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Environmental Accounting and Sustainable Development of Firms in Rivers State, Nigeria

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Abstract

Within the scope of the research, environmental accounting and sustainable development were explored in relation to oil and gas firms located in Rivers State, Nigeria. There was a correlational survey research design used for the investigation. A total of six oil and gas businesses that were active in the Rivers State Region of Nigeria were included in the study's research population. For this particular investigation, secondary data served as the instrument. Statistical Package for the Social Sciences (SPSS) Version 22 was used in order to do the analysis on the data. A simple bivariate regression analysis was performed at a significance level of.05. The research issues were evaluated using the mean and standard deviations, and hypotheses were assessed using the analysis. The data indicated that there is no substantial connection between the cost of waste management and the ecologically sustainable growth of oil and gas businesses in Rivers State, Nigeria. Additionally, there is a strong significant association between the cost of pollution control and the development of ecological sustainability, as well as a strong significant relationship between the cost of pollution control and the development of economic sustainability for oil and gas businesses in Rivers State, Nigeria. By adhering to social responsibility in waste management, oil and gas firms should put a premium value on initiatives that are focused towards reducing their ecological footprint and promoting sustainable growth while also reducing their environmental impact.

Keywords: Environmental Accounting; Waste Management Cost; Ecological Sustainable Development, Economic Sustainable Development; Rivers State, Nigeria.

1. Introduction

In recent years, environmental accounting and sustainable development have become integral components of strategic planning and reporting frameworks for businesses worldwide, particularly in regions like Rivers State, Nigeria, where economic activities, notably in the oil and gas industry, intersect with environmental concerns. This alignment with global sustainability initiatives reflects a commitment by companies to address both immediate environmental and social implications while also considering long-term sustainability goals (Ephraim -Emmanuel, et al., 2023). Environmental accounting, as a subset of accounting, plays a crucial role in identifying, quantifying, and communicating the environmental costs and benefits associated with a company's actions. It provides insights into environmental performance, compliance with sustainable development goals, and informs decision-making processes internally and externally. Sustainable development, defined as meeting present needs without compromising future generations' ability to meet their own needs, is not just a statutory or ethical obligation but a strategic imperative for businesses in Rivers State (Idowu et al., 2022). Despite the significance of incorporating environmental accounting into business strategies, companies in Rivers State face challenges. These include the absence of defined reporting standards, limited knowledge and competence, and the need for substantial investments in cleaner technologies and procedures. Additionally, Nigeria's regulatory environment has been criticized for inefficiencies and lack of enforcement, hindering sustainability efforts (Orisakwe, 2021). However, businesses in Rivers State are increasingly recognizing the importance of integrating environmental accounting and sustainable development into their models. Drivers for this shift include the desire to enhance company reputation and stakeholder trust, regulatory pressures, cost savings through resource optimization, and the adoption of international sustainability reporting standards like those by the Global Reporting Initiative (GRI) and the Sustainability Accounting Standards Board (SASB).

In the face of these challenges, businesses in Rivers State are embracing creative approaches to tackle environmental concerns, such as collaborative projects with local communities, government agencies, and non-governmental organizations to restore ecosystems and promote sustainable practices (Olawuyi, 2018). These initiatives reflect a broader global movement toward sustainability and corporate responsibility. However, despite increasing awareness and efforts, environmental degradation persists, particularly in oil-rich regions like Rivers State, due to decades of oil exploration and exploitation. This underscores the urgency for research and action to address environmental challenges and enhance sustainability practices in the region (Ephraim -Emmanuel, et al., 2023; Orisakwe, 2021).

This study investigates the impact of waste management expenses on the ecological and economic sustainability of oil and gas companies in Rivers State, Nigeria. It focuses on four main inquiries: the influence of waste management costs on ecological development, the interplay between waste

management expenses and economic sustainability, the effect of pollution management costs on ecological sustainability, and the interaction between pollution management expenses and economic sustainability. The overarching aim is to understand the relationship between environmental accounting practices and the sustainable progress of oil and gas firms in Rivers State. To achieve this, the study aims to research the connections between waste and pollution management costs and both ecological and economic sustainability, providing insights into the specific dynamics within this sector in Rivers State, Nigeria.

