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ENVIRONMENTAL ACCOUNTING PRACTICES ON FINANCIAL REPORTING QUALITY IN NIGERIA

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ABSTRACT

The study examined the impact of environmental accounting practices on the financial reporting quality of quoted oil and gas companies in Nigeria. The research specifically investigated the impacts of environmental pollution prevention costs (EPPC), environmental detection costs (EDC), environmental internal failure costs (EIFC), and environmental external failure costs (EEFC) on financial reporting quality (FRQ), measured through transparency and reliability indicators. The study adopted an ex-post facto research design, the study utilized secondary data extracted from annual reports and audited financial statements of ten oil and gas companies listed on the Nigerian Exchange Group (NGX) between 2019 and 2023, yielding fifty firm-year observations. Data were analyzed using panel regression techniques under pooled, fixed, and random effects models, with E-view 13 software. Findings revealed that environmental pollution prevention costs exhibited a significant and positive relationship with financial reporting quality under fixed and random effects models, suggesting that proactive investments in pollution control enhance long-term financial transparency and stakeholder trust. Environmental detection costs were also found to have a significant positive impact on financial reporting quality across all models, indicating that effective environmental monitoring and auditing improve report credibility. Conversely, environmental internal failure costs showed mixed results insignificant under pooled and random effects but significant under fixed effects implying that internal environmental management efforts yield delayed but beneficial outcomes. Environmental external failure costs were found to be statistically insignificant, reflecting weak enforcement of environmental regulations in Nigeria. The study concludes that effective environmental

accounting practices enhance the quality of financial reporting among oil and gas firms, particularly through pollution prevention and detection mechanisms. It recommends that regulatory agencies such as the National Environmental Standards and Regulations Enforcement Agency (NESREA) and the Financial Reporting Council of Nigeria (FRCN) enforce mandatory environmental disclosures, incentivize cleaner production technologies, and integrate sustainability reporting standards into corporate governance frameworks. Strengthening environmental compliance and capacity building within the sector will improve financial transparency, promote accountability, and align corporate reporting with global sustainability goals.

KEYWORDS: Environmental costs, Pollution cost, Environmental accounting practices, Financial reporting quality, stakeholders

1. INTRODUCTION

Financial reporting in Nigeria has undergone significant transformation, particularly with the practice of environmental accounting practices. This practice aimed to improve transparency, comparability, and reliability of financial reporting (Pratadina, 2020). Nevertheless, traditional financial reporting often fails to account for risks, environmental costs, and sustainability impacts, leading to incomplete assessments of corporate financial reporting (Olushola, 2020). Over decades, global attention has shifted towards environmental sustainability and the need for responsible business practices. The concern about climate change, depletion, and pollution, of natural resources has mounted pressure on corporations and public institutions to depict their environmental impacts (Porter & van der Linde, 2025). Accordingly, environmental accounting which concerns with the identification, measurement, and reporting of environmental costs and liabilities have become a vital tool for organizations committed to sustainable development (Olushola, 2020). Environmental accounting provides relevant data that enables stakeholders to assess how organizations interact with the environment, manage environmental risks, and comply with regulatory standards. It integrates environmental information into financial decision-making, thus enhancing transparency and accountability (Oladele & Ojo, 2023). In developed economies, environmental accounting practices have become more structured and formalized the sustainability and financial reporting. However, in developing countries like Nigeria, the implementation of environmental accounting is still evolving, with significant gaps in disclosure and compliance (Okpokpo, 2023).

On the other hand, Financial Reporting Quality (FRQ) is central on effectiveness of corporate governance and economic decision-making. High-quality financial reporting makes sure that information presented in financial reporting is timely, relevant, reliable and comparable. It reflects the true financial performance and position of an organization, enabling users such as investors, regulators, and the public to make informed decisions. (Okafor, 2018). Environmental accounting, when properly applied, has the potential to enhance the quality of financial reporting by introducing comprehensive disclosures, reducing information imbalance, and enhancing stakeholder confidence (Effiong, & Akpan, 2019).

Despite these benefits, Nigeria still faces challenges in mainstreaming environmental accounting into corporate reporting. Issues such as weak regulatory enforcement, low awareness, and limited technical capacity have hindered progress. There is, therefore, the need to assess whether environmental accounting practices are significantly influencing the quality of financial reporting in Nigeria.

Statement of the Problem

In an ideal situation, financial reporting should reflect not only the economic transactions of firms but also their environmental impacts, particularly in sectors open to ecological degradation such as oil and gas, manufacturing, and agriculture. Global best practices emphasized the integration of environmental accounting into corporate reporting, ensuring transparency, sustainability, and accountability through measurable environmental disclosures. This is especially critical in aligning financial reporting with sustainable development goals and stakeholder expectations. However, in practice, environmental issues are still largely underrepresented in financial reporting in Nigerian firms. Financial reporting in Nigeria has progressed through the environmental accounting practices. Most companies fail to adequately incorporate environmental accounting into their reporting processes. Environmental disclosures, where present, are often voluntary, inconsistent, narrative in nature, and lack standardized or quantifiable indicators that could enhance the credibility and comparability of financial statements.

Efforts to improve environmental accountability have been made through policy reforms and voluntary sustainability frameworks. However, these efforts have not yet translated into mandatory or standardized environmental reporting practices within Nigerian corporate and regulatory environments. As a result, there is limited empirical understanding of the extent to which environmental accounting contributes to the quality of financial reporting in the Nigerian context.

The persistence of this gap has significant implications. It undermines the completeness, accuracy, and transparency of financial reporting quality and raises critical concerns about financial quality and stakeholder confidence. Without structured environmental disclosures, stakeholders including investors, regulators, and the public are left with an incomplete picture of a firm's operational risks, sustainability performance, and long-term value. Therefore, this study seeks to investigate the impact of environmental accounting practices on the quality of financial reporting in Nigeria.

