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Moderating Effect of Firm Size on the Relationship Between Environmental Cost and Financial Performance of Listed Consumers Goods Firm in Nigeria

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ABSTRACT: Environmental costs increasingly burden manufacturing firms, yet their effect on financial performance remains inconsistent and poorly understood, creating uncertainty about whether such expenditures enhance or erode corporate profitability. This study examined the moderating effect of firm size on the relationship between environmental cost and financial performance of listed consumer goods firms in Nigeria. the study adopted an ex-post facto research design, utilizing secondary data from annual reports of thirteen listed consumer goods firms on the Nigerian Exchange Group covering the period 2011 to 2024. The population comprised all listed consumer goods firms, with a purposive and judgmental sampling technique employed to select all thirteen firms. Data were collected from published financial statements and panel least squares regression technique analyzed using EViews 10 statistical software. Findings revealed that employee health and safety cost has a negative but significant effect on return on capital employed, while pollution control cost has a positive and significant effect on return on capital employed. Firm size has a significant positive direct effect on financial performance. The moderating effects showed that firm size significantly mitigated the negative effect of employee health and safety cost but diminished the positive returns from pollution control investments. It was recommended among others that firms should adopt scale-appropriate environmental investment strategies, with smaller firms prioritizing pollution control for competitive positioning while larger firms should optimize health and safety integration with broader corporate social responsibility initiatives.

Keywords: Environmental cost, employee health and safety cost, pollution control cost, firm size and financial performance

INTRODUCTION

Financial performance remains the central preoccupation of corporate governance and strategic management, serving as the primary metric by which shareholders, regulators, and other stakeholders evaluate the health and sustainability of business enterprises. In an era of escalating environmental regulation, growing consumer consciousness, and intensified scrutiny of corporate ecological conduct, the financial performance of manufacturing firms is increasingly shaped not merely by operational efficiency or market positioning, but by how effectively organizations manage and account for their environmental obligations (Iyoha & Igbinovia, 2023). This intersection of ecological responsibility and economic outcomes has emerged as one of the most contested and consequential research frontiers in contemporary accounting and finance scholarship, particularly within developing economies such as Nigeria where institutional frameworks for environmental accountability are still maturing.

Environmental costs, representing organizational expenditures on waste management, pollution control, employee health and safety, environmental remediation, and community development, have become increasingly significant line items in corporate financial statements as regulatory frameworks intensify and stakeholder expectations evolve (Omeh et al., 2025; Okeke, 2021). For consumer goods firms operating in Nigeria, these environmental cost considerations are particularly salient given their direct interface with environmentally conscious consumers, extensive supply chain footprints, and significant contributions to packaging waste and resource consumption (Ogiriki & Atagboro, 2022; Odubuasi, Anene & Okeke, 2022). Recent empirical evidence presents a complex and often contradictory picture of how environmental costs influence financial performance across different contexts. Conversely, Egbadju and Elaigwu (2023) reported that waste management cost and community development cost had positive and significant effects on financial performance.

Despite growing research examining environmental cost-performance relationships, critical gaps persist that limit theoretical advancement and practical applicability. While Egbadju and Elaigwu (2023) acknowledged conditional relationships through moderated regression analysis, their work does not clearly specify tested moderator variables or explicitly report moderation effects, creating ambiguity about examined conditional relationships. This represents significant conceptual oversight, as stakeholder theory and resource-based view suggest that firm-level characteristics fundamentally influence how environmental investments translate into financial outcomes (Obiora & Nwamah, 2022). The predominant focus on industrial goods firms (Omeh et al., 2025), oil and gas companies (Nwanwu, 2022; Besson et al., 2020; Chukwu et al., 2020; Okeke, 2023), and mixed-sector samples (Iyoha & Igbinovia, 2023) has created insufficient consumer goods-specific insights. Consumer-oriented firms face more direct scrutiny from end consumers regarding environmental practices, potentially creating different cost-performance dynamics compared to business-to-business contexts where stakeholder pressures manifest differently (Egbadju & Elaigwu, 2023; Obiora & Nwamah, 2022; Emeka-Nwokeji, Ekwueme & Okeke, 2021). Most significantly, existing studies have systematically neglected firm size as a potential moderating variable that could explain contradictory literature findings. Iyoha and Igbinovia (2023) did not investigate whether firm size moderates the disclosure-value relationship, despite arguments that larger firms may derive greater value from environmental disclosures due to wider stakeholder audiences and greater commitment credibility. Okezie et al. (2019) suggested that environmental costs likely affect firms differently depending on their scale, with larger firms potentially deriving greater performance benefits through economies of scale and superior ability to leverage environmental credentials for competitive advantage.

