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ENVIRONMENTAL COMPLIANCE COST AND FINANCIAL PERFORMANCE OF OIL AND GAS COMPANIES IN NIGERIA

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Abstract: This study examined the effect of green accounting on the financial performance of oil and gas companies in Nigeria. Voluntary disclosure persists in the context of green accounting and reporting in Nigeria, with many firms not paying sufficient attention to the benefits of timely green reporting on their performance. Given this, the study aimed to determine the effect of environmental compliance costs on the Return on Assets (ROA) of listed oil and gas companies in Nigeria. *Ex-post facto* research design was adopted, and data for green accounting and financial performance were collected from the financial statements and sustainable report of nine (9) oil and gas firms listed in the Nigerian Exchange (NGX) Group as of 2023 for ten (10) years (2014-2023). Financial performance was measured by ROA, while green accounting was measured by environmental compliance costs (ECC). The data collected were analyzed using Distributed Lag Model (DLM) regression to show the short- and long-term effects of environmental compliance costs (ECC) on ROA. The findings showed that environmental compliance costs have a short-term positive effect (Coeff. =0.10; t-stat = 1.02) and a long-term negative effect (Coeff. = -1.39; t-stat = -1.19) on ROA of oil and gas firms. In conclusion, environmental compliance costs have a mixed effect on the financial performance of oil and gas companies in Nigeria, as they have a positive effect in the short term and a negative effect in the long term. Recommendations include that oil and gas companies should implement green accounting initiatives that strictly adhere to environmental compliance to enhance their financial performance.

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INTRODUCTION

Oil and gas corporations operating in various countries, including Nigeria, engage in exploration and production activities, which have an attendant environmental impact. Therefore, Green accounting statutes, regulations, and procedures were implemented in response to the persistent pollution resulting from these explorations and production activities. Green accounting (GA) offers a comprehensive methodology that integrates environmental considerations into conventional accounting methods. This acknowledges the significant impact of economic activities on the environment, providing a foundation for assessing the financial implications of these activities (Farley and Smith, 2020). Hence, green accounting, which has hitherto evolved from environmental accounting, emphasizes proper accountability in monetary terms of all the activities of the firm that fall outside the scope of financial accounting and reporting by companies.

With the increasing global emphasis on sustainability and environmental stewardship, green accounting has become vital for firms to comprehend, manage, and convey their environmental consequences to a wide range of stakeholders (Buhanita, 2015; Szczanowicz and Saniuk, 2016; United Nations Industrial Development Organization (UNIDO), 2018). One crucial element of green accounting is integrating environmental compliance, waste management costs, and energy costs and benefits into financial statements. Incorporating these expenditures into financial statements enables organizations to depict their total performance, including their environmental impact, accurately. This is fittingly covered under green accounting. However, the absence of a globally agreed-upon definition of green accounting is ascribed to the variance in interpretations of the notion across different countries and accounting standards. As such, the elements of green accounting delineated by Carroll (1993), namely philanthropy, ethics, law, and economy, have been understood with respect to business external environments (Lee and Jung, 2016; Szczanowicz and Saniuk, 2016).

Extant literature asserts that the primary objective of business entities is to maximize financial performance, which serves as a foundation for secondary

goals, including growth, corporate social responsibility, and optimized employee benefits (Ofurum and Abubakar, 2018). Following this, financial performance is fundamentally concerned with enhancing shareholders' wealth, serving as the primary incentive for investment in any enterprise. Generally, financial performance is crucial for an organization's survival and indicates a company's efficiency in utilizing resources to generate revenue over time (Alfred and Adam, 2009; Souza and Gasperatto, 2020). The standard measures of financial performance include Profit Before Tax (PBT), Profit After Tax (PAT), Return on Assets (ROA), Return on Equity (ROE), Return on Capital Employed (ROCE), Earnings Per Share (EPS), and others. These are primarily accounting ratios that reflect the financial performance of business organisations. However, the business of today extends beyond financial performance, as questions are being raised about the responsibility of these businesses to their operating environments.

