

<https://doi.org/10.26565/2310-9513-2026-23-04>
JEL Index: C58, G28, G30

ACCOUNTING FOR GREEN COST IMPLICATION ON THE FINANCIAL PERFORMANCE OF LISTED MANUFACTURING FIRMS IN NIGERIA

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The costs incurred to acquire green technology or install pollution-abatement facilities usually translate into direct, indirect, or operating expenses. This study examined the effect of green cost accounting practices specifically clean technology adoption, pollution control, and recycling costs on the financial performance of Nigerian listed manufacturing firms. An ex-post facto research design was employed to analyse data from a random sample of 47 firms listed on the Nigerian Exchange Group (NGX) as of December 31st, 2024. Descriptive and inferential statistics, including linear regression, were applied. Findings revealed that the coefficient of clean technology adoption cost was 0.2108, indicating a positive relationship with return on assets (ROA). Thus, a unit increase in clean technology adoption cost raised ROA by 0.2108 units. However, this effect was statistically insignificant ($P=0.4393>0.05$). The coefficient of pollution control cost was -0.0746, suggesting a weak negative relationship with ROA. A unit increase in pollution control cost reduced ROA by 0.0746 units, though this effect was also insignificant ($P=0.8165>0.05$). Similarly, the coefficient for recycling cost was 0.3630, reflecting a positive association with ROA, where a unit increase raised ROA by 0.3630 units. Yet, this relationship too was insignificant ($P=0.8165>0.05$). The study concludes that investments in green initiatives may not yield immediate financial returns for Nigerian manufacturing firms. Policymakers are therefore encouraged to design supportive policies and provide financial incentives to enhance the financial viability of adopting green practices.

Keywords: *Clean technology adoption costs, financial performance, pollution control costs, recycling costs*

In cites: Omolade, O.T., Igbekoyi, O.E., Awotomilusi, N.S., Tosin, A.K. & Ojo, O.B. (2026). Accounting for Green Cost Implication on the Financial Performance of Listed Manufacturing Firms in Nigeria. *The Journal of V. N. Karazin Kharkiv National University. Series International Relations. Economics. Country Studies. Tourism*, (23), 39–52. <https://doi.org/10.26565/2310-9513-2026-23-04>

INTRODUCTION

Global conversation has largely focused on the question of what the implications of industrial activities are on the environment and what the way forward is. The terminology 'green,' as in 'green costs,' 'green productivity,' or 'green performance,' is an adjective that simply means 'related to the environment' (Gu et al., 2023). Green costs' relate to the prevention of, and the treatment of, man-made environmental disasters. The cost items gained from such actions are referred to as green catalytic cost items (i.e., expenditure, expenses, and costs) (Trotta et al. 2024). On the other hand, the term 'financial performance' is used interchangeably with 'firm performance' in this paper.

Currently, the Nigerian manufacturing sector operates using various work processes and techniques that pose a high level of risk to the health of the environment because of the associated environmentally unfriendly products and by-products. Nigerian manufacturing firms have been forced by related laws and regulations to adopt cleaner and less risky work methods or production techniques (Okorie, 2021). The outcome of complying with such regulations has been an increase in production costs to a great extent. Manufacturing firms in Nigeria spend money to ensure that ample facilities, services, checks, measures, health, and communication systems are in place. They also operate maintenance to ensure that their manufacturing plants and machinery are in a vibrant state and sound to enable their continuous production. Managers of such firms are interested in determining the efficacy of putting such resources in place and ensuring that the objectives of incurring such resources are achieved.

The adoption of green practices among manufacturing firms, in which costs are incurred to acquire modern technology or install effective pollution-abatement facilities, usually leads to direct costs, indirect costs, or operating expenses. Previous studies have identified that such an investment may or may not improve profitability by enhancing a firm's image, product quality, and productivity.

This study is motivated by the growing recognition of environmental sustainability as a critical factor in corporate success. While prior research has examined the diverse facets of green accounting and its influence on financial outcomes, there remains a significant gap in understanding the specific influence of green costs within the Nigerian manufacturing sector. In addition, most existing research has focused on the oil and gas industries or international contexts, neglecting the distinct hurdles and prospects confronting sustainability practices in Nigerian manufacturing firms. The implications of specific cost elements, such as clean technology adoption based on research and development and pollution control, on financial performance have not been adequately explored. This research is important because it addresses the critical

need to understand the economic implications of green investments within the unique context of the Nigerian manufacturing sector, which is under-researched. The uniqueness of this study lies in its focused analysis of specific green cost elements, such as R&D-driven clean technology adoption and pollution control, and their impact on financial performance within this specific setting. This study contributes by quantifying the distinct impact of these specific green cost elements on financial performance, and by providing empirical evidence of the economic viability of green investments in a developing economy context, offering actionable insights for Nigerian manufacturing firms.

Green costs, which are essential for environmental sustainability, can have a complex impact on financial performance. The short-term costs associated with implementing green initiatives may negatively affect profitability, but long-term benefits include cost reductions, reduced environmental liabilities, and enhanced market reputation. Previous research has yielded conflicting results on the link between green costs and financial performance. Hosam et al. (2020) discovered a negative correlation between autonomous green accounting costs and financial performance in multinational corporations. Conversely, Riyadh et al. (2020) explored the impact of green accounting (GA) on financial performance (FP) in the top 100 multinational corporations, aiming to empirically investigate and analyse this relationship. Robaina and Madaleno (2020) affirmed the positive influence of environmental cost accounting on business performance. However, these studies often lack depth and critical analysis, focusing on specific elements of environmental accounting rather than on the holistic impact of green costs on financial performance. Therefore, this study aims to address the research gap by investigating the specific relationship between green cost accounting, focusing on the effects of clean technology adoption costs, pollution control costs, and recycling costs, and the financial performance of listed Nigerian manufacturing firms, ultimately seeking to evaluate the impact of these specific cost elements within the unique context of this developing economy.

THEORETICAL REVIEW

Sustainability Theory

Sustainability theory has emerged from the recognition that traditional development models often prioritize short-term gains over long-term environmental and social well-being (Thao et al., 2019). It aims to balance the needs of the present and future generations by addressing resource depletion, environmental degradation, and social inequality. This theory seeks a holistic framework that incorporates social, economic, and environmental factors. Criticisms of the theory include its all-encompassing nature, the difficulty of balancing different aspects, and conflict with the traditional economic model of continuous

growth. Sustainability accounting, as defined by Laine et al. (2021), focuses on generating sustainability data for transparency, accountability, and decision making. However, this theory does not fully consider the shareholder perspective, focusing primarily on the sustainability of natural resources for future generations. To better explain how sustainability theory underpins the link between green cost implications and financial performance, it's essential to emphasize the long-term perspective inherent in the theory. Green cost investments, while potentially incurring short-term costs, can lead to long-term financial benefits such as reduced environmental liabilities, improved brand reputation, and enhanced operational efficiency, which are all aligned with the core tenets of sustainability. Furthermore, the generation of sustainability data, as highlighted by Laine et al. (2021), can provide valuable insights for investors and stakeholders, potentially influencing financial performance metrics like market capitalization and investor confidence. By demonstrating how sustainability accounting practices translate into tangible financial benefits, this theory provides a relevant framework for understanding the impact of green costs.