For consumer goods firms operating at vastly different scales from small local producers to large multinationals this moderation effect becomes particularly salient yet remains empirically unexamined. Against this backdrop, the current study addresses the moderating effect of firm size on the relationship between environmental costs and financial performance of listed consumer goods firms in Nigeria. However, the study formulated the following null hypotheses to test the validity and reliability of the variables.

H_01: Employee health and safety has no significant effect on financial performance of listed consumers goods firm in Nigeria.

H_02: Pollution control cost has no significant effect on financial performance of listed consumers goods firm in Nigeria.

H_03: Firm size has no significant effect on the relationship between employee health and safety cost and financial performance of listed consumers goods firm in Nigeria.

iv. **H_04:** Firm size has no significant effect on the relationship between pollution control cost and financial performance of listed consumers goods firm in Nigeria.

LITERATURE REVIEW

Financial Performance

Financial performance represents the extent to which a firm achieves its economic objectives through efficient resource utilization and value creation. Kaur and Singh (2021) conceptualize financial performance as the measurement of how well organizations employ assets from their primary business activities to generate revenues and maximize shareholder wealth. Similarly, Nwanyanwu (2022) describes financial performance as the comprehensive assessment of a company's financial health, operational efficiency, and capacity to generate sustainable profits over specified periods. From a strategic perspective, Almaqtari et al. (2019) define financial performance as the degree to which financial goals are accomplished, reflecting management's effectiveness in utilizing company resources to create value for stakeholders. For the purpose of this study, Nwanyanwu's (2022) definition is adopted as the working definition because it captures both the multidimensional nature of financial performance and its temporal aspect. This definition acknowledges that financial performance encompasses various metrics rather than a single indicator, which aligns with contemporary corporate reporting practices. Returns on capital employed (ROCE) serves as a critical profitability metric that measures how efficiently companies generate earnings from their capital base. Delen et al. (2020) emphasize that ROCE demonstrates management's ability to deploy both equity and debt capital to produce operating profits before interest and taxes. This metric has gained prominence in performance evaluation because it accounts for the total capital structure rather than equity alone, providing a more comprehensive picture of capital efficiency (Yazdanfar and Öhman, 2021; Ugwu, Eboatu, Okoro, Okeke, 2022).

Environmental Cost

Environmental costs encompass all expenditures incurred by organizations to prevent, reduce, or remediate environmental damage arising from business operations. Latan et al. (2018) define environmental costs as the monetary expression of activities undertaken to manage environmental impacts, including pollution prevention, waste treatment, and regulatory compliance expenses. Taking a broader perspective, Burritt et al. (2019) conceptualize environmental costs as both explicit monetary outlays and implicit opportunity costs associated with environmental protection measures and sustainable resource management. From an accounting standpoint. The working definition adopted for this research is Burritt et al.'s (2019) conceptualization, as it recognizes both tangible and intangible dimensions of environmental expenditure. This comprehensive definition acknowledges that environmental costs extend beyond direct monetary payments to include foregone opportunities and strategic investments in sustainability initiatives. Manufacturing firms increasingly face pressure to internalize environmental externalities, transforming previously unaccounted environmental impacts into measurable costs (Emeka-Nwokeji & Okeke, 2019).

Employees Health and Safety Cost

Employees health and safety costs represent investments and expenditures directed toward protecting workers from occupational hazards and promoting workplace wellbeing. Yorio et al. (2019) argue that these costs include direct expenses for safety equipment, training programs, health surveillance, and preventive measures designed to minimize workplace injuries and illnesses. The financial implications extend beyond immediate safety investments to encompass costs associated with accident investigation, workers' compensation, productivity losses, and potential litigation (Hämäläinen et al., 2020). Recent empirical evidence suggests that

proactive health and safety investments yield substantial returns through reduced absenteeism, lower insurance premiums, and enhanced employee morale (Alarcón et al., 2021). Manufacturing sectors face particularly high health and safety costs due to exposure to hazardous materials, heavy machinery operations, and physically demanding work environments.

Pollution Control Cost

Pollution control costs comprise expenditures associated with preventing, monitoring, and mitigating environmental pollution generated by industrial activities. Alnajjar (2020) characterizes pollution control costs as investments in technologies, processes, and systems that minimize emissions, effluents, and waste discharges to air, water, and land. These costs encompass capital investments in pollution abatement equipment, operational expenses for waste treatment facilities, monitoring and testing fees, and regulatory compliance costs (Balasubramanian, 2021). Manufacturing industries particularly confront escalating pollution control costs due to stringent environmental regulations and growing public scrutiny of industrial emissions (Li and Wu, 2020). Recent studies demonstrate that while pollution control investments initially appear as cost burdens, they frequently generate long-term benefits through resource efficiency, waste valorization, and improved stakeholder relations (Del Giudice et al., 2020). The evolving regulatory landscape and adoption of circular economy principles are reshaping how organizations perceive and manage pollution control expenditures, increasingly viewing them as strategic investments in sustainable competitiveness.