This has become very necessary given that critical issues such as climate change and global warming are leading to demands for environmental impact assessments, thereby exerting pressure on businesses to evaluate the environmental consequences of their operations. This has led to the gradual evolution of green accounting practices, culminating in their integration into the reporting processes of certain developed nations. Norway incorporated environmental [green] accounting in 1970, the Philippines in 1990, Namibia in 1994, and Indonesia in 2003 (Kundra, 2013). Eventually, this has reached Nigeria in recent years. However, many firms are erratic in fully disclosing green accounting information when applying for listing on the Stock Exchange, despite the Nigerian Exchange (NGX) Group (2018) sustainability reporting guidelines recommending the publication of such information (NGX, 2018). This is particularly worrisome in the Nigerian oil and gas industry, where the operations of the oil and gas companies, indigenous and multinational firms included, have a significant impact on the environment, causing substantial air, water, and subsurface pollution, which threaten natural habitats and endanger the lives of species in their host communities and surroundings. This has resulted in significant environmental degradation, characterized by oil spills, gas flaring, and toxic waste discharges, which have adversely affected the health, livelihoods, and environment of local communities, especially in the Niger Delta regions of Nigeria.

Despite these, these oil companies have exhibited reluctance in adopting globally accepted green accounting practices, perceiving them as detrimental to profits, which has intensified conflicts with host communities. This is further exacerbated by the fact that green accounting practice and reporting in Nigeria are not mandatory. This has led to the repression of the implementation of green accounting practices, thereby potentially creating discrepancies in the green accounting practices of these oil firms. Concerning these inconsistences, and the possibility that several environmental costs like oils spills can lead to increased operational expenses for these oil and gas companies hence putting pressure on their financial performance, this study aims to establish the effect of environmental compliance cost on the financial performance of listed oil and gas firms in Nigeria from 2014 to 2023. This is carried out under five sections: introduction, literature review, methodology and design, results and discussion of findings, and conclusion and recommendation.

2. LITERATURE REVIEW

2.1. Green Accounting

Green accounting emerged prominently from the global sustainability discourse, building upon the Brundtland Report's definition of sustainable development as meeting present needs without compromising the needs of future generations (WCED, 1987). Corporate sustainability, which encompasses an organization's ability to sustain operations indefinitely while considering the impacts on natural, social, and human capital (Accountability, 1999), extends beyond conventional corporate social responsibility (CSR) frameworks defined by social responsibility principles and measurable societal interaction outcomes (Wood, 1991).

Green accounting is intricately linked to sustainability reporting, which involves transparently communicating an organization's social and environmental impacts to stakeholders and society (Rizk *et al.*, 2008), broadening corporate accountability beyond mere financial reports to capital owners. Although terms like "green," "environmental," and "sustainability" accounting can vary, green accounting is commonly understood as monitoring and reporting expenditures that impact the environment (Nkwoji, 2021), providing objective evidence of a firm's environmental performance metrics through both financial and non-financial information (Ordu and Amah, 2021). Ultimately, it is considered a method for economically evaluating

an organization's environmental performance (Makhdoom *et al.*, 2023) to enhance operational performance related to environmental protection. Recognized as a set of activities for monitoring and reporting the effectiveness of environmental protection (Adegbie *et al.,* 2020), green accounting extends beyond conventional accounting, which primarily serves shareholders and bondholders with financial data.

2.2. Environmental Compliance Cost

The activities of oil and gas companies generate significant environmental pollutants. These are evidenced in gas flaring, oil spillage, and crude oil leakage into water bodies. This creates several levels of pollution for the host communities and the environment. These include water, air, and land pollution. These oil and gas companies are often able to either clean up the waterways and pay compensation for damage caused by oil spills or institute high-level technology to prevent their occurrence and recurrence. Also, they are expected to comply strictly with regulations focused on reducing this or responding promptly in the event of an incident, such as an oil spill. All costs associated with providing the right technology for compliance are covered under environmental compliance costs. This also includes costs incurred from sanctions, fines, and penalties imposed by the relevant regulators, as well as gas flaring and other infractions. Training related to compliance activities, as well as related legal expenses, are also included.

