

Effect of Environmental Cost on the Financial Performance of Listed Manufacturing Firms in Nigeria

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Abstract

This study investigates the effect of environmental cost disclosure, particularly waste management costs, on the financial performance of listed manufacturing firms in Nigeria. Guided by the ex-post facto research design, secondary data were collected from annual financial statements and sustainability reports of 12 purposively selected firms across six manufacturing sectors for the period 2015–2024. Descriptive and inferential statistics, including correlation and panel Generalized Method of Moments (GMM) regression were employed for analysis. Descriptive results showed wide variability and non-normal distribution in financial performance metrics such as return on assets (ROA), return on equity (ROE), and earnings per share (EPS), while log-transformed waste management cost (LNWMC) demonstrated approximate normality. Correlation analysis revealed that waste management cost had a statistically significant positive relationship with ROE, a negative significant relationship with EPS, and an insignificant relationship with ROA. Regression results from the GMM estimation showed that waste management cost had a significant positive effect on both ROA and ROE, indicating that improved environmental disclosure enhances firm performance and shareholder value. However, EPS was negatively influenced, possibly due to the short-term cost burden of environmental investments. The model validity tests confirmed the appropriateness of the GMM specification and the reliability of instruments used. The study concludes that transparent and proactive environmental cost disclosures especially in waste management can yield long-term financial benefits. It recommends that Nigerian manufacturing firms should adopt stronger environmental accounting practices and that regulators mandate standardized sustainability disclosures to improve corporate accountability and investor confidence.

Keywords: Environmental cost disclosure, waste management cost, financial performance, Earnings per share, Return on assets, Return on equity.

Introduction

In today's global economy, sustainability has shifted from being a voluntary corporate responsibility to a strategic necessity that affects stakeholders' perception and firm value (Adegbite & Olayemi, 2021). Investors, regulators, and consumers are increasingly demanding transparency in how companies manage their environmental responsibilities. One important aspect of this is environmental cost disclosure, which involves reporting expenses incurred in mitigating environmental damage. A key component of these disclosures is waste management cost expenses related to the collection, treatment, and disposal of industrial waste (Olawale & Osuji, 2022). This issue is especially critical in Nigeria, where the manufacturing sector, while vital to economic growth, contributes significantly to environmental degradation, particularly through poor waste disposal practices (Egbetunde, 2022; Ajibade, 2021). These environmental harms have led to water and soil pollution and public health issues, driving the demand for more responsible corporate

environmental behavior (Nwachukwu & Dike, 2023). Despite these concerns, uncertainty persists over whether investments in waste management offer measurable financial benefits. This study measures financial performance using Earnings per Share (EPS), Return on Assets (ROA), and Return on Equity (ROE), which indicate how efficiently firms utilize resources and generate profit (Osuji & Nduka, 2022). However, many Nigerian firms still fail to integrate environmental costs into their financial disclosures due to high compliance costs, weak enforcement, and unclear financial outcomes (Ogunyemi & Bakare, 2021). While some argue that environmental investments improve efficiency and reputation, others claim the financial benefits are uncertain in emerging economies like Nigeria. This study seeks to address the gap by investigating the effect of waste management cost disclosure on financial performance among listed Nigerian manufacturing firms. Its findings aim to inform sustainability practices, investment decisions, and policy development. The specific objectives of the study are to

- i. Determine the effect of waste management cost on earnings per share of listed manufacturing firms in Nigeria.
- ii. Investigate the effect of waste management cost on return on equity of listed manufacturing firms in Nigeria.
- iii. Determine the effect of waste management cost on return on asset of listed manufacturing firms in Nigeria.

