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Green Accounting and Profitability of Listed Manufacturing Firms in Nigeria

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ABSTRACT

This study examined Green Accounting and Profitability of Listed Manufacturing Firms in Nigeria, and considered how green accounting employed by Nigerian firms would significantly impact investors' return in the long run. The study used ex-post facto research design that covered annual financial report from 2020 to 2024 as listed on Nigerian Exchange Group as at December 31, 2024, and data were analysed through descriptive statistics, regression and Correlation. The findings displayed that return on assets showed significant effect with co-efficient of −41.658 and P = 0.035; returns on equity displayed positive but insignificant with co-efficient of 29.182 and P = 0.475, and net profit margin showed co-efficient of 265.778 and P = 0.001 at 1% level. The study concluded that green accounting was a significant approach that could be used to get more returns on asset utilisation and operational effectiveness. It was recommended that environmental costs should be well managed, adhering to regulatory framework and given tax incentive to firms that involved in sustainability.

Keywords: Accountability, Surrounding, Revenue and Disclosure
JEL Classification: C10

1. INTRODUCTION

Green accounting is a process of recording expenditure incurred on environmental sustainability from the operation of firms within surroundings with a multiplier effect of increasing production, revenue and profit; it also ensures adequate reduction in clean-up and litigation costs (Allen, 1994). Profitability is the return realized from business operation which resulted to excess of revenue over expenditure; this serves an encouragement to the investors to release their resources for sound business operation (Helfert, 1991). It can be used to determine gross profit margin, net profit margin, return on equity, dividend per share and return on assets. Mugova et al. (2025) examined environmental investment, social and governance (ESG) on profitability of listed firms in South Africa, where social responsibility in the host environment produced multiplier effect on firms' profitability and improvement of investors' benefit.

Pillay et al. (2025) discussed on a need for environmental sustainability to run firms' operation in South Africa with a determination of ensuring cost reduction, increase in reputation and efficiency, and increasing financial sustainability of firms. Chawarura et al. (2025) provided details on low economic and development in South Africa with a move to remove challenges confronted by various firms, this prompted the study to examine Environmental, Social and Governance and firm performance of JSE-listed firms in South Africa.

Matemane et al. (2024) discussed how environmental, social and governance affected financial performance of firms in South Africa where emission of green gasses affected activities; this urgently required proper attention on how issues could be managed. De Sousa Paiva et al. (2024) emphasized on a need for sustainability and corporate social responsibility in Africa with aim of ensuring environmental awareness in order to guide against degradation

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and depletion of environment. Mgilane et al. (2023) provided how environmental reporting practices of manufacturing firms in South Africa reduced degradation and enhanced out-look of various firms' surrounding.

1.1. Statements of the Problem

As Mugova et al. (2025) examined environmental investment, social and governance (ESG) on profitability of listed firms in South Africa, where social responsibility in the host environment produced multiplier effect on firms' profitability and improvement of investors' benefit; this prompted current study to consider how green accounting employed by Nigerian firms could significantly impact investors' profitability in the long run. As a Pillay et al. (2025) discussed on a need for environmental sustainability to run firms' operation in South Africa with a determination of ensuring cost reduction, increase in reputation and efficiency, and increasing financial sustainability of firms. This called for proper introduction of environmental sustainability in other parts of Africa particularly Nigeria.

Matemane et al. (2024) discussed how environmental, social and governance affected financial performance of firms in South Africa where emission of green gasses affected activities; this urgently required proper attention on how issues could be managed. This called for firms' attention in Nigeria on how these methods could be employed to manage the menace of green emission in order to improve profitability. Mgilane et al. (2023) provided how environmental reporting practices of manufacturing firms in South Africa reduced degradation and enhanced out-look of various firms' surrounding. This encouraged more studies and evaluation to be conducted in Nigeria in order to ensure total compliance of green accounting sustainability.

The study serves a great benefit to environmental analysts, government agencies, Nigerian exchange groups, and the specific objectives of the study are listed as follows:

1. To examine effect of green accounting disclosures and return on assets (ROA) of listed manufacturing firms in Nigeria
2. To assess impact of green accounting reporting and return on equity (ROE) of listed manufacturing firms in Nigeria
3. To evaluate effect of green accounting disclosure and net profit margin (NPM) of listed manufacturing firms in Nigeria.

1.2. Research Questions

1. What is the effect of green accounting disclosure on assets' return (ROA) of listed manufacturing firms in Nigeria?
2. How green accounting reporting affects return on equity (ROE) of listed manufacturing firms in Nigeria?
3. What is the impact of green accounting disclosure on net profit margin (NPM) of listed manufacturing firms in Nigeria?