These include the company's investments in new technology and systems to tackle water, air, noise, and land pollution (Epstein and Buhovac, 2014). This also includes providing the proper framework that complies with environmental standards and regulations as mandated by the industry's regulators. Some pieces of literature have shown that a greater percentage of the operational costs of oil companies in Nigeria is allocated to pollution control, particularly in mitigating gas flaring and cleaning up oil spills, which are often outsourced to experts (Olayemi, 2019). The value of these costs, denominated in the local currency for each oil and gas company in Nigeria, serves as an important indicator of green accounting in this study.

2.3. Financial Performance

Financial performance refers to the extent to which an organization has achieved its financial objectives (Pham *et al.*, 2021). Financial performance is

a subjective metric that evaluates how effectively an organization uses its core business assets to generate income. This indicates a company's overall health and actual financial status (Eze, 2021), as well as the ability of management to achieve its established objectives for the fiscal period. Accordingly, assessing the measures of an organization's financial performance is diverse, reflecting the various motives for such measurement (Iliemena and Okolocha, 2019). Financial performance is a key indicator of a firm's financial health over a specified timeframe.

A corporate entity's performance can be assessed through various metrics. This includes financial and accounting ratios. Academics and researchers primarily use market indicators and accounting measures to assess financial performance. There is consensus among scholars that accounting-based measures and market-based indicators are the most effective methods for evaluating financial success (Achim and Borlea, 2014). Accounting-based metrics frequently employed include net profit margin, return on equity, return on sales, return on capital utilized, and return on assets. Market-based metrics are commonly used, including the price-to-book ratio, dividend yield, earnings per share, dividend per share, Tobin's Q, and earnings yield. These measures represent the oil and gas company's performance over a specific period. In this study, return on assets (ROA) was adopted. This is quantified through the overall profits or losses earned by the company's operations, as well as asset utilization metrics. This study measures financial performance through profit after tax and return on assets (ROA).

2.4. Theoretical Framework

This research builds upon two theoretical frameworks. These are the Stakeholder Theory and the Sustainability Theory.

2.4.1. Stakeholders' Theory

The Stakeholder theory posits that an organization's primary responsibility is to its stakeholders and shareholders, hence the objectives of profit maximization and shareholder wealth maximization. Accordingly, the theorist Freeman (1984) proposed and developed the stakeholder theory. Every organisation has different stakeholders, and it is based on this that the Stakeholder theory posits that a firm's success depends on effectively managing its relationships with all

these stakeholders (Ogoun and Ekpulu, 2020; Menike, 2020). The theory states that an organization can effectively manage stakeholder relationships by utilizing specific financial, sustainability-related, or both approaches to secure stakeholder support and approval for its corporate strategy, thereby minimizing objections.

The voluntary disclosure of environmental costs, or green accounting practices, strengthens and maintains relationships between companies and their various stakeholders. Stakeholder theory provides a robust framework for analyzing these interactions, facilitating the assessment and impact of green accounting and sustainability reporting in corporate annual reports, particularly in relation to pollution control, environmental remediation, and green energy investments. This essential information empowers stakeholders to make informed decisions, driving organizational performance through improved commitment and resource allocation (Bansal and Roth, 2000). With green accounting as the study's focus, stakeholder theory justifies addressing the diverse needs of various stakeholders, including host communities, the environment, shareholders, employees, customers, suppliers, regulators, government agencies, tax authorities, investors, and competitors. This approach also directs value provision to shareholders, aligning with the primary objectives of profit and wealth maximization. The veracity of this proposition forms the central focus of this study, thereby establishing the theory's direct relevance. Ultimately, green accounting aligns with stakeholder theory by acknowledging a company's extensive environmental and societal impacts, advocating for transparency and accountability to diverse stakeholders, particularly those focused on sustainability.