Conceptual Clarification

Environmental Cost Disclosure

Environmental Cost Disclosure (ECD) refers to the systematic reporting of expenses related to a company's environmental activities such as pollution control, regulatory compliance, and waste management (Shehu, 2014; Hassan & Ibrahim, 2021). It integrates environmental considerations into both financial and non-financial reporting structures, thereby improving corporate transparency and accountability (Bennett & James, 1998). According to KPMG (2012), environmental costs are essential in mitigating ecological harm and ensuring firms meet legal and regulatory requirements. These disclosures may be qualitative or quantitative and are often aligned with global frameworks like the Global Reporting Initiative (GRI) and the Sustainability Accounting Standards Board (SASB) (Nguyen & Tran, 2023). One significant aspect of ECD is the disclosure of waste management cost, which includes expenditures for collecting, transporting, treating, recycling, and disposing of waste materials. Waste, as defined by the United Nations Statistics Division (UNSD, 2013), includes all materials considered unusable or discarded after their primary use, including industrial and hazardous by-products.

Waste management costs can be substantial, with collection and transport comprising up to 70% of total waste system expenses (Dijkgraaf & Gradus, 2017). Additional costs may arise from landfill usage, regulatory monitoring, and compliance measures (Ajayi *et al.*, 2021). Efficient waste management not only fulfills environmental obligations but also enhances operational efficiency and brand reputation. Hassan and Ibrahim (2021) emphasize that effective recycling and treatment strategies are key to sustainable business operations. Similarly, Rahman and Wong (2024) found that firms with strong waste management practices often experience cost savings and improved investor trust. Nonetheless, challenges remain. High compliance costs, the absence of standardized reporting frameworks, and the potential exposure of inefficiencies can discourage firms from fully embracing ECD (Egbunike *et al.*, 2023). Despite these barriers, environmental cost disclosure—particularly of waste management costs continues to be a vital tool for promoting

long-term sustainability, building stakeholder confidence, and aligning with global environmental expectations (Agyei-Mensah, 2022).

Financial Performance

Financial performance refers to a firm's ability to generate profits, maintain growth, and deliver value to shareholders over time. It encompasses various financial indicators that measure profitability, efficiency, and effective resource utilization (Adegbite *et al.*, 2021). A company's financial performance is a key determinant of its sustainability and competitive positioning in the market, and it serves as a benchmark for investors, regulators, and other stakeholders when evaluating business viability. This study focuses on three critical indicators of financial performance: earnings per share (EPS), return on assets (ROA), and return on equity (ROE). EPS reflects the portion of a company's profit allocated to each outstanding share and is widely used by investors to gauge profitability and the potential for dividend payouts. ROA measures how effectively a firm uses its total assets to generate net income, providing insight into operational efficiency. ROE evaluates the company's ability to generate returns from shareholders' investments, indicating the management's efficiency in utilizing equity capital (Rahman & Wong, 2023; Scott & Meyer, 2022). These metrics collectively offer a comprehensive understanding of how well a company is performing financially. Strong results in EPS, ROA, and ROE signify robust management practices, financial health, and the capacity to create long-term value for stakeholders.

Theoretical framework

This study is anchored on the Stakeholder Theory which was developed by R. Edward Freeman (1984) in his book *Strategic Management: A Stakeholder Approach*. Stakeholder Theory posits that organizations exist within a network of relationships that include not just shareholders but also employees, customers, suppliers, government agencies, and the broader community. According to this theory, a firm's success depends on its ability to balance and manage the interests of these diverse stakeholders. Companies that fail to address stakeholder concerns, including environmental issues, risk losing legitimacy, investor confidence, and public trust (Freeman, 1984). In the context of environmental cost disclosure, this theory suggests that firms disclose pollution control costs, waste management costs, and employee health and safety costs to satisfy stakeholders' expectations and maintain positive relationships. This theory underpins the study by explaining why manufacturing firms in Nigeria disclose environmental costs. Firms recognize that stakeholders, including regulatory bodies and investors, expect transparency in pollution control, waste management, and employee health and safety. By disclosing these costs, firms can strengthen stakeholder relationships, improve their corporate reputation, and potentially enhance financial performance.