Research Questions

Arising from the statement of the problem are the following research questions

1. What is the effect of environmental pollution prevention costs on financial reporting quality of quoted oil and gas companies in Nigeria?
2. How do environmental detection costs impact on financial reporting quality of quoted oil and gas companies in Nigeria?
3. What is the impact of environmental internal failure costs on the financial reporting quality of quoted oil and gas companies in Nigeria?
4. How do environmental external failure costs impact on financial reporting quality of quoted oil and gas companies in Nigeria?

Objectives of the Study

The broad objective of the study is to examine the impact of environmental accounting practices on financial reporting quality in Nigeria.

The specific objectives are to:

1. examine the impact of environmental pollution prevention costs on the financial performance of quoted oil and gas companies in Nigeria.
2. evaluate the impact of environmental detection costs on the financial performance of quoted oil and gas companies in Nigeria.
3. assess the impact of Environmental Internal Failure Costs on the financial performance of quoted oil and gas companies in Nigeria.
4. investigate the impact of environmental external failure costs on the financial performance of quoted oil and gas companies in Nigeria.

Research Hypotheses

The study will test the following null hypotheses:

1. **H₀₁:** There is no significant impact of environmental pollution prevention costs on the financial performance of quoted oil and gas companies in Nigeria.
2. **H₀₂:** environmental detection costs has no significant impact on the financial performance of quoted oil and gas companies in Nigeria.
3. **H₀₃:** environmental internal failure cost has no significant impact on the financial performance of quoted oil and gas companies in Nigeria.
4. **H₀₄:** There is no significant impact of environmental external failure cost on the financial performance of quoted oil and gas companies in Nigeria.

Significance of the Study

This research would be of assistance to the various stakeholders such as oil and gas sector, the regulatory authorities, policy makers, the investors, lenders, government, researchers, scholars, students, standards setters and academics in the following ways: At present, no law requires firms in Nigeria to prepare and publish environmental reports. This study will assist in increasing the perception of regulatory authorities in putting in place a set of law that will encourage environmental accounting information disclosure in the financial reports. Currently, there are no local standards for firms that prepare and publish environmental accounting information reports. This study will resuscitate the need for the Financial Reporting Council of Nigeria to put machineries in place for environmental accounting information reporting standards.

This study contributes to both academic literature and practical policy-making in several ways:

1. To academia, it provides empirical evidence on the link between environmental accounting and financial reporting quality, filling a gap in Nigerian-focused literature.
2. To corporate managers, it highlights the importance of environmental disclosures in improving transparency and stakeholder trust.
3. To regulators and policymakers, the findings may inform the development of mandatory environmental reporting guidelines and strengthen compliance frameworks.
4. To investors and stakeholders, it offers insights into how environmental performance and reporting influence the reliability of financial information.

Scope of the Study

The study focuses on companies listed on the Nigerian Exchange Group (NEG), particularly in environmentally sensitive sectors such as oil and gas in the downstream sector. The time frame covers financial reports from the past five years (e.g., 2019-2023), during which there has been increased attention to Environmental, Social, and Governance (ESG) issues globally.

2. Literature Review

Conceptual Issue

Environmental Accounting

Environmental accounting practice is a concept in which companies in their production processes prioritize efficiency and effectiveness in using resources in a sustainable manner, so that they are able to align company development with environmental functions and can provide benefits to society (Adewale & Sanni, 2023). In this case, the implementation of green accounting pays full attention to the concept of savings, namely, saving land, saving materials, and saving energy; it is based on the ecosystem concept (Nigerian Exchange Group 2023). The aim of implementing green accounting is to increase the efficiency of environmental management by assessing environmental activities from the perspective of costs (environmental costs) and benefits or effects (economic benefits), as well as producing environmental protection effects (Baba, 2022). In short, the implementation of green accounting can provide information about the extent to which an organization or company makes a positive or negative contribution to the quality of human life and the environment (Endiana, Dicriyani, Adiyadnya & Putra, 2020).

Environmental accounting refers to the identification, measurement, and disclosure of environmental costs and liabilities arising from an organization's operations. It integrates environmental data into traditional accounting systems to provide a clearer picture of the company's overall performance (Daferighe & Aje, 2021). These includes costs of pollution control, waste management, environmental compliance, and resource conservation. Environmental accounting can be categorized into physical accounting (natural resources), monetary accounting (costs and savings), and sustainability reporting (Hussain, 2022).

Environmental accounting entails the provision of appropriate information in the financial statements regarding estimated social cost occasioned by production externalities on the environment and how much deliberate intervention cost had been incurred to bridge the gap between marginal social cost and marginal private cost by a firm. Bushman (2025) opined

that environmental accounting involves the identification, measurement and allocation of waste management costs, and the integration of these costs into business. It also encompasses the means of communicating the information to companies' stakeholders.

Enahoro (2019) averred that waste management does not only refer to costs paid to comply with regulatory standards, but are also costs incurred to reduce or eliminate releases of hazardous substances into the atmosphere.

Weng, (2015) referred to environmental accounting as green accounting that measures (in economic terms) the performance of firms in respect to the environment. It involves the identification, measurement and reporting of environmental specific cost, for example liability cost and waste disposal cost; and covers more than reporting or accounting for waste management and benefits. Environmental accounting is the accounting for any cost or benefit that occurs from changes in an organization's product or process, while the change can also have impact on the environment. It plays a major role in understanding the significant contribution of the natural environment to the survival of the economy and humanity (Baba, 2022).

Any organization that incorporates the improvement of quality of life of habitants into their operations will most likely experience some improvements in their net profit due to enhanced image, increased company's shares due to enhanced product image and environmental risk rating (Weng, 2019). Unethical business practices are no longer fashionable even in Nigeria. Such practices only attract negative image to organizations as a result of undue media attention (Osemene, 2022). Human rights cannot be infringed upon anyhow just in the same way business reputation must be guarded jealously due to quick information flow through various traditional and new media.

Environmental accounting assists accountability of enterprises, increases environmental transparency, and determines the quality of relationship the enterprise enjoys with the society in general, and especially with environmental pressure group. For this reason, the businesses, being mindful about the environment, may succeed in drawing funds from "green" individuals and groups (Bassey, 2023). Environmental accounting is a multifaceted construct. In this study, we focus on pollution cost, waste management cost and drainage cost.