Firm Size

Firm size represents a multidimensional construct that captures the scale and magnitude of organizational operations, typically measured through total assets, revenue, or employee numbers. Dang et al. (2020) explain that firm size influences operational capabilities, market power, resource accessibility, and strategic flexibility available to organizations. Larger firms generally enjoy economies of scale, greater bargaining power with suppliers, enhanced access to capital markets, and superior capacity to absorb environmental compliance costs compared to smaller counterparts (Aguilera-Caracuel and Ortiz-de-Mandojana, 2021). Research demonstrates that firm size moderates various organizational relationships, including the nexus between environmental practices and financial performance, as resource availability affects implementation capacity (Hang et al., 2019). The moderating role of firm size in the environmental cost-financial performance relationship reflects differential resource endowments and stakeholder pressures across organizational scales. Large manufacturing firms face intensified regulatory scrutiny, greater stakeholder expectations for environmental responsibility, and enhanced reputational risks, compelling substantial environmental investments (Velte, 2020). Empirical evidence suggests that firm size significantly influences how environmental costs translate into financial outcomes, with larger firms potentially converting environmental investments into competitive advantages more effectively than smaller enterprises through innovation synergies and market positioning.

Empirical Review

Omeh *et al* (2025) investigated the impact of environmental costs on financial performance of listed industrial goods firms in Nigeria from 2010 to 2022, analyzing eleven companies using ordinary least square pooled panel regression. Findings revealed that waste management cost had negative and significant effects, while environmental remediation cost, employee health and safety cost, and community development cost showed positive and significant impacts on financial performance. This very recent study provides contemporary evidence spanning twelve years, capturing important temporal dynamics. However, its focus on industrial

goods rather than consumer goods limits direct applicability.

Nwanwu (2022) examined environmental management cost and financial performance of oil and gas companies in Nigeria from 2011 to 2018, analyzing ten companies using descriptive statistics, regression analysis, and correlation coefficients guided by a regression model. The study found that pollution cost had positive and significant impact on financial performance. While this research provides evidence from the oil and gas sector, its applicability to consumer goods firms is limited by fundamental sectoral differences.

Ekpose and Enidiok (2021) studied the effect of environmental cost on financial performance of Nigerian brewery listed firms in Egypt from 2009 to 2019, employing an ex-post facto research design with twelve Nigerian breweries as sample. Using linear regression model on secondary data from annual reports, the study revealed that health-related costs had positive and significant effects on profit margin, while infrastructural development costs and education program costs showed positive but insignificant impacts. This study exhibits substantial methodological inconsistencies that undermine its credibility and applicability to the current study.

Theoretical Framework

This study is anchored on Stakeholder Theory, pioneered by Freeman in 1984. This theory argues that firms operate within complex relationship networks involving employees, customers, suppliers, communities, regulators, and investors, each possessing legitimate claims on organizational resources and decision-making processes. Within environmental management contexts, Stakeholder Theory suggests firms invest in environmental cost initiatives not merely for regulatory compliance but to satisfy diverse stakeholder expectations regarding corporate environmental responsibility, thereby securing social license to operate and maintaining stakeholder support essential for long-term organizational survival. Contemporary environmental accounting research has extensively utilized Stakeholder Theory to explain financial implications of environmental practices across various industrial contexts. Muttanachai et al. (2023) investigated environmental, social, and governance disclosure in Thailand, demonstrating that stakeholder theory effectively explained environmental disclosure benefits despite its voluntary nature, confirming that firms respond to stakeholder expectations even absent regulatory mandates.

The relevance of Stakeholder Theory to this study lies in its capacity to explain how Nigerian consumer goods firms navigate competing stakeholder demands while managing environmental costs and their moderating firm size effects. Chukwu et al. (2020) investigated Nigerian oil firms, finding that environmental liability provisions were not significantly related to earnings persistence, with results supporting institutional theory rather than stakeholder concerns as primary drivers, suggesting that in certain contexts, stakeholder influence may be constrained by institutional frameworks. By employing Stakeholder Theory, this study acknowledges that environmental cost management in Nigerian consumer goods firms represents strategic stakeholder engagement aimed at balancing multiple interests, with firm size potentially amplifying or dampening stakeholder pressures and financial returns associated with environmental investments addressing stakeholder expectations.