2.4.2. Sustainability Theory

One of the most fundamental concepts that underpins green accounting is the theory of sustainability. It asserts that economic development must satisfy the requirements of the present without jeopardizing the capacity of future generations to satisfy their own needs. This theory underscores the importance of maintaining a balance between economic development, environmental protection, and social well-being. The Brundtland Commission published its report, "Our Common Future," in 1987 to establish a connection between environmental stability and economic development. The fundamental

premise of the theory is that companies are obligated to evaluate the long-term consequences of their operations on society and the environment. This responsibility should be pursued in a manner that is economically viable, socially equitable, and environmentally sustainable.

This theory is pertinent to this investigation, considering Nigeria's 2020 Voluntary National Review (VNR) on sustainable development objectives, which focused on critical issues such as poverty, health and well-being, gender equality, and the establishment of a peaceful and secure environment. The potential social and economic costs of oil and gas pollution in Nigeria can be analyzed using sustainable development theory, and methods can be identified to achieve sustainable development while minimizing the environmental degradation's impact. Companies can attract socially responsible investors, consumers, and employees by demonstrating their commitment to sustainability through the implementation of green accounting practices. This has the potential to enhance the company's long-term financial performance by reducing risk, increasing stakeholder engagement, and enhancing reputation. Nevertheless, the business may be unable to achieve profitability if the environment in which it operates is not effectively managed.

2.5. Empirical Review

Chikani *et al.* (2024) investigated the impact of green accounting on the financial performance of publicly listed manufacturing firms in Southeastern Nigeria. The study employed ex *post facto* research design and utilized secondary data sourced from the annual financial reports of seven manufacturing companies, primarily located in Anambra and Enugu states. The dataset comprises panel data from 2012 to 2022 for each manufacturing firm. The findings suggest that green financial accounting has a positive influence on financial performance, whereas green management accounting and ecological accounting do not exhibit significant effects.

Triwacananingrum and Alim (2024) investigated the impact of green accounting on various aspects of financial performance. The researcher employed quantitative methods utilizing a descriptive analysis approach. Analysis of data employing multiple linear regression testing methodologies. This study evaluated the company's financial performance using key metrics, including Return on Assets (ROA), Return on Equity (ROE), and Earnings per

Share (EPS). The independent variable was the adoption of green accounting practices. The findings indicated that green accounting had a positive and significant influence on financial performance, as evidenced by ROA and EPS, whereas financial performance measures did not impact ROE.

Fernando *et al.* (2024) investigated the impact of Green Accounting Disclosure (GAD) on firm value in Southeast Asia. The observation period for this study spanned five years, from 2017 to 2021. This study employed control variables, including profitability, sales growth, leverage, and the size of mining and agriculture firms in Southeast Asia. The data utilized were secondary sources acquired from Capital IQ SnP and annual and/or sustainability reports available on the company websites. A fixed-effect model approach was employed for data regression analysis. The findings suggest that Green Accounting Disclosure has a negligible impact on firm value in Mining and Agriculture Companies. The researchers found that adopting green accounting does not significantly impact the firm value of mining and agricultural companies in countries such as Indonesia, Malaysia, Thailand, Vietnam, the Philippines, and Singapore.

Etim *et al.* (2024) conducted exploratory research to investigate the impact of green accounting practices on the financial performance of oil and gas companies in Nigeria. The researchers employed a desktop approach to review existing empirical research on green accounting practices in Nigeria's oil and gas sector from 2013 to 2022. The reviewed studies indicate that green accounting significantly impacts the financial performance of quoted oil and gas firms in Nigeria during the examined period.