2.0 Literature Review

Existing and related works upon which this research seeks to advance are best appreciated from a review of the conceptional and theoretical frameworks of the subject of the research.

2.1 Conceptual Framework

2.1.1 Environmental Costs and Environmental Accounting

"Environmental costs" encompasses expenditures incurred to meet legal regulations, including expenses for limiting or eliminating hazardous chemical discharges and implementing practices to reduce environmental impacts. These costs represent a subset of overall business expenses. Environmental contamination resulting from chemical discharges is considered a societal cost or externality, but regulation has led to the internalization of some of these externalities, such as through investments required for compliance.

As environmental externalities are absorbed, new costs emerge, necessitating adjustments in cost accounting systems to maintain accurate product costing for rational decision-making. For example, the cost of waste treatment facilities like wastewater plants and incinerators must be factored into the cost of products generating waste. This integration of environmental costs into accounting systems ensures that the true costs associated with business activities are reflected, facilitating informed decision-making, and promoting environmental responsibility. Accounting for environmental costs not only aligns with regulatory requirements but also supports sustainable business practices by incentivizing the consideration of environmental impacts in cost management strategies.

2.1.2 Dimensions on Environmental Accounting

a. Waste Management Cost (WMC)

The expenses related to waste management incurred by businesses are directly influenced by the nature of their operations and the type of waste generated. Such costs include environmental taxes, disposal fees, and expenses for addressing environmental hazards like air pollution. These expenditures can have adverse effects on a company's financial performance and may necessitate increased investment in health and safety measures to mitigate risks to the community (Ango,

2021). Consequently, companies may incur additional costs for regulatory compliance and community development, impacting their overall profitability. These expenses are typically accounted for as operational costs before profits or dividends are declared, further affecting the company's financial performance.

b. Pollution Control Cost

According to the Basic Law for Environmental Pollution Control, environmental pollution refers to actions that harm the health or environment of others in a limited region, with a proven causal relationship. This definition applies to activities conducted by both businesses and individuals. Environmental contamination can be categorized into seven distinct types. Pollution control involves restricting emissions and effluents into the environment, achieved through the use of materials, processes, or practices aimed at minimizing, reducing, or eliminating pollutants or wastes. This includes activities that reduce resource consumption and the use of harmful or dangerous products.

Sustainable development can be defined as meeting present needs without compromising the ability of future generations to meet their own needs, thus ensuring a sustainable future. It involves replacing resources used with those of equal or higher value without degrading natural biotic systems, thereby preserving production processes indefinitely. Sustainable development addresses environmental, social, political, and economic challenges faced by humanity (Atairet and Mboho, 2019).

This definition aligns with the concept outlined in the United Nations report published in 2015, originating from the Brundtland Commission report. Sustainable development is characterized by meeting present needs without jeopardizing the ability of future generations to meet their own needs. It aims to fulfill the objectives and aspirations of the current generation while ensuring the ability to meet the expectations of future generations, specifically in the context of development. This comprehensive understanding of sustainable development emphasizes the importance of balancing environmental, social, and economic considerations to achieve long-term prosperity and well-being (Brundtland Commission, 1987).

2.1.3 Measures of Sustainable Development

a. Ecological Sustainable Development

The concept of ecologically sustainable development refers to the use, preservation, and enhancement of the community's resources in order to ensure the preservation of ecological processes, which are essential to the survival of life, and to enhance the overall quality of life, both in the present and in the future. According to Pramanil, Shil, and Das (2021), the objective of the strategy is to achieve a development that leads to an improvement in the overall quality of life,

both in the present and in the future, while simultaneously preserving the ecological processes that are essential to the survival of life.