1.3. Research Hypotheses

- H_1: Green accounting has a significant effect on assets' return (ROA) of listed manufacturing firms in Nigeria
- H_2: Green accounting reporting significantly affects return on equity (ROE) of listed manufacturing firms in Nigeria
- H_3: Green accounting disclosure has a significant effect on net profit margin (NPM) of listed manufacturing firms in Nigeria.

2. LITERATURE REVIEW

2.1. Conceptual Review

2.1.1. Green accounting

This is the process of recording expenditure incurred on environmental sustainability in the surrounding of firms' operation with a multiplier effect of increasing production, revenue and profit; it also ensures adequate reduction in clean-up and litigation costs (Allen, 1994).

2.1.2. Profitability

This is the return realized from business operation and produced excess of revenue over expenditure; this serves an encouragement to the investors to release their resources for sound business operation (Helfert, 1991). It can be used to determine gross profit margin, net profit margin, return on equity, dividend per share and return on assets.

2.2. Theoretical Review

2.2.1. Legitimacy theory

This provides relationship between firms and immediate environment that ensure cordial relationship with meaningful and sustainable development (Deegan et al., 2002). It also provides orderliness in business operation with people in order to ensure peaceful co-existence. Aramburu and Pescador (2019) stated that legitimacy encourages and promotes profitability without hindering others stakeholders' interest, and serves a best way of managing business operation.

2.2.2. Stakeholder theory

Amorelli and García-Sánchez (2021) stated that a proper method and control must be put in place to manage a business with the purpose of achieving firm objective such as interest payment, profit realization, social responsibility and environmental protection; this is the best ways of improving profitability of firms as all parties will be taken into consideration.

2.2.3. Resource based theory

Wernerfelt (1984) discussed that resources are major factors determined financial performance of business operation, and its multiplier effect enables firms to carry out environmental sustainability with aim of ensuring peaceful co-existence. This symbolizes method of increasing firm's reputation, risk management and innovation at different levels of operation. It was further stated that interest of various investors would be sustained when there is an increase in productivity (Wijayanto et al., 2019).

2.3. Empirical Review

Mugova et al. (2025) examined relationship between environmental, social and government (ESG) on profitability of listed firms in South Africa, and purposely determined to evaluate improvement on shareholders' investment and equity. The study collected data from seventy-four Johannesburg Stock and analysed through panel regression; the findings displayed mixed results where financial showed negative result while non-financial institution displayed positive signal.

Pillay et al. (2025) examine environmental management accounting practices on financial performance of wooden furniture firm in South Africa with a purpose of reducing cost, improvement on reputation, efficiency of operation, and increasing financial sustainability of firm in the long run. The data were collected from financial sustainability reports with utilization of qualitative techniques to analyze data collected through ordinary least square. The findings displayed positive relationship among variables, and recommended that policy makers should promote sustainability among firms.

Chawarura et al. (2025) examined ESG and firm performance of JSE-listed firms in South Africa as a result of economic and developmental challenges in the country which encouraged introduction of sustainability disclosure guidelines. Forty firms (40) were captured within 2002-2022, and applied System Generalized Method of Moments analysis; it was discovered significant relationship among firms.

Matemane et al. (2024) examined effect of environmental, social and governance on financial performance of firms in South Africa, and purposely conducted to determine level of gas emission in the country. The data were collected from Johannesburg Stock Exchange (JSE) listed companies within 2012-2022, and results displayed insignificant relationship between variables.

De Sousa Paiva et al. (2024) examined Corporate Social Responsibility information, environmental awareness and diffusion in Small Medium Enterprises of Angola with utilization of managers' perceptions of hundred and thirty-one (131) collections. The findings disclosed that improvement on sustainability and environment awareness increased Small Medium Enterprises' diffusion.

Mgilane et al. (2023) investigated environmental reporting practices of listed manufacturing firms in South Africa with utilization of content analysis to extract annual report of listed manufacturing firms and data were anlysed through descriptive and ranked text. The findings disclosed that there were increasing in environmental reporting and profitability with reduction in environmental degradation of Johannesburg Stock Exchange (JSE) listed manufacturing firms.

3. RESEARCH METHODS

The study used ex-post facto research design that covered annual financial report from 2020 to 2024 as listed on Nigerian Exchange Group as at December 31, 2024. The population comprised manufacturing sectors and utilized a purposive sampling technique to collect data from Lafarge Africa Plc, Nigerian Breweries Plc, Dangote Cement Plc, Nestlé Nigeria Plc, and Unilever Nigeria Plc (Table 1 and Appendix I).