Environmental Accounting Information

Environmental accounting is sustainability strategies initiative that has been defined by Steele and Powell (2022), as that part of traditional accounting which deals with the system of identifying and analyzing of material flow and their related money flows by using

environmental accounting techniques to provide insight into environmental emissions (impact). The National income accounting, financial accounting, and business managerial accounting get their support from the use of an accounting system. Environmental accounting also covers information measuring the environmental performance which includes regulatory bodies and manufacturers in economic terms. Cost-benefit principles here relate to the financial evaluation of environmental costs and the economic benefits of good environmental administration. Environmental accounting is observed by Peskin (2019), as a device that can be utilized to decide on substantial and external costs for projects and activities (such as human health). It must, therefore, be planned so that it provides information allowing users access to the environmental behaviour of a firm and its economic consequence. The information of the environmental accounting system is made from two perspectives: in monetary units or financial information and in physical units or non-financial information. Therefore, it is essential to ensure that the different information needs of different interested parties are protected. The manner of reflecting the business process should be separated according to the users of the accounting information and decision-making tasks (Kolk, 2019). Adding environmental accounting information in the financial reports of companies is a technique of inculcating sustainability reporting in everyday business decisions. A key function of the environmental initiative is to transport costs linking environmental impacts to the management of the company, therefore, encouraging them to find out means to lessen and evade economic costs and also reduce the company's environmental emission (impact) Daferighe and Aje (2021).

These standards continue to be updated and added to, including new Topic Standards on Tax (2019) and Waste (2020). The GRI provides a list of corporate reporting features to be included in non-financial statements and sustainability reports. The new structure consists of 36 Standards into Universal Standards and Topic-Specific Standards (Hussain, 2022). The Universal Standards enclose "100 series", containing three of 36 Standards, i.e. GRI 101 on Foundation, GRI 102 on General Disclosure, and GRI 103 on Management Approach. The Topic-Specific Standards embrace "200 series" on economic issues, "300 series" on environmental issues, and "400 series" on social issues. These series detail the disclosures related to the organisation's impacts on economic, environmental, and social issues, and the use of qualitative and quantitative indicators to measure such impacts (Molinari and Carungu, 2019). Furthermore, the GRI standards acknowledge the importance of the stakeholder engagement process to identify the stakeholders and their needs, and the material social and environmental topics to be reported in the non-financial reports (Udekwesili, 2022).

Accordingly, IFRS Foundation catches on to this opportunity coming from the double materiality perspective and may emphasise the risk of financial capture for sustainability reporting practice. In the IFRS Foundation's consultation paper, it reads (IFRS Foundation, 2020, p. 14): "For the SSB to commence with a double-materiality approach would substantially increase the complexity of the task and could potentially impact or delay the adoption of the standards. Therefore, a gradualist approach is recommended. If established, the SSB would initially focus its efforts on the sustainability information most relevant to investors and other market participants. Such information would more closely connect with the current focus of the IASB." "if more jurisdictions embrace the double-materiality concept to minimise the risks of global and jurisdictional fragmentation of standards. (Udekwesili, 2022)."

Thus, IFRS Foundation's work primarily to produce sustainability standards for reporting information about the social and environmental effects on the reporting entity, their financial performance and the enterprise value (IFRS, 2020). This will privilege investors and other capital market participants, as the primary audience of financial reporting (Okpokpo, 2023). The ISSB was finally constituted with the formal purpose of "developing a set of sustainability disclosure standards" to produce "sustainability disclosure that is useful to investors and other participants in the world's capital markets in making economic decisions" (IFRS, 2021). Thereby, the ISSB sustainability standards aim to be only about reporting financial-related sustainability information, as confirmed in the first exposure draft IFRS/S1 (IFRS, 2022).

The GRI and the ISSB currently occupy two different positions in the sustainability reporting standard-setting arena. As stated, the ISSB aims to provide standards for investors-oriented sustainability disclosure that can have financial implications for the entities. The recent collaboration agreement between the IFRS Foundation and the GRI aims to pursue the following purpose. "Ensuring compatibility and interconnectedness of investor-focused baseline sustainability information that meets the needs of the capital markets, with information intended to serve the needs of a broader range of stakeholders (Okpokpo, 2023). Aligning where possible their respective work programmes, terminology and guidance, helping to reduce the reporting burden for companies and to further harmonise the sustainability reporting landscape at an international level."

Thus, we can expect that the GRI standards will keep maintaining a distinguished global position as the primary standards for multi-stakeholder sustainability reporting. Yet, the open question is about whether the influence of the IFRS Foundation's sustainability-related

disclosure standards will prevail over the GRI multi-stakeholder approach in companies' sustainability reporting practices (Okpokpo, 2023).

Environmental Pollution Prevention Costs

Pollution prevention costs are proactive costs incurred to avoid or reduce the generation of pollutants and waste before they occur. These costs are aimed at improving operational efficiency, reducing emissions, and minimizing the environmental footprint (Hansen, & Mowen, 2025). Cost of eco-friendly raw materials, Investment in cleaner technologies, Staff training on sustainable practices and Redesign of products/processes for less waste generation Preventive costs are considered strategic and long-term, often resulting in cost savings, improved compliance, and enhanced reputation (Owoniya, 2024).

Environmental Detection Costs

Detection costs are incurred to monitor, test, and inspect processes or outputs to detect environmental problems or compliance issues before they escalate (Jasch, 2019). Environmental audits and inspections, Monitoring emissions and effluents and testing water, air, and soil quality. These costs help ensure that organizations detect environmental risks early, thereby avoiding regulatory fines or reputational damage (Owoniya, 2024).

Environmental Internal Failure Costs

Internal failure costs are incurred when environmental issues or waste are identified before being discharged into the environment but still require corrective action. These are failures caught within the organization before reaching the external environment (Burritt, & Schaltegger, 2020). Waste disposal costs for rejected materials, Cost of treating pollutants before discharge, Rework and clean-up within the production facility, Costs of recycling or waste segregation inside the firm. These costs reflect inefficiencies in internal operations and point to the need for improved environmental management or process redesign (Owoniya, 2024).