METHODOLOGY

This study adopted an ex-post facto research design to examine the moderating effect of firm size on the relationship between selected environmental cost and financial performance of listed consumer goods firms in Nigeria. The population of the study consist of the entire 21 consumer goods firms listed on the Nigeria Exchange Group (NGX) as at 31st December, 2024. The sample size for this study consists

of 13 listed consumer goods firms selected from the population of 21 firms. The study employed purposive and judgmental sampling techniques in selecting the sample firms. The study utilized secondary data collection method to gather information on environmental cost and financial performance of listed consumer goods firms. The primary sources of secondary data for this study were the audited annual reports and financial statements of the 13 sampled consumer goods firms. The study employed panel regression model for data analyzed using EViews 10 statistical software. In line with the previous researches, the study adapted and modify the model of Okoli, *et al.* (2025), in determining the effect of environmental cost management on financial performance. The modified functional model proposed for the study is shown below as thus:

ROCE = F(CDC, WNC, ESHC, PCC, FSIZE) ----------i

The Econometric Form of the Regression Proposed for the study is shown below as thus:

Model 1: Effect

$ROCE_{it} = \beta_0 + \beta_1 EHSC_{it} + \beta_2 PCC_{it} + \beta_3 FSIZE_{it} + \varepsilon_{it}$ ----------ii

Model 2: Moderation

$ROCE_{it} = \beta_0 + \beta_1 EHSC_{it} + \beta_2 PCC_{it} + \beta_3 FSIZE_{it} + \beta_4 (EHSC_{it} \times FSIZE_{it}) + \beta_5 (PCC_{it} \times FSIZE_{it}) + \varepsilon_{it}$----------iii

Where:

ROCE = Return on Capital Employed, **EHSC** = Employee Health and Safety Cost, **PCC** = Pollution Control Cost, **FSIZE** = Firm Size (natural logarithm of total assets), **β0**= Intercept term, **β1, β2, β3**, = Coefficients of independent and moderating variables, **β4, β5,** = Coefficients of interaction terms, **εit**= Error term for firm i at time t, **i** = Cross-sectional units (firms 1 to 13) and **t** = Time period

Table 3.1: Operationalization of Variables

Variable	Type	Proxy/Indicator	Measurement	Source
Financial Performance	Dependent	Return on Capital Employed (ROCE)	Operating Expenses ÷ Capital Employed × 100	Raymond and Nwachukwu (2024)
Environmental Cost Management	Independent	Employee Health & Safety Cost (EHSC)	Total health & safety expenditure ÷ Total Revenue or EHSC will measure by scoring, 1 if an item is present in a financial report and 0 if otherwise based on Global Reporting Initiative (GRI) guidelines	Okoli and Nwokoye. (2024)

Variable	Type	Proxy/Indicator	Measurement	Source
Financial Performance	Dependent	Return on Capital Employed (ROCE)	Operating Expenses ÷ Capital Employed × 100	Raymond and Nwachukwu (2024)
		Pollution control Cost (PC)	Total pollution control expenditure ÷ Total Revenue or PCD will measure by scoring, 1 if an item is present in a financial report and 0 if otherwise based on Global Reporting Initiative (GRI) guidelines	Okoli and Nwokoye. (2024)
Firm Size	Moderating	Total Assets	Natural logarithm of Total Assets	Statement of Financial Position

Sources: ***Researcher Compilation 2025***

4. Results and Discussion

Descriptive statistics

	ROCE	EHSC	PCC	FSIZE	FSIZE_EHSC	FSIZE_PCC
Mean	0.227764	0.785714	0.428571	40062.79	31706.79	16613.57
Median	0.043150	1.000000	0.000000	33433.00	28612.00	0.000000
Maximum	1.172800	1.000000	1.000000	72443.00	72443.00	59713.00
Minimum	0.003100	0.000000	0.000000	27528.00	0.000000	0.000000
Std. Dev.	0.373363	0.411458	0.496237	14575.13	22009.48	20530.48
Skewness	1.795701	-1.392621	0.288675	1.069448	0.206335	0.689478
Kurtosis	4.602656	2.939394	1.083333	2.749970	2.330415	2.023107
Jarque-Bera	117.2890	58.85614	30.38600	35.16691	4.691364	21.65677
Probability	0.000000	0.000000	0.000000	0.000000	0.095782	0.000020
Sum	41.45310	143.0000	78.00000	7291427.	5770635.	3023670.
Sum Sq. Dev.	25.23133	30.64286	44.57143	3.85E+10	8.77E+10	7.63E+10
Observations	182	182	182	182	182	182

Source: Researcher's computation using Eviews 10

The descriptive statistics results reveals that the average score for Returns on capital employed, employee health and safety cost, pollution control cost, firm size, FSIZE_EHSC and FSIZE_PCC are respectively 0.227764, 0.785714, 0.428571, 400062.27, 31706.79 and 16613.57. the jargue-Bera probabilities in the respective case reveals that all except FSIZE_EHSC data are normally distributed. This is evident in the probabilities been greater than 0.05 (5%).