The statistical software package was used to analyse data collected, and descriptive statistics provided details on mean, standard deviation, minimum, and maximum values while correlation analysis was used to see if the independent variables were multi-collinear.

3.1. Model Specification

To examine relationship between the independent variables and firm profitability, a multiple regression model was specified and generic model that was adopted is specified as follows:

$$PROF_{it} = \beta_0 + \beta_1 ECA_{it} + \beta_2 GRP_{it} + \beta_3 SI_{it} + \varepsilon_{it}$$

$$ROA_{it} = \beta_0 + \beta_1 ECA_{it} + \beta_2 GRP_{it} + \beta_3 SI_{it} + \varepsilon_{it} \quad \text{(Model 1)}$$

$$ROE_{it} = \beta_0 + \beta_1 ECA_{it} + \beta_2 GRP_{it} + \beta_3 SI_{it} + \varepsilon_{it} \quad \text{(Model 2)}$$

$$NPM_{it} = \beta_0 + \beta_1 ECA_{it} + \beta_2 GRP_{it} + \beta_3 SI_{it} + \varepsilon_{it} \quad \text{(Model 3)}$$

Where:

- $PROF_{it}$ = profitability (ROA, ROE, or NPM) of firm "i" in year "t"
- β_0 = constant or intercept of the model
- β_1 - β_3 = coefficients of the independent variables
- ECA_{it} = Environmental Cost Accounting for firm "i" in year "t"
- GRP_{it} = Green Reporting Practices score for firm "i" in year "t"
- SI_{it} = Sustainability Investment for firm "i" in year "t"
- ε_{it} = Error term.

4. DATA ANALYSIS AND DISCUSSION OF FINDINGS

The Data obtained from the study was presented in form of descriptive statistics to reveal important preliminary insights into characteristics of dataset for the study variables and statistics are presented in Table 2.

The result in Table 2 revealed that across the 5 firms observed for a period of 5 years, the mean value for returns on assets is 5.177, indicating that on average, the returns of the firms on the use of their assets is around 5% with standard deviation of 10.478 which indicates a high variance of returns on assets across the firms considering distance of the standard deviation value to the mean, coupled with a co-efficient of variation that above 200%. Also showing wide range of minimum value of −19.170 to maximum value of 16.560 which suggested considerable variability in returns on assets across firms and total sum of the ROA showed value of 129.420. The descriptive statistics also showed that data variable was normally distributed with positively skewed and normally peaked.

Likewise, it was shown on Table 2 that across firm-year observations, the mean value for returns on equity was 33.884%, indicating that on average, returns on equity was below 50% for the sampled firms. The standard deviation of 72.987 indicated a high variance of returns on equity across firms, considering distance of standard deviation value to the mean coupled with a co-efficient of variation over 200%. Also showing wide range of minimum value of −162.300 and maximum value of 187.270 which suggested considerable variability in returns on equity across firms, and the total sum of returns on equity was 847.090.

Table 1: Measurement of variables

Variables	Classification	Measurement	Source
Independent	Green Accounting Disclosure	This captured Environmental Cost Accounting and Sustainability Investment	(Allen, 1994)
Dependent	Return on Assets	This is total income realized after deducting expenses divided by total assets	Siyila and Solanke (2026)
	Return on Equity	This is total income after deducting expenses divided by total shares purchased by shareholders	(Helfert, 1991)
	Net Profit Margin	This is total income after all necessary expenses have been deducted.	Solanke et al. (2025)

Table 2: Descriptive statistics of study variables

Statistics	Return on assets	Returns on equity	Net profit margin	Environmental cost	Green reporting	Sustainability investment
Mean	5.177	33.884	7.373	1,365,431	0.84	7,087,053
Standard deviation	10.478	72.987	12.963	1,613,270	0.69	10,500,000
C.V	2.024	2.154	1.758	1.18	0.82	1.49
Min	−19.170	−162.300	−17.640	131,808	0.26	1,000,000
Max	16.560	187.270	26.700	7,162,000	2.82	40,000,000
Sum	129.420	847.090	184.320	34,100,000	21.02	177,000,000
Skewness	−0.978	0.206	−0.555	2.23	1.67	1.99
Kurtosis	2.825	4.417	2.501	7.99	5.05	5.68

Source: Researcher's Computation (2026)

The descriptive statistics also showed that data for the variable was abnormally distributed with positively skewed and abnormally peaked. On the other hand, it was shown on Table 2 that mean value for net profit margin was 7.373% with standard deviation of 12.963 which indicated a high variance of net profit margin across firms, considering distance of standard deviation value to mean, coupled with a coefficient of variation of over 100%. Also showing wide range of minimum value of −17.640 and maximum value of 26.700, and total sum of net profit margin showed value of 184.320. The descriptive statistics also showed that data for the variable was normally distributed with negatively skewed and normally peaked.