Empirical Review

A growing body of empirical research has examined the relationship between environmental cost disclosure particularly waste management cost and financial performance metrics such as Earnings Per Share (EPS), Return on Assets (ROA), and Return on Equity (ROE). Chen and Wang (2025) explored how sustainability reporting, including pollution control and waste management costs, affects stock market performance in Chinese manufacturing firms. Their panel data analysis revealed that while pollution control costs significantly improved ROE, waste management costs had a comparatively weaker effect. They emphasized the need for improved environmental disclosure to attract investors. Similarly, Carter and Green (2025), in their global analysis, found

that pollution control cost positively influenced EPS, whereas waste management cost had a limited effect on ROE, recommending greater transparency to boost shareholder wealth. Gomez and Martinez (2024) reported that while employee health and safety costs positively affected ROA, waste management cost negatively impacted ROA in Latin American firms. Adeyemi and Bello (2024) found that both pollution control and waste management costs positively influenced EPS in Nigerian firms, but had an insignificant effect on ROA, prompting calls for mandatory disclosure regulations. Nwachukwu and Ugwueze (2023) reported a significant positive relationship between waste management cost and ROE among listed oil and gas firms in Nigeria, emphasizing stronger governmental oversight of CSR spending. In contrast, Dubois and Martin (2023) found that waste management cost significantly improved ROA among French firms, encouraging long-term investment in sustainability. Nguyen and Hoang (2023) also reported a positive effect of waste management cost on ROA among Vietnamese firms, advocating for regulatory reforms to enhance environmental transparency. Similarly, Park and Lee (2022) discovered that waste management cost positively influenced EPS in South Korean firms and recommended mandatory environmental disclosures. Chinedu and Onyekachi (2022), through a longitudinal study in Nigeria, showed that while pollution control cost strongly impacted both ROA and ROE, waste management cost had an insignificant negative effect on ROA but a significant positive effect on ROE. They called for robust regulatory frameworks to enhance environmental accountability. Torres and Ramirez (2021) assessed Latin American firms and found that pollution control cost significantly improved both ROA and ROE, while waste management cost had no significant effect on either metric, reinforcing the need for more detailed disclosures. Finally, Fernandes and Costa (2020) in their European longitudinal study, reported that pollution control cost positively affected ROA, but waste management cost had an insignificant effect on ROE. They recommended integrating sustainability into financial planning. In summary, while pollution control cost frequently shows a significant positive relationship with financial performance, findings on waste management cost are mixed. Some studies report positive or significant associations, particularly with EPS and ROE (e.g., Park & Lee, 2022; Nwachukwu & Ugwueze, 2023), while others observe weaker or insignificant effects (e.g., Gomez & Martinez, 2024; Torres & Ramirez, 2021). These inconsistencies suggest that the impact of waste management cost on financial performance may be context-dependent, influenced by geographic, industry-specific, and regulatory differences. Overall, the evidence underscores the importance of transparent and standardized environmental cost disclosures to improve stakeholder confidence and financial outcomes.

Methodology

This study adopted an ex-post facto research design, which is appropriate for examining the causal relationship between environmental cost disclosure and financial performance without manipulating any variables. Since the study relied on historical, publicly available data from financial statements and sustainability reports of listed manufacturing firms in Nigeria, experimental control was not required. The target population comprised all 59 manufacturing companies listed on the Nigerian Exchange Group (NGX) as of 2024. A stratified sampling technique was employed to select 12 firms across six manufacturing sectors, ensuring sectoral representation and purposive inclusion. Secondary data were collected from annual financial reports, sustainability disclosures, and regulatory filings for the period 2015 to 2024. Data analysis involved both descriptive and inferential statistics. The inferential analysis included correlation and panel data estimation using the Generalized Method of Moments (GMM). This estimator was chosen due to the panel structure of the dataset, where the number of firms (cross-sections)

exceeded the time period (years), making GMM suitable for addressing potential endogeneity and autocorrelation issues. Preliminary data screening and diagnostic tests were conducted. The panel unit root test revealed a mixed order of stationarity, while descriptive statistics showed that the variables did not follow a normal distribution. Despite these limitations, the GMM approach was applied to obtain robust and reliable estimates. The model specification used in the study is functionally specified as follows:

$$Y_{it} = f(X1_{it}, X2_{it}, X3_{it}, \dots, X_{nit}) \quad \dots \quad (1)$$

The panel GMM model with instrumental variables and transformation at both First Differences and Orthogonal Deviation are specified as follows:

Instrument Specification =

$$@DYN (EPS (-2) WMC (-1)) \dots \dots \dots (2)$$

$$@DYN (ROE (-2) WMC (-1)) \dots \dots \dots (3)$$

$$@DYN (ROA (-2) WMC (-1)) \dots \dots \dots (4)$$

Where;

β_1 to β_2 = the coefficients (rate of change) in the predictor or exogenous variables.

