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Empirical Analysis of Sustainable Green Accounting Practices and Firm Performance of Listed Agro-Allied Firms in Nigeria

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Abstract

This study investigates the impact of sustainable green accounting practices specifically green pollution control cost, soil degradation control cost, and climate change control cost on the performance of listed agro-allied firms in Nigeria. The study is motivated by growing global emphasis on environmental sustainability and the implementation of the Sustainable Development Goals (SDGs), which have heightened awareness of environmental accountability in Sub-Saharan Africa and Nigeria. Unethical environmental practices such as soil degradation, excessive pollution, and poor climate management continue to undermine sustainability efforts due to weak regulatory frameworks and ineffective policy enforcement. The study population comprises five agro-allied firms listed on the Nigerian Exchange Group (NGX) as of December 31, 2023. A panel dataset spanning the period 2012–2023 was obtained from the firms' audited annual reports. The data were subjected to time series analysis, with descriptive statistics employed to summarize key variables and the Dynamic Ordinary Least Squares (DOLS) regression technique applied to examine the long-run relationship between sustainable green accounting practices and firm performance. Findings indicate that green pollution control has a positive and significant effect on firm performance. Soil degradation control and climate change control also exhibit positive and significant effects on firm performance, suggesting that proactive environmental management enhances operational efficiency and long-term profitability. The study concludes that sustainable green accounting practices are pivotal for both environmental protection and financial sustainability in the agro-allied sector. It recommends that firms should adopt technology-driven green strategies, integrate environmental cost accounting systems, and disclose their sustainability activities transparently in financial statements.

Keywords: Sustainable Green Accounting Practices, Firm Performance, Pollution Control, Soil Degradation, Climate Change, Agro-Allied Firms

1. Introduction

In the last few decades, environmental sustainability has become a dominant concern in global economic and corporate governance discourse. Increasing industrialization, population growth, and resource exploitation have placed immense pressure on the natural environment, leading to widespread pollution, soil degradation, and climate change. To address these challenges, the global business community has embraced green accounting, also referred to as environmental accounting, as a framework for incorporating environmental costs and benefits into traditional financial reporting (Şimsek & Ozturk, 2021; Nguyen, 2020). Green accounting provides an integrated approach to measuring, recording, and reporting the financial implications of environmental protection activities. It allows organizations to account for environmental costs such as waste

VOLUME 9, ISSUE 1 - 2026
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management, pollution abatement, and climate change mitigation hereby promoting transparency, accountability, and sustainability in corporate decision-making (Ekubiat, 2019). Green accounting captures the economic value of environmental stewardship by identifying, quantifying, and reporting costs associated with environmental degradation, resource depletion, and pollution. These include expenditures on pollution prevention technologies, soil restoration, waste treatment, and compliance with environmental regulations (Iliemena, 2020; Magara, Aming & Momanyi, 2020). When effectively applied, green accounting enhances firm performance by optimizing resource use, minimizing waste, and fostering innovation in production processes (Vandna, 2018; Gonzalez & Peña-Vinces, 2022).

In developing economies such as Nigeria, Ghana, and South Africa, poor environmental practices have been linked to declining firm performance and increased social costs (Mayndarto & Agustine, 2021; Damieibi, 2023; Kolawole et al., 2023). The Nigerian business environment, particularly the agro-allied sector, faces growing scrutiny due to environmental degradation arising from industrial waste, deforestation, and unsustainable farming methods. Agro-allied firms play a crucial role in Nigeria's food security and economic growth, yet their operations contribute significantly to pollution, soil degradation, and climate change (Amosun & Akintoye, 2021; Akpan & Nkanta, 2023). Despite the country's commitment to the Sustainable Development Goals (SDGs), the absence of a comprehensive legal framework for mandatory environmental disclosure allows firms considerable discretion in reporting environmental performance (Okafor, 2020). Environmental pressures in Sub-Saharan Africa and Nigeria including land and water pollution, soil degradation and rising emissions have intensified attention on corporate environmental responsibility and the need for robust measurement and reporting systems. Some scholars argue that these environmental problems are not only ecological but also economic, because they generate external costs such as cleanup, health impacts and reduced productivity of natural resources, which ultimately affect firms and communities (Iyginovia & Agbadua, 2024). Green accounting (or environmental accounting) has therefore emerged as a tool to internalize environmental costs, improve transparency and guide corporate and policy decisions by valuing natural-resource depletion, pollution-control expenditures and environmental liabilities alongside traditional financial measures (Degan, 2013)