Furthermore on Table 2, it was revealed that mean value for environmental cost was 1,365,431, with standard deviation of 1,613,270, and indicated a moderate variance of environmental cost across firms, considering distance of standard deviation value to mean coupled with a coefficient of variation of over 100%. Also showing wide range of minimum value of 131,808 to maximum value of 7,162,000 and total sum of the environmental cost has value of 34,100,000. The descriptive statistics also showed that data for the variable was abnormally distributed with positively skewed and abnormally peaked.

Also on Table 2, it was revealed that mean value for green reporting was 0.84% with standard deviation of 0.69, and indicated a high variance across firms considering distance of standard deviation value to mean coupled with a co-efficient of variation of 82%. Also showing wide range of minimum value of 0.26 to maximum value of 2.82 which suggested considerable variability in green reporting across firms and total sum of green reporting was valued 21.02. The descriptive statistics also showed that data for the variable was normally distributed with positively skewed and abnormally peaked.

Lastly on the Table 2, it was shown that mean value for sustainability investment was 7,087,053, with standard deviation of 10,500,000, and indicated a high variance of sustainability investment across firms with distance of standard deviation value to mean coupled with a co-efficient of variation that was over 100%. Also, it showed a wide range of minimum value of 1,000,000 with maximum value of 40,000,000, and total sum of sustainability investment of 177,000,000. The descriptive statistics also showed that data for the variable was abnormally distributed with positively skewed and abnormally peaked.

4.1. Test of Variables

4.1.1. Correlation analysis

This is a bivariate analysis that computes association between two variables and measures the strength of linear relationship, and the degree of change in one variable as a result of other's change. The correlation analysis equally helped in detecting likelihood multi-collinearity among variables where presence of multi-collinearity could have a devastating effect on standard error of the variables. The correlation results showed relationship between green accounting and profitability of listed firms were presented in Table 3.

From Table 3, the study finds that there is a weak positive association between return on assets and environmental cost as relationship is a direct relationship and insignificant, this is evidenced by coefficient value of 0.1528 and P = 0.466. Likewise relationship between green reporting and returns on assets is positive but insignificant with co-efficient value of 0.2371 and P = 0.2537. However, it is observed that returns on assets and sustainability investment has direct and significant relationship, this shows that one unit of increase in sustainability investment will lead to 43.09% increase in return on assets which is evidenced by co-efficient value of 0.4309 and P = 0.0315.

The returns on equity relationship and environmental cost direct relationship are significant, and this is evidenced by co-efficient value of 0.4735 and P = 0.017. Likewise, the relationship between

Table 3: Correlation green accounting and firm profitability

Study variables	Return on assets	Returns on equity	Net profit margin	Environmental cost	Green reporting	Sustainability investment
Return on assets	−1.000					
Returns onEquity	0.1912 (0.3600)	−1.000				
NetProfitMargin	0.9593* (0.000)	0.1596 (0.446)	−1.000			
Environmental cost	0.1528 (0.466)	0.4735* (0.017)	0.0909 (0.666)	−1.000		
Green reporting	0.2371 (0.2537)	−0.092 (0.6637)	0.171 (0.4128)	−0.127 (0.546)	−1.000	
Sustainability investment	0.4309* (0.0315)	0.0033 (0.988)	0.5421* (0.0051)	−0.276 (0.1813)	0.1267 (0.546)	−1.000

Researcher's Computation (2026)

green reporting and returns on equity is inverse and insignificant with co-efficient value of −0.092 and P = 0.6637. However, it is observed that returns on equity and sustainability investment have direct and insignificant relationship, and this is evidenced by co-efficient value of 0.0033 and P = 0.0988. The net profit margin and environmental cost is a direct but insignificant, and this is evidenced by co-efficient value of 0.0909 and P = 0.666. Likewise, relationship between green reporting and net profit margin is positive but insignificant with co-efficient value of 0.171 and P = 0.4128. Lastly, it is observed that net profit margin and sustainability investment has direct and significant relationship, this shows one unit of increase in sustainability investment will lead to 54.12% increase in net profit margin which is evidenced with co-efficient value of 0.5421 and P = 0.0051. It is further observed that relationship between explanatory variables is normal and causes multi-collinearity between the variables.