Stakeholder Theory

Stakeholder theory, popularized by R. Edward Freeman in the 1980s, is a widely recognized framework that formalizes the concept of balancing the interests of various stakeholders. The theory postulates the existence of multiple stakeholders, where businesses maintain interconnected relationships with various groups that impact their decisions. These stakeholders go

beyond shareholders and include employees, customers, suppliers, communities, the environment, and future generations. Stakeholder interests are important. The stakeholder theory assumes that the interests and concerns of these stakeholder groups are important and should be considered by businesses. Considering the impact of their decisions on various stakeholders, businesses can build more sustainable and resilient practices that will benefit everyone involved in the long run. However, this study was anchored in sustainability theory because it examines issues with depletion of resources, degradation of the environment, and social inequality, which is becoming more noticeable because of the prerequisites balancing present-day needs with the ability of future generations to meet their own, emphasizing the reduction of environmental problems. While the study is anchored in sustainability theory, a more robust explanation of how stakeholder theory could also contribute to understanding the link between green costs and financial performance is warranted. Green cost initiatives can enhance relationships with various stakeholders, leading to improved financial outcomes. For example, investing in pollution control measures can improve community relations, potentially leading to increased sales and reduced regulatory risks. Similarly, adopting sustainable sourcing practices can enhance relationships with suppliers and customers, leading to improved brand reputation and increased market share.

Conceptual Framework

Figure 1 illustrates the relationship between green accounting costs and the financial performance of listed Nigerian manufacturing firms.

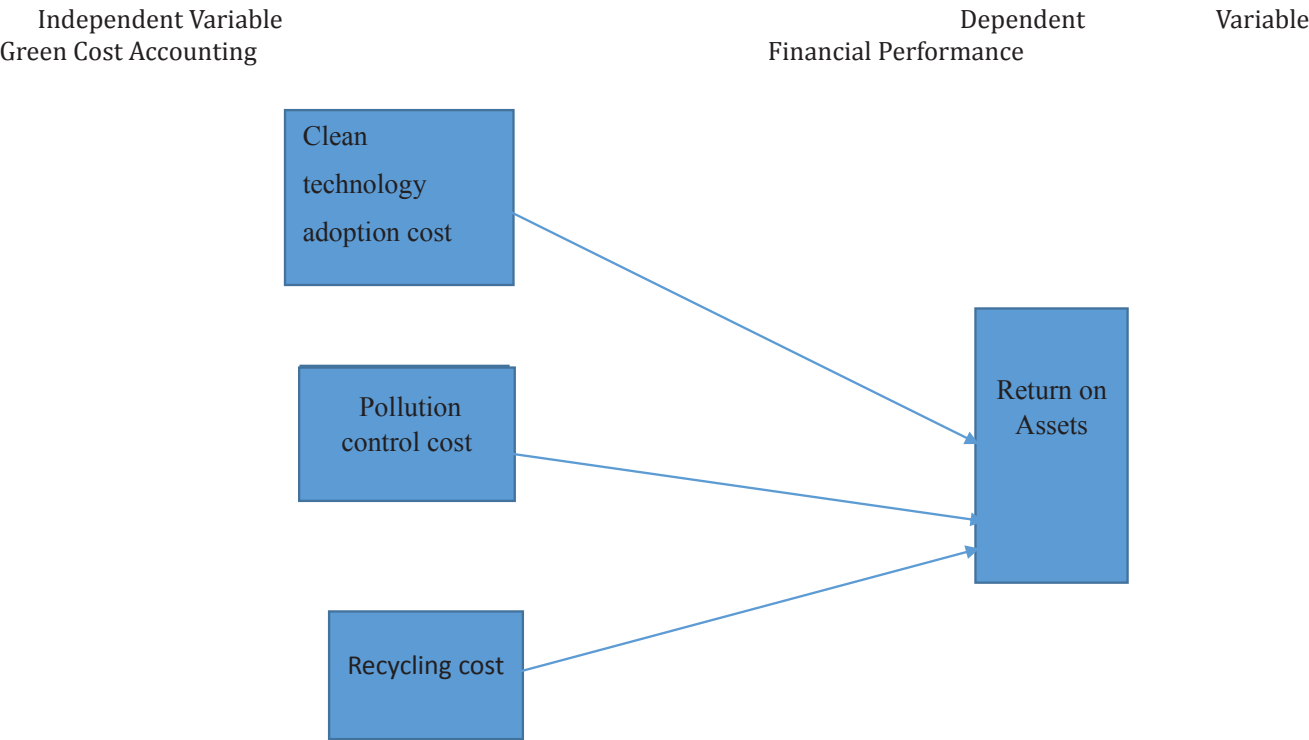


Figure 1: Conceptual framework
Source: Researcher's Design: 2025

Clean technology adoption cost and Financial Performance

Rahman and Islam (2023) examined the relationship between green accounting, energy efficiency, and environmental performance in Bangladeshi pharmaceutical and chemical companies, also exploring the mediating role of energy efficiency. Employing a simple random sampling technique, 326 responses were collected and analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM). Key findings revealed a significant positive impact of green accounting on both energy efficiency and environmental performance, with energy efficiency partially mediating this relationship; specifically, economic, environmental, and social green accounting practices positively influenced both outcomes, with environmental practices exhibiting the strongest effect. Okporo et al. (2023) investigated the effect of green accounting (specifically emission control cost, renewable energy cost, and pollution remediation costs) on the financial performance (return on capital) of selected oil and gas firms in Nigeria, utilizing an ex post facto research design and panel least squares regression technique. The study found that emission control cost, pollution control cost, and renewable energy cost all had a significant positive effect on the return on capital of the selected listed oil and gas firms in Nigeria, leading to the conclusion that green accounting positively impacts financial performance.

Hosam et al. (2020) examine the effect of green accounting costs on the financial performance of Indonesian corporations. Their study, which employed secondary data and multiple regression analysis, revealed a negative correlation between environmental costs, a measure of green accounting costs, and the return on capital employed, a measure of financial performance. These findings suggest a potential area for further research in Nigeria, particularly in the manufacturing industry. Odum and Arinomor (2023) examined the effect of green accounting cost on return on equity, shareholders' fund, earnings per share, profit after tax, and net profit margin of selected oil and gas companies over a three-year period (2020-2022), employing an ex-post facto research design and analysing data with Panel Ordinary Least Square (POLS) and Granger Causality techniques. The Granger Causality test results indicated that green accounting cost had no significant effect on return on equity, shareholders' fund, earnings per share, and net profit margin for the studied oil and gas companies. We hypothesize the following:

H1: *Clean technology adoption cost will have a significant positive effect on the financial performance of manufacturing companies in Nigeria.*