Table 4.3 Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	5	0.0045

Source: Researcher's computation using Eviews 10

The Hausman test was conducted to determine the appropriate panel estimation model for examining the moderating effect of firm size on the relationship between environmental costs and financial performance of listed consumer goods firms in Nigeria. The Chi-Square statistic of 0.0000 with 5 degrees of freedom yielded a probability value of 0.0045, which is below the 5% significance level. This justifying the use of the fixed effect model over the random effect model.

Multicollinearity Test

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
EHSC	0.042280	443.4989	9.03548
PCC	0.003361	19.22906	9.98804
FSIZE	2.78E-11	674.9682	8.51074
FSIZE_EHSC	2.83E-11	560.8965	10.7090
FSIZE_PCC	2.01E-12	18.62599	9.23098
C	0.040300	538.0229	NA

Source: Researcher's computation using Eviews 10

Table 2 shows the Variance Inflation Factor (VIF) values for each independent variable. The VIF values are used to detect the presence of multicollinearity between the regressors. The value of the Mean VIF (Centered VIF values) is above the threshold of 10. Therefore, we reject the null hypothesis and conclude that there is multi-collinearity among the independent variables based on the common rule of thumb. This confirms the correlation coefficients.

Heteroskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.436718	Prob. F(5,176)	0.2133
Obs*R-squared	6.946769	Prob. Chi-Square(5)	0.2246
Scaled explained SS	9.622764	Prob. Chi-Square(5)	0.0867

Source: Researcher's computation using Eviews 10

The result on the table above shows that the probability values of 0.2133, 0.2246 and 0.0867are greater than 0.05. Therefore, we accept the null hypothesis and conclude that there is no heteroskedasticity among the series.

Panel Regression Model

Fixed effect test equation:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.740814	0.046141	-16.05535	0.0000
EHSC	0.144745	0.030640	4.724030	0.0000
PCC	-0.081536	0.025463	-3.202166	0.0016
FSIZE	2.22E-05	8.40E-07	26.44871	0.0000
R-squared	0.822749			

Adjusted R-squared	0.806733
Durbin-Watson stat	2.132739

Source: Researcher's computation using Eviews 10

The fixed effect panel least squares regression results reveal that Employee Health and Safety Cost (EHSC) has a positive and significant effect on financial performance, with a coefficient of 0.144745 and a probability value of 0.0000, which is well below the 5% significance threshold. Similarly, Pollution Control Cost (PCC) has a significant negative effect (coefficient = -0.081536; prob. = 0.0016), indicating that increased pollution control costs reduce financial performance. Firm Size (FSIZE) also returns a significant positive coefficient (2.22E-05; prob. = 0.0000). The R-squared of 0.8227 and Adjusted R-squared of 0.8067 confirm that approximately 82.3% of the variation in financial performance is explained by the model, indicating a strong goodness-of-fit. The Durbin-Watson statistic of 2.133 falls within the acceptable range (1.5–2.5), confirming the absence of first-order serial autocorrelation in the residuals. However, consistent with the broader objective of the study which is to examine the *moderating effect of firm size* on the relationship between environmental costs and financial performance the direct effects observed in this base model necessitate the introduction of an interaction (moderating) variable. The standalone significance of EHSC and PCC does not capture how firm size conditions these relationships. The inclusion of firm size as a moderator is therefore required to determine whether its interplay with environmental cost variables produces additional explanatory power, and to address the study's specific objectives iii and iv regarding moderation, thereby strengthening the model's theoretical and empirical robustness.

Moderation Model

Fixed effects test equation:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.375081	0.200749	-1.868408	0.0635
EHSC	-0.422708	0.205621	-2.055766	0.0414
PCC	0.620618	0.057972	10.70541	0.0000
FSIZE	1.33E-05	5.28E-06	2.523846	0.0126
FSIZE_EHSC	1.35E-05	5.32E-06	2.532593	0.0123
FSIZE_PCC	-1.75E-05	1.42E-06	-12.37671	0.0000
Effects Specification				
R-squared	0.911390			
Adjusted R-squared	0.902205			
Durbin-Watson stat	2.409186			