4.2. Test for Data Normality

The data normality test is a crucial preliminary diagnostic in estimating regression as it helps to determine whether the distribution of variables aligns with assumptions of parametric statistical methods. In this study, the Shapiro-Wilk test is employed to assess normality of the study variables. The null hypothesis of the Shapiro-Wilk test posits that data follow a normal distribution and a significant P-value (typically <0.05) leads to the rejection of this null hypothesis, and this indicated that the variable deviates from normality. The results of the test determine choice of appropriate statistical techniques, and ensured that subsequent analyses yield valid and reliable inferences; the output is shown in Table 4.

In the Table 4, result showed that residual of the models is not normally distributed since the probabilities of the z-statistics are statistically significant at the 1% level. The outlier is strong and stands for the abnormality in residual of errors, and this will be corrected by allowing a robust standard error for all of the models across the objectives.

4.3. Test for Multicollinearity

The test is an essential diagnostic procedure in regression analysis that is used to assess extent independent variables are correlated with one another. When multicollinearity is present, it can distort estimated co-efficients, inflate standard errors, and undermine statistical significance of predictors that will lead to unreliable and unstable model results.

To detect multi-collinearity, the Variance Inflation Factor (VIF) is commonly employed and value exceeding 10 is typically regarded as a sign of serious multi-collinearity, although lower thresholds may also warrant attention depending on the context. In this study, the VIF test is conducted to ensure that the explanatory variables in the regression models are sufficiently independent, thereby validating robustness and interpretability of the estimated relationships.

Table 4: Shapiro-Wilk W test for normal data

Variable	W	V	Z	Prob>z
Residual (Model 1) Returns on asset	0.90265	2.705	2.034	0.02097
Residual (Model 2) Returns on equity	0.86173	3.842	2.752	0.00297
(Residual (Model 3) Net profit margin	0.90143	2.739	2.060	0.01971

Source: Researcher's Computation (2026)

Based on the evidence presented in Table 5, it can be concluded that there is no multi-collinearity problem for the green accounting measurement which are environmental cost, green reporting and sustainability investment not exhibit multi-collinearity where none of the VIF is beyond threshold of 10 and the tolerance values for the variables are >0.10 (rule of thumb). Therefore, the study can rely on regression co-efficient to predict impact of independent variables on dependent variables.

4.4. Post-Estimation Tests

The Error test for model specification is conducted and used Ramsey RESET test. The results showed probability above 5% for all models, and this indicated that the model has no omitted variable bias and mis-specification. The heteroscedasticity test was conducted to check the validity of homoscedasticity assumption that variance in the residuals are constant. Heteroscedasticitytest was conducted using Breusch-Pagan/Cook-Weisberg test and the result was presented in Table 6. The data for the study revealed that there was absence of heteroscedasticity given the probability value above 5% for all models which was higher than 0.05.

Likewise, variables for the study were also tested for auto-correlation by using Wooldridge test in the panel data. The Autocorrelation depicts how closely variable values are correlated across time. The result is presented in Table 6 and it shows probability of 0.0215 for model 1 which is significant and indicated that there is a problem of auto-correlation, hence the null hypothesis showed that there was no first-order correlation and rejected. However, for model 2 and 3, it showed P > 0.05 which indicated that there was no problem of auto-correlation hence the null hypothesis showed that there was no first-order correlation

Table 5: Variance inflation factor (VIF)

Variables	VIF	1/VIF
Environmental cost	1.09	0.9151
Green reporting	1.03	0.9748
Sustainability investment	1.09	0.9151
Mean VIF	1.07	

Source: Researcher's Computation (2026)

Table 6: Summary of post estimation test results

Ramsey RESET test		
Null Hypothesis H_0: model has no omitted variables (P>0.05)	**F-Statistics**	**Probability**
Model 1 (Returns on assets)	0.75	0.5391
Model 2 (Returns on equity)	0.03	0.9940
Model 3 (Net Profit margin)	1.08	0.3833
Breusch-Pagan/Cook-Weisberg test for Heteroscedasticity		
Null hypothesis constant variance across the variable's residuals (P>0.05)	**Chi-square statistics**	**(P-value)**
Model 1 (Returns on assets)	1.76	0.1841
Model 2 (Returns on equity)	0.43	0.5139
Model 3 (Net profit margin)	2.38	0.1232
Wooldridge test for autocorrelation		
Null Hypothesis - No first-order autocorrelation (P>0.05)	**F-statistics**	**(P-value)**
Model 1 (Returns on assets)	13.430	0.0215
Model 2 (Returns on equity)	4.241	0.1085
Model 3 (Net profit margin)	6.444	0.0641
Pesaran's test of cross-sectional independence		
There is no cross-sectional dependence (P>0.05)	**F-statistics**	**(P-value)**
Model 1 (Returns on Assets)	0.493	0.6217
Model 2 (Returns on Equity)	0.010	0.8261
Model 3 (Net Profit Margin)	1.172	0.2413
Hausman specification test		
Null hypothesis (Difference in coefficients not systematic (P>0.05)	**Statistics**	**P-value**
Model 1 (Returns on assets)	13.96	0.0030
Model 2 (Returns on equity)	0.08	0.9936
Model 3 (Net profit margin)	27.39	0.0000
Breusch and Pagan Lagrangian Multiplier Test		
Null hypothesis (Difference in coefficients not systematic (P<0.05)	**Chi-square (01)**	**Prob> Chi-square**
Model 1 (Returns on assets)	-	-
Model 2 (Returns on equity)	23.67	0.0000
Model 3 (Net profit margin)	-	-