EPS = earnings per share

ROE = return on equity

ROA = return on asset

WMC = waste management cost

u = error term

Y_{it} = the dependent variable of company i in time t.

X_{it} = the series of independent variables of company i in time t.

Results and Discussion of Findings

Table 1: Descriptive Statistics on ROA, ROE, EPS and WMC

	ROA	ROE	EPS	LNWMC
Mean	0.084880	0.286506	12.14853	6.129426
Median	0.054507	0.144302	2.080000	6.198247
Maximum	1.513072	4.345244	213.0000	8.660420
Minimum	0.001281	-0.482133	-1.130000	3.207634
Std. Dev.	0.152039	0.541771	32.03371	1.001629
Skewness	7.812058	5.132742	4.079650	-0.128453
Kurtosis	72.95192	35.09542	21.24944	3.257904
Jarque-Bera	23332.29	5157.046	1814.924	0.601842
Probability	0.000000	0.000000	0.000000	0.740136
Sum	9.251869	31.22917	1324.190	668.1074
Sum Sq. Dev.	2.496501	31.69969	110825.1	108.3522
Observations	109	109	109	109

The descriptive statistics for the variables—Return on Assets (ROA), Return on Equity (ROE), Earnings per Share (EPS), and the log-transformed Waste Management Cost (LNWMC)—based on 109 observations provide insight into the distribution and behavior of financial performance and environmental cost disclosure among listed Nigerian manufacturing firms. The average ROA of 8.49% suggests moderate profitability, though the right-skewed distribution, high skewness (7.81), and extreme kurtosis (72.95) indicate that a few firms have unusually high returns, significantly influencing the mean. Similarly, ROE reflects relatively strong performance, with an

average of 28.65%. However, the gap between the mean and median (0.1443), coupled with high variability and outliers (maximum 434.52%), underscores significant differences across firms. The high skewness (5.13) and kurtosis (35.10) also point to non-normality, confirmed by the Jarque-Bera test. EPS results further reflect this trend, with an average of ₦12.15 and a median of only ₦2.08, highlighting the presence of extreme high values (maximum ₦213.00) and a wide performance range among firms. The high standard deviation (32.03), skewness (4.08), and kurtosis (21.25) again demonstrate the impact of outliers. In contrast, the log-transformed Waste Management Cost (LNWMC) exhibits a nearly normal distribution. Its mean of 6.13 and median of 6.20 are close, and the slight left skewness (-0.13) and mild kurtosis (3.26) suggest symmetry. The Jarque-Bera statistic confirms normality ($p = 0.740$). Overall, while financial performance variables show high dispersion and non-normality due to outliers, the transformed environmental cost variable is normally distributed, validating its suitability for regression analysis in the study.

Table 2 Correlation Analysis on ROA, ROE, EPS and WMC

		ROA	ROE	EPS	LNWMC
ROA	Pearson Correlation	1	.849**	.132	.127
	Sig. (2-tailed)		.000	.150	.167
	N	120	120	120	120
ROE	Pearson Correlation	.849**	1	.068	.217*
	Sig. (2-tailed)	.000		.462	.017
	N	120	120	120	120
EPS	Pearson Correlation	.132	.068	1	-.295**
	Sig. (2-tailed)	.150	.462		.001
	N	120	120	120	120
LNWMC	Pearson Correlation	.127	.217*	-.295**	1
	Sig. (2-tailed)	.167	.017	.001	
	N	120	120	120	120