To safeguard the environment in Queensland by encouraging development that is ecologically sustainable is the purpose of the Environmental Protection Act (EP Act). The act provides an overview of a "standard criteria," which contains the principles of ecologically sustainable development (which are derived from the National Strategy for Ecologically Sustainable Development) as well as other policy instruments that are pertinent. With regard to the evaluation of the EIS, the Department of Environment and Heritage Protection (EHP) of Queensland is required to take into consideration the standard criteria. Section G.6 of this report contains a summary of the compatibility of the Project with the standard criteria. This report is comprised of several sections.

b. Economic Sustainable Development

Sustainable economic growth is a fundamental pillar for the majority of firms, ensuring their long-term existence and profitability. However, it is essential to recognize that economic sustainability extends beyond mere profit generation. Activities encompassed within this pillar include compliance with regulations, effective governance practices, and risk management strategies. While these practices are increasingly viewed as standard operating procedures in North America (Agbiogwu, Ihendinihu, & Okafor, 2016), their adoption varies globally.

The governance pillar emphasizes the importance of excellent corporate governance in achieving economic sustainability. This concept underscores the alignment of interests between a company's shareholders, community, value chains, end-user customers, and its board of directors and management. Investors are particularly interested in governance practices that ensure accurate and transparent accounting methods, shareholder participation in key decision-making processes, and the prevention of illegal activities or conflicts of interest within the organization (Bermiss, Zajac, & King, 2022).

In essence, economic sustainability goes beyond profit maximization and includes a commitment to responsible governance, compliance with regulations, and effective risk management. It is through these practices that firms can ensure their long-term viability and contribute positively to both shareholder value and broader societal interests.

2.2 Theoretical Framework

This study is anchored on Legitimacy Theory. Legitimacy Theory, categorized under systems-oriented theories alongside Stakeholder Theory and Political Economy Theory, posits that organizations are influenced by, and exert influence on society. Disclosure policies within corporations are seen as crucial avenues through which management can shape public perceptions of their businesses (Watts, et al., 2016). According to legitimacy theory, organizations do not

inherently possess the right to resources or existence but derive legitimacy from societal perception, akin to a social contract (Matthews, 2013). The concept of a social contract underpins legitimacy theory, suggesting that an organization's existence relies on societal recognition of its legitimacy. Violations of this social contract jeopardize an organization's continued existence, as society may withdraw its support if it perceives unethical or unacceptable behavior (Matthews, 2013). Managers, per the legitimacy hypothesis, seek to ensure the availability of resources vital for organizational survival by maintaining legitimacy. Strategies include targeted disclosures and collaboration with other legitimate parties (Fiedler, et al., 2021).

In summary, Legitimacy Theory asserts that organizations must maintain societal legitimacy to ensure survival. This necessitates adherence to societal expectations and norms, as deviations may lead to the withdrawal of societal support. Managers respond by engaging in practices aimed at preserving legitimacy, such as strategic disclosures and alliances with legitimate stakeholders.

2.3 Empirical Review

Madukwe, Chimezie et al., (2022) conducted a study on the impact of environmental and social accounting on the performance of Nigerian firms, analyzing data from fourteen randomly selected listed enterprises. They found a negative correlation between environmental accounting and return on capital employed and earnings per share (EPS), while there was a substantial correlation with net profit margin and dividend per share (cum DPS). Velte (2023), using data for 50 firms spanning 2008–2017, the reports that the environmental performance has positively influenced the stock price of both the product and service-based firms listed on LSE. Additionally, the dissemination of social and environmental reports was found to have little effect on company performance.

Onyekwelu and Ekwe (2022) investigated the impact of corporate social responsibility (CSR) on the Nigerian banking industry's success, finding variations in CSR dedication and spending among banks. Their study, employing ordinary least square regression, revealed that CSR affects corporate performance and can help resolve conflicts within corporations, potentially reducing fines, penalties, and compensations. Deegan (2002) explored the environmental disclosure policies of Australian businesses, finding minimal voluntary environmental disclosure, mainly positive, in the annual reports of sampled corporations, with a noted increase due to the proliferation of environmental groups.

Aigbedo, 2021 analyzed how the environmental performance affects financial performance in different industries using a framework that included stakeholder power, strategic posture, and economic performance. Their findings suggested no substantial correlation between return on assets and environmental performance but identified three other parameters influencing the inclusion of environmental initiatives in business strategy plans. Smith (2017) observed a negative correlation between environmental disclosure and financial success in Malaysia, suggesting different prioritization of environmental disclosure compared to other nations.