Nigeria's regulatory environment for environmental protection and sustainability has evolved over the years, with frameworks such as the National Environmental Standards and Regulations Enforcement Agency (NESREA) Act and the Nigerian Environmental Impact Assessment (EIA) regulations providing legal backing for environmental compliance. Enforcement, however, remains inconsistent due to limited institutional capacity, inadequate monitoring, and occasional regulatory overlap between agencies, which undermines the effectiveness of policies. In the agro-allied sector, firms face unique challenges including fluctuating input costs, reliance on traditional farming methods, and vulnerability to climate shocks, which increase the cost of implementing green practices. While some companies voluntarily adopt sustainability measures, lack of standardized reporting and weak incentives reduces widespread compliance (Mayndarto & Agustine 2021). Corruption and bureaucratic delays further impede timely enforcement of environmental regulations. Moreover, penalties for non-compliance are often minimal relative to

VOLUME 9, ISSUE 1 - 2026
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operational revenues, limiting their deterrent effect. Despite growing awareness of climate change and soil degradation, many firms prioritize short-term profitability over long-term environmental investment. Access to green technologies and finance is still limited, constraining effective adoption of pollution control and climate mitigation measures. Overall, while Nigeria has a regulatory framework in place, practical enforcement gaps, industry-specific operational constraints, and financial limitations continue to challenge the effective integration of green accounting practices across the agro-allied sector.

Within Nigeria, agro-allied firms which include companies engaged in food processing, livestock production, animal feed manufacturing, and agricultural inputs play a pivotal role in ensuring food security and economic growth. However, these firms are also major contributors to environmental stress through effluents, chemical runoff, land clearing, and unsustainable farming practices (Amosun & Akintoye, 2021; Akpan & Nkanta, 2023). Such environmental pressures not only affect surrounding communities but can also increase operational costs, damage firm reputation, and reduce long-term profitability. Despite Nigeria's commitment to the Sustainable Development Goals (SDGs), regulatory oversight on environmental disclosure remains weak. This regulatory gap highlights the critical need for sustainable green accounting practices, particularly in the agro-allied sector, to guide firms in managing environmental risks while improving performance. Specifically, green pollution control, soil degradation control, and climate change mitigation have emerged as priority areas where corporate intervention can simultaneously protect the environment and enhance financial outcomes. Against this backdrop, this study investigates the impact of sustainable green accounting practices focusing on green pollution control, soil degradation control, and climate change control on the performance of listed agro-allied firms in Nigeria. By examining these relationships, the study aims to provide empirical evidence to inform policymakers, investors, and corporate managers on designing effective environmental strategies that balance ecological stewardship with profitability, thereby promoting sustainable development in Nigeria's agro-allied sector.

2. Literature Review

Concept of Green Accounting

Green accounting, also referred to as environmental or ecological accounting, integrates environmental inputs, outputs, and externalities into traditional financial and economic accounting systems to ensure that corporate and policy decisions reflect both environmental and monetary impacts (Makori & Jagongo, 2013). It provides a comprehensive view of an organization's total contribution to national welfare by linking environmental and economic accounting at both corporate and macro levels (Aifuwa, 2020). This accounting system emphasizes the inclusion of environmental costs such as pollution control, waste management, and resource depletion into firm reporting frameworks to improve sustainability decisions. In Nigeria, regulatory and institutional efforts such as the Nigerian Exchange Group (NGX) Sustainability Disclosure Guidelines have sought to formalize environmental, social, and governance (ESG) disclosures and integrate sustainable practices into corporate operations, thereby operationalizing the principles of green accounting within the country's financial ecosystem. Despite the conceptual acceptance of green

VOLUME 9, ISSUE 1 - 2026
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accounting, significant gaps exist between theory and practice. According to Aifuwa (2020), operational definition of this concept vary widely. Some studies measure green accounting through disclosure indices, others through environmental cost recognition, or the adoption of environmental management tools such as life-cycle costing and eco-efficiency accounting. This lack of definitional and methodological uniformity undermines comparability across studies. Moreover, the absence of a globally accepted GAAP-level standard for environmental accounting means that many firms still treat green accounting as a voluntary or corporate social responsibility activity rather than an enforceable reporting requirement, resulting in inconsistent data and potential green washing (Ajayi, Olubunmi & Adeyemi, 2024). Consequently, while the conceptual foundation of green accounting is strong, the literature reveals a pressing need for standardization, unified measurement frameworks, and stronger regulatory enforcement to translate theory into consistent global practice.

