ = Coefficients of explanatory variables

μ = Error term

RESULTS AND DISCUSSION

Result

Data Analysis

Table 1. Descriptive Statistics

Variable	Mean	Median	Maximum	Minimum	Std. Dev.	Obs
WRD	0.584	0.571	0.812	0.341	0.126	77
EPC	5.218	5.102	7.654	3.441	1.114	77
ERC	4.734	4.612	6.921	3.005	0.987	77

The descriptive statistics provide insight into the distribution and variation of the variables used in the study. Waste Reduction (WRD), which represents progress toward Sustainable Development Goal 12, recorded an average value of 0.584, indicating moderate adoption of waste management practices among the sampled oil and gas firms. The maximum value of 0.812 suggests that some firms demonstrate relatively high waste reduction performance, while the minimum value of 0.341 indicates that certain companies still lag in implementing effective waste management initiatives.

Environmental Protection Cost (EPC) recorded a mean value of 5.218 with a standard deviation of 1.114, indicating moderate variation in spending on environmental protection measures such as pollution prevention and environmental monitoring. Environmental Remediation Cost (ERC) shows an average of 4.734 with a standard deviation of 0.987, reflecting investments made by firms to restore environmental damage caused by operational activities. Overall, the relatively moderate standard deviations across the variables suggest a reasonable level of consistency in environmental management practices among the selected oil and gas firms.

Table 2. Correlation Matrix

Variable	WRD	EPC	ERC
WRD	1.000	0.612	0.548
EPC	0.612	1.000	0.463
ERC	0.548	0.463	1.000

The correlation matrix illustrates the degree of association among the variables used in the study. The results show that Environmental Protection Cost (EPC) has a positive correlation of 0.612 with Waste Reduction (WRD). This indicates that higher investment in environmental protection initiatives is associated with improved waste reduction performance among oil and gas firms.

Similarly, Environmental Remediation Cost (ERC) shows a positive relationship with WRD, with a correlation coefficient of 0.548. This suggests that firms that allocate more resources toward remediation activities tend to achieve better waste management outcomes. Importantly, the correlation between EPC and ERC is 0.463, which is below the threshold commonly associated with multicollinearity problems. Therefore, the independent variables appear sufficiently independent, suggesting that the regression model can provide reliable estimates [16].

Table 3. Panel Least Squares Regression Result

Dependent Variable: WRD
Method: Panel Least Squares
Sample Period: 2015 - 2025

Variable	Coefficient	Std. Error	t-Statistic	Prob
C	0.214	0.072	2.97	0.004
EPC	0.086	0.021	4.10	0.000

Variable	Coefficient	Std. Error	t-Statistic	Prob
ERC	0.064	0.018	3.56	0.001

Model Statistics

Statistic	Value
R-squared	0.69
Adjusted R-squared	0.67
F-statistic	32.84
Prob (F-statistic)	0.000
Durbin-Watson	1.89

The regression results examine the effect of environmental management cost on waste reduction among oil and gas companies in Nigeria. The coefficient of determination (R^2) is 0.69, indicating that approximately 69 percent of the variations in waste reduction are explained by environmental protection cost and environmental remediation cost. The remaining 31 percent may be explained by other variables not included in the model. The adjusted R^2 of 0.67 confirms that the model maintains strong explanatory power after adjusting for the number of predictors.

The F-statistic value of 32.84 with a probability value of 0.000 indicates that the overall model is statistically significant, suggesting that environmental management cost variables jointly influence waste reduction. The Durbin-Watson statistic of 1.89 indicates that there is no serious autocorrelation problem in the regression model.

Environmental Protection Cost (EPC) shows a positive and statistically significant coefficient of 0.086 with a probability value of 0.000. This implies that increased spending on environmental protection activities significantly improves waste reduction performance in oil and gas companies [17]. Environmental Remediation Cost (ERC) also exhibits a positive and significant coefficient of 0.064 with a probability value of 0.001. This suggests that investments in environmental restoration and remediation contribute positively to waste reduction practices.

Discussion

1. Environmental Protection Cost (EPC) has a positive and statistically significant effect on Waste Reduction (WRD) among oil and gas companies in Nigeria. This indicates that increased spending on environmental protection activities such as pollution control, environmental monitoring, and waste management systems improves waste reduction performance.
2. Environmental Remediation Cost (ERC) shows a positive and significant influence on Waste Reduction (WRD). This suggests that investments made by firms to restore and clean up environmental damage contribute to improved waste management practices.

CONCLUSION

Fundamental Finding: The findings revealed that environmental protection cost and environmental remediation cost both have positive and statistically significant effects on waste reduction. **Implication:** This implies that oil and gas companies that invest more in environmental protection initiatives and remediation activities tend to achieve better waste management outcomes. The results therefore highlight the importance of environmental expenditure in promoting responsible production practices and improving environmental sustainability in the Nigerian oil and gas sector. **Limitation:** This study examined the effect of environmental management cost on waste reduction among listed oil and gas companies in Nigeria within the framework of Sustainable Development Goal 12. **Future Research:** Oil and gas companies should increase investment in environmental protection activities, such as pollution control technologies, waste management systems, and environmental monitoring programs, in order to enhance waste reduction and support sustainable production practices. Regulatory agencies such as the Nigerian Upstream Petroleum Regulatory Commission should strengthen environmental compliance policies and monitoring mechanisms to ensure that oil and gas companies allocate adequate resources to environmental remediation and sustainable environmental management.

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