Bello and Usman (2020) highlighted environmental disclosure as a strategy to manage the validity of environmental impacts associated with oil operations, noting differing approaches between environmental and social disclosures. Arsad et al (2014) developed a disclosure index to examine voluntary disclosure in the annual reports of Shariah-approved companies in Malaysia, finding low disclosure levels of environmental information compared to other sections, with no information on harmful environmental policies and practices provided.

In summary, these studies underscore the varying impacts of environmental and social accounting practices on firm performance across different contexts, with implications for regulatory frameworks, corporate strategies, and stakeholder engagement.

3.0 Research Methodology

Specifically, a correlational survey research strategy will be used for this investigation. A correlational study is a quantitative form of research, as stated by Waters (2017). The six oil and gas firms that are now functioning in the Rivers State region of Nigeria should be considered the target demographic for the research. Total Nigeria Plc, Seplat Petroleum Development Company, Conoil Plc, Oando Plc, MRS Plc, and Mobil Oil Plc are the companies that fall under this category. Due to the fact that the target demographic consists of six oil and gas businesses that are currently functioning in the Rivers State Region of Nigeria. In light of the fact that the population is quite tiny, the research does not entail any sampling. The instrument that was used for this research was secondary data from the financial statements of six (6) oil and gas companies as well as the Nigeria Stock Exchange (NSE) from the years 2017 to 2022. When it comes to this particular research, the annual reports of the firms serve as the authoritative sources of information. The papers were obtained from the Corporate Affairs Commission of Rivers State as well as listed publications of credible government establishment vis-à-vis the Nigeria Stock Exchange (NSE). According to Freedman (2019), regression analysis is concerned with the study of how one or more variables affect changes in another variable.

Thus, the formula for regression: $y = \beta o + \beta x + \mu$

Where: $y =$ index of outcome variable

$\beta o =$ constant term for the independent variables

$b =$ index of predictor variable

$x =$ coefficients

$\mu =$ error level

$SUSDEV_{it} = \beta o + \beta(ENVCOST)_{it} + \mu\ (0.05)$…….1

Thus:

The First Model

The first hypothesis test model shows the relationship between waste management cost and ecology sustainability development: $ECOGLSUDEV_{it} = \beta o + \beta_1(WMCOST)_{it}, + \mu$ (.05)

The Second Model

The second hypothesis test model shows the relationship between waste management cost and economic sustainability development: $ECOSUDEV_{it} = \beta o + \beta_2(WMCOST)_{it} + \mu$ (.05)

The Third Model

The third hypothesis test model shows the relationship between pollution control cost and ecology sustainability development: $ECOGLSUDEV_{it} = \beta o + \beta_3(PULCCOST)_{it} + \mu$ (.05)

The Fourth Model

The fourth hypothesis test model shows the relationship pollution control cost and economic sustainability development: $ECOSUDEV_{it} = \beta o + \beta_4(PULCCOST)_{it}, + \mu$ (.05).

The Statistical Package for the Social Sciences (SPSS) Version 22 was used in order to do the analysis on the data that was gathered from the questionnaire. When doing the analysis of the research questions, the Mean and Standard Deviation was used in the tables of distributive statistics. In order to evaluate the hypotheses that have been made, a basic bivariate regression analysis was performed, along with a model summary that provides an explanation of the connection and the determinant percentage of the association, as measured by R and R-square, respectively. The analysis of variance (ANOVA) and the acceptance and rejection of hypotheses at 0.05 levels of significance will be used in order to assess the significance of the variability. The coefficients table will be utilized with the assistance of the SPSS platform.

4.0 Research Analysis and Findings

4.1 Descriptive Analysis

The following table presents the summary of the descriptive statistics for the measures of the explanatory variables dimension Environmental Costs (ENVCOST), Waste Management Cost (WMCOST) and Pollution Control Cost (PULCCOST), and Sustainability Development (SUSDEV) also of dependent variable measures Ecology Sustainability Development (ECOGLSUDEV) and Economic Sustainability Sevelopment (ECOSUDEV) which containing minimum, maximum, mean, standard deviation, skewness and kurtosis are revealed.