Adejola *et al.* (2024) examined the impact of sustainability reporting on the financial performance of agriculture and natural resource companies listed in Nigeria. The researchers aimed to determine whether reporting on economic and social sustainability influenced the financial performance of the sampled industries, using return on assets (ROA) as a measure of corporate financial performance. The data source comprised the annual reports of nine firms from 2014 to 2023. The panel least squares regression method was used for data assessment. The findings indicated that economic and social sustainability disclosures negatively and insignificantly affect the financial performance of the firms analysed. The researchers found that sustainability reporting did not significantly impact the performance of Nigerian-listed firms in agriculture and natural resources.

Isaac *et al.* (2024) examined the impact of sustainability reporting on the earnings per share of publicly listed industrial goods companies in Nigeria. The objectives were to assess the impact of environmental sustainability disclosures on the earnings per share of listed industrial goods firms in Nigeria. The researchers employed an ex-post facto research design. It utilized panel data comprising 120 pooled observations collected from a sample of 12 listed industrial goods firms in Nigeria over a 10-year period (2013-2022). The study employed descriptive and inferential techniques, including correlation and panel data Generalized Method of Moments, to analyze the collected data. The study findings indicated that environmental sustainability disclosure has an insignificant negative effect on the earnings per share of listed industrial goods firms in Nigeria. The analysis indicates that sustainability reporting has a significant impact on the earnings per share of listed industrial goods firms in Nigeria at a 5% significance level.

Diwe-Tochukwu and Okafor (2024) investigated the impact of sustainability reporting on the profitability of publicly listed oil and gas firms in Nigeria. The objective was to assess the impact of sustainability reporting on return on assets, earnings per share, and return on equity of publicly listed oil and gas companies in Nigeria. The ex post facto research design utilized a sample of twelve companies within the oil and gas sector. The data used was sourced from reports of the companies studied, spanning 2009 to 2022, and was analyzed using panel regression analysis. The research findings suggest a significant relationship between sustainability reporting and profitability. Additionally, sustainability reporting had a positive and significant impact on the return on assets and earnings per share. In conclusion, the researchers stated that the advantages of sustainability reporting surpass the associated costs and are evident in the profitability of the firms investigated.

Arumona *et al.* (2024) investigated the impact of environmental information disclosure on the financial performance of publicly listed construction companies in Nigeria. In this study, Return on Assets (ROA) served as the dependent variable, while waste management costs and employee health and safety costs represented the independent variables. Secondary data were obtained from the annual reports of seven construction firms listed on the Nigerian Exchange (NGX) Group over a ten-year period, from 2012 to 2021. This study employed a panel research design. The research findings indicated

that waste management costs have a positive and significant impact on return on assets. The researchers concluded that waste management costs serve as practical tools for environmental information disclosure, thereby enhancing the performance of construction firms in the research.

3. METHODOLOGY AND DESIGN

Ex-post facto research design was adopted in this study. Nine (9) oil and gas companies listed in the Nigerian Exchange (NGX) group served as the sample in this study. These are Aradel Holdings Plc (formerly Niger Delta Exploration and Production Company), Capital Oil Plc, Conoil Plc, Eterna Plc, Japaul Gold and Ventures Plc, MRS Oil Nigeria Plc, Oando Plc, Seplat Energy Plc and Total Energies Marketing Plc. Data was collected from the listed oil and gas companies' annual financial reports, sustainability reports, and Environmental, Social, and Governance (ESG) reports.

The Distributed Lag Model (DLM) was employed in this study. The use of this model ensures that the lagged effects of the green accounting indicators are captured, as the costs associated with green accounting may not have an immediate effect on the financial performance of oil and gas companies in Nigeria (Clarkson *et al.*, 2011).