2.1Green Accounting Practices and Corporate Performance

Empirical evidence on green accounting practices and corporate performance between 2021 and 2025 reveals mixed but expanding findings. Several studies (Aifuwa, 2020; Bhat, 2014; Makori & Jagongo, 2013; Amahalu, 2023) show that integrating green accounting practices such as sustainability disclosure, green innovation, and environmental cost recognition positively influences long-term corporate performance. According to Damieibi (2023), green innovation and sustainability adoption indicates improved financial outcomes, enhanced investor confidence, and strengthened firm reputation, particularly when firms commit to structured environmental management systems and transparency frameworks like the NGX Sustainability Disclosure Guidelines. These studies often employ panel data and fixed-effects models to demonstrate how environmental initiatives translate into competitive advantage and improved market valuation over time. However, many Nigeria-focused and sectoral studies report that immediate implementation costs, such as pollution control and remediation expenditures, can negatively affect short-term profitability (ROA, ROE, EPS) because such expenses are recognized immediately without corresponding revenue gains.

Despite the growing evidence base, significant methodological and conceptual gaps persist. Scholars highlight issues of endogeneity and causality, where firms already performing well are more capable of adopting green initiatives. Moreover, horizon mismatches studies focusing on single-year data ignore the dynamic benefits that emerge over multiple years as environmental investments begin to yield efficiency gains (Cheng et al., 2025; Orisakwe-Lawrence, 2023). Measurement inconsistencies also limit comparability, as researchers alternately treat green accounting as disclosure indices, environmental expenditures, or innovation proxies. Consequently, findings differ depending on how green practices and performance are defined. In my view, while green accounting may initially strain profitability, it fosters long-term corporate resilience and investor trust when integrated strategically and reported transparently. Therefore, policymakers and firms should view green accounting not merely as a cost but as a sustainability-driven investment essential for enduring financial and environmental performance. Green accounting and sustainability practices are conditionally beneficial when firms adopt green strategies deliberately and when investments are paired with transparent, comparable disclosure, the evidence points to improved long-term firm value and environmental outcomes. However,

VOLUME 9, ISSUE 1 - 2026
https://doi.org/10.5281/zenodo.19024130

policymakers and standard-setters should be realistic many firms face real short-term profit trade-offs from remediation and pollution control, and without common accounting standards (or incentives to capitalise qualifying green investments), firms will continue to report heterogeneous costs that obscure comparability (Cheng et al., 2025)

Environmental Costs and Firm Performance

Recent studies have continued to explore how environmental costs particularly soil degradation control, pollution management, and climate change adaptation affect firm performance, revealing a mix of supportive and contradictory findings. Research on soil remediation and restoration costs positions these expenditures within environmental accounting frameworks, especially in the agricultural and extractive sectors, where degradation undermines productivity and long-term asset values. Aifuwa, (2020) agree that though soil restoration and monitoring entail high upfront costs, their social and economic returns including improved land productivity and reduced regulatory risks justify such interventions. However, firms rarely capitalise or systematically disclose soil protection costs in their financial statements, which limits comparability and recognition of these expenditures as strategic investments rather than sunk costs. The lack of uniform reporting standards means that many companies in Nigeria and other developing economies still treat environmental costs as voluntary or incidental, reflecting the broader standardisation problem (Makori & Jagongo, 2013). The failure to systematically record soil-related costs distorts the true economic picture of environmentally dependent firms and delays recognition of sustainability-driven value creation.