Table 4.1 **Descriptive Statistics**

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
WMCOST	5	.206	.667	.36560	.192179	1.227	.913	.511	2.000
PULCCOST	5	1.400	9.680	6.14000	3.269457	-.544	.913	-.260	2.000
ECOGLSUDEV	5	.170	.960	.53201	.295838	.477	.913	.377	2.000
ECOSUDEV	5	3.241	4.542	4.13180	.551418	-1.415	.913	1.272	2.000
Valid N (listwise)	5								

The data provided in Table 4.1 illustrates various measures related to waste management cost (WMCOST), Pollution Control Cost (PULCCOST), Ecological Sustainability Development (ECOGLSUDEV), and Economic Sustainability Development (ECOSUDEV).

For WMCOST, values range from 0.206 to 0.667. The mean value is 0.36560 with a standard deviation of 0.192179, indicating a considerable deviation from the mean. Skewness and kurtosis values of 0.351 and 0.255, respectively, suggest a normal distribution.

PULCCOST varies from 1.400 to 9.680, with a mean of 6.14000 and a standard deviation of 3.269457. Skewness and kurtosis values are -0.596 and -0.13, respectively, also indicating a normal distribution.

ECOGLSUDEV ranges from 0.170 to 0.960, with a mean of 0.53201 and a standard deviation of 0.295838. Skewness and kurtosis values of 0.522 and 0.377, respectively, suggest a normal distribution.

ECOSUDEV values span from 3.241 to 4.542, with a mean of 4.13180 and a standard deviation of 0.551418. Skewness and kurtosis values are -0.002 and 0.636, respectively, also indicating a normal distribution.

These analyses reveal substantial variability in the data for all measures in relation to their means, as indicated by the standard deviations being relatively close to the mean values. However, despite this variability, the skewness and kurtosis values falling within the normal distribution range suggest that the data may follow a normal distribution pattern.

In summary, the data provided indicate significant variability in waste management cost, pollution control cost, ecological sustainability development, and economic sustainability development. While deviations from the mean are evident, the normal distribution of skewness and kurtosis values suggests that the data may conform to a normal distribution pattern.

4.2 Regression Analysis

Analysis of Research Hypothesis One: There is no significant relationship between waste management cost and ecological sustainable development of oil and gas companies in Rivers State, Nigeria.

The First Model: The first hypothesis test model; the relationship between waste management cost and ecology sustainability development: $ECOGLSUDEV_{it} = \beta o + \beta_1(WMCOST)_{it,} + \mu$ (.05)

Table 4.2a **Model Summary[b]**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.809[a]	.654	.539	.303720	1.590

a. Predictors: (Constant), WMCOST

b. Dependent Variable: ECOGLSUDEV

Source: SPSS Output 2024

The model summary table that was shown earlier yielded a correlation coefficient, denoted by the letter 'R', of 0.809a, which indicates that there is a strong and substantial association between the cost of waste management and the growth of ecological sustainability. In addition, our R2 value was 0.654, which indicates that around 65 percent of the fluctuations in the dependent variable (ecological sustainability development) may be related to changes in the independent variables (waste management cost). The value of the standard error is 0.303720, which indicates that the measure of variation of the observation made from the actual values of j relative to the calculated value of j on the regression line is very near to 0 and a significant distance from 1. Because the Durbin-Watson d value is 1.590, which falls between the two essential values of $1.5 < d < 2.5$, we may safely claim that the data does not exhibit any first order linear autocorrelation. Consequently, the model is an excellent match for the data.

Table 4.2b **ANOVA[a]**

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.523	1	.523	5.673	.097[b]
	Residual	.277	3	.092		
	Total	.800	4			

a. Dependent Variable: ECOGLSUDEV

b. Predictors: (Constant), WMCOST

Source: SPSS Output 2024

The F-value for the analysis of variance (ANOVA) table that was shown before was 5.673, and the sig value was 0.097, which is larger than 0.05 (P-Value > 0.05). According to the data shown in this table, the regression model does not provide a substantial level of accuracy in predicting the dependant variable. It may be concluded that there are considerable deviations from the line of best fit between the variables.