Pollution control cost and Financial Performance

Olawumi et al. (2023) investigated the key benefits of implementing smart-sustainable practices (SSP)

in the built environment of Hong Kong and Nigeria by identifying factors through a literature survey and collecting data via questionnaires, which were then analysed using various methods to establish common beneficial outcomes. The study found that better design products with low environmental impact and enhanced project quality and productivity were common key benefits in both contexts, and three main clusters were established: sustainable design and resource management, innovation and business performance, and green initiatives and productivity, with high consensus between experts in both locations on the benefits related to green initiatives and sustainable products (57%) and project productivity and efficiency (100%). Lanteri and Rampini (2023) analysed the adoption of clean technology by firms with varying financing constraints. They developed a model to explain how firms invest in different types of capital goods, based on their energy needs and age. The study finds that larger firms tend to adopt cleaner and newer technologies, leading to higher energy efficiency. However, financially constrained smaller firms may choose dirtier and older capital because of the higher down payment requirements for cleaner technology. Based on the above results, the following hypothesis was proposed:

H2: *Pollution control cost has no significant effect on financial performance*

Recycling cost and Financial Performance

Enekwe et al. (2023) investigated the effect of environmental costs staff development, community development, and employee health and safety on the financial performance (return on assets) of four purposively sampled listed oil and gas companies in Nigeria over a ten-year period (2010-2019) using an ex-post facto research design and Panel Ordinary Least Square regression. The findings indicated that staff development costs had a negative but insignificant effect, while community development and employee health and safety costs had a positive but insignificant effect on return on assets, suggesting the incurred costs were likely too small to significantly impact performance. Damieibi (2023) investigated the influence of environmental accounting practices on Nigerian oil and gas companies' net profit. Using multiple regression analysis, this study reveals a positive correlation between pollution cost accounting and net profit. However, this research was limited to the oil and gas sector, suggesting the need for further studies exploring other sectors, such as manufacturing, and incorporating additional variables. Shi Yu and Wang (2022) assessed the impact of China's Green Finance Reform and Innovation (GFRI) pilot policy on the debt financing costs of heavy-polluting enterprises. Employing a quasi-natural experiment and difference-

in-differences (DID) methodology, they found that debt financing costs for these firms in pilot zones significantly declined. The study suggests that this policy is likely to operate through a reputation insurance mechanism rather than through innovation compensation. Thus, based on the foregoing, we hypothesized that

H3: *Environmental accounting practices, particularly Recycling cost accounting, will have a significant positive effect on the net profit of manufacturing companies in Nigeria.*

METHODOLOGY

This study employed an *ex-post facto* design to investigate the relationship between specific variables within manufacturing firms listed on the Nigerian Exchange Group. A simple random sampling technique was adopted in this ex-post facto study primarily to ensure that each of the 67 listed manufacturing firms had an equal chance of being included in the final sample of 47 firms. This helps to minimize selection bias, increasing the likelihood that the selected sample is representative of the broader population of listed manufacturing firms in Nigeria. By selecting firms randomly, the study aims to enhance the generalizability of the findings to the entire population of interest, as any systematic over- or under-representation of certain types of firms is reduced.

Model Specification

The econometric model of this study was developed in line with the framework established by Hosam et al. (2020) to explore the relationship between independent and dependent variables. It is outlined as follows.

$FP = f(GCA)$

$FP = f(CTAC, PCC, RC)$

The model can therefore be formulated as econometrically as:

$$FP = \beta_0 + \beta_1 CTAC_{it} + \beta_2 PCC_{it} + \beta_3 RC_{it} + e_{it} \dots \dots \dots eqn. 3.1$$

Where;

FP= financial performance

CTAC= clean technology adoption cost

PCC= pollution control cost

RC= recycling cost

it = firm 'i' in period 't'

eit= Residual or error term of firm 'i' in period 't'

A priori expectation

The expectation based on the literature and theories is that green cost accounting will have a positive effect on the financial performance of manufacturing firms in Nigeria.

$\beta_1 > 0, \beta_2 > 0, \beta_3 > 0$

Measurement of Variables

DATA ANALYSIS AND DISCUSSION OF FINDINGS

Descriptive Statistics

The descriptive statistics reveal significant variability and skewness in the costs associated with pollution control, Recycling cost, and clean technology adoption among listed manufacturing firms in Nigeria. The mean return on assets (ROA) is 5.65, which indicates that on average, the manufacturing firms under study generated a return of 5.65% of their total assets. The median ROA is 4.07%, suggesting that half of the firms earned less than this value, whereas the other half earned more. The proximity between the mean and median indicates a slight skew in the distribution, which becomes clearer with further statistical analysis. ROA has a wide range, with a maximum of 75% and a minimum of -29.53%. This indicates that, while some firms are highly profitable, others incur significant losses. The large gap between the maximum and minimum suggests a high variability in financial performance. The standard deviation of 11.86, further

Table 1

Measurement and Description of Research Variables

SN	Variable	Description	Measurement	Data Source	Literature Evidence
Dependent Variable:					
1	Financial performance	Financial performance is the achievement of a company from its business activities.	Return on Assets (ROA) = Net Income / Average Total Assets	Annual Financial Reports.	Pratiwi et.al (2020)
Independent Variables:					
2	Green cost				
2a	Clean technology adoption cost	This is the financial outlay required to implement environmentally friendly technologies and processes within an organization or system.	The actual amount spent on clean technology adoption as cost	Annual Financial Reports.	Lanteri and Rampini, (2023).
2b	Pollution control cost	Clean pollution cost refers to the financial resources used to address existing pollution and prevent future pollution.	The actual amount spent on clean pollution as cost	Annual Financial Reports.	Daieibi, (2023)
2c	Recycling cost	Recycling costs is the financial resources used throughout the process of transforming used materials into usable raw materials for new products.	The actual amount spent on Recycling as cost	Annual Financial Reports.	Abou & Al (2021)

The table shows the description, measurement, data source, and literature evidence of the investigated variables.

supports this observation, indicating a high degree of variation in returns on assets across firms. This could be due to the differences in firm size, capital efficiency, or operational strategies. A skewness of 1.70 indicates a positively skewed distribution, means that most firms have lower returns on assets, but a few firms with very high ROA values pull the distribution's tail to the right.

The kurtosis value of 11.28 suggests that the distribution is leptokurtic, with heavy tails and a sharp peak, meaning that extreme values are more frequent than in a normal distribution. The Jarque-Bera statistic of 1128.85 with a probability value of 0.000, indicates that the ROA distribution deviates significantly from normality. This further confirmed the presence of outliers or extreme values in the data. The mean Pollution Control Cost is 4.74, while the median is 5.05, indicating that the distribution is relatively cantered around these values, with most firms spending between four and five units (likely in millions) on pollution control. The slight difference between the mean and median values suggests a symmetric distribution. The maximum pollution control cost is 9.25, while the minimum is 0.00, indicating that some firms do not allocate resources to pollution control. The range from 0 to 9.25 highlights the disparity in how firms approach the pollution control measures.

The standard deviation of 2.31 indicates a moderate spread around the mean, with some firms investing significantly more in pollution control than others. A skewness of -0.89 indicates a left-skewed distribution, meaning that more firms spend relatively less on pollution control, with a few firms spending significantly more. The kurtosis value of 3.14 suggests that the distribution is nearly mesokurtic and close to a normal distribution with moderate tails. The Jarque-Bera statistic of 45.09 with a probability value of 0.000, indicates that the distribution of pollution control costs is significantly non-normal. This suggests that some firms have exceptionally high or low costs, which causes the distribution to deviate from normality.

