

Original Article

Firm Characteristics and Stakeholder Accountability Predictors of Environmental Disclosure among Listed Nigerian Oil and Gas Firms

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Abstract: Environmental effluent disclosure has attracted regulatory and investor attention because it signals corporate environmental management capacity and risk exposure. Yet firm-level determinants of its disclosure quality remain less understood in the Nigerian oil and gas context, which is one motivating factor of this study that seeks to assess the effect of firm attributes on environmental information disclosure. The specific objective is to determine the effect of leverage, firm size and audit committee size on effluent information disclosure of listed oil and gas firms in Nigeria. An ex-post facto research design was used in this study, with a population consisting of eight (8) oil and gas companies listed on the Nigerian Exchange Group (NGX). A purposive sampling technique was employed to select seven (7) listed oil and gas firms over a ten (10) year period, 2015 to 2024. The hypotheses were tested using a Panel Corrected Standard Errors regression technique, whose findings revealed that leverage has an insignificant effect on effluent disclosure, firm size has a significant positive effect on effluent disclosure, while audit committee size has a significant negative effect on effluent disclosure. Conclusively, this study shows that environmental effluent disclosure is significantly shaped by firm size and audit committee structure. Thus, it is recommended that senior executives and strategic planning units of oil and gas firms in Nigeria should leverage their scale, infrastructure, and stakeholder influence to lead by example in environmental disclosure by mandating the integration of effluent reporting into the firm's enterprise risk management and sustainability strategies.

Keywords: Environmental Disclosure, Firm Size, Leverage, Panel-Corrected Standard Errors (PCSE).

I. INTRODUCTION

The environment is a vital concern in today's ecological, social and economic set up, and environmental accounting disclosure has emerged extensively in response to issues of global concern such as gas flaring, greenhouse warming effects, water pollution, and other negative environmental impacts, while environmental damage is evident from the extent of greenhouse gas emissions that cause the earth's temperature to rise (Nyikwagh & Igyuse, 2025). In recent years, the increasing popularity and significance of environmental reporting organizations on the determinants of environmental disclosure seek to receive greater publicity to disclose environmental information in their annual reports due to stakeholder pressure, regulations, the power of environmental groups, the influence of competitors and multinational companies, and the need for improving corporate productivity and competitiveness (Okafor, Nworie & Onyebuchi, 2024; Hossain, Adams & Walker, 2021). Further, awareness of environmental issues has increased significantly over the past few decades following the release of the United Nations Sustainable Development Goals (SDGs) resolution in 2015, as environmental issues have become critical for firms, public sector organizations, and the international community (Bakare, Lambe, & Arumona, 2025). Consequently, firms must maintain transparency on environmental responsibilities in order to gain legitimacy from stakeholders, while environmental information disclosure serves as a form of firm accountability through annual reports and sustainability reporting. Environmental information disclosures communicate externally the environmental consequences of organizational economic actions externally and embody reporting concerning environmental policies, impacts, environmental expenditures, and firm activities that lead to profit (Okafor, Nworie & Onyebuchi, 2024; Herold, 2018). Moreover, Taurigana (2021) documented several factors such as firm size, audit committee size, profitability, financial leverage, board size, independent audit, ownership concentration, and firm age as proportional to the company's concern to disclose sustainability reports.

Environmental sustainability remains a crucial issue in Nigeria, where the economy relies heavily on oil exploration. Little wonder why Notteboom & Haralambides (2020) posit that stakeholders increasingly demand transparency and accountability from corporate activities through environmental information disclosure, despite the fact that sustainability reporting remains voluntary in Nigeria. Nigeria is the largest oil and gas producer in Africa, and the oil sector contributes significantly to the country's GDP, thereby making environmental accounting and environmental disclosure highly relevant to environmental sustainability and corporate responsibility. However, Sam, Pegg & Oladejo (2024) maintain that many quoted



oil and gas firms provide inadequate and inconsistent environmental information, failing to meet both local and international standards due to insufficient regulatory enforcement, lack of awareness, and prioritization of short-term financial gains over long-term sustainability. Consequently, this undermines stakeholder trust and investor confidence, impedes effective environmental monitoring, exacerbates environmental degradation, and poses risks to public health and sustainable development (Yusuf, 2023). Several extant literatures have examined the determinants of environmental disclosure, however, no consensus has been reached, as Nyikwagh and Igyuse (2025), Solikhah and Maulina (2021), Kalash (2020), Almaqtari, Al-Hattami, Al-Nuzaili and Al-Bukhrani (2020), Ofoegbu, Odoemelam, and Okafor (2018), and Levin and Franssen (2017) reported divergent findings regarding the determinants of environmental disclosure. These divergent views created a gap in the literature, which this study filled by focusing exclusively on all listed oil and gas firms in Nigeria and extending the fiscal year to 2024, contrary to prior studies whose financial period ended in 2023.