Evidence from climate change mitigation and adaptation costs is similarly ambivalent. Cheng et al., (2025) empirical study showed that firms investing in eco-friendly technologies and resilient infrastructure tend to experience improved environmental performance and long-term profitability, especially when supported by regulatory incentives. Yet, such benefits often materialise only in the medium to long term. In the short run, many firms experience increased cost burdens due to new technology acquisition, compliance reporting, and restructuring, resulting in temporary declines in return on equity or profitability ratios. Conversely, some studies reveal that companies adopting climate-conscious investments gain market reputation and investor trust, leading to positive valuation effects even when accounting profits decline. This divergence between market value and accounting performance underscores the importance of how environmental costs are treated in financial reporting. It is argued that climate-related expenditures should be reframed from costs to strategic capital investments that secure future competitiveness and risk resilience, especially in high-impact industries such as energy and manufacturing. With respect to pollution control and waste management costs, empirical studies of Edo, Itoje-, Akpokiniovo, Obasohan & Agbo, (2024) find that emissions reduction, effluent treatment, and recycling initiatives enhance investor perception and long-term firm value, while others record negative or insignificant short-term effects due to inefficiencies and the lack of scale economies. Scholars largely agree that environmental expenditures are real and value-relevant, yet differ on their temporal and sectoral impacts Adipudi, Kim & Biermann, (2025).

LASUJMS
JOURNAL OF MANAGEMENT SCIENCES

VOLUME 9, ISSUE 1 - 2026
https://doi.org/10.5281/zenodo.19024130

Pollution of the environment is a global pressing issue, posing significant threat in the environment, human, health and the economy inclusive. Environmental cost of pollution is staggering and the environmental impact of pollution is huge. Green pollution control encompasses all strategies that is used by an entity to control pollution related environmental hazards like water pollution, air pollution among others which are colossus to the existence of the green environment. Environmental cost control of waste water treatment technology, water conservation strategies, green infrastructure and ecofriendly technology are necessary for sustainable environment. Liu (2017) defines green pollution control as the act of restricting or eliminating the discharge of harmful substances into the environment. Additionally, the elimination of hazardous substances is also regarded as a form of pollutant control. However, it is important to note that pollutant control specifically addresses waste and emissions resulting from human activities, rather than those from natural sources. Strategies for combating environmental pollution often involve planning the environment, managing waste, and designing transportation systems in a manner that minimizes pollution. These practices can have a positive impact on the financial performance of any company (Rizal &Yatminiwati, 2020). Green pollution control strategies are a cornerstone of sustainability practice, therefore, the risk management structure is the structure created to manage strategic and business risks, and serves as culture, structure and processes with singular aim to take advantages of possible opportunities and avoidance of all unwanted risks (Hichri, 2022).Pollution control management is a topic related to firm sustainability practices. It therefore argued that it is the responsibility of firms to keep strategic risk management within the firm's appetite and control operational risk for optimum firm performance (Saygili, et al., 2022).

1.6 Research Gaps

Despite increasing global attention on environmental sustainability and the adoption of green accounting frameworks, several conceptual, empirical, contextual, and temporal gaps persist in existing literature, particularly within the Nigerian agro-allied sector. Most prior studies have examined environmental accounting or sustainability disclosure in broad terms without disaggregating the specific dimensions of sustainable green accounting practices, often treating green accounting as a single construct and thereby overlooking the distinct contributions of green pollution control, soil degradation control, and climate change control to firm performance. Empirical findings also remain mixed and inconclusive, with some studies (Orisakwe-Lawrence, 2023; Ajayi, Olubunmi & Adeyemi, 2024) reporting positive effects of environmental disclosure on firm value, while Biggi, Mina & Tamagni (2023) reveal negative or insignificant effects depending on sectoral and temporal contexts. Furthermore, few studies have employed robust dynamic panel estimation techniques such as Dynamic Ordinary Least Squares (DOLS) to examine long-run relationships between green accounting indicators and firm performance. Most existing works focus on developed economies or cross-sectoral analyses in developing countries, neglecting Nigeria's agro-allied industry, a highly environmentally sensitive sector where pollution, soil degradation, and resource depletion are predominant. Also, the absence of a standardized legal and institutional framework for environmental reporting in Nigeria has led to

VOLUME 9, ISSUE 1 - 2026
https://doi.org/10.5281/zenodo.19024130

inconsistent and discretionary disclosures, limiting the reliability of data available for stakeholders and policymakers (Okafor, 2020). Limited studies have explored long-term trends in sustainable green accounting practices. By utilizing panel data spanning twelve years (2012–2023), the present study seeks to address these conceptual, empirical, contextual, institutional, and temporal gaps, providing fresh insights into how sustainable green accounting practices affect the performance of listed agro-allied firms in Nigeria. The key gap lies in developing harmonised and causally robust frameworks to quantify environmental costs, enabling fair comparisons across industries and time horizons.