The correlation analysis reveals several insights into the relationships between financial performance indicators and environmental cost disclosure among listed Nigerian manufacturing firms. There is a strong, positive, and statistically significant relationship between Return on Assets (ROA) and Return on Equity (ROE), with a correlation coefficient of 0.849 and a p-value of 0.000. This suggests that firms that utilize their assets effectively to generate profits also tend to deliver higher returns to shareholders. In contrast, ROA and Earnings per Share (EPS) show a weak, positive, but statistically insignificant relationship (correlation = 0.132, $p = 0.150$), indicating that efficient asset use does not necessarily result in higher EPS. Similarly, the correlation between ROA and Waste Management Cost (WMC) is weak and statistically insignificant (correlation = 0.127, $p = 0.167$), suggesting that greater environmental expenditure does not directly translate to improved asset-based returns. The relationship between ROE and EPS is very weak and insignificant (correlation = 0.068, $p = 0.462$), implying that shareholder equity returns may not strongly influence earnings per share. However, ROE and WMC exhibit a weak-to-moderate, positive, and statistically significant relationship (correlation = 0.217, $p = 0.017$), indicating that higher environmental cost disclosure may enhance investor confidence and shareholder value. Lastly, a moderate, negative, and statistically significant correlation exists between EPS and WMC (correlation = -0.295, $p = 0.001$), suggesting that increased environmental spending may reduce earnings per share, possibly due to the short-term financial burden of sustainability investments.

Regression Analysis

The regression analysis examined the influence of the independent variable (Waste management cost (WMC)) on the three dependent variables return on asset (ROA), return on equity (ROE) and earnings per share (EPS).

Effect of waste management cost (WMC) on return on asset (ROA)

The regression results for Return on Assets (ROA) show that the coefficient of 0.335364 implies that approximately 33.5% of the prior year's ROA carries over into the current year, indicating a strong element of profit persistence. The small standard error of 0.071471 reflects high precision in this estimate. The t-statistic of 4.692299 and a p-value of 0.0000 indicate the coefficient is statistically significant at the 1% level. Regarding the impact of Waste Management Cost (WMC), the coefficient of 0.198095 indicates that a one-unit increase in the log-transformed waste management cost (LNWMC) is associated with a 0.198 rise in ROA, assuming all other factors remain constant. The very low standard error of 0.016520 shows that this estimate is highly reliable.

Table 3: Generalized Method of Moments (GMM) Regression of waste management cost (WMC) on return on asset (ROA)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROA(-1)	0.335364	0.071471	4.692299	0.0000
LNWMC	0.198095	0.016520	11.99126	0.0000
Effects Specification				
Cross-section fixed (first differences)				
Mean dependent var	-0.012366	S.D. dependent var	0.241957	
S.E. of regression	0.244028	Sum squared resid	5.478563	
J-statistic	9.012271	Instrument rank	12	
Prob(J-statistic)	0.341262			

The corresponding t-statistic of 11.99126 and p-value of 0.0000 confirm that this relationship is highly statistically significant. These findings provide robust evidence that higher environmental cost disclosure through waste management spending positively affects a firm's financial performance. In terms of model validity, the J-statistic value of 9.012271 with a p-value of 0.341262 exceeds the 0.05 threshold, suggesting that the null hypothesis of instrument validity cannot be rejected. This indicates that the instruments used in the Generalized Method of Moments (GMM) estimation are appropriate, and the model is well-specified without issues of instrument over-identification.

Effect of waste management cost (WMC) on return on equity (ROE)

Coefficient: 0.2696 indicate a 1-unit increase in previous ROE leads to a 0.27 unit increase in current ROE. T-Statistic: 8.53 and p-Value: 0.0000 indicate a highly significant effect. Coefficient: 0.5386 suggests that a 1-unit increase in LNWMC (roughly a 2.7-fold increase in waste management cost) leads to a 0.54 increase in ROE. T-Statistic: 5.69 and p-Value: 0.0000 suggests a highly significant effect. This is a substantial and statistically significant positive effect, showing

that greater environmental cost disclosure related to waste management correlates with improved firm financial performance.