The potential beneficiaries of this study include policy makers and regulators who will gain comprehensive insights for developing and enforcing more effective environmental disclosure regulations and accountability standards, investors who will benefit from enhanced transparency and reliable environmental reporting for informed investment decisions, oil and gas firms that will obtain a roadmap for improving environmental disclosure practices, strengthening stakeholder trust, corporate image, sustainability, and profitability, as well as academia where the study will contribute empirical evidence and serve as a foundation for further related research. The present section has introduced firm attributes as a determinant of environmental disclosure. Section two examines the literature in terms of conceptual, theoretical, expository and empirical literature review. Section three turns to the methodology, which provides the steps that were employed to test the hypothesis. Section four presents and discusses the results obtained from the various analyses conducted. The final section provides the conclusion and gives recommendations for policy implementation.

II. LITERATURE REVIEW

A) *Firm Attribute*

Firm attributes encompass the key characteristics and qualities that define an organization's identity, performance, and competitive edge (Handoyo, Mulyani, Ghani & Soedarsono, 2023; Bakare, Lambe & Arumona, 2025), broadly categorized into organizational culture, operational capabilities, and market positioning. A strong and positive culture fosters collaboration, innovation, commitment, high employee morale, and retention, while operational capabilities such as leverage, audit committee, and size encompass the firm's processes, technologies, and resources that enable efficient and effective delivery of products and services, including production efficiency, supply chain management, technological innovation, and quality control (Sansone, Hilletoft & Eriksson, 2017). Further, a firm's ability to streamline operations, reduce costs, and maintain high standards directly impacts profitability and customer satisfaction, as companies that invest in state-of-the-art technology and continuous improvement initiatives can adapt more swiftly to market changes and maintain competitive advantage in their industry (Handoyo, Mulyani, Ghani & Soedarsono, 2023).

B) *Environmental Disclosure*

Disclosure refers to the timely release of all information about a company that may influence an investor's decision and reveals both positive and negative news, data, and operational details that impact its business. Publicly listed companies are required to disclose all relevant financial information as well as analyses of their strengths, weaknesses, opportunities, and threats (Troy, 2020). As put forward by Solikhah & Maulina (2021), environmental disclosure is a form of corporate responsibility and accountability for fulfilling the information needs of investors, shareholders, customers, and other stakeholders regarding environmental matters and the impact of organizational activities on the environment. Environmental reporting and disclosure practices therefore serve as a means of communicating environmental information and responsibilities to stakeholders (Udo, 2019).

C) *Leverage and Environmental Disclosure*

Leverage shows how much firms depend on creditors in financing business operations (Wahyuningsih and Mahdar, 2018), and a firm with a moderate level of financial leverage is expected to disclose its environmental commitment in order to assure the populace that the firm is financially buoyant, although excessive financial leverage increases the risk of business failure. Further, leverage is employed to increase return on equity and has been identified as a determinant of voluntary environmental disclosure in several studies. Egbunike and Tarilaye (2017) found financial leverage to have a positive influence on firms' willingness to voluntarily disclose environmental activities, and Handoyo and Angela (2021) suggested that only financial leverage is significant enough to predict the quality of environmental disclosure. However, contrary findings were reported by Adeniyi and Adebayo (2018), Ofoegbu and Odoemelam (2018), and Kiende and Karambu (2016), who established that financial leverage has no significant effect on voluntary environmental disclosure.

D) *Firm Size and Environmental Disclosure*

Firm size is among the determinant factors of firm performance and particularly shows the profitability of business (Oyelade, 2019; Isik, Unal & Unal, 2017), while firms, through economies of scale, can produce more efficiently, reduce costs,

apply technology to production easily, negotiate with suppliers easily, increase competitiveness, and access capital easily (Vu & Dang, 2020). Empirical studies such as Chouaibi and Chouaibi (2021), Shabbir and Wisdom (2020), Ali, Frynas and Mahmood (2017), Huang (2021), and Handoyo and Angela (2021) further emphasize the importance of firm size.