Source: Researcher's computation (2026)

accepted for the models. However, the observed estimation problem of serial autocorrelation was to be corrected by using panels corrected standard errors (PSCE).

Furthermore, the cross-sectional dependence test was carried out and the result as presented in Table 6 indicated that null hypothesis which implied there was cross-sectional dependence and rejected for the models as the statistics showed 2.187 with probability value indicated 0.6217 for model 1; f-stat of 0.010 and P = 0.8261; for model 2 and f-stat of 1.172 and P = 0.2413. Hence, there is sufficient evidence to conclude that green accounting under fixed-effect condition does not exhibits cross-sectional dependence.

The Hausman test was also conducted to specify the appropriate model between fixed-effect model and random effect model. The result favoured fixed-effect model 1 and 3 as the probability showed 0.0030 and 0.0000, and this showed that difference in coefficient was systematic. In the model 2, result showed probability value of 0.9936 which was above 5% and this implied that random-effect model was preferred for interpretation as the difference in co-efficient was not systematic. It was further tested to know the appropriate model between random effect and polled OLS regression examined and used Breusch and Pagan Lagrangian multiplier test for random effects, and the result showed that random effect was most appropriate as the probability was significant by showing P = 0.0000 and supported the null hypothesis.

5. RESULTS AND DISCUSSION OF FINDINGS

The regressed result showed how green accounting affected profitability as measured in returns on assets, return on equity and net profit margin after considered the basis for a Best Linear Un-Bias Estimate (BLUE) as shown in Table 6. The first model indicated the effect of green accounting on return on assets while the Hausman specification test specified interpretation of fixed-effect model.

However, due to the observed statistical problem of auto-correlation, problem with the model was adjusted and used fixed-effect regression with auto regressive disturbances. Furthermore, the second model indicated the effect of green accounting on return on equity and Hausman specification test specified interpretation of random-effect model, and the result was presented in Table 6. The last model which specified effect of green accounting on net profit margin, and Hausman specification test specified interpretation of fixed-effect model as was presented in Table 6.

The result showed that the model specified linear relationship between returns on assets and green accounting, and linearity of the variables was different from zero. This indicated f-stat of 0.4683 and probability value of 0.0488, and this showed that model was significant and fit. Furthermore, from Table 7, the result obtained showed R-square of 0.4683, the variation showed that green accounting caused a variation of 46.83% in the returns on assets of sampled firms in Nigeria.

The individual results for the variables as shown in Table 7 revealed that environmental cost displayed co-efficient value of 2.4673 and probability value of 0.264 with positive and insignificant effect. This suggested that environmental expenditures may contribute positively to asset returns, and effect was not strong enough to significantly influence profitability within the study period. Green reporting has co-efficient value of 16.788 and probability value of 0.035, and this showed that green reporting significantly affect firm profitability in terms of returns on assets at 5% level of significance. This enhances corporate reputation, stakeholder confidence, and operational efficiency, thereby improving firm profitability. It was

Table 7: Regression results

Variables	Returns on assets	Returns on equity	Net profit margin
	Fixed-effect (AR)	Random-effect	Fixed-effect
Environmental cost	2.4637 (0.264)	22.295** (0.016)	−7.690 (0.416)
Green reporting	16.788** (0.035)	−4.645 (0.831)	22.6150** (0.002)
Sustainability investment	−41.658** (0.035)	−19.515 ** (0.043)	−35.577** (0.014)
Intercept	265.166** (0.012)	29.182 (0.475)	265.778** (0.001)
Observations	25	25	25
R^2	0.4683	0.2648	0.0987
F (3,12)	3.52	Wald Chi-square-10.51	F (3,17)-8.19
Prob>F	0.0488	Prob> Chi-square=0.0147	Prob >F = 0.0014

P-values are in parentheses. ***P<0.01, **P<0.05, Source: Researcher's Computation (2026)

also observed on the Table 7 that sustainability investment showed negative and significant effect on returns on assets, and this was evidence by co-efficient of −41.658 and P = 0.035. The result indicated that sustainability investments might impose short-term financial burdens that reduce returns on assets.