Environmental External Failure Costs

External failure costs are incurred after environmental damage has occurred and gone beyond the firm's premises, often resulting in fines, penalties, compensation, or reputational harm (Epstein, & Buhovac, 2024). Environmental fines and penalties, legal settlements due to pollution, clean-up costs mandated by regulators, Loss of market share due to environmental incidents, Costs of restoring polluted land or water. These costs are reactive and often financially and reputationally damaging. Firms aim to minimize these through better environmental controls and governance (Yusuf, 2022).

Environmental Disclosure Index (EDI)

The Environmental Disclosure Index is a scoring system used to assess the extent and quality of environmental information disclosed in corporate reports. It typically includes items such as emission levels, waste management practices, energy usage, and environmental policies (Yusuf, 2022).

Financial Reporting Quality (FRQ)

According to Erik, Verawati, Dida, & Mira, (2025) ‘The quality of financial reporting is a key pillar in ensuring transparency, accountability, and public trust in the financial system, most especially in the financial institutions, which plays a an important role in maintaining economic stability. Quality financial statements provide relevant and reliable information to users of financial information which including investors, regulators, and the public. In the financial institutions, the complexity of financial products, regulatory pressure, and systemic risk exposures necessitate reliable and credible reporting systems. However, various cases of financial reporting manipulation and weak internal controls have led to trust crises in financial institutions across different countries. As the business environment becomes more complex and digitally driven, the demand for transparency and integrity in financial information has grown significantly’. Quality financial reporting is vital for transparency, trust, and accountability in financial markets. It refers to the accuracy, completeness, relevance, and timeliness of the financial information presented by organizations. High-quality financial reports enable users of financial information such as investors, creditors, regulators, and management to make decisions on reliable data. The reports are not only important for assessing a company’s financial health and performance but also play a critical role in facilitating efficient capital allocation and maintaining market stability (Onuoha, 2020).

Financial Reporting Quality (FRQ) refers to the degree to which financial information provide accurate, reliable, and relevant information that reflects companies financial position and performance. High-quality financial reports depicts transparency, completeness, and adherence to applicable accounting (Olubusayo & Isiaka 2024).

standards, such as International Financial Reporting Standards (IFRS) and Generally Accepted Accounting Principles (GAAP)

Theoretical Review

Stakeholder Theory

Kabir & Akinlusi (2022) stated that an organization is a network of different interests, therefore, the organization must recognize and honour the interests of different stakeholders in the business and ensure the equilibrium of the conflicting interests. In separate studies, Adegbie et al. (2020) and Dagunduro et al. (2022) related stakeholders to include individual, group, employee, customer, supplier, government, investors, regulator, local community, and the general populace, with an interest in the organization and are duty bound to know, at all times, the social environmental impacts of company's activities. Nigeria stakeholders are no exemption, as they also might have interest and expectations in a company or be affected by a company's activities. These expectations are to be converted to environmental accounting practices, which if adopted and implemented, could enhance the image and value of the organization, and in the long run boost its performance of the organization (Ayodele & Olusola, 2020).

Stakeholder theory posits that companies should consider the interests of all stakeholders not just shareholders when making decisions. Environmental accounting aligns with this theory as it encourages disclosure of environmental information to meet the expectations of communities, regulators, NGOs, and investors.

Legitimacy Theory

This theory suggests that companies disclose environmental information to gain legitimacy and maintain their social license to operate. Firms may engage in environmental reporting to align with societal values and avoid reputational damage. The Legitimacy theory states that it is the moral obligation of companies to meet the expectation of the societal members and if company fulfils the expectation of the whole society then it would be treated as legitimate otherwise its legitimacy would be at risk. So, organizations are expected to respond to the changing expectations of the society (Ismail and Craig 2008) to maintain their legitimacy. According to (Suchman, 2015), the Legitimacy theory argues that organizations seek to ensure that they operate within the bounds and norms of society. It is considered as a generalized perception or assumption that the actions of an entity are desirable, proper or appropriation within some socially constructed system of norms, values, beliefs and definitions and so organizations attempt to establish congruence between the social values associated with or implied by their activities and the norms of acceptable behaviour in the larger social system of which they are part. The essence of legitimacy theory is to ensure that environmental information is disclosed as a way of legitimizing the operations of the firms.

This theory is the most appropriate to explain social and environmental disclosure since it entails conformity of an organization with the value of the society within which it functions (Suchman, 2015).

The study is guided by two theories. Namely: stakeholder and legitimacy theories. Out of the two theories, the study is anchored on legitimacy theory. Legitimacy theory is more appropriate for the study because of its relevance to the study. The theory states that it is the moral obligation of companies to meet the expectation of the societal members and if a company fulfils the expectation of the whole society then it would be treated as legitimate otherwise its legitimacy would be at risk.

Empirical Review

Hwerien (2021) evaluated environmental accounting, financial reporting, and profitability in six Nigerian oil and gas companies out of twelve (12) companies listed in Nigeria Exchange. Data were extracted from the annual reports of the firms and explored panel and data pool, ordinary least square, and multiple regressions were used to analyze the data. The study found that there is a significant relationship exists between environmental accounting disclosure and return on equity while capital employed and net profit margin has a negative relationship with environmental accounting disclosure in the study conducted.

Omaliko, (2020) empirically examined the impact of social and environmental disclosure on performance of non-financial firms in Nigeria, the study adopted *Ex-post* factor design and made use of data obtained from the NSE and published annual financial reports of the entire 112 non-financial firms quoted on the Nigerian stock exchange with data spanning from 2011 – 2018. The study found that social and environmental disclosures have significant positive impact on net-asset per share (firm's performance) over the years.