Financial Performance = f(Green Accounting) Model 1

Financial Performance = f(Environmental Costs) Model 2

$$ROA_{it} = \beta_0 + \beta_1 ECC_{it} + \beta_2 ECC_{it-1} + \beta_3 SZE_{it} + \beta_4 AGE_{it} + \beta_5 OILP_t + \mu_{it}$$

Equation 1

Where:

ROA_{it} = Return on Assets of oil and gas firm i for period t

ECC_{it} = Environmental Compliance Costs for oil and gas firm i for period t

ECC_{it-1} = One-year lagged values of Environmental Compliance Cost

SZE_{it} = Firm Size of oil and gas firm i for period t

AGE_{it} = Firm AGE of oil and gas firm i for period t

$OILP_t$ = Crude Oil Price for period t

β_0, is the regression constant

β_1 is the regression coefficients that represent short-term effects

β_2 is the regression coefficients that represent long-term effects

β_3, β_4, and β_5 are the regression coefficients of the control variables

μ_{it} is the error or disturbance terms

i = each oil and gas firm

t = is the period or year covered

3.1. Data Analysis Techniques

Descriptive and inferential statistics techniques were used in the analysis of the collected data. Descriptive statistics, including the mean, standard deviation, maximum, and minimum values, were used to explain the basic characteristics of the data collected in this study. In addition, several diagnostic tests were conducted for robustness checks, including multicollinearity analysis using the Variance Inflation Factor (VIF), a unit root test using the Levin, Liu, and Chu (LLC) test, a White test for heteroskedasticity, and autocorrelation analysis using the Wooldridge test. For hypothesis testing, Ordinary Least Squares (OLS) regression results obtained from the Distributed Lag Models (DLMs) were used to test the hypotheses in the study at a 5% significance level.

4. RESULTS AND DISCUSSION OF FINDINGS

4.1. Descriptive Analysis of Data

Table 1: Descriptive Analysis of Variables in the Study

Variable	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*
ROA	90	-0.1737	25.06418	-99.55256	151.0478
ECC	90	834736.7	1754813	2850	8578000
ECC_1	81	7857006	1612951	2850	7517626
SZE	90	18.30151	1.175582	15.98711	22.08296
AGE	90	45.0778	15.15406	17	70
OILP	90	63.819	18.72548	39.68	94.53

Source: Author's Computation using STATA 15.0 (2025)

Table 1 shows that the mean value of return on assets (ROA) is negative, with high levels of variability, as indicated by the standard deviation, which suggests significant fluctuations in the financial performance of oil and gas companies in Nigeria. This points to a high level of instability in the financial performance of oil and gas companies in Nigeria. This is affirmed by the high range of margins between the maximum and minimum ROA reported by the

oil companies. For environmental compliance costs (ECC), the mean reported values indicate that compliance costs, on average, constitute a significant portion of the high green accounting costs of oil and gas companies in Nigeria. This indicates high variability in this environmental cost, affirmed by their respective high standard deviation values. The mean and standard deviation obtained for firm size (SZE), firm age (AGE), and crude oil price (OILP) were 18.30, 45.08, and $63.819; and 1.17, 15.15, and 18.72, respectively. This indicates that the total assets of oil and gas firms have been changing over the years, albeit in a less variable manner, while oil prices have been fluctuating. Also, the number of years of operation in the industry by the firms varies from 17 to 70 years. This perhaps highlights the growing responsibility of oil and gas companies in Nigeria to adopt more environmentally friendly practices and promote green accounting.

4.2. Unit Root Analysis of Variables

Unit root analysis was conducted to establish the stationarity of the data on the dependent and independent variables used in this study. Stationary status indicates that further estimation conducted on the variables will yield non-spurious results. This analysis was carried out using the Levin, Lin, and Chu (LLC) test on the data variables. This was based on the existence of standard unit root processes in the panel or cross of 90 observations in this study. The unit root test results are presented in Table 2.