Stakeholder's Theory

Stakeholder theory provides the theoretical logic that links environmental accounting practices (EAP) to firm financial outcomes captured by EPS in the Adegbie et al. (2021) model. From a stakeholder perspective, firms operate within a web of relationships investors, regulators, suppliers, customers, local communities and employees each with distinct interests and varying power to affect firm value. The stakeholder theory was propounded by Freeman (1984). Environmental accounting practices are a managerial response to stakeholder demands for transparency, risk mitigation and responsible resource use: by identifying, measuring and disclosing environmental costs (pollution control, soil restoration, climate adaptation), firms signal commitment to stakeholders, reduce information asymmetry, and lower regulatory and reputational risks. These stakeholder-driven channels translate into economic effects that the model captures through credible EAP can increase investor confidence and access to cheaper capital, protect revenues through improved license-to-operate and market acceptance, and yield operational efficiencies over time all of which should, ceteris paribus, raise EPS.

Firm size in the model is likewise interpretable through stakeholder salience and capacity arguments embedded in stakeholder theory. Larger firms are typically more visible to a wider, more powerful set of stakeholders (regulators, institutional investors, NGOs) and therefore face stronger pressure to adopt formal EAP. They also possess greater financial and managerial resources to invest in environmental controls and to capitalise eligible expenditures, which can change how environmental spending flows into EPS. Methodologically, stakeholder theory thus motivates including firm size as a control and testing interaction terms and dynamic specifications so the model can distinguish stakeholder-mediated pathways (reputation, access to capital, regulatory compliance) through which environmental accounting affects earnings per share.

Empirical Review

Empirical studies on green accounting and firm performance present mixed findings across countries and sectors. Makori and Jagongo (2013) examined selected firms listed in India and found a significant negative relationship between environmental accounting and Return on Capital Employed (ROCE) and Earnings per Share (EPS), while observing a significant positive relationship with Net Profit Margin and Dividend per Share. Similarly, Jagongo (2013) reported negative correlations between environmental accounting and ROCE and EPS but positive correlations with net profit margin and dividends. In Nigeria, Akpan and Simeon (2021) investigated sustainability disclosures and cash flow return on investment of oil and gas companies

VOLUME 9, ISSUE 1 - 2026
https://doi.org/10.5281/zenodo.19024130

and found that social sustainability disclosure had a positive significant effect, whereas health and safety and environmental disclosures showed an insignificant effect. Lusiana et al. (2021) analyzed over thirty studies on green accounting and corporate social responsibility disclosures and concluded that green accounting significantly affects financial performance and firm value by increasing profits and decreasing insurance and capital costs, thereby potentially reducing total production costs.

Contrasting these positive findings, Egbunike and Okoro (2018) found no significant relationship between green accounting expenditures (community involvement and environmental protection) and profitability measures such as return on equity and Tobin's Q among Nigerian non-consumer goods firms. Omesi and Berembo (2020) similarly reported no significant relationship between social accounting and performance of oil and gas companies. In the Philippines, Carandang and Ferrer (2020) observed that green accounting disclosures had no significant effect on profitability or firm value, although environmental cost reporting showed significant impact on return on equity when moderated by firm size, board size, and location. These variations suggest that the effect of green accounting on performance is context-dependent, influenced by regulatory environments, industry characteristics, and measurement methods. Several studies further highlight contrasting evidence across countries. Iliemena (2020) found environmental accounting practices positively affected turnover and return on capital employed, although the impact on net profit was positive but insignificant. Susanto and Meiryani (2019) in Indonesia reported that environmental accounting information systems positively and significantly influence firm performance and environmental performance. Arum (2019) noted that implementing green accounting affects earnings sustainability.