E) Audit committee size and Environmental Disclosure

The major responsibility of the audit committee is to assist the board of directors in overseeing corporate reporting policy (Achraf, El-Ammari & Bouri, 2021), while audit committee size refers to the number of members in the audit committee, as a larger audit committee size is willing to devote greater resources and authority to effectively carry out responsibilities (Fulop, 2019). Moreover, more directors on the audit committee are likely to bring diversity of views, expertise, experiences, and skills to ensure effective monitoring (Intal & Diyanty, 2017), while a higher number of audit committee members can help uncover and resolve potential issues in corporate reporting processes (Abdullah, Ismail & Smith, 2018). Additionally, audit committee size adequately oversees disclosure practices (Huang, 2021).

F) Theoretical Review

a. Stakeholders Theory

In 1984, R. Edward Freeman originally detailed the Stakeholder Theory of organizational management and business ethics that addresses morals and values in managing an organization, while the theory stresses the interconnected relationships between a business and its customers, suppliers, employees, investors, communities, environmental groups, governmental groups, and others who have a stake in the organization. The theory argues that a firm should create value for all stakeholders, not just shareholders, because stakeholder theory accounts for multiple constituencies impacted by business entities such as employees, suppliers, local communities, creditors, and others, while emphasizing the interconnections between business and all those who have a stake in it (Lin, 2018). Further, stakeholder theory suggests that shareholders are only one of many groups an organization must serve, since anyone affected by the organization is considered a stakeholder. This study is anchored on stakeholder theory because it examines the relationships between organizations and their internal and external environments, emphasizing that organizations should strive to do right by all stakeholders to achieve lasting success.

G) Empirical Review

Adekanmi (2022) examined the effect of firm attributes on sustainability reporting of non-finance firms listed on the Nigerian Exchange Group (NGX) between 2006 and 2020. The study's population comprised 113 listed non-finance firms, with a sample size of 76 firms determined using the Taro Yamane technique. Panel least squares multiple regression was employed for the analysis. The results indicate that profitability, firm size, and liquidity have positive relationships with sustainability reporting, while asset tangibility has a negative relationship with sustainability reporting. In contrast, the age of the business has an insignificant effect on sustainability reporting. The findings also show that growth rate, financial leverage, free cash flow, and business risk have insignificant relationships with sustainability reporting.

Onuoha and Okoye (2024) reviewed existing empirical studies on the determinants of environmental sustainability information disclosure, highlighting the key drivers in developing countries and the dominant theoretical underpinnings. A total of 18 articles from empirical studies conducted in developing countries, published mainly in Scopus-indexed journals over a decade (2013 to 2022), were reviewed using content analysis. The dominant theoretical bases for studies in this area were legitimacy, stakeholder, and agency theories, with firm size, profitability, and industry type identified as key determinants of environmental sustainability disclosure in developing countries. Additionally, the study highlights environmental sustainability performance as an uncommonly explored rationale for environmental sustainability information disclosure, noting that the reviewed papers are predominantly single-country studies.

Nyikwagh and Igyuse (2025) explored how specific firm characteristics affect environmental disclosure practices among listed oil and gas companies in Nigeria over the period from 2017 to 2021. The study focused on firm size, age, and financial performance as independent variables, with the environmental disclosure index serving as the dependent variable. *ex-post facto* research design was utilized, relying on secondary data extracted through content analysis of audited annual reports from ten selected oil and gas companies. Employing panel regression techniques, the analysis revealed that each firm attribute studied size, age, and financial performance exerts a significant influence on the level of environmental disclosure. Based on the findings, the researchers emphasized the importance of profitability and organizational growth in supporting firms' capacity to bear the costs of environmental disclosure, which, in turn, can help enhance stakeholder trust and legitimacy.

Olagunju *et al.* (2025) conducted an investigation into what drives the quality of sustainability reporting among Nigeria's listed deposit money banks. Using a sustainability report quality index drawn from prior literature, the study assessed firm attributes such as size, growth, performance, and type, alongside corporate governance variables like board independence, frequency of meetings, gender diversity, and institutional ownership. An ordered logistic regression model was used due to the

categorical nature of the dependent variable. Findings from the analysis demonstrated that firm size and increased female representation on boards contribute positively to the quality of sustainability reports. In contrast, better performance and a more independent board were associated with a reduction in report quality.