Source: Researcher's computation using Eviews 10

The moderation results reveal significant relationships between environmental costs and financial performance (ROCE) of listed consumer goods firms in Nigeria. Using the 5% significance level decision rule, employee health and safety cost (EHSC) has a negative but significant effect on financial performance with a coefficient of -0.422708 ($p=0.0414 < 0.05$), indicating that a unit increase in EHSC reduces ROCE by 0.42 units. Conversely, pollution control cost (PCC) has a positive and significant effect with a coefficient of 0.620618 ($p=0.0000 < 0.05$), suggesting that increased investment in pollution control

enhances financial performance by 0.62 units. Firm size (FSIZE) alone shows a positive and significant effect (coefficient = 0.000013, p=0.0126 < 0.05), confirming larger firms achieve better financial performance. The moderating effects of firm size are statistically significant for both environmental cost dimensions. FSIZE_EHSC shows a positive coefficient of 0.000013 (p=0.0123 < 0.05), indicating firm size mitigates the negative impact of health and safety costs on performance. FSIZE_PCC demonstrates a negative coefficient of -0.000018 (p=0.0000 < 0.05), suggesting larger firms experience diminished returns from pollution control investments. The model's explanatory power is robust with R-squared of 0.911390 and Adjusted R-squared of 0.902205, indicating that 91.14% of variations in financial performance are explained by environmental costs and firm size. The Durbin-Watson statistic of 2.409186 (approximately 2.0) confirms no autocorrelation problems, validating the model's reliability for panel data analysis using EViews 10.

Discussion of Findings

The first objective examined the effect of employee health and safety cost on financial performance, revealing a negative but significant effecton financial performance (β=-0.422708, p=0.0414). This finding contradicts Omeh et al. (2025), Oti and Mbu-Ogar (2018), and Oshiole et al. (2022), who reported positive significant effects of employee health and safety costs on performance in industrial goods and oil/gas firms. However, these studies focused on different sectors without examining firm size moderation, representing a critical gap. The current study fills this void by specifically analyzing consumer goods firms and incorporating firm size as a moderator. The second objective revealed pollution control cost has a positive and significant effect (β=0.620618, p=0.0000), aligning with Nwanwu (2022) who found positive impacts of pollution costs in oil/gas companies, and Obiora and Nwamah (2022) who reported positive effects of pollution control disclosure. However, these prior studies examined different industries and focused on disclosure rather than actual costs, failing to investigate moderation effects. The present study advances knowledge by examining actual pollution control costs in consumer goods firms while testing firm size moderation, filling the sectoral and analytical gaps in existing literature.

The third and fourth objectives examined firm size moderation effects, with FSIZE_EHSC showing positive significance (β=0.000013, p=0.0123) and FSIZE_PCC demonstrating negative significance (β=-0.000018, p=0.0000). None of the reviewed empirical studies—including Omeh et al. (2025), Egbadju and Elaigwu (2023), Ogiriki and Atagboro (2022), Obiora and Nwamah (2022), Nwanwu (2022), or Oshiole et al. (2022)—explicitly tested firm size as a moderating variable despite acknowledging heterogeneity across organizational scales. This represents the most significant gap the current study addresses. While Egbadju and Elaigwu (2023) employed moderated regression, they did not specify firm size as the moderator or report moderation effects explicitly. The present study uniquely demonstrates that firm size conditions environmental cost-performance relationships differently: larger firms mitigate negative health/safety cost impacts but experience diminished pollution control returns. This nuanced understanding, absent in prior research, provides scale-appropriate strategic guidance for consumer goods firms' environmental investments.

CONCLUSION

Based on the significant negative effect of employee health and safety cost on financial performance, the study concludes that consumer goods firms in Nigeria experience reduced profitability when investments in employee health and safety increase, suggesting these costs are viewed as regulatory compliance burdens rather than value-creating investments. However, the

positive moderating effect of firm size on this relationship reveals that larger consumer goods firms successfully mitigate these negative impacts through economies of scale and superior environmental management capabilities. The study also concludes that pollution control cost positively influences financial performance, indicating that investments in pollution control enhance corporate reputation and stakeholder confidence, thereby improving profitability. Nevertheless, the negative moderation effect of firm size on pollution control cost suggests that larger firms experience diminishing returns from pollution control investments, possibly due to already established environmental credentials or saturation effects. Furthermore, the study concludes that firm size independently enhances financial performance, confirming that organizational scale provides competitive advantages in the consumer goods sector. The robust model fit (R-squared=0.911390) and absence of autocorrelation (Durbin-Watson = 2.409186) validate these conclusions, demonstrating that environmental costs and firm size jointly explain 91.14% of financial performance variations in Nigerian consumer goods firms.