On the other hand, Riyadh et al. (2020), Nkwoji (2021), and Sumiati et al. (2022) observed negative relationships between green accounting and profitability, return on capital, or earnings per share. Shah and Bhatt (2022) highlighted that adoption of green accounting is positively influenced by environmental knowledge, concern, and perceived benefit. Hossain (2019) in Bangladesh identified critical challenges to implementing green accounting, including high cost involvement, lack of skilled personnel, inadequate standards, and low adoption, which may partially explain the inconsistent empirical findings. Recent developments show that green accounting research is becoming increasingly sophisticated and institutionalized. Large global companies are providing more detailed sustainability disclosures and obtaining assurance for these reports, reducing measurement errors and enhancing reliability (IFAC 2024). Meta-analytic evidence also confirms a positive relationship between green accounting practices and firm performance, with industry type and regulatory stringency acting as moderating factors (Maryanti, 2025). Additionally, current research has expanded to consider green intellectual capital, environmental management accounting, and the role of transition costs in the green economy, showing that these factors significantly affect firm value and performance (Tri Astuti & Nurmala Ahmar, 2025; Radi & Westerhoff, 2024). Collectively, these developments indicate that while early studies produced mixed results, recent work increasingly supports a positive impact of green accounting on financial and environmental performance, particularly when contextual factors and dynamic effects are considered. Empirical studies on green accounting reveal mixed findings

LASUJMS
JOURNAL OF MANAGEMENT SCIENCES

VOLUME 9, ISSUE 1 - 2026

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across sectors and time horizons. While some capital-intensive industries experience initial cost burdens from pollution control investments, long-term efficiency gains often offset these costs (Biggi, Mina & Tamagni, 2023). Evidence indicates that sustainable environmental practices enhance corporate reputation and attract eco-conscious investors, improving profitability in the long run (Albertini, 2023; Touab & Issor, 2019). Conversely, neglect of environmental accountability leads to reputational loss, sanctions, and financial decline (Emeka, Nwokeji & Okeke, 2019). In Nigeria, voluntary environmental disclosure significantly boosts firm value (Orisakwe-Lawrence, 2023), while green accounting disclosure improves profitability among non-financial firms (Ayodele, Olubunmi & Adeyemi, 2024)). Overall, studies demonstrate that transparent environmental reporting and sound green accounting practices enhance firm performance by reducing information asymmetry and improving operational efficiency, though effects vary with disclosure quality, regulatory framework, and corporate strategy.

Table 1: Operationalisation

Variable	Type	Indicators / How Measured
Green Pollution Control Cost	Independent	- Compliance with environmental standards related to pollution
Green Climate Change Control Cost	Independent	- Climate risk mitigation programs
Green Soil Degradation Control Cost	Independent	- Programs to prevent soil erosion and chemical contamination
Firm Performance	Dependent	- Return on Equity
Firm Size	Mediator	- total assets, annual sales revenue,

Methodology

This study adopted a quantitative research approach using a correlational research design to examine the relationship between green accounting practices and firm performance in Nigeria's agro-allied sector between 2012 and 2023. The analysis relied exclusively on secondary data obtained from the annual reports, sustainability reports, and other official publications of the selected firms, as well as the Fact Book of the Nigerian Exchange Group. These data sources provided comprehensive information on environmental costs, firm size, and performance indicators over the study period. The population of the study comprised five (5) agro-allied firms listed on the Nigerian Exchange as of December 31, 2023. Firms were deliberately selected based on three criteria: the degree of environmental interface in their operations, particularly activities relating to pollution control, climate change mitigation, and soil management; the nature of their operational activities, ensuring relevance to green accounting practices; and the availability and completeness of financial and environmental data for the period under study. This purposive selection ensured that the sample reflected firms with significant environmental exposure, thereby

LASUJMS
JOURNAL OF MANAGEMENT SCIENCES

VOLUME 9, ISSUE 1 - 2026

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enabling meaningful assessment of the impact of green accounting practices on corporate performance.