The mean Recycling cost was 3.26, whereas the median was slightly higher at 4.24, suggesting a slight skew in the data. This indicates that most firms tend to spend less on Recycling, while spend more, pulling the median upward. The maximum cost is 8.32, while the minimum is 0.00, indicating that some firms do not incur any Recycling cost, whereas others have higher expenditures. The standard deviation of 2.64 suggests a moderate degree of variation around the mean, with firms spending different amounts on recycling. A skewness of -0.15 indicates that the distribution is nearly symmetric, with only a slight left skew. The kurtosis value of 1.58 suggests a platykurtic distribution with lighter tails and a flatter peak than a normal distribution, means that extreme values are less frequent. The Jarque-Bera statistic of 29.62 with a probability value of 0.000 indicates that the Recycling

cost distribution is significantly non-normal, although the deviation from normality is less extreme compared to other variables.

The mean Clean Technology Adoption Cost is 3.58, and the median is 4.66, indicating that most firms spend close to 4.66 units (likely in millions) on adopting clean technologies. A lower mean compared to the median suggests a slightly skewed distribution. The maximum cost is 7.71, while the minimum is 0.00, indicating that some firms do not invest in adopting clean technology. The standard deviation of 2.70 shows a moderate degree of variation around the mean, implying that firms differ in their level of investment in clean technologies. The skewness of -0.40 indicates a slight left skew, suggests that most firms are clustered around lower values, with fewer firms investing heavily in clean technologies. A kurtosis value of 1.52 indicates a platykurtic distribution, with fewer extreme values and a flatter distribution compared to a normal distribution. The Jarque-Bera statistic of 39.76 with a probability value of 0.000 suggests that the Clean Technology Adoption Cost distribution is non-normal, driven by the relatively lower incidence of extreme values.

Test of Variables

Unit Root Test

In Table 3, the ADF test with intercept only was applied to four key variables: return on assets, clean technology adoption cost, pollution control cost, and Recycling cost. The results are presented in terms of the T-statistics, P-value, and order of integration of each variable. The interpretation of the test was based on these results. The ADF test results for return on assets show a T-statistic of 99.5197 and P-value of 0.0076. The P-value is less than the conventional significance level of 0.05, indicating that the null hypothesis of a unit root (non-stationarity) is rejected. This means that the return on assets is stationary at level; that is, it does not require differencing to become stationary. The Order of Integration is denoted as $I(0)$, indicating that no transformation (differencing) is needed for this variable to achieve stationarity. From a practical standpoint, the stationarity of return on assets suggests that the variable's statistical properties (e.g., mean and variance) do not change over time, which makes it suitable for use in regression analysis without concerns about non-stationarity, leading to inaccurate results.

The ADF test results for the Clean Technology Adoption Cost yielded a T-statistic of 135.851 and a P-value of 0.0000. Since the P-value is far below the threshold of 0.05, the null hypothesis of nonstationarity is strongly rejected. This indicates that the Clean Technology Adoption Cost is also stationary at level and no differencing is required. The Order of Integration $I(0)$ confirms that the variable is stationary in its original form. The stationarity of the Clean Technology

Table 2

Descriptive Statistics

	Returns on Assets	Pollution Control Cost	Recycling Cost	Clean technology adoption cost
Mean	5.654153	4.736146	3.262258	3.584058
Median	4.065000	5.053046	4.239405	4.662794
Maximum	75.000000	9.245728	8.324243	7.709620
Minimum	-29.530000	0.000000	0.000000	0.000000
Std. Dev.	11.86075	2.314895	2.643878	2.697759
Skewness	1.697385	-0.891933	-0.153812	-0.396590
Kurtosis	11.28437	3.138576	1.582839	1.518819
Jarque-Bera	1128.854	45.08610	29.61692	39.75771
Probability	0.000000	0.000000	0.000000	0.000000
Sum	1911.104	1600.817	1102.643	1211.412
Sum Sq. Dev.	47408.31	1805.895	2355.661	2452.654
Observations	338	338	338	338

This table shows the important things like the average, spread, and shape of numbers, helping to understand the data better.

Source: Researcher's Computation (2025)

Table 3

Unit Root Test

Unit Root Test [ADF Test with Intercept Only]

Variable	T-Statistics	P-Value	Order of Integration	Decision
Return on Asset	99.5197	0.0076	I(0)	Stationary
Clean technology adoption cost	135.851	0.0000	I(0)	Stationary
Pollution Control Cost	146.159	0.0000	I(0)	Stationary
Recycling Cost	130.196	0.0000	I(0)	Stationary

The table contain the result of checking whether data is bouncing around randomly. If it is, it means the data doesn't have a clear pattern or trend.

Source: Researcher's computation (2025)

Adoption Cost is important because it suggests that the cost associated with adopting clean technologies does not exhibit random trends over time, making it appropriate for inclusion in regression models without further transformation. For the Pollution Control Cost, the T-statistic is 146.159, and the P-value is 0.0000. Similar to the other variables, the P-value is well below 0.05, leading to rejection of the null hypothesis of non-stationarity. The pollution control cost is stationary at level, as indicated by the Order of Integration (I(0)). This means that the Pollution Control Cost variable remains consistent in its statistical behavior over time and does not require differencing. This is crucial for ensuring accurate regression results, as nonstationary variables could otherwise lead to misleading interpretations. In terms of policy implications, the stationarity of this variable implies that pollution control efforts have maintained a consistent cost level over time.

The results for the Recycling cost show a T-statistic of 130.196 and a P-value of 0.0000, again leading to the rejection of the null hypothesis of non-stationarity. Similar to the other variables, the Recycling cost was stationary at level, with an order of integration of I(0). This finding suggests that the costs associated with

Recycling do not exhibit random trends or changing patterns over time, making them stable for use in further econometric analyses. The stationarity of this variable ensures that its inclusion in the regression models will not distort the results and reflect accurate relationships with other variables. The Unit Root Test results indicate that all four variables return on assets, clean technology adoption cost, pollution control cost, and Recycling cost are stationary at level I(0).

This means that these variables do not contain unit roots and their statistical properties remain constant over time. Consequently, these variables can be used directly in regression analyses without the need for transformation or differencing. The stationarity of these variables is significant because it ensures that the relationships between these costs (clean technology adoption, pollution control, and recycling cost) and financial performance (as measured by return on assets) can be accurately examined in econometric models without the risk of spurious regression results. This strengthens the reliability of subsequent analyses that investigate the impact of environmental and technology-related costs on corporate financial performance.