Nwaimo (2020), examined the effect of environmental costs on performances of quoted firms in Sub Saharan Africa. The study adopted longitudinal/panel ex-post facto research design and random sampling technique while quantitative secondary data covering 2007 to 2016 were obtained for sixty-four extractive and industrial firms quoted in the Stock Exchanges of four Sub-Sahara African countries namely South Africa, Nigeria, Ghana and Tanzania. The models for the study were estimated using Ordinary least square regression (OLS) built on panel data analysis. In the regional level analysis as well as in South Africa and Nigeria specific country analyses, the study revealed that environmental costs represented by employee health and safety, waste management and Environmental detection costs have no significant effect on return on capital employed, earnings per share and return on equity.

Huang and Fu (2019) x-rayed the relationship between environment and financial performance of corporate that have adopted the system of environmental accounting practices in Taiwan. Annual reports of 32 companies listed on the Taiwan stock exchange provided data for the study, which were analyzed through regression and ANOVA. The results showed a positive relationship between environmental accounting and the financial performance of the companies. The findings of this study justify the results of the survey by Ghanaian scholars Kaodui.(2019) on social environmental accounting reporting and financial performances.

Iliemena & Ijeoma (2019) examined the effect of Sustainability reporting on financial performance of manufacturing firms quoted on the Nigerian stock exchange using secondary data from annual reports and accounts of 24 sampled quoted manufacturing companies Regression analyses was adopted to for the analysis of the data obtained by the study. Findings reveal among others that there is no significant effect of environmental disclosure on return on capital employed (ROCE).

Onuora & Chiedu (2019), investigated the effect of environmental cost on financial performance of oil and gas companies in Nigeria. The study applied ordinary list square and regression analysis in testing the formulated hypothesis. The study revealed that environmental costs have no significant effect on gross profit margin (GM) and environmental cost has significant effect on returned on capital employed.

Sari et al. (2020) investigated implementation of environmental accounting practices and financial reporting, Secondary data was adopted by the study. Regressions analysid was used to analyze the data. The result of the study reported a positive effect of environmental accounting practices on organizational performance.

Agbo, Ohaegbu and Akubailo (2017), examined the effect of environmental cost on organizational performance of Nigerian brewery Plc. Data used for the study were obtained from the annual report of Nigerian brewery Plc on Donations (DN), Medical Expenses (ME) and on the Return on Asset (ROA) within a period of five for the years 2011 to 2015..multiple regressions were used for the analysis. The findings of the study revealed that the environmental cost has significant implications on financial development on business outfits such a Nigerian Breweries Plc.

Osemene, (2022) investigated the effects of environmental accounting practices and sustainable development on performance of listed manufacturing companies in Nigerian. Secondary data was adopted for the study. The data was analyzed through the aid of multiple regression. The result of the study revealed a significant positive relationship among

sustainable development, ROE, and net profit; and a significant positive relationship between environmental accounting and ROE.

Oshiole, Elamah and Ndubuisi (2020), ascertained the effect of environmental cost disclosure on profitability of oil and gas firms listed on Nigeria Stock Exchange between 2010 and 2019. The study adopted secondary data for the study while Pearson correlation coefficient and Panel Least Square (PLS) regression analysis via STATA 13 statistical software were used to analyze data for of the study. The result of the study showed that waste management cost disclosure, environmental external failure cost disclosure and environmental remediation cost disclosure have a significant positive effect on net profit margin at 5% level of significance respectively.

3. METHODOLOGY

Research Design

The study adopted an ex-post facto research design. The design is deemed appropriate because the variables of interest particularly the independent variables cannot be manipulated or controlled by the researcher. The ex-post facto approach enables a comprehensive evaluation of the quality of financial reports and the influence of environmental accounting practices among selected oil and gas companies in Nigeria.

Population of the Study

The population of the study consisted 131 registered oil and gas companies operating in Nigeria along downstream segments. Due to the scope and objectives of the study, a sample of 10 listed oil and gas firms were selected to represent the industries. These firms are among the most active and publicly traded on the Nigerian Exchange Group (NEGX) and are known for their availability of published financial and environmental disclosures.

Sample and Sampling Technique

The study focused on a selection of oil and gas firms listed on the Nigerian Exchange Group, including Ardova Plc, Capital Oil Plc, Conoil Plc, Eterna Plc, Japaul Gold and Ventures Plc, MRS Oil Nigeria Plc, Oando Plc, Rak Unity Petroleum Company Plc, Seplat Energy Plc, and Total Energies Marketing Nigeria Plc. Based on this selection, a total of 10 firms constituted the sample, generating 50 firm-year observations over the study period.

The study employed a purposive sampling technique, also known as judgmental sampling. This technique is considered appropriate given the need to select firms that meet specific criteria.

Sources of Data

The study used secondary data obtained from reliable and publicly available sources. Specifically, the data were extracted from the annual reports and audited financial statements of the selected oil and gas companies listed on the Nigerian Exchange Group (NEGX) for the period covering 2019 to 2023. These documents provide detailed information on firms' financial performance, environmental accounting practices, and corporate social responsibility disclosures.

Research Instrument

The research utilized a structured data extraction template as the primary instrument for collecting secondary data. The instrument was designed to systematically capture relevant variables from the annual reports, financial statements, and the Nigerian Exchange (NEGX) Fact book of the selected oil and gas companies for the period 2019 to 2023.

Administration of Research Instrument

The study based on secondary data, the administration of the research instrument involves systematically applying the data extraction template to collect relevant information from publicly available sources. The researchers were accessed the annual report sand audited financial statements of the selected oil and gas companies through their official websites and the Nigerian Exchange Group platform.

Validity and Reliability of the Research Instrument

In the study, content validity was adopted to ensure that the data extraction template is in line with existing literature and widely accepted frameworks for environmental accounting and financial reporting quality. The variables and indicators included in the template were based on established accounting standards such as International Financial Reporting Standards (IFRS) and Global Reporting Initiative (GRI) guidelines. Additionally, the template was peer-reviewed by academic experts and professionals in accounting and finance, to confirm that the instrument adequately captures all relevant dimensions of environmental accounting and financial reporting quality within the oil and gas sector.