Environmental cost data were extracted from the notes to the financial statements and sustainability disclosures of the selected firms. Green Pollution Control Cost (GPCC) was measured as the annual expenditure on air, water, and industrial waste pollution reduction, adoption of cleaner technologies, and compliance with environmental regulations. Green Climate Change Control Cost (GCCC) represented annual spending on carbon emission reduction, renewable energy investments, and climate risk mitigation programs. Green Soil Degradation Control Cost (GSDCC) covered annual expenditure on soil rehabilitation, sustainable land management, erosion control, and eco-friendly agricultural practices. Firm performance was proxied by Return on Equity (ROE), while firm size (FMS) was employed as a control variable, measured as the natural logarithm of total assets. Although other control variables such as firm age, leverage, and industry type were initially considered, they were excluded due to data constraints. This methodological design provided a structured and empirical foundation for evaluating the extent to which green accounting initiatives influence firm performance within Nigeria's agro-allied industry.

Model Specification

This study adapted a model developed by Adegbie et al. (2021) which focused on environmental accounting practices and firm value of quoted manufacturing companies in Nigeria. The model is stated thus:

$EPS_{i,t} = \alpha + \beta_1 EAP_{i,t} + \beta_2 FZ_{i,t} + \mu_{i,t}$ ……..……a

Where: EPS = Earnings Per Share

EAP = Environmental Accounting Practices

FZ= Firm Size

The model was modified to suit this study. The study proxy green environmental practice with green pollution control, green soil degradation control and green climate change control and firms performance into return on equity, thus we have:

FPE = *f*(SGAPs) …….b

FPE = *f*(GPCC, GSDCC, GCCCC) ……..…… …..……..c

$FPE_{i,t} = \alpha_o + \beta_1 GPCC_{i,t} + \beta_2 GSDCC_{i,t} + \beta_3 GCCCC_{i,t} + \beta_4 FMS_{i,t} + e_{i,t}$ ……d

Where: FPE = Firm Performance

GPCC = Green Pollution Control Cost

GSDC = Green Soil Degradation Control Cost

GCCC = Green Climate Change Control Cost

FMS = Firm Size (Control Variable)

α = Constant; i = i^{th} Firm; t = Time Period; β_1-β_3, = Regression of the Independent Variable; β_4 = Regression of the Control Variable; e = Error Term. The apriori expectation of this study are stated as follow: $\beta_1 > 0$, $\beta_2 > 0$, and $\beta_3 > 0$ (the implication means that green pollution control cost, green soil degradation control cost and green climate change control cost are expected to have a positive impact on firm performance.

LASUJMS
JOURNAL OF MANAGEMENT SCIENCES

VOLUME 9, ISSUE 1 - 2026
https://doi.org/10.5281/zenodo.19024130

Regression Analysis

Method: Dynamic Ordinary Least Square
Dependent Variable: RTEQ
Control Variable: FMS
Date: 05/11/24 Time: 11:01
Sample: 1 60 (2012 2023)
Included Observations: 60

Indep-corrected	Coefficient	Std. Error	t-Statistic	Prob.
Const.	2.7566	1.9023	1.4491	0.0002
GPCC	0.0304	0.3438	0.0884	0.0091
GSDCC	0.0844	0.4910	0.1719	0.0000
GCCCC	0.0731	1.9603	0.0373	0.0023
R-Squared	0.6914	Mean dependent var.		1.4350
Adjusted R-squared	0.6155	S.D. dependent var.		1.0494
S.E. of regression	0.4301	Akaike info criterion		5.4031
Sum squared resid.	5.0459	Schwarz criterion		5.3024
Log likelihood	10.433	Hannan-Quinn criter.		5.7829
F-statistic	0.0001	Durbin-Watson stat.		1.6040
Prob(F-statistic)	0.0028			

Source: Eviews 13, 2024

Above regression analysis of the variables reveals the strength of the relationship that exists among the variables. From the table above, it was discovered that green pollution control cost variable as significant relationship with the dependent variable of firm performance with a t-value of 0.0884 and p-value of 0.0091 which is less than 5% level of significance. Green soil degradation control cost is positive and significant to firm performance with a t-value of 0.1719 and P-value of 0.0000 which is less than 5% level of significance. Also, the green climate change control cost has t-value of 0.0373 and p-value of 0.0023 which is less than 5% level of significance

Discussion of Findings

The coefficient of determination as revealed by R-square (R^2) indicates that 69.1% of the volatility observed in the model were explained by the combined influence and variations in the explanatory variables (green pollution control cost, green soil degradation control cost and green climate change control cost), this indicates that there is 69.1% chances that green accounting practices can impact firm performance. While the remaining 30.9% is attributed to other factors not included in the model. The Prob. F-statistic which test the goodness of fit suggest that the model employed in the study is significant given the value of 0.0028 which is less than 5% level of significance, the equation in use is statistically valid. This implies the equation is useful in explaining a unit change