Furthermore, on Table 7, the result showed that linear relationship between returns on equity and green accounting displayed linearity of the variables and was different from zero Wald Chi-square of 10.51 and probability value of 0.0147, and this showed that the model was significant and fit. Furthermore, Table 7 showed R-square of 0.2648 variations and green accounting caused a variation of 26.48% in the returns on equity of sampled firms in Nigeria. The results for the variables as shown in Table 7 revealed that environmental cost have coefficient value of 22.295 and probability value of 0.016 with positive and significant effect of environmental cost on returns on equity.

The result showed that environmental cost might enhance shareholder value through improved regulatory compliance and enhanced corporate image. Green reporting showed co-efficient value of −4.645 and probability value of 0.831; this showed that green reporting could not significantly affect firm profitability in related to returns on equity at 5% level of significance. It was also observed on the Table 7 that sustainability investment showed negative and significant effect on returns on equity which was evidence by co-efficient of 29.182 and P = 0.475.

Likewise Table 7 revealed that the linear relationship between net profit margin and green accounting showed linearity of the variables was different from zero and indicated f-statistics of 8.19 and probability value of 0.0014 which was significant. From Table 7, the result obtained showed R-square of 0.0987 variations which showed that green accounting caused a variation of 9.87% in the net profit margin of sampled firms in Nigeria.

The individual results for the variables as shown in Table 7 revealed that environmental cost showed co-efficient value of −7.690 and probability value of 0.416 with negative and insignificant effect of environmental cost on net profit margin. Green reporting displayed co-efficient value of 22.6150 with probability value of 0.002, and showed significantly effect on profitability in terms of net profit margin at 5% level of significance. It is also observed on the Table 7 that sustainability investment displayed a negative and significant effect on net profit margin which was evidenced by co-efficient of 265.778 and P = 0.001.

5.1. Discussion of Findings

Based on the results, it was shown that green accounting displayed a favourable impact on profitability metrics. Hence, policymakers should boost green accounting standards and enforce measures that would encourage businesses to adopt them. Furthermore, sustainability investment has long-term environmental benefits and displays a short-term financial challenge because of how draining investment could be in the first few years before returns start flowing from it. Therefore, government can support businesses by making sustainability investments with incentives such as tax breaks, grants, or subsidies. More so, in order to strike a balance between sustainability goals and profitability, business managers should incorporate green accounting into strategic decision-making processes.

This result was consistent with the findings of Umaigba et al. (2025) who reported that green accounting disclosures significantly improved key profitability indicators such as Return on Assets (ROA), Return on Equity (ROE), and Net Profit Margin (NPM) among non-financial firms in Nigeria. Likewise, the finding showed that environmental cost displayed a positive but insignificant effect on ROA aligns with empirical evidence reported by Mugova et al. (2025) In the study on manufacturing firms in Nigeria, it was revealed that environmental protection expenditure displayed a positive and statistically insignificant impact on profitability, and this suggested that environmental spending might not immediately translate into higher financial returns. This also supported findings of Pillay et al. (2025) that examined environmental management accounting practices on the financial performance of wooden furniture manufacturing in South Africa, and the findings revealed a positive relationship between environmental management practices and financial performance.

6. CONCLUSION AND RECOMMENDATIONS

The research presented empirical evidence about the influence of green accounting on the profitability of Nigerian firms that was evaluated through returns on assets (ROA), returns on equity (ROE), and net profit margin (NPM). The findings indicated that investments in sustainability, green reporting, and environmental costs impacted profitability. This study then concluded that green accounting practice was significant as could be used to get more returns on asset utilisation and operational effectiveness.

Based on the conclusion, the study recommended that;

i. Environmental cost should be well managed and channeled towards more preventive measures to reduce financial burden and capable of generating returns for the firms in the long run

ii. Management should adhere to framework and standard provided for green reporting as this would increase legitimacy, stakeholders' loyalty and performance
iii. Government should provide tax incentives to firms that engage in sustainability investment in order to encourage them and lessen burden that might affect profitability.