Correlation Matrix

Table 4 presents the correlation statistics between the four variables: returns on assets (ROA), clean technology adoption cost, pollution control cost, and Recycling cost. The analysis was based on 338 observations of ROA and environmental cost variables. The correlation between ROA and Clean Technology Adoption Cost was positive, with a correlation coefficient of 0.132, and this relationship was statistically significant ($p = 0.015$). This indicates that there is a modest positive relationship between a firm's returns on assets and its expenditure on adopting clean technology. In other words, firms that invest more in clean technology tend to experience a slight improvement in their financial performance as measured by ROA. However, this relationship is relatively weak, suggesting that clean technology adoption, while beneficial, may not be a major determinant of profitability in the short term. The correlation between ROA and pollution control cost is negative (-0.022) but not statistically significant ($p = 0.681$). This implies that there is no meaningful linear relationship between a firm's investment in pollution control and its returns on assets. In essence, whether a firm spends more or less on pollution control does not appear to directly affect its financial performance in the sample of firms analysed. This result suggests that pollution control measures may not have an immediate impact on profitability or that the costs associated with such measures may be offset by other factors.

The correlation between ROA and recycling cost was positive, with a coefficient of 0.113, and statistically significant ($p = 0.038$). This suggests that firms that allocate more resources for environmental remediation tend to experience slightly better financial performance. However, similar to the relationship between ROA and clean technology adoption, this relationship is weak, indicating that environmental remediation costs may contribute to improved financial outcomes, but are not a dominant factor in determining profitability. The correlation between Clean Technology Adoption Cost and Pollution Control Cost is almost zero (-0.003) and not statistically significant ($p = 0.954$). This lack of correlation suggests that firms that spend more on adopting clean technology do not necessarily spend more or less on pollution control. This implies that clean technology adoption and pollution control are independent investment decisions that potentially reflect firms' different strategic priorities.

The correlation between Clean Technology Adoption Cost and Recycling cost was negative and significant (-0.259, $p = 0.000$). This result indicates a moderate inverse relationship between the two variables, meaning that firms that invest heavily in clean technology tend to spend less on environmental remediation and vice versa. One possible explanation for this is that clean technology may serve a preventive role, reducing the need for costly remediation efforts by minimizing

environmental harm at the outset. Firms may view clean technology as a more proactive and cost-effective solution than as addressing environmental damage. The correlation between the pollution control cost and Recycling cost was positive and statistically significant (0.348, $p = 0.000$). This finding suggests a moderately positive relationship between these two variables, indicating that firms that spend more on pollution control tend to spend more on Recycling.

This relationship is intuitive because both pollution control and Recycling are part of a firm's broader environmental management strategy. Firms committed to mitigating their environmental impact may allocate resources to both prevent pollution and address any environmental damage that does occur. In summary, the positive correlations between ROA and both clean technology adoption and recycling cost suggest that firms that are more environmentally conscious and invest in sustainable practices tend to experience slightly better financial outcomes. However, these relationships are relatively weak, indicating that although environmental investments may contribute to financial performance, other factors are likely to be more influential in driving profitability. The lack of a significant relationship between ROA and pollution control costs suggests that pollution control expenditures may not directly affect financial performance, possibly because these costs are seen as necessary regulatory compliance measures rather than strategic investments that could yield financial benefits.

Post-Estimation Tests

This relationship is intuitive because both pollution control and Recycling are part of a firm's broader environmental management strategy. Firms committed to mitigating their environmental impact may allocate resources to both prevent pollution and address any environmental damage that does occur. In summary, the positive correlations between ROA and both clean technology adoption and Recycling cost suggest that firms that are more environmentally conscious and invest in sustainable practices tend to experience slightly better financial outcomes. However, these relationships are relatively weak, indicating that although environmental investments may contribute to financial performance, other factors are likely to be more influential in driving profitability. The lack of a significant relationship between ROA and pollution control costs suggests that pollution control expenditures may not directly affect financial performance, possibly because these costs are necessary regulatory compliance measures rather than strategic investments that could yield financial benefits.

The Hausman Test is used to determine whether a fixed-effects or random-effects model is appropriate for panel data analysis. The null hypothesis is that the differences in coefficients between the two models are not systematic, implying that the random effects model is appropriate. Conversely, if the null hypothesis is

Table 4

Correlation Statistics							
RA		CTAC		PCC		RC	
Return on Asset		1					
323							
Clean Technology (AC)		.230**		1			
.000							
323		346					
Pollution Control Cost		.094		-.023		1	
.093		.670					
323		346		346			
Recycling cost		.077		-.030		.943**	
.168		.577		.000		1	
323		346		346		346	

The table shows the results of correlation analysis for investigated variables.

Source: Researcher’s Computation (2025)

Table 5

Summary of Post Estimate Test Result		
Panel Cross-section Heteroskedasticity LR Test		
Null Hypotheses	Chi2 statistics	Probability
Constant variance across the variable residuals (P>0.05)	383.9412	0.000
Pesaran CD		
Null Hypotheses	Statistics	Probability
There is no cross sectional dependent (P>0.05)	1.204383	0.2284
Hausman Test		
Null Hypotheses	Statistics	Probability
Difference in coefficient not systematic (P>0.05)	4.501616	0.212
Breusch Lagrangian multiplier test for random effects		
Null Hypotheses	Statistics	Probability
Difference in coefficient not systematic (P>0.05)	1048.754	0.0000
Pegan Lagrangian multiplier test for random effects		
Null Hypotheses	Statistics	Probability
Difference in coefficient not systematic (P>0.05)	14.56146	0.0000

This table shows how well the study model fits the data and if it’s making accurate predictions. It help us to decide if the model is good enough or if there is need to make changes.

Source: Researcher’s Computation (2025)

rejected, the fixed effects model is preferred. The test yielded a statistic of 4.501616 and P-value of 0.2121. Since the P-value is greater than 0.05, we fail to reject the null hypothesis, meaning that there is no systematic difference between the fixed- and random-effects models. This suggests that the random-effects model is appropriate for this dataset.

The Breusch-Pagan Lagrangian multiplier (LM) test was used to test for the presence of random effects in

a panel data model. The null hypothesis is that there are no random effects (i.e., a pooled OLS model is appropriate), whereas rejection of the null hypothesis implies that a random-effects model is more suitable. The test statistic was 1048.754 with a P-value of 0.0000. Because the P-value is less than 0.05, the null hypothesis of no random effects is rejected, indicating that random effects are present in the model. Similar to the Breusch-Pagan LM test, the Pagan LM test for random effects

also checks for the presence of random effects in panel data. The null hypothesis was that there are no random effects. The test yielded a statistic of 14.56146 and a p-value of 0.0000. As the P-value is below 0.05, the null hypothesis of no random effects is rejected, indicating that the random effects model is more appropriate than the pooled OLS model.

The post-estimation tests provided important insights into the suitability and robustness of the regression model. Heteroscedasticity was present, suggesting the need for a panel-corrected standard error. There was no cross-sectional dependence, which strengthened the reliability of the estimates. The Hausman Test indicates that the random-effects model is appropriate for this analysis. The Breusch-Pagan and Pagan LM tests confirm the presence of random effects, further supporting the use of the random-effects model. Based on these results, the model was refined by addressing heteroskedasticity and applying random-effects estimators to improve the reliability and accuracy of the regression analysis.