Table 4: Generalized Method of Moments (GMM) Regression of waste management cost (WMC) on return on equity (ROE)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROE(-1)	0.269594	0.031613	8.527879	0.0000
LNWMC	0.538591	0.094663	5.689541	0.0000
Effects Specification				
Cross-section fixed (first differences)				
Mean dependent var	-0.047854	S.D. dependent var		0.798408
S.E. of regression	0.831496	Sum squared resid		63.60743
J-statistic	10.68183	Instrument rank		12
Prob(J-statistic)	0.220387			

J-Statistic 10.68183 and ($p = 0.220$) imply that Waste management cost disclosure (LNWMC) has a significant, strong positive effect on ROE, supporting the hypothesis that environmental responsibility enhances financial outcomes.

Effect of waste management cost (WMC) on earnings per share (EPS)

Coefficient: 0.1063 suggests that a 1-unit increase in the previous period's EPS is associated with a 0.106 unit increase in current EPS. T-Statistic: 169.719 and p-Value: 0.0000 (Highly significant) indicates extremely strong statistical significance, suggesting that past profitability (EPS) is a powerful predictor of current profitability. Coefficient: 25.088 imply that a 1-unit increase in LNWMC (approximately a 2.7x increase in actual waste management cost) increases EPS by 25.088 units.

Table 5: Generalized Method of Moments (GMM) Regression of waste management cost (WMC) on earnings per share (EPS)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EPS(-1)	0.106342	0.000627	169.7194	0.0000
LNWMC	25.08804	0.301402	83.23769	0.0000
Effects Specification				
Cross-section fixed (first differences)				
Mean dependent var	-0.083229	S.D. dependent var		21.46728
S.E. of regression	21.74048	Sum squared resid		43483.66
J-statistic	10.02304	Instrument rank		13
Prob(J-statistic)	0.348623			

T-Statistic: 83.238 and p-Value: 0.0000 (Highly significant indicating that greater environmental spending (as disclosed via waste management costs) is strongly associated with improved earnings.

J-statistic (10.0230) and Prob (J-statistic) 0.3486 shows a strong, positive, and highly significant effect implying that greater environmental cost disclosure improves firm earnings.

Hypothesis Testing

H₀₁: There is no significant effect of waste management cost on the earnings per share (EPS) of listed manufacturing firms in Nigeria.

With a t-Statistic of 83.24 and p-value of 0.0000, since $p < 0.05$, we reject the null hypothesis (H_{01}) and conclude that waste management cost has a statistically significant and positive effect on the earnings per share of listed manufacturing firms in Nigeria.

H₀₂: Waste management cost effect on return on equity (ROE) of listed manufacturing firms in Nigeria is not significant.

With a t-Statistic of 5.69 and a p-value of 0.0000, since $p < 0.05$, we reject the null hypothesis (H_{02}) and conclude that waste management cost has a statistically significant and positive effect on the return on equity of listed manufacturing firms in Nigeria.

H₀₃: The effect of waste management cost on return on asset (ROA) of listed manufacturing firms in Nigeria is not significant.

With a t-Statistic of 11.99 and a p-value of 0.0000, since $p < 0.05$, we reject the null hypothesis (H_{03}) and conclude that waste management cost significantly and positively affects the return on assets of listed manufacturing firms in Nigeria.

Discussion of findings

Effect of Waste Management Cost on Return on Assets (ROA)

The GMM regression result shows that WMC (log-transformed) has a positive and statistically significant effect on ROA (coefficient = 0.1981; $p = 0.0000$). This means a 1% increase in WMC is associated with an approximately 0.198% increase in ROA, holding other factors constant. It was initially expected that WMC would positively influence ROA. This assumption is based on the notion that proper waste management enhances operational efficiency, reduces long-term costs, and improves resource utilization, all of which can lead to better asset performance. This result aligns with Stakeholder Theory and Legitimacy Theory, which argue that proactive environmental investment (like waste management) legitimizes firm operations and satisfies key stakeholders, leading to better financial performance. This finding supports the results of Dubois and Martin (2023) and Nguyen and Hoang (2023), who found a significant positive effect of WMC on ROA. Also, Adeyemi and Bello (2024), who reported positive but statistically insignificant effects in the Nigerian context. Chinedu and Onyekachi (2022) as well as Gomez and Martinez (2024) however, reported insignificant or negative effects, possibly due to regional or sectorial variations. The strong significance of WMC on ROA suggests that Nigerian manufacturing firms can enhance asset productivity and profitability through strategic environmental investments.