It is recommended that consumer goods firms, particularly smaller ones, should adopt strategic approaches to employee health and safety investments by focusing on initiatives that simultaneously comply with regulations and enhance productivity, such as training programs that reduce workplace accidents while improving operational efficiency. Larger firms should leverage their scale advantages to integrate health and safety programs with broader corporate social responsibility initiatives that strengthen brand reputation. Regarding pollution control, it is recommended that firms should prioritize pollution control investments as they demonstrate clear performance benefits; however, larger firms should optimize rather than maximize such investments, focusing on innovative pollution reduction technologies that provide competitive differentiation rather than merely increasing expenditure. Finally, the study recommends that policymakers and industry regulators should develop scale-appropriate environmental compliance frameworks that recognize the differential capabilities and resource constraints across firm sizes, ensuring that environmental regulations do not disproportionately burden smaller consumer goods firms while encouraging larger firms to pursue environmental leadership beyond minimum compliance standards.

REFERENCES

Aguilera-Caracuel, J., & Ortiz-de-Mandojana, N. (2021). Green innovation and financial performance: An institutional approach. *Organization & Environment, 34*(3), 365-385. https://doi.org/10.1177/1086026613507931

Alarcón, L. F., Acuña, D., Diethelm, S., & Pellicer, E. (2021). Strategies for improving safety performance in construction firms. *Accident Analysis & Prevention, 94*, 107-118. https://doi.org/10.1016/j.aap.2016.05.021

Alnajjar, M. I. M. (2020). Impact of pollution prevention practices on firm performance: Evidence from Jordan. *Journal of Environmental Management and Tourism, 11*(4), 826-835. https://doi.org/10.14505/jemt.v11.4(44).08

Balasubramanian, S. (2021). Environmental cost management and firm performance: Empirical evidence from Indian manufacturing sector. *International Journal of Environmental Science and Technology, 18*(6), 1547-1560. https://doi.org/10.1007/s13762-020-02896-3

Besson, M., Bauweraerts, J., & Discua Cruz, A. (2020). Environmental performance and firm performance: The moderating role of family influence. *Journal of Cleaner Production*, *255*, 120002.

Chukwu, G. J., Egiyi, M. A., & Onyema, J. I. (2020). Environmental liability

provisions and earnings persistence of oil firms in Nigeria. *International Journal of Advanced Academic Research*, *6*(2), 12-28.

Dang, C., Li, Z. F., & Yang, C. (2020). Measuring firm size in empirical corporate finance. *Journal of Banking & Finance, 86*, 159-176. https://doi.org/10.1016/j.jbankfin.2017.09.006

Del Giudice, M., Soto-Acosta, P., Carayannis, E., & Scuotto, V. (2020). Emerging perspectives on business process management (BPM): IT-based processes and ambidextrous organizations, theory and practice. *Business Process Management Journal, 26*(1), 1-5. https://doi.org/10.1108/BPMJ-02-2019-0056

Delen, D., Kuzey, C., & Uyar, A. (2020). Measuring firm performance using financial ratios: A decision tree approach. *Expert Systems with Applications, 40*(10), 3970-3983. https://doi.org/10.1016/j.eswa.2013.01.012

Egbadju, P. U., & Elaigwu, J. (2023). Environmental cost management and financial performance of listed manufacturing firms in Nigeria. *Journal of Accounting and Financial Management*, *9*(4), 45-62.

Emeka-Nwokeji, N.A. & Okeke, P.C (2019). Evaluating corporate environmentaldisclosuresand performance of quoted non-financial firms in Nigeria, *Journal of accounting, business and social sciences*, 1(2), 119-132

Emeka-Nwokeji, N.A., Ekwueme, C.M. & Okeke, P.C. (2021). Usefulness of voluntary disclosures in annual reports of listed companies in Nigerian: An examination of users' perception. *International Journal of Business and Management Review* 9(5), 22-48

Freeman, R. E. (1984). *Strategic management: A stakeholder approach*. Pitman Publishing.

Hämäläinen, P., Takala, J., & Boon Kiat, T. (2020). *Global estimates of occupational accidents and work-related illnesses 2017*. Workplace Safety and Health Institute.

Hang, M., Geyer-Klingeberg, J., Rathgeber, A. W., & Stöckl, S. (2019). Measurement matters—A meta-study of the determinants of corporate capital structure. *Quarterly Review of Economics and Finance, 68*, 211-225. https://doi.org/10.1016/j.qref.2017.11.011

Iyoha, F. O., & Igbinovia, I. M. (2023). Environmental disclosure and firm value: Evidence from Nigerian listed companies. *African Journal of Business Management*, *17*(1), 1-15.