Multicollinearity Analysis

Multicollinearity associated with variables. This means that Clean Technology Adoption Cost is relatively independent of the other variables in the model and does not exhibit problematic levels of correlation with them. Consequently, the regression coefficient for this variable is stable and can be interpreted confidently. For the Pollution Control Cost, the tolerance value was 0.861, meaning that 86.1% of its variance was not explained by the other independent variables. The VIF value of 1.162 suggests low multicollinearity between the pollution control cost and the other variables in the model. Like Clean Technology Adoption Cost, this variable is relatively independent, and its inclusion in the model does not inflate the standard errors of the regression coefficients. Therefore, the effect of pollution control costs on the dependent variable can also be interpreted without concerns of multicollinearity bias.

The tolerance value for the Recycling cost was 0.794, meaning that 79.4% of its variance was not explained by the other variables in the model. The VIF value of 1.260 is slightly higher than the values for the other variables, but is still well below the threshold of 5, which indicates moderate multicollinearity. This suggests that, while the Recycling cost is somewhat more correlated with the other variables, the level of multicollinearity is still very low and unlikely to pose any significant issues in the model. The regression coefficient for this variable remains interpretable and its effect on the dependent variable can be considered stable and reliable.

The VIF values for all three independent variables—clean technology adoption, pollution control, and Recycling cost—are well below the commonly accepted threshold of 5. This indicates that multicollinearity was not a concern in this model. The low VIF values suggest

that none of the independent variables are highly correlated, meaning that each variable contributes uniquely to the explanation of the dependent variable, and their coefficients can be estimated with confidence. Low multicollinearity is a positive outcome because it ensures that the model is well specified, and the regression results are not distorted by inflated standard errors. In the context of this study, the absence of multicollinearity implies that the effects of environmental costs (clean technology adoption, pollution control, and Recycling cost) on the dependent variable (financial performance) can be analysed independently without the risk of confounding due to correlated predictors. This strengthens the reliability of the regression results as the estimated effects of each variable on the dependent variable are stable and unbiased. Therefore, the conclusions drawn from the analysis of the relationship between environmental costs and financial performance can be regarded as robust.

Table 6

Variance Inflation Factor Test of Variables

Variable	Tolerance	VIF
Clean technology adoption cost	.910	1.098
Pollution Control Cost	.861	1.162
Recycling cost	.794	1.260

The table checks if the variables are too similar. If they are, it can make it harder to understand their individual effects on the outcome. This is like trying to understand the effects of both wind and rain on a garden when they often happen together.

Source: Researcher's computation (2025)

Regression Analysis

The panel-corrected standard error (PCSE) regression results provide insights into the relationship between green cost accounting variables and the financial performance of listed manufacturing firms in Nigeria. The constant or intercept term represents the expected value of the dependent variable (return on assets) when all the independent variables are equal to zero. The estimated coefficient for the constant is 4.0416, suggesting that if the clean technology adoption, pollution control, and Recycling cost were zero, the return on assets would be 4.04 units. The P-value for the constant is 0.0545, slightly above the 5% significance level, indicating that the intercept is marginally statistically insignificant. Although it does not provide strong evidence of significance, it suggests a moderate baseline ROA level in the absence of Recycling cost.

The coefficient of Clean Technology Adoption Cost is 0.2108, indicating a positive relationship between clean technology adoption and ROA. For each unit increase in clean technology adoption cost, ROA increases by 0.2108 units, holding other variables constant. The P-value for this variable was 0.4393, which is well above the threshold of 0.05. This indicates that the

relationship between clean technology adoption costs and ROA is statistically insignificant, meaning that there is no evidence to suggest that clean technology adoption costs have a meaningful impact on the profitability of the firms in the sample. The coefficient of pollution control cost is -0.0746, suggesting a weak negative relationship with ROA. This means that, for each unit increase in pollution control costs, ROA decreases by 0.0746 units, all else being equal. The P-value for pollution control cost is 0.8165, which is much higher than the 5% significance level. This indicates that the negative relationship is statistically insignificant. Consequently, we cannot conclude that pollution control costs have a meaningful impact on firms' ROA.

The coefficient for Recycling cost was 0.3630, suggesting a positive relationship between Recycling cost and ROA. For every unit increase in Recycling cost, ROA increased by 0.3630 units, controlling for other factors. The P-value is 0.2099, which is higher than the standard threshold of 0.05, indicating that this variable is statistically insignificant. Therefore, while the relationship appears positive, we do not have enough statistical evidence to support the claim that higher Recycling cost improve the ROA. R-squared measures the proportion of variation in the dependent variable (ROA), which is explained by the independent variables. Here, the R-squared value is 0.004271, indicating that only 0.43% of the variation in ROA is explained by clean technology adoption, pollution control, and Recycling

cost. The adjusted R-squared value is -0.004673, which accounts for the number of independent variables relative to the number of observations.

A negative adjusted R-squared value suggests that the model is not well fitted, and the inclusion of independent variables does not improve the model's explanatory power. These low R-squared and adjusted R-squared values indicate that the model explains a negligible amount of the variation in ROA. In other words, the Recycling cost included in this model do not meaningfully account for the differences in firm profitability as measured by ROA. This suggests that other factors not captured in the model are likely to play a more significant role in determining ROA. The F-statistic was used to test the overall significance of the model. It assesses whether the independent variables as a group significantly explain the variation in the dependent variable. The F-statistic was 0.477502 and the P-value was 0.698150. Because the P-value is greater than 0.05, the F-statistic is not statistically significant, meaning that the independent variables taken together do not significantly explain the variation in ROA. This further supports the finding that Recycling cost included in the model do not have a significant impact on firm performance. In summary, the findings suggest that Recycling cost, as measured in this analysis, do not substantially impact firm profitability.

Discussion of Findings

Several studies examine the impact of green cost accounting on financial performance across different

Table 7

Panel-Corrected Standard Error Regression Results

Variable	Fixed Effect Model
C	4.041629 (2.094371) {0.0545}
Clean technology adoption costs	0.210799 (0.272235) {0.4393}
Pollution control costs	-0.074611 (0.321344) {0.8161}
Recycling cost	0.363019 (0.288937) {0.2099}
R ²	0.004271
Adjusted R ²	0.004673
F- Statistics	0.477502
Prob. (F- stat)	0.698150

This table explained a special way to analyse data that changes over time. It takes into account the fact that data from the same group (like people or countries) might be more similar than data from different groups. This helps the study to get more accurate results.

* sig @ 5%, *() standard error { } p-values.

Source: Researcher's computation (2025)

industries and geographical locations. Pratiwi et al. (2020) find that environmental management accounting positively affects corporate sustainability, while Hosam et al. (2020) and Riyadh et al. (2020) discover a negative relationship between green cost accounting and financial performance. From the regression results, clean technology adoption cost was found to have an insignificant positive impact on financial performance (coefficient: 0.210799, p-value: 0.4393). This aligns somewhat with Pratiwi et al. (2020), as the relationship between environmental costs and corporate sustainability was positive, but the insignificant p-value suggests that the positive effect in the Nigerian context is statistically weak. Several empirical studies, such as Bollinger (2015) and Hoque et al. (2023), have demonstrated that clean technology adoption improves both financial and environmental performance, especially when combined with regulatory incentives or customer pressure.