Table 4.2c Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.450	.305		8.034	.004
	WMCOST	1.223	.513	.809	2.382	.097

a. Dependent Variable: ECOGLSUDEV

Source: SPSS Output 2024.

According to the coefficient table shown above, the value of the model constant (a) is 2.450, and the value of the cost of waste management is 0.087. This indicates that the value of the dependent variable (ecological sustainability development) will grow by nine percent for every one-unit increase in the cost of waste management of waste management. As opposed to this, Beta (β) values of.809 indicate that the ecological sustainability development ratio is being achieved. The T-value for the ecological sustainability development ratio, which was calculated to be 2.382, is lower than the significant (Prob) value, which is 0.097, an amount that is more than the alpha of α that was selected, which was 0.05. It may be concluded that there exists a negative linear connection between the expense of waste management and the growth of ecological sustainability.

Analysis of Research Hypothesis Two

There is no significant relationship between waste management cost and economic sustainable development of oil and gas companies in Rivers State, Nigeria.

The Second Model: the second hypothesis test model; shows the relationship between waste management cost and economic sustainability development: $ECOSUDEV_{it} = \beta o + \beta_2(WMCOST)_{it} + \mu(.05)$

Table 4.2d Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.889[a]	.790	.720	.241829	2.095

a. Predictors: (Constant), WMCOST

b. Dependent Variable: ECOSUDEV

Source: SPSS Output 2024

The model summary table that was shown earlier yielded a correlation coefficient, denoted by the letter 'R', of 0.889a, which indicates that there is a strong and substantial association between the cost of waste management and the growth of economic sustainability. In addition, our R2 value was 0.790, which indicates that around 79% of the fluctuations in the dependent variable (economic sustainability development) can be related to changes in the independent variables (management cost). Based on the fact that the standard error is 0.241829, it can be concluded that the measure of variation of the observation made from the actual values of j around the calculated value of j on the regression line is very near to 0 and a significant distance from 1. Because the Durbin-Watson d value is 2.095, which falls between the two essential values of $1.5 < d < 2.5$, we may safely claim that the data does not exhibit any first order linear auto-correlation. Consequently, the model is an excellent match for the data.

Table 4.2e **ANOVA[a]**

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.660	1	.660	11.283	.044[b]
	Residual	.175	3	.058		
	Total	.835	4			

a. Dependent Variable: ECOSUDEV
b. Predictors: (Constant), WMCOST
Source: SPSS Output 2024

The analysis of variance (ANOVA) yielded an F-value of 11.283 and a significance value of 0.044, both of which are below the threshold of 0.05 (P-Value < 0.05). Based on the data shown in this table, it can be concluded that the regression model performs a significant job of predicting the dependent variable. It may be concluded that there are considerable deviations from the line of best fit between the variables.

Table 4.2f **Coefficients[a]**

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.672	.243		6.886	.006
	WMCOST	1.373	.409	.889	3.359	.044

a. Dependent Variable: ECOSUDEV
Source: SPSS Output 2024.

Source: SPSS Output 2024.

The model summary table that was shown earlier yielded a correlation coefficient, denoted by the letter 'R', of 0.903a, which indicates that there is a strong and substantial link between the cost of pollution management and the growth of ecological sustainability. In addition, our R2 value was 0.816, which indicates that about 81% of the fluctuations in the dependent variable (ecological sustainability development) can be related to changes in the independent variables (pollution

According to the coefficient table that was just shown, the value of the model constant (a) is 1.672, and the value of the current ratio is 1.373. This indicates that the value of the dependent variable (economic sustainability development) will grow by 1.4% for every one-unit increase in the cost of waste management. As opposed to this, Beta (β) values of.889 indicate that the economic sustainability development ratio is being achieved. The T-value for economic sustainability development returns, which was calculated to be 3.359, is higher than the significant (Prob) value, which is 0.044. However, the latter number is lower than the alpha of α, which was decided to be 0.05. It may be concluded that there exists a positive linear connection between the cost of waste management and the development of economic sustainability.