VOLUME 9, ISSUE 1 - 2026
https://doi.org/10.5281/zenodo.19024130

in firm performance of listed agro-allied firms in Nigeria. The Durbin-Watson (DW) statistics is equal to 1.6040 which implying the absence of serial auto-correlation. This is because when the DW value is above 2.5, it is an evidence of serial auto correlation. The findings of the study is align with Budiono and Dura (2021). The study explains how sustainable green accounting practices contributes positively and significantly to firm performance. The findings also corroborate with the study of Effendi (2021) that posited that environmental management positively affects firm's value in India. The regression results indicate that green accounting practices has significant effects on firm performance (RTEQ) among the sampled Nigerian agro-allied firms, with Green Pollution Control Cost (GPCC) showing a coefficient 0.0304 and Green Soil Degradation Control Cost (GSDCC) and Green Climate Change Control Cost (GCCCC) exhibiting positive coefficients 0.0844 and 0.0731, respectively. This corroborate the studies of Lusiana et al. (2021) and Susanto & Meiryani (2019), which found positive effects of environmental investments on firm profitability, while, Makori & Jagongo (2013) and Egbunike & Okoro (2018) reported negative or insignificant effects. The Nigeria's agro-allied sector-specific still face challenges of high upfront costs for pollution control, regulatory inefficiencies, and limited adoption of advanced technologies. Positive effects of soil and climate control costs suggest that strategic, long-term environmental investments enhance resource efficiency and stakeholder confidence. To mitigate negative impacts, policymakers could provide tax incentives, subsidies, or regulatory support for pollution control, while managers could integrate cost-effective green technologies and prioritize environmental initiatives that offer tangible long-term returns. However, findings should be interpreted cautiously due to the **small sample size** (five firms), potential measurement inconsistencies in environmental cost reporting, and limited coverage of other moderating factors such as leverage, firm age, and industry-specific risks. Overall, the study highlights that while certain green accounting practices may impose short-term financial burdens, strategically targeted initiatives can foster long-term performance improvements.

Conclusion and Recommendations

This study concludes that green accounting practices have a significant impact on firm performance in Nigeria's agro-allied sector. While investments in green soil degradation control and climate change mitigation positively influence performance, expenditures on green pollution control may impose short-term financial burdens, reflecting the high costs and operational inefficiencies associated with such initiatives. The findings highlight the importance of integrating green practices strategically into corporate decision-making rather than treating them as isolated compliance activities. Considering the limitations of this study, including the small sample size, potential data constraints, and limited sectoral coverage, future research should extend to larger samples and other industrial sectors to enhance generalizability. Based on the results, it is recommended that policymakers implement mandatory environmental disclosure requirements in financial reports, and provide regulatory incentives or tax reliefs to encourage proactive investment in pollution control, soil management, and climate mitigation technologies. Firms should adopt cost-effective green innovations, leverage technology, and embed sustainable environmental strategies into their corporate frameworks to ensure long-term profitability and resilience. Overall, a structured approach involving government oversight, stakeholder engagement, and corporate

VOLUME 9, ISSUE 1 - 2026
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commitment is essential to foster sustainable growth, protect ecosystems, and advance Nigeria's environmental, social, and economic sustainability goals.

The study recommends that policymakers implement mandatory environmental disclosure requirements in financial reports to enhance transparency and accountability, provide regulatory incentives or tax reliefs to encourage investments in pollution control, soil management, and climate change mitigation, and establish clear frameworks for sustainable environmental practices tailored to the agro-allied sector. Firms should integrate cost-effective green innovations into their corporate strategies, leverage technology, and embed sustainability into operational and strategic decision-making to ensure long-term profitability and resilience. Future research should extend to larger samples and other industrial sectors to enhance generalizability and strengthen the evidence base, while a structured approach involving government oversight, stakeholder engagement, and corporate commitment is essential to foster sustainable growth, protect ecosystems, and advance Nigeria's environmental, social, and economic sustainability goals.

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