Effect of Waste Management Cost on Return on Equity (ROE)

The GMM regression result shows a positive and significant effect of WMC on ROE (coefficient = 0.5386; $p = 0.0000$), indicating that increased waste management spending enhances shareholder returns. It was expected that WMC would positively influence ROE, based on the assumption that investors reward environmentally responsible firms with higher equity returns. This result is consistent with Stakeholder Theory, which asserts that satisfying societal and environmental expectations improves investor confidence and market valuation. Additionally, Legitimacy Theory suggests firms that report environmental expenditures maintain societal approval, contributing to

equity performance. This result is strongly supported by Nwachukwu and Ugwueze (2023) and Chinedu and Onyekachi (2022), who reported significant positive relationships between WMC and ROE in Nigerian firms. Torres and Ramirez (2021) and Fernandes and Costa (2020) found weaker or insignificant effects, possibly due to cross-country variations. Carter and Green (2025) found a weaker effect on ROE, suggesting that the impact may depend on firm size, transparency level, and investor responsiveness. The result provides robust support for encouraging Nigerian manufacturing firms to increase investment in waste management as a means to enhance shareholder value.

Effect of Waste Management Cost on Earnings per Share (EPS)

The GMM regression result reveals a strong positive and statistically significant effect of WMC on EPS (coefficient = 25.0880; $p = 0.0000$). This substantial coefficient suggests that even a marginal increase in WMC can lead to a sizable increase in EPS. It was anticipated that WMC would positively affect EPS, based on the view that such investments reduce regulatory risks and improve public perception, leading to increased market confidence and stock performance. This finding supports the Stakeholder Theory, implying that firms seen as environmentally responsible are likely to benefit from increased demand for their shares. It also reinforces Legitimacy Theory, as firms seen to align with environmental norms gain public and market approval. This aligns with Park and Lee (2022), who found a significant positive impact of WMC on EPS in South Korean firms. Equally, Adeyemi and Bello (2024), who also found positive significant effects in Nigerian firms. Carter and Green (2025) found a weaker effect, likely reflecting the mixed global investor response to sustainability disclosures. The results confirm that waste management spending is not just a compliance cost but a value-creating strategy that enhances shareholder earnings in the Nigerian manufacturing sector.

Conclusion

The Generalized Method of Moments (GMM) regression analysis revealed that Waste Management Cost (WMC) has a positive and statistically significant effect on financial performance indicators. Specifically, WMC showed a significant positive influence on Return on Assets (ROA), with a coefficient of 0.1981 and a p-value of 0.0000. Similarly, a strong and significant positive relationship was observed between WMC and Return on Equity (ROE), reflected by a coefficient of 0.5386 and a p-value of 0.0000. Furthermore, the analysis demonstrated that WMC has a substantial and highly significant positive impact on Earnings per Share (EPS), with a coefficient of 25.0880 and a p-value of 0.0000. These results collectively suggest that increased investment in waste management contributes positively to firm performance. The study concludes that environmental cost measured by Waste Management Cost plays a critical role in enhancing financial performance among listed manufacturing firms in Nigeria.

Recommendations

Based on the findings of the study, the following recommendations are made;

- i. Firms should adopt asset-integrated environmental management systems. By embedding waste management into operational workflows and capital budgeting, firms can maximize asset utilization and increase long-term returns. Managers should also conduct regular assessments to measure the return on ecological investments.
- ii. Corporate executives and financial managers should prioritize transparent environmental investments like waste management in their annual reporting. This will not only enhance

equity performance but also signal strong governance to shareholders, potentially lowering the cost of equity capital.

- iii. To boost shareholder value and market appeal, firms should leverage environmental reporting as a strategic communication tool. Waste management investments should be highlighted in investor presentations and sustainability reports to attract socially responsible investors and improve stock performance.

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