Lanteri and Rampini (2023) emphasized that larger firms, unconstrained by financing, tend to invest in cleaner and more efficient technology, enhancing their financial performance. The clean technology adoption cost coefficient was positive (0.210799), which aligns with empirical studies suggesting a potential benefit from clean technology investments. However, the result was statistically insignificant (p-value: 0.4393), meaning that while the relationship is positive, it does not significantly contribute to explaining the variations in financial performance for Nigerian firms in the sample. This weak statistical significance could imply that either the adoption of clean technologies in Nigerian firms is still in its early stages or that financial constraints limit the short-term effectiveness of these investments, as suggested by Lanteri and Rampini (2023). Pollution control costs were also found to have varied impacts in the empirical literature. Nguyen et al. (2021) and Robaina and Madaleno (2020) find positive relationships between environmental performance (including pollution control efforts) and financial performance, particularly in heavily polluting industries. However, Shi et al. (2022) note that reducing pollution could lower firms' debt financing costs. From the regression results, the coefficient for pollution control cost was negative (-0.074611), implying a weak negative relationship with financial performance, although it was statistically insignificant ($p = 0.8165$). This result aligns with Shi et al. (2022) and Robaina and Madaleno (2020), who suggest that pollution control efforts may come at a cost to firms in the short term, which may not necessarily lead to improved financial performance in the immediate future. The empirical literature of Kifordu (2022) and Abou and Al (2021) often shows positive effects of recycling and circular economy initiatives on firm performance, with recycling programs improving resource efficiency and reducing operational costs. Ayeleru et al. (2021) found that municipal solid waste recycling is a viable option for improving environmental and financial performance. In contrast, the PCSE regression results did not directly

measure the impact of recycling costs but focused on Recycling and clean technology adoption costs. Given the general context, it can be inferred that the Recycling cost in the PCSE model, particularly the Recycling cost (coefficient: 0.363019, p-value: 0.2099), could encompass aspects of recycling efforts. The positive coefficient for Recycling cost is consistent with the findings of Kifordu (2022) and Ayeleru et al. (2021), which suggest that efforts to manage environmental impacts, whether through recycling or remediation, could positively affect financial performance, although this effect is not statistically significant in the Nigerian context.

Implication of Result

This study found that although green technology adoption and environmental remediation efforts have positive effects, they do not significantly impact financial performance. This suggests that current policies may not be effective in encouraging green investment. To address this issue, policymakers should introduce incentives such as tax breaks or subsidies to make green technologies more appealing to firms. Additionally, this study found that pollution control costs may negatively impact financial performance, indicating the need for policies to mitigate this burden. However, this study suggests that effective pollution control can provide long-term financial benefits. Governments should balance environmental regulations with support mechanisms to help firms manage their initial costs of compliance. Additionally, this study highlights the need for better integration of environmental accounting into financial reporting to help firms understand and manage environmental costs. Policies should encourage the adoption of comprehensive environmental accounting practices to support sustainable business decisions.

This study highlights the need for a balance between the economic, environmental, and social dimensions to achieve long-term sustainability. This underscores the importance of policies that support sustainable practices, even if short-term financial impacts are negative. This study also supports the idea that firms should consider the interests of all stakeholders in their decision-making processes, even if it means addressing environmental concerns that may not immediately improve financial performance.

CONCLUSION AND RECOMMENDATIONS

This study investigated the influence of green cost accounting practices on the financial performance of Nigerian manufacturing firms. The findings suggest that neither clean technology adoption nor pollution control costs significantly impact financial performance. The study suggests that, while green practices may be beneficial for long-term sustainability, they do not immediately translate into financial gains. The study concludes that firms need more support and investments to effectively integrate green practices into their operations. This study recommends that policymakers implement tax incentives and provide

grants to encourage firms to adopt green technology. Governments should also establish green technology hubs to support businesses in adopting sustainable practices. These measures can promote the adoption of green technologies and reduce firms' financial burden.

This study adds to the body of knowledge by providing empirical evidence on how the various characteristics of green cost accounting affect financial performance in the Nigerian manufacturing sector. The study offers insights into the specific challenges and opportunities faced by Nigerian manufacturing firms in adopting green cost accounting practices, while also emphasizing the need for supportive policies, financial incentives, and improved infrastructure to enhance the financial viability of green initiatives. This contributes to the existing body of knowledge on this topic,

particularly in emerging economies. These findings can inform policymakers and industry stakeholders on how to support and promote sustainable business practices. This study also contributes to the literature on green accounting and sustainability reporting. It provides a deeper understanding of the factors that influence the relationship between green cost accounting and financial performance in a specific context.

Conflict of Interest / Competing Interests

The authors declare that there are no conflicts of interest or competing interests related to this study.

Funding Statement

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. The work was carried out solely through the individual efforts of the authors.