Table 4.2g **Model Summary**[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.903[a]	.816	.755	.221415	1.581

a. Predictors: (Constant), PULCCOST
b. Dependent Variable: ECOGLSUDEV

control). Based on the fact that the standard error is 0. 221415, it can be concluded that the measure of variation of the observation made from the actual values of j around the calculated value of j on the regression line is very near to 0 and a significant distance from 1. Due to the fact that the Durbin-Watson d value is 1.581, which falls within the range of 1.5 to 2.5, we may confidently claim that there is no first order linear autocorrelation present in the data. Consequently, the model is an excellent match for the data.

Analysis of Research Hypothesis Three

There is no significant relationship between pollution control cost and ecological sustainable development of oil and gas companies in Rivers State, Nigeria.

The Third Model

The third hypothesis test model; shows the relationship between pollution control cost and ecology sustainability development: $ECOGLSUDEV_{it} = \beta o + \beta_3(PULCCOST)_{it} + \mu$ (.05)

Table 4.2f **ANOVA**[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.653	1	.653	13.318	.036[b]
	Residual	.147	3	.049		
	Total	.800	4			

a. Dependent Variable: ECOGLSUDEV
b. Predictors: (Constant), PULCCOST
Source: SPSS Output 2024.

The analysis of variance (ANOVA) yielded an F-value of 13.318 and a significance value of 0.036, both of which are below the threshold of 0.05 (P-Value < 0.05). Based on the data shown in this table, it can be concluded that the regression model performs a significant job of predicting the dependent variable. In light of this, there are no substantial deviations from the line of best fit between the variables observed.

Table 4.2g **Coefficients[a]**

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.227	.835		1.469	.238
	PULCCOST	.733	.201	.903	3.649	.036

a. Dependent Variable: ECOGLSUDEV

Source: SPSS Output 2024.

According to the coefficient table shown above, the value of the model constant (a) is 1.227, and the value of the pollution cost is 0.733. This indicates that the value of the dependent variable (ecological sustainability development) will increase by 0.73% for every one-unit increase in the pollution cost. As opposed to this, Beta (β) levels of.903 are associated with the development of ecological sustainability. The T-value for ecological sustainable development, which was calculated to be 3.649, is higher than the significant (Prob) value, which is 0.044. However, the selected alpha of α, which is 0.05, is lower than the predicted value. It may be concluded that there exists a positive linear connection between the expense of pollution management and the growth of ecological sustainability.

Analysis of Research Hypothesis Four: There is no significant relationship between pollution control cost and economic sustainable development of oil and gas companies in Rivers State, Nigeria.

The Fourth Model: the fourth hypothesis test model; show the relationship pollution control cost and economic sustainability development: $ECOSUDEV_{it} = \beta o + \beta_4(PULCCOST)_{it,} + \mu(.05)$

Table 4.2h **Model Summary[b]**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.881[a]	.777	.702	.249288	1.991

a. Predictors: (Constant), PULCCOST

b. Dependent Variable: ECOSUDEV

Source: SPSS Output 2024.

The model summary table that was shown earlier yielded a correlation coefficient, denoted by the letter 'R', of 0.881a, which indicates that there is a strong and substantial link between the cost of pollution management and the development of economic sustainability. In addition, our R2 value was 0.777, which indicates that around 78% of the fluctuations in the dependent variable (economic sustainability development) can be related to changes in the independent variables (pollution control). Considering that the standard error is 0.249288, it can be concluded that the measure of variation of the observation produced from the actual values of j around the calculated value of j on the regression line is very near to 0 and a significant distance from 1. Since the Durbin-Watson d value is 2011, which falls between the two key values of $1.5 < d < 2.5$, we can safely infer that there is no first order linear auto-correlation present in the data. Consequently, the model is an excellent match for the data.

Table 4.2i ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.649	1	.649	10.441	.048[b]
	Residual	.186	3	.062		
	Total	.835	4			

a. Dependent Variable: ECOSUDEV
b. Predictors: (Constant), PULCCOST
Source: SPSS Output 2024.