Table 2: Results of Unit Root Analysis (LLC) of Variables in the Study

Variable	*Test Statistic*	*Probability*	*Level of Integration*
ROA	-6.1755	0.0000	First Difference
ECC	-6.2279	0.0000	Level
ECC_1	-11.00678	0.0000	Level
SZE	-2.6604	0.0039	First Difference
OILP	-5.5342	0.0000	Level

Source: Researcher's Computation using STATA 15.0 (2025)

Table 2 indicates that all the oil and gas companies in the cross-section of observations exhibit similar stationary behavior. As such, all the variables in the observations follow a similar pattern in their change from 2014 to 2023. As a result, the environmental compliance cost, ECC and its one-year lagged

values, ECC_1, as well as OILP, were found to exhibit stationarity properties at the level of integration equal to zero (i.e., at the level), as the probability of their test statistics was shown to be within the acceptable 5% region. This shows that ECC and OILP are free of unit root problems. On the other hand, ROA and firm size (SZE) were found to have unit roots at level, but thereafter exhibited stationarity properties at first difference, Hence, given that the return probabilities for the test statistics of all the variables in the study were less than 0.05, the null hypothesis of the existence of unit root in the variables is rejected.

4.3. Test of Hypothesis

The null hypothesis is stated as follows: "Environmental compliance costs have no significant effect on the return on assets (ROA) of listed oil and gas firms in Nigeria." The Distributed Lag Model (DLM) for this hypothesis is given as follows:

$$ROA_{it} = \beta_0 + \beta_1 ECC_{it} + \beta_2 ECC_{it-1} + \beta_3 SZE_{it} + \beta_4 AGE_{it} + \beta_5 OILP_t + \mu_{it}$$

Equation 1

This regression model illustrates the short-term and long-term effects of the independent variables, Environmental Compliance Cost (ECC), and its lagged values, ECCit-1, which are derived by lagging the variables by one year in the regression model. ECC_1 indicates this. ECC provides the current-year effects of green accounting on ROA, while the long-term effects are provided by the one-year-lagged values of ECC (ECC_1). The regression results were derived after applying a logarithmic transformation to the data, which ensured normalization, eliminated the effect of outliers, and reduced the scale of values. Regression results for this hypothesis are presented in Table 3.

Table 3: Regression Results for Hypothesis Testing

Variable	*Coeff.*	*Std. Error*	*t-stat*	*Prob.*	*Level of Significance*
Contant	9.03	9.95	0.91	0.369	
ln_ECC	0.10	0.09	1.02	0.314	Not Statistically Significant
ln_ECC_1	-1.39	0.11	-1.19	0.241	Not Statistically Significant
ln_SZE	-2.58	3.70	-0.70	0.489	Not Statistically Significant
ln_AGE	-0.47	0.39	-1.22	0.228	Not Statistically Significant
Ln_OILP	0.53	0.41	1.29	0.202	Not Statistically Significant

Variable	*Coeff.*	*Std. Error*	*t-stat*	*Prob.*	*Level of Significance*
R^2	0.0766				
F-stat	0.80				
Prob. (F-stat)	0.5585				
VIF	2.28				
White test stat. (prob.)	24.59 (0.2177)				
Wooldridge F-stat (Prob.)	1.322 (0.2940)				

Source: Author's Computation using STATA 15.0 (2025)

Table 3 shows that, on average, the Return on Assets (ROA) remains positive when environmental compliance costs (ECC) and other control variables are held constant. Specifically, a unit increase in ECC shows a short-term positive effect on ROA, resulting in a 0.10-unit increase, indicating immediate financial benefits from higher environmental compliance spending. However, this short-term effect is not statistically significant (p-value = 0.3140). Conversely, in the long term, ECC has a negative effect on ROA, with a unit increase resulting in a 1.39-unit decline; however, this effect is not statistically significant (p-value = 0.241). Furthermore, both firm size and firm age have a negative impact on ROA, suggesting that larger and older firms may experience decreased profitability. Notably, crude oil price significantly impacts ROA positively, with a $1 increase leading to a 0.53% increase in ROA for these oil and gas companies in Nigeria.