REFERENCES

1. Abou Taleb, M., & Al Farooque, O. (2021). Towards a circular economy for sustainable development: An application of full cost accounting to municipal waste recyclables. *Journal of Cleaner Production*, 280, 124047. <https://doi.org/10.1016/j.jclepro.2020.124047>
2. Ayeleru, O. O., Fajimi, L. I., Oboirien, B. O., & Olubambi, P. A. (2021). Forecasting municipal solid waste quantity using artificial neural network and supported vector machine techniques: A case study of Johannesburg, South Africa. *Journal of Cleaner Production*, 289, 125671. <https://doi.org/10.1016/j.jclepro.2020.125671>
3. Bollinger, B. (2015). Green technology adoption: An empirical study of the Southern California garment cleaning industry. *Quantitative Marketing and Economics*, 13, 319-358. <https://link.springer.com/article/10.1007/s11129-015-9163-0>
4. Damieibi, I. J. (2023). Environmental accounting practices and net profit of quoted oil and gas companies in Nigeria. *Nigerian Journal of Management Sciences*, 24 (19), 130, 141.
5. Enekwe, C. I., Ugwuioha, O. M., & Uyagu, B. D. (2023). Effect of environmental costs on the financial performance of listed oil and gas companies in Nigeria. *International Journal of Accounting Research*, 8(1), 31-36. <https://doi.org/10.65453/ijar.v8i1.688>
6. Gu, H., Yang, S., Xu, Z., & Cheng, C. (2023). Supply chain finance, green innovation, and productivity: Evidence from China. *Pacific-Basin Finance Journal*, 78, 101981. <https://doi.org/10.1016/j.pacfin.2023.101981>
7. Hoque, M. M., Islam, A., Islam, A. R. M. T., Pal, S. C., Mahammad, S., & Alam, E. (2023). Assessment of soil heavy metal pollution and associated ecological risk of agriculture dominated mid-channel bars in a subtropical river basin. *Scientific Reports*, 13(1), 11104. <https://www.nature.com/articles/s41598-023-38058-0>
8. Hosam, A. R., Maher, A. A., Henry, H. H., Barbara, G., Salsabila, A. A. (2020). The Analysis of Green Accounting Cost Impact on Corporations Financial Performance. *International Journal of Energy Economics and Policy* 10(6), ISSN: 2146-4553 421-426. <https://doi.org/10.32479/ijeep.9238>
9. Kifordu, A. A. (2022). Recycling sustainability on organizational performance of publishing firms: a survey-based approach. *Journal of Global Social Sciences*, 3(10), 103-118. <https://doi.org/10.58934/jgss.v3i10.35>
10. Laine, M., Tregidga, H., & Unerman, J. (2021). *Sustainability accounting and accountability*. Routledge. <https://doi.org/10.4324/9781003185611>
11. Lanteri, A., & Rampini, A. A. (2023). *Financing the adoption of clean technology*. Mimeo.
12. Odum, A. N., & Arinomor, C. O. (2023). Green accounting cost and financial performance of Oil and Gas companies in Nigeria. *Journal of Global Accounting*, 9(4), 1-22.
13. Okorie, D. I. (2021). The energy use of capital inputs: towards cleaner production in Nigeria. *Environmental Challenges*, 4, 100104. <https://doi.org/10.1016/j.envc.2021.100104>
14. Okporo, E. N., Okafor, L. C., Chukwu, U. C., & Uguru, L. C. (2023). Green accounting and financial performance in Nigerian industries: A study of selected oil and gas firms in Nigeria. *Certified National Accountant Journal*, 31(4), 81-98. <https://doi.org/10.70518/cnaj.v3i4.06>
15. Olawumi, T. O., Chan, D. W., Saka, A. B., Ekundayo, D., & Odeh, A. O. (2023). Are there any gains in green-tech adoption? Unearthing the beneficial outcomes of smart-sustainable practices in Nigeria and Hong Kong built environment. *Journal of Cleaner Production*, 410, 137280. <https://doi.org/10.1016/j.jclepro.2023.137280>
16. Pratiwi, A., Nurulrahmatia, N., & Muniarty, P. (2020). Pengaruh Corporate Social Responsibility (CSR) Terhadap Profitabilitas Pada Perusahaan Perbankan Yang Terdaftar di BEI. *Owner: Riset dan Jurnal Akuntansi*, 4(1), 95-103. <https://doi.org/10.33395/owner.v4i1.201>
17. Riyadh, H. A., Al-Shmam, M. A., Huang, H. H., Gunawan, B., & Alfaiza, S. A. (2020). The analysis of green accounting cost impact on corporation's financial performance. *International Journal of Energy Economics and Policy*, 10(6), 421-426.
18. Shi, J., Yu, C., Li, Y., & Wang, T. (2022). Does green financial policy affect debt-financing cost of heavy-polluting enterprises? An empirical evidence based on Chinese pilot zones for green finance reform and innovations. *Technological Forecasting and Social Change*, 179, 121678. <https://doi.org/10.1016/j.techfore.2022.121678>

19. Rahman, M. M., & Islam, M. E. (2023). The impact of green accounting on environmental performance: mediating effects of energy efficiency. *Environmental Science and Pollution Research*, 30(26), 69431-69452. <https://doi.org/10.21203/rs.3.rs-2604713/v1>
20. Robaina, M., & Madaleno, M. (2020). The relationship between emissions reduction and financial performance: Are Portuguese companies in a sustainable development path. *Corporate Social Responsibility and Environmental Management*, 27(3), 1213-1226. <https://doi.org/10.1002/csr.1876>
21. Thao, V. T. T., Tien, N. H., & Anh, D. B. H. (2019). Sustainability Issues in Social Model of Corporate Social Responsibility Theoretical Analysis and Practical Implication. *Journal of Advanced Research in Management*, 10(1 (19)), 17-29. [https://doi.org/10.14505/jarm.v10.1\(19\).02](https://doi.org/10.14505/jarm.v10.1(19).02)
22. Trotta, L., Bernardini, V., Ermini, M. V., Campana, L. G., Verna, M., Raimondi, G., & Spazzafumo, G. (2024). Climate finance-driven feasibility study of a green ammonia and urea production plant in Italy. *International Journal of Hydrogen Energy*. 137/ suppl/C 987-999; <https://doi.org/10.1016/j.ijhydene.2024.08.079>

Authors Contribution: All authors have contributed equally to this work.

Conflict of Interest: The authors declare no conflict of interest.

The article was received by the editors 13.01.2026

The article is recommended for printing 04.03.2026

The article was published 30.05.2026

No artificial intelligence tools were used by the authors during the preparation of this article.

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ОБЛІК ЕКОЛОГІЧНИХ ВИТРАТ ТА ЇХ ВПЛИВ НА ФІНАНСОВУ ЕФЕКТИВНІСТЬ ЗАРЕЄСТРОВАНІХ ВИРОБНИЧИХ КОМПАНІЙ У НІГЕРІЇ

Витрати, пов'язані з придбанням «зелених» технологій або встановленням обладнання для зменшення забруднення, зазвичай трансформуються у прямі, непрямі або операційні витрати. Це дослідження було спрямоване на оцінку впливу практик обліку екологічних витрат, зокрема витрат на впровадження чистих технологій, контроль забруднення та переробку, на фінансову ефективність виробничих компаній Нігерії, що котируються на Нігерійській фондовій біржі. Було застосовано дизайн ex-post facto для аналізу даних випадкової вибірки 47 компаній, зареєстрованих на Нігерійській фондовій біржі (NGX) станом на 31 грудня 2024 року. Для аналізу використано описову та інференційну статистику, включно з лінійною регресією. Результати показали, що коефіцієнт витрат на впровадження чистих технологій становив 0,2108, що свідчить про позитивний зв'язок із рентабельністю активів (ROA). Це означає, що збільшення витрат на чисті технології на одну одиницю підвищує ROA на 0,2108 одиниці. Однак цей вплив є статистично незначущим ($P = 0,4393 > 0,05$). Коефіцієнт витрат на контроль забруднення становив -0,0746, що вказує на слабкий негативний зв'язок із ROA. Збільшення цих витрат на одну одиницю знижує ROA на 0,0746 одиниці, однак ефект також є статистично незначущим ($P = 0,8165 > 0,05$). Аналогічно, коефіцієнт витрат на переробку становив 0,3630, що відображає позитивний зв'язок із ROA: збільшення витрат на одну одиницю підвищує ROA на 0,3630 одиниці. Проте цей результат також є статистично незначущим ($P = 0,8165 > 0,05$). Дослідження робить висновок, що інвестиції у «зелені» ініціативи можуть не забезпечувати негайної фінансової віддачі для виробничих компаній Нігерії. Тому рекомендується впровадження державної підтримки та фінансових стимулів для підвищення економічної доцільності переходу до екологічних практик.

Ключові слова: витрати на впровадження чистих технологій, фінансова ефективність, витрати на контроль забруднення, витрати на переробку.

Внесок авторів: всі автори зробили рівний внесок у цю роботу.

Конфлікт інтересів: автори повідомляють про відсутність конфлікту інтересів.

Стаття надійшла до редакції 13.01.2026

Стаття рекомендована до друку 04.03.2026

Статтю опубліковано 30.05.2026

При підготовці даної статті інструменти штучного інтелекту авторами не використовувалися.