The analysis of variance (ANOVA) yielded an F-value of 10.441 and a significance value of 0.048, both of which are below the threshold of 0.05 (P-Value < 0.05). Based on the data shown in this table, it can be concluded that the regression model performs a significant job of predicting the dependent variable. In light of this, there are no substantial deviations from the line of best fit between the variables observed.

Table 4.2j Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.076	.941		2.207	.114
	PULCCOST	.730	.226	.881	3.231	.048

a. Dependent Variable: BOND MARKET RETURNS
Source: SPSS Output 2024.

According to the coefficient table that was just shown, the value of the model constant (a) is 2.076, and the value of the pollution control cost is 1.373. This indicates that the value of the dependent variable (economic sustainability development) will increase by 1.4% for every one-unit increase in the current ratio. As opposed to this, Beta (β) values of.881 indicate that the economic sustainability development ratio is being achieved. The T-value for economic sustainability

development, which was calculated to be 3.359, is higher than the significant (Prob) value, which is 0.044. However, the prob value is lower than the alpha of α, which was decided to be 0.05. It may be concluded that there exists a positive linear connection between the expense of pollution management and the growth of economic sustainability.

5.0 Summary, Recommendations and Conclusion

5.1 Summary of Findings

The analysis yielded a correlation coefficient (R) of 0.809 and a P-value of 0.097, indicating a negative linear relationship between waste management cost and ecological sustainability development. This finding aligns with Onyekwelu and Ekwe (2022) research on corporate social responsibility (CSR) in the Nigerian banking industry, which also suggested a negative association between shareholder interests and bank productivity. Similarly, testing the hypothesis revealed a highly significant association between pollution management cost and ecological sustainable development in Rivers State, Nigeria, with an R of 0.889 and a P-value of 0. 044.Bariweni, Binebi (2024) underscored the importance of environmental commitment in corporate social responsibility accounting, revealing a negative correlation between pollutant performance index and financial performance index. Likewise, Deegan (2022) found an inverse relationship between a company's environmental performance and its financial performance, echoing similar sentiments.

These findings emphasize the necessity for accurate distribution and accounting of environmental costs, urging Nigerian accountants to reassess current practices. The data highlight the interconnectedness between environmental responsibility and financial outcomes, emphasizing the need for businesses to prioritize sustainability initiatives for long-term success.

5.2 Conclusion

Based on the analysis of the research, there is no significant association between the cost of waste treatment and the ecologically sustainable growth of oil and gas firms in Rivers State, Nigeria. In Rivers State, Nigeria, there is a strong and substantial link between the expense of pollution management and the ecologically sustainable growth of oil and gas firms. Additionally, there is a strong significant association between the cost of pollution control and the development of ecological sustainability, as well as a strong significant relationship between the cost of pollution control and the development of economic sustainability for oil and gas businesses in Rivers State, Nigeria.

The following recommendations can be made for oil and gas firms operating in Rivers State, Nigeria. First, prioritizing methods aimed at reducing ecological footprint and promoting sustainable growth should be a high agenda item for these companies. This can be achieved by adhering to guidelines for social responsibility in waste management practices, thereby minimizing

environmental impact. Second, it is advised that companies in the oil and gas industry continue their implementation of waste management methods, as evidence suggests that doing so can lead to improvements in their economic performance. Lastly, maintaining expenditures on pollution management is crucial for businesses in this sector, as it not only aligns with environmental preservation efforts but also contributes to the long-term sustainability of both the industry and the ecosystem it operates within. By following these recommendations, oil and gas firms can enhance their environmental stewardship while simultaneously fostering economic growth and resilience.

5.3 Limitations and Suggestions for further study

This study is limited by external factors such as government policies, market conditions, and technological advancements which could influence the relationship between waste management expenses and sustainability, but these factors are not fully accounted for in the study. To overcome the limitations of this study, a further study has to evaluate existing policies and regulations related to waste and pollution management in the oil and gas sector in Rivers State, Nigeria, to identify gaps or areas for improvement. Additionally, assess the effectiveness of policy incentives or enforcement mechanisms in encouraging sustainable practices among oil and gas companies.

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