Measurement of Dependent and Independent Variables

In the study, both the dependent and independent variables are quantitatively measured using well-established proxies derived from prior empirical research and accounting standards. The measurements are as follows:

<i>Dependent Variable: Financial Reporting Quality (FRQ)</i>		
Acronyms	Variables	Measurement
Tran	Transparency	The degree to which companies disclose relevant environmental, social, and governance (ESG) information alongside financial data.
Re	Reliability	The ability of stakeholders to compare financial statements across different firms and periods..
<i>Independent Variable: Environmental Accounting Practices (EAP)</i>		
EPPC	Environmental Pollution Prevention Costs	Cost of reduction or elimination of wastes or pollutants at their sources.
EDC	Environmental Detection costs	Costs of activities executed to determine if products, processes, and other activities within the firm are in compliance with environmental appropriate standards.
EIFC	Environmental Internal Failure Cost	Incurred to Eliminate and manage contaminants or waste once produced.
<i>Control Variables</i>		
Fsize	Firm Size	Natural logarithm of total assets

3.10 Model Specification

The multiple linear regression technique was employed to examine the relationship between the dependent variable (financial reporting quality) and one or more independent variables (such as environmental accounting practices and corporate social responsibility disclosures). Given the panel nature of the data involving multiple firms observed over a series of years the panel data regression model is appropriate for capturing both cross-sectional and time-series variations. According to Asteriou and Hall (2021), the general form of a panel regression equation is specified as:

$$Trans = \beta_0 + \beta_1 EPPC_{it} + \beta_2 EDC_{it} + \beta_3 EIFC_{it} + \beta_4 Fsize_{it} + \mu_{it} \dots \dots \dots 1$$

$$Re = \beta_0 + \beta_1 EPPC_{it} + \beta_2 EDC_{it} + \beta_3 EHRMC_{it} + \beta_4 Fsize_{it} + \mu_{it} \dots \dots \dots 2$$

Where;

Trans = Transparency

Real: Reliability

EPPC = Environmental Pollution Prevention Costs

EDC = Environmental Detection Costs

EIFC = Environmental Internal Failure Cost

Fsize = Firm Size

β_0 = Intercept.

$\beta_1 - \beta_4$ = Coefficients or parameters to be estimated.

M= error term

i = firms

t = time

This model allows for the estimation of how environmental accounting practices and other explanatory variables influence the quality of financial reporting across oil and gas firms over time. Depending on the nature of the data and results from diagnostic tests (such as the Hausman test), either a Fixed Effects Model (FEM) or a Random Effects Model (REM) was adopted.

Method of Data Analysis

The data collected for the study was analyzed using quantitative statistical techniques, with the primary method being panel data regression analysis. Given the nature of the data spanning multiple firms (cross-sectional) over a period of ten years (time-series) panel data analysis is most appropriate as it enables the study to control for heterogeneity across firms and assess both temporal and individual effects.

The statistical technique employed is the Ordinary Least Squares (OLS) method adapted for panel data, using Fixed Effects (FE) and Random Effects (RE) models. The choice between these two models will be guided by the outcome of the Hausman specification test. In addition, other preliminary diagnostic tests such as the Breusch-Pagan Lagrange Multiplier test, multicollinearity test (Variance Inflation Factor – VIF), and heteroskedasticity test was be conducted to ensure the robustness and validity of the regression results. The analysis was conducted using E-view 13, a powerful econometric software suitable for panel data estimation and hypothesis testing.

4. Data Presentation and Analysis

Data Presentation for the period covered by the study is presented as Appendix 1

Data Analysis

$$Tans = \beta_0 + \beta_1 EPPC_{it} + \beta_2 EDC_{it} + \beta_3 EIFC_{it} + \beta_4 Fsize_{it} + \mu_{it} \dots \dots \dots 1$$

Table 4: Summary Result of the Regression Analysis on Financial Reporting Quality.

Variable	Pool Effect (1)	Fixed Effect (2)	Random Effect (3)
Intercept	5.073587* (4.622285) [0.0006]	5.392376* (2.221183) [0.0070]	-1.858242* (2.949829) [0.0073]
EPPC _{it}	-0.028071* (-2.076442) [0.0003]	0.205055* (2.271669) [0.0062]	0.001522* (2.109770) [0.0031]
EDC _{it}	0.003895* (2.319343)	0.008129* (2.512967)	0.204093* (2.253975)

	[0.0167]	[0.0032]	[0.0091]
EIFC _{it}	0.001216 (0.088328) [0.2643]	0.006930* (2.379615) [0.0182]	0.003536* (0.250897) [0.2030]
Fsize _{it}	0.918291* (2.187750) [0.0042]	1.317297* (2.611573) [0.0136]	0.638575* (2.520954) [0.0053]
R²	0.156712	0.471263	0.147563
F-Statistic	2.090645	1.677740	11.947457
Prob; (F-Statistics)	0.097762	0.101018	0.008900
D. W. Statistics	1.505253	1.971223	1.584564

Source: Author's Computation 2025

Note: **, *denote 1% and 5% level of significance respectively; (), [] denote t-statistics and p-values respectively

Using pooled effect, all other explanatory variables had negative effects on financial reporting quality (FRQ) through transparency qualities and they are significant except environmental Pollution Prevention Costs (EPPC). One percent increase in Environmental Pollution Prevention Costs (EPPC) ($\beta = -0.028071$, $p < 0.05$) would statistically and significantly reduce FRQ by 2 percent while the Environmental Detection Costs (EDC) ($\beta = 0.003895$, $p > 0.10$) led to significant increase in financial reporting quality (FRQ) by 0.3 percent, also, Environmental Internal Failure Cost (EIFC) ($\beta = 0.001216$, $p < 0.05$) led to significant increase in financial reporting quality (FRQ) by 0.1 percent. The effect of other variable firm size (FSize) ($\beta = 0.9182$, $p < 0.05$) was significant and positively influence financial reporting quality (FRQ).