Kaur, M., & Singh, B. (2021). Determinants of financial performance of banks in India. *International Journal of Productivity and Performance Management, 70*(2), 298-320. https://doi.org/10.1108/IJPPM-05-2019-0221

Latan, H., Chiappetta Jabbour, C. J., Lopes de Sousa Jabbour, A. B., Wamba, S. F., & Shahbaz, M. (2018). Effects of environmental strategy, environmental uncertainty and top management's commitment on corporate environmental performance: The role of environmental management accounting. *Journal of Cleaner Production, 180*, 297-306. https://doi.org/10.1016/j.jclepro.2018.01.106

Li, W., & Wu, H. (2020). The impact of environmental regulation on firms' pollution control costs: Evidence from China. *Journal of Cleaner Production, 277*, 123387. https://doi.org/10.1016/j.jclepro.2020.123387

Malik, F., Wang, F., Naseem, M. A., Ikram, A., & Ali, S. (2023). Determinants of corporate environmental disclosure and its impact on financial performance: Moderating role of environmental performance. *Business Strategy and the Environment*, *32*(4), 1646-1665.

Muttanachai, S., Suwanmaneepong, S., & Mankeb, P. (2023). Sustainability disclosure and financial performance: The case of Thailand. *Journal of Asian Finance, Economics and Business*, *10*(1), 85-97.

Nguyen, A. H., & Nguyen, L. H. (2020). Determinants of firm value: An empirical study of listed trading companies in Vietnam. *Journal of Asian Finance, Economics and Business,* *7*(11), 589-599. https://doi.org/10.13106/jafeb.2020.vol7.no11.589

Nwanwu, C. E. (2022). Environmental cost and financial performance of oil and gas companies in Nigeria. *International Journal of Economics and Financial Management*, *7*(3), 34-48.

Nwanyanwu, L. A. (2022). Financial performance determinants of micro, small and medium enterprises in Nigeria. *Journal of Small Business and Entrepreneurship Development, 10*(1), 15-29. https://doi.org/10.15640/jsbed.v10n1a2

Obara, L. C., & Nangih, E. (2017). Environmental costs and firm performance: Evidence from Nigerian oil companies. *Journal of Accounting and Taxation*, *9*(3), 28-36.

Obiora, F. C., & Nwamah, U. N. (2022). Environmental accounting practices and organizational performance of manufacturing firms in Nigeria. *European Journal of Accounting, Auditing and Finance Research*, *10*(5), 1-22.

Odubuasi, A.C., Anene, J.I. & Okeke, P.C. (2022). Do Chief Executive Officer's attributes impact on the performance of Nigerian firms *Journal of Business Administration Research* 11 (2), 1-12

Ogiriki, T., & Atagboro, E. (2022). Environmental cost accounting and profitability of consumer goods firms in Nigeria. *International Journal of Innovative Finance and Economics Research*, *10*(2), 68-79.

Okeke, P.C. (2023). Financial leverage and profitability of recapitalized banks in Nigeria from 2010 - 2021. *Nigerian Journal of Management Sciences*, 24(1a), 362-369

Okeke, P.C.(2021). Empirical analysis of factors affecting auditor quality: Evidence from listed firms in the service sector of Nigerian Stock Exchange European *Journal of Business, Economics and Accountancy,* 9(2), 53-67

Okezie, B. N., Erinne, G. C., & Njoku, P. N. (2019). Environmental costs and financial performance of listed companies in Nigeria. *Journal of Accounting and Financial Management*, *5*(3), 112-125.

Omeh, G. N., Okoye, E. I., & Okafor, T. G. (2025). Environmental costs and financial performance of industrial goods firms in Nigeria. *International Journal of Management Studies and Social Science Research*, *7*(1), 45-63.

Onyekachi, O., Ugwu, O. K., & Emenike, K. O. (2020). Environmental expenditure and firm value: Evidence from Nigerian oil and gas sector. *Asian Journal of Economics, Business and Accounting*, *18*(2), 12-24.

Oti, P. A., & Mbu-Ogar, G. B. (2018). Environmental cost management and financial performance of selected quoted oil and gas companies in Nigeria. *International Journal of Finance and Accounting*, *7*(5), 123-136.

Qian, W., Hörisch, J., & Schaltegger, S. (2021). Environmental management accounting and its effects on carbon management and disclosure quality. *Journal of Cleaner Production, 174*, 1608-1619. https://doi.org/10.1016/j.jclepro.2017.11.092

Ugwu, I.V., Eboatu, I., Okoro, E.C., Okeke, P.C (2022). Efficiency of Credit Regulation on Profitability of Banks in NigeriaAsian *Journal of Social Science and Management Technology*, 4(5), 48-62

Yazdanfar, D., & Öhman, P. (2021). Financial distress determinants among SMEs: Empirical evidence from Sweden. *Journal of Economic Studies, 47*(3), 547-560. https://doi.org/10.1108/JES-01-2019-0015

Yorio, P. L., Willmer, D. R., & Moore, S. M. (2019). Health and safety management systems through a multilevel and strategic management perspective: Theoretical and empirical considerations. *Safety Science, 72*, 221-228. https://doi.org/10.1016/j.ssci.2014.09.011