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APPENDIX I

Company	Year	Revenue	Net profit	Total assets	Total equity	Return on assets (%)
Lafarge PLC	2020	230572922	30842138	507213975	359638502	6.08
Lafarge PLC	2021	293086183	51003549	395785109	378560677	12.88
Lafarge PLC	2022	373244938	53647456	432328643	416102005	12.41
Lafarge PLC	2023	405502712	51141070	681371572	435051866	7.51
Lafarge PLC	2024	696757959	100145281	990509585	504640662	10.11
Nestlé PLC	2020	287084087	39212025	246184996	29296984	15.92
Nestlé PLC	2021	351822329	40037277	310238504	21378209	12.9
Nestlé PLC	2022	446819260	48965488	415044031	30291224	11.8
Nestlé PLC	2023	547118754	−79473781	581774407	−78035156	−13.66
Nestlé PLC	2024	958814739	−164595022	858698352	−92289917	−19.17
Dangote Cement PLC	2020	1034196000	276068000	2022451000	890970000	13.65
Dangote Cement PLC	2021	1383600000	364400000	2200000000	950000000	16.56
Dangote Cement PLC	2022	1618000000	405000000	2500000000	1000000000	16.2
Dangote Cement PLC	2023	2208100000	455400000	3000000000	1200000000	15.18
Dangote Cement PLC	2024	3581000000	503200000	4000000000	2174000000	12.58
Nigerian Breweries PLC	2020	337006000	7529000	424683000	189756000	1.77
Nigerian Breweries PLC	2021	437285000	12670000	500966000	199804000	2.53
Nigerian Breweries PLC	2022	550638000	13185000	596974000	183516000	2.21
Nigerian Breweries PLC	2023	599509000	−105769000	797327000	65169000	−13.27
Nigerian Breweries PLC	2024	1074882000	−144338000	1138276000	463944000	−12.68
Unilever PLC	2020	61959678	−3965921	72352836	21757206	−5.48
Unilever PLC	2021	70166251	1782000	94349000	34906000	1.89
Unilever PLC	2022	88570826	4467084	125389892	67564716	3.56
Unilever PLC	2023	114364350	8439895	116302344	74509103	7.25
Unilever PLC	2024	149522596	15143154	141646696	85106080	10.69

Return on equity (%)	Net profit margin (%)	Environmental cost	Environmental cost allocation (%)
8.57	13.38	432656	0.19
13.47	17.4	439629	0.15
12.9	14.37	559000	0.15
11.76	12.61	338373	0.08
19.85	14.37	1513621	0.22
133.81	13.66	430626	0.15
187.27	11.38	527733	0.15
161.7	10.96	670229	0.15
101.81	−14.52	820678	0.15
178.33	−17.17	1438222	0.15
30.99	26.7	2068392	0.2
38.36	26.33	2767200	0.2
40.5	25.03	3236000	0.2
37.95	20.63	4416200	0.2
23.14	14.05	7162000	0.2
3.97	2.23	674012	0.2
6.34	2.9	874570	0.2
7.18	2.39	1101276	0.2
−162.3	−17.64	1199018	0.2
−31.11	−13.43	2149764	0.2
−18.23	−6.4	131808	0.21
5.1	2.54	150000	0.21
6.61	5.04	131808	0.15
11.33	7.38	733756	0.64
17.79	10.13	169215	0.11

Green capital expenditure	Sustainability index	GRI reporting score	GRI reporting description
1919243	0.38	0	No GRI reference
2000000	0.51	0	No GRI reference
2500000	0.58	60	Adhered to GRI principles
3000000	0.44	70	Prepared with reference to GRI
4000000	0.4	80	GRI-aligned sustainability reporting
1650209	0.67	50	Env policy and UNGC mention
1800000	0.58	60	Env management system and awards
2200000	0.53	70	SERAS award for Circular Economy
2500000	0.43	75	Continued UNGC and env focus
3000000	0.35	80	Awards for SDG/green projects and Circular Economy
13906870	0.69	60	GCCA and UNGC principles
22000000	1	65	Sustainability pillar focus
25000000	1	70	Integrated GRI reporting
30000000	1	75	CDP B rating and GCCA alignment
40000000	1	80	Full GRI and UNGC compliance
1200000	0.28	50	SDG alignment and wastewater focus
1500000	0.3	60	Brew a Better World initiatives
2000000	0.34	70	Renewable energy expansions
2500000	0.31	75	UN SDG and reforestation progress
3000000	0.26	80	Net-zero ambitions and 100% renewable agreements
1000000	1.38	70	GRI Core Option
1500000	1.59	72	GRI and UNGC alignment
2000000	1.6	75	NGX and SEC principles
3000000	2.58	78	IFRS S1/S2 and SASB
4000000	2.82	80	Full GRI and UNGC compliance