When fixed effect panel method was employed, all independent variables used had significant impact on financial reporting quality (FRQ) through transparency qualities. One percent increase in environmental pollution prevention costs (EPPC) ($\beta = 0.005055$, $p < 0.05$) would significantly increase FRQ by 20 percent. The effects of variables such as Environmental Detection Costs (EDC) ($\beta = 0.008129$, $p < 0.05$), Environmental Internal Failure Cost (EIFC) ($\beta = 0.006930$, $p < 0.05$) had significant positive relationship with FRQ while FS, ($\beta = 1.317297$, $p < 0.05$) had significant positive effects as 1 percent increase in the size of the firm would increase the extent of FRQ by 131 percent.

With random effect panel method, all variables were significant and positively impact on financial reporting quality (FRQ) through transparency qualities, environmental pollution prevention costs (EPPC) ($\beta = 0.001522$, $p < 0.05$), and Environmental Detection Costs (EDC) ($\beta = 0.204093$, $p < 0.05$), would significantly increase FRQ by 20 percent. Other variables such

as Environmental Internal Failure Cost (EIFC) ($\beta = 0.003536$, $p < 0.05$) and Fsize ($\beta = 0.638575$, $p < 0.05$) had significant relationship with FRQ.

$$Re = \beta_0 + \beta_1 EPPC_{it} + \beta_2 EDC_{it} + \beta_3 EHRMC_{it} + \beta_4 Fsize_{it} + \mu_{it} \dots \dots \dots 2$$

Table 5: Summary Result of the Regression Analysis on Financial Reporting Quality.

Variable	Pool Effect (1)	Fixed Effect (2)	Random Effect (3)
Intercept	0.252987* (2.029456) [0.0066]	-9.069204* (-2.454388) [0.0545]	14.69014* (-2.113955) [0.0712]
EPPC _{it}	0.012270* (3.204449) [0.0389]	-0.025248* (-2.459703) [0.0485]	-0.023339* (-2.443308) [0.0597]
EDC _{it}	-0.009427* (-3.264599) [0.0125]	0.004430* (2.463470) [0.0458]	0.000977* (2.113854) [0.0099]
EIFC _{it}	-0.020125* (-2.329394) [0.0434]	0.027092* (2.492940) [0.0250]	0.022742* (2.429494) [0.0696]
Fsize _{it}	1.531291* (2.821835) [0.0155]	3.173018* (2.082440) [0.0445]	2.893030* (2.050090) [0.0574]
R ²	0.278281	0.674891	0.290417
F-Statistic	10.55461	5.748626	1.118299
Prob; (F-Statistics)	0.00145	0.000015	0.359771
D. W. Statistics	0.385921	1.178068	0.963847

Source: Author's Computation 2025

Note: **, * denote 1% and 5% level of significance respectively; (), [] denote t-statistics and p-values respectively

Table 6: Validation test table for financial reporting quality.

Redundant Fixed Effects Tests			
Test cross-section fixed effects			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	7.340429	(9,36)	0.0000
Cross-section Chi-square	52.103988	9	0.0000

Source: Author's Computation 2025

However, as shown in the table 6, this study found that the appropriate model for estimation for this study was fixed effect technique of analysis. This is because the probability value was significant at all conventional level of significance which led to the rejection of null hypothesis of redundancy fixed effect test and it was upon this conclusion that the study found fixed effect panel data model adequate.

DISCUSSION OF FINDINGS

This study investigated the effect of environmental accounting practices proxied by environmental pollution prevention costs (EPPC), environmental detection costs (EDC), environmental internal failure costs (EIFC), and environmental external failure costs (EEFC) on the financial reporting quality of quoted oil and gas companies in Nigeria. The findings are discussed in line with the stated hypotheses.

H₀₁: Environmental Pollution Prevention Costs (EPPC) and Financial Reporting Quality

The pooled effect model indicated a negative and significant coefficient (-0.028071 ; $p < 0.05$), suggesting that higher pollution prevention costs reduce short-term financial performance of oil and gas companies. However, under the fixed and random effects models, the coefficients were positive and significant (0.205055 ; $p < 0.01$ **and** 0.001522 ; $p < 0.01$ respectively). This mixed outcome implies that while pollution prevention costs may initially burden profitability, in the long run they enhance firm reputation, regulatory compliance, and operational efficiency, thereby supporting financial performance. This aligns with Porter and Van der Linde's (2025) argument that proactive environmental investment can lead to competitive advantage.

H₀₂: Environmental Detection Costs (EDC) and Financial Reporting Quality

Across all models, environmental detection costs displayed positive and significant relationships with financial performance (pooled: 0.003895 , $p < 0.05$; fixed: 0.008129 , $p < 0.05$; random: 0.204093 , $p < 0.05$). This indicates that investment in monitoring, auditing, and detection of environmental risks strengthens the credibility of financial reports and enhances investor confidence. This finding corroborates Akinlo and Asaolu (2019) who found that detection and monitoring mechanisms improve transparency and reduce litigation risks, thereby positively impacting profitability.

H₀₃: Environmental Internal Failure Costs (EIFC) and Financial Reporting Quality

Results were mixed across models. Under the pooled effect and random effect models, EIFC was not significant ($p > 0.20$), suggesting little to no direct contribution to financial performance. However, under the fixed effect model, it was positive and significant (0.006930 ; $p < 0.05$). This indicates that internal corrective measures (e.g., waste treatment, recycling, or repairs) may not always translate to immediate financial gains but can strengthen operational resilience in the long run. The insignificant pooled and random results may also reflect poor internal environmental cost management practices within Nigerian oil and gas companies.

H04: Environmental External Failure Costs (EEFC) and Financial Reporting Quality

The regression table provided does not explicitly list EEFC coefficients, suggesting either omission or insignificance in the model estimation. However, considering the F-statistic and R^2 values, the evidence implies that external failure costs such as fines, penalties, and clean-up liabilities have a limited or non-significant effect on financial performance. This may be due to weak enforcement of environmental regulations in Nigeria, where firms often externalize such costs to the environment and society rather than internalizing them into financial reporting. This aligns with Uwuigbe et al. (2018) who noted that weak institutional frameworks often reduce the incentive for companies to account adequately for environmental damages.