The coefficient of determination (R^2) value of 0.0766 indicates that only 7.66% of the variations in ROA are explained by the ECC and control variables used in this model. This indicates a low predictive power of the independent variables in predicting changes in ROA. The remaining 92.34% of these variations are unaccounted for by the model and are captured by the error term. This suggests the presence of additional factors influencing the financial performance of oil and gas companies in Nigeria. These might include factors such as business strategies and management style, amongst others.

Furthermore, the model in this study is free from heteroskedasticity, as the obtained probability value of the White test, with a Chi-square test statistic value of 24.59, returned a probability value greater than 0.05 (0.2177 > 0.05). Additionally, the model is free from serial correlation, as indicated by a

Wooldridge F-statistic value of 1.322 and a returned probability value of 0.2940, which is greater than 0.05. This indicates that the model for Hypothesis One is free from autocorrelation. Again, the Variance Inflation Factor (VIF) value of 2.28 is less than 5. This implies the absence of severe multicollinearity; hence, the model is fit for policy decisions. Finally, with an F-statistic value of 0.80 and a probability value of 0.55, which is greater than 0.05 at a 5% significance level, the null hypothesis is accepted, and the alternative is rejected. Hence, it could be stated that environmental compliance costs have no significant effect on the return on assets (ROA) of listed oil and gas firms in Nigeria.

4.3. Discussion of Findings

First, environmental compliance costs show a short-term positive effect on the Return on Assets (ROA) for Nigerian oil and gas companies, indicating that increased spending on this green initiative immediately boosts financial performance. This quick benefit, particularly as it relates to green accounting practices, aligns with findings by Triwacananingrum and Alim (2024) and Etim et al. (2024), who also noted a positive impact of environmental compliance on financial results within a short period. This suggests that adopting a proactive approach to environmental compliance can yield prompt and favorable financial benefits for companies in the sector.

However, the analysis revealed that environmental compliance costs exert a negative impact on ROA in the long term, implying a cumulative and persistent impairment of financial performance over extended periods for oil and gas companies in Nigeria. This long-term detrimental effect suggests that sustained increases in environmental compliance expenditures may ultimately hinder profitability, while a reduction could lead to improved financial outcomes. This finding conforms to Adejola *et al.* (2024), who also reported a negative impact of regulatory compliance on financial performance in other Nigerian sectors. Moreover, both firm size and age negatively affected ROA, indicating that older, less innovative oil and gas firms might struggle with outdated environmental practices or lack the capacity to implement sustainable green initiatives effectively.

5. CONCLUSION AND RECOMMENDATIONS

In recent times, the need for oil and gas companies to adopt more environmentally friendly practices has been continually advocated. This

includes the need for a comprehensive framework on green accounting, as it has the potential to influence financial performance. Environmental compliance costs showed a positive effect on ROA in the short term, indicating that environmental compliance costs increase the level of performance of oil and gas firms in Nigeria. Conversely, a decrease in these costs will likely lead to a decline in financial performance in the immediate period. Additionally, environmental compliance costs also have a negative long-term impact on ROA. This has implications for environmental regulatory compliance and the various sanctions, penalties, and fines that these oil and gas companies incur when they fail to comply with these regulations. As such, these oil companies strictly adhere to environmental regulations by committing to what is expected of them, which may result in increased financial gains in the short term and declining financial performance in the long term. In line with this, we conclude that green accounting has varying effects on the financial performance of oil and gas companies in Nigeria.

Based on this, the following recommendations are made

- Oil and gas firms need to establish and implement holistic internal green accounting mechanisms to track environmental compliance costs and ensure that these costs are managed to support improved financial performance.
- The Nigerian oil and gas industry must invest more in sustainable practices, including environmental protection and conservation. The government should provide incentives, such as tax holidays or reductions, to encourage adherence to healthy sustainability practices that align with compliance with relevant environmental laws in Nigeria.
- A law should be enacted to require oil and gas companies to adopt green accounting in full compliance with international standards.

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