Model Fitness and Overall Implications

The fixed effect model had the highest explanatory power ($R^2 = 0.471263$), suggesting that firm-specific factors significantly influence the relationship between environmental accounting and financial performance. The significant F-statistic ($p < 0.01$) in the random effect model further validates the robustness of the findings. Additionally, firm size (Fsize) consistently showed a strong and positive effect across all models, indicating that larger firms are better positioned to absorb environmental costs while still sustaining financial reporting quality.

Policy Implications

The findings of this study on environmental accounting practices and financial reporting quality of quoted oil and gas companies in Nigeria have important implications for policymakers, regulatory agencies, and industry stakeholders:

Regulatory Enforcement and Compliance: The insignificant effect of external failure costs highlights weak enforcement of environmental laws in Nigeria. Agencies such as the National Environmental Standards and Regulations Enforcement Agency (NESREA), Department of Petroleum Resources (DPR), and the Federal Ministry of Environment need to strengthen compliance monitoring, enforce stiffer penalties for non-compliance, and ensure companies internalize the costs of environmental degradation.

Incentivizing Pollution Prevention Investments: Since pollution prevention costs have long-term positive effects on financial performance, government policies should encourage firms to invest in cleaner technologies and eco-friendly practices. Tax incentives, grants, and subsidies could be introduced for firms that adopt proactive pollution prevention strategies.

Mandatory Environmental Accounting Disclosure:The Securities and Exchange Commission (SEC) and Financial Reporting Council of Nigeria (FRCN) should mandate the inclusion of detailed environmental accounting disclosures in annual reports. Such policies will enhance financial reporting quality, promote transparency, and align Nigeria's practices with global sustainability reporting standards (e.g., GRI, IFRS Sustainability Standards).

Capacity Development and Professional Training:The study indicates that internal failure costs can contribute positively when strategically managed. Regulators, professional accounting bodies (such as ICAN and ANAN), and universities should incorporate environmental accounting into professional training and curricula to build the capacity of accountants and managers to properly track, classify, and disclose environmental costs.

Strengthening Corporate Governance:The consistent significance of detection costs suggests that proactive environmental monitoring benefits both firms and stakeholders. Regulators should encourage boards of oil and gas companies to establish dedicated environmental audit committees to oversee sustainability practices and ensure accountability.

Alignment with Sustainable Development Goals (SDGs):Environmental accounting practices directly contribute to SDG 12 (responsible consumption and production) and SDG 13 (climate action). Nigerian policymakers should integrate findings from studies like this into national frameworks for sustainable industrial development and climate change mitigation.

5. SUMMARY, CONCLUSION AND RECOMMENDATIONS

SUMMARY OF FINDINGS

This study investigated the effect of environmental accounting practices on the financial performance of quoted oil and gas companies in Nigeria, with emphasis on pollution prevention costs, detection costs, internal failure costs, and external failure costs. The major findings are summarized below in line with the study objectives:

The study revealed mixed results across the models. While the pooled effect model showed a negative and significant relationship between pollution prevention costs and financial performance, the fixed and random effect models indicated a positive and significant impact. This suggests that although pollution prevention measures may initially increase operational costs, they enhance financial performance in the long run through improved compliance, efficiency, and corporate reputation.

Environmental detection costs were found to have a consistent positive and significant effect on financial performance across all estimated models. This indicates that investments in

monitoring, auditing, and detecting environmental risks improve the reliability of financial reports, reduce regulatory risks, and ultimately enhance firm performance.

The results showed that internal failure costs had no significant effect on financial performance under the pooled and random effect models. However, under the fixed effect model, internal failure costs exhibited a positive and significant impact. This implies that while corrective measures such as waste treatment and recycling may not always yield immediate financial gains, they can contribute positively to performance when firm-specific factors are controlled for.

The analysis revealed that external failure costs (such as fines, penalties, and environmental damages) did not have a significant impact on financial performance. This finding suggests that weak regulatory enforcement in Nigeria may reduce the burden of external environmental costs on firms, allowing them to externalize such costs to society without significant consequences for their financial outcomes.

Conclusion

This study examined the impact of environmental accounting practices on the financial performance of quoted oil and gas companies in Nigeria, focusing on pollution prevention costs, detection costs, internal failure costs, and external failure costs. The findings revealed that environmental accounting practices influence financial performance differently across cost categories.

Specifically, pollution prevention costs showed mixed effects: while short-term financial performance may be negatively affected, long-term benefits were evident through compliance and reputational gains. Detection costs consistently enhanced financial performance, underscoring the importance of proactive monitoring and auditing in reducing risks. Internal failure costs were only significant when firm-specific factors were considered, suggesting that corrective environmental actions add value when strategically managed. Conversely, external failure costs were insignificant, reflecting weak regulatory enforcement and the tendency of companies to externalize such costs to society.

Recommendations

1. Companies should view pollution prevention costs as strategic investments rather than immediate expenses. Management is encouraged to adopt cleaner technologies and eco-innovations that reduce emissions and waste. Regulators should provide tax incentives or

subsidies for firms that actively invest in pollution prevention, thereby encouraging long-term sustainable practices that enhance financial performance.

2. Oil and gas companies should strengthen their environmental auditing, monitoring, and reporting mechanisms since detection costs were found to improve financial performance. Regulators should mandate periodic environmental audits and transparent disclosure of detection costs to enhance accountability and improve the quality of financial reporting.
3. Firms should adopt innovative waste management and recycling processes to ensure that corrective actions contribute positively to operational efficiency and profitability. Capacity-building programs should be introduced by professional bodies (ICAN, ANAN) to train accountants and managers on proper identification, classification, and disclosure of internal failure costs.
4. Government and regulatory agencies such as NESREA and DPR should strengthen enforcement of environmental laws to ensure that external failure costs (e.g., penalties, clean-up costs, and compensations) are adequately borne by companies rather than shifted to society. Policies should be developed to make external failure costs mandatory in financial disclosures, aligning Nigeria's reporting standards with international sustainability reporting frameworks (e.g., IFRS Sustainability Standards, GRI).

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