Bakare, Lambe, and Arumona (2025) analyzed the relationship between firm characteristics and environmental reporting among Nigeria's listed consumer goods companies over a fourteen-year span (2010–2023), drawing on data from fifteen firms. The study followed an *ex-post facto* design and utilized secondary data obtained from the Nigerian Exchange Group. Applying panel regression analysis, the study found that both firm age and liquidity had insignificant effects on the environmental reporting index. The study concluded that older firms and those with higher liquidity do not necessarily exhibit improved environmental reporting practices.

III. METHODOLOGY

This study adopts an *ex-post facto* research design to examine the effect of firm attributes on environmental disclosure among listed oil and gas firms in Nigeria. The population of the study comprised all eight (8) oil and gas companies listed on the Nigerian Exchange Group (NGX) as of 31st December, 2024. However, using a purposive sampling technique, seven (7) firms were selected as the sample size based on their continuous listing status and availability of annual reports throughout the study period of 2015 to 2024. Firms that were not listed before 2015, such as Aradel Holdings Plc., were excluded from the study. The selected firms include Conoil Plc, Eterna Plc, Japaul Oil and Maritime Services Plc, MRS Oil Nigeria Plc, Oando Plc, Seplat Energy Plc, and TotalEnergies Nigeria Plc. Data analysis involved the use of both descriptive and inferential statistics. Descriptive statistics such as mean, median, standard deviation, skewness, kurtosis, maximum, and minimum values were employed to summarize the study variables using EViews 10 statistical software, while the hypotheses were tested using the panel regression analysis technique. Further, a content analysis procedure was performed on the variable of environmental sustainability reports to show how organizational boundaries are set for the whole report and how operational boundaries are set for specific environmental indicators. This study adopts the Global Reporting Initiative (GRI) framework disclosures according to the G4 guidelines for the purpose of developing the Environmental disclosure indices. Environmental Reporting was evaluated by 4 indicators. For each report, all 4 indicators were scored as follows:

A score of 0 for an item not referred to in the sampled report; OR a score of 1 when the report referred to the item or provided qualitative statements in the sampled report.

A) Model Specification

In order to test the hypotheses regarding the determinants of environmental disclosure of oil and gas firms listed on the Nigerian Exchange Group, the study adapted the model of Geerts, Dooms and Stas (2021), stated as;

$$EHSD = \beta_0 + \beta_1 FSZ + \beta_2 PROF + \beta_3 INDT + \varepsilon \dots\dots\dots (1)$$

Where:

EHSD = Employee Health and Safety Disclosure
 FSZ = Firm Size
 PROF = Profitability
 INDT = Industry Type
 ε = error term

To test for H₁, H₂, and H₃, this study estimates the following regression equation based on the formulated hypotheses. Considering the utilization of the adapted model, the following model is formulated as:

$$ED_{it} = \beta_0 + \beta_1 LEV_{it} + \beta_2 FSZ_{it} + \beta_3 ACS_{it} + \mu_{it}$$

Where:

β_0 is the intercept of the regression.
 $\beta_1, \beta_2, \beta_3$ are the coefficients of the regression
 ED = Effluent Disclosure of firm *i* in period *t*
 LEV = Leverage of firm *i* in period *t*
 FSZ = Firm Size of firm *i* in period *t*
 ACS = Audit Committee Size of firm *i* in period *t*
i = individual firms (1,2,3...7)
t = time periods (2015, 2016 ... 2024)
 μ_{it} = Error term

Table 1: Operationalization of Variables

Variable Type	Indicators	Variable Acronym	Definition and Measurement
Independent Variable (Determinants)			
	Leverage	LEV	Total debt divided by Total shareholders' equity
	Firm Size	FSZ	Measured as the natural logarithm of the firm's total assets
	Audit Committee Size	ACS	Measured as the total number of audit committee members
Dependent Variable (Environmental Disclosure)			
	Effluent Disclosure	ED	Total effluent score divided by maximum number of effluent information disclosure score

Source: Author's Compilation

IV. DATA ANALYSIS RESULT PRESENTATION & DISCUSSION

The descriptive statistics in Table 2 reveal a mean ED score of 0.129, indicating that, on average, firms disclosed only about 12.9% of the maximum possible effluent-related environmental information. This low average value suggests a generally weak level of environmental disclosure among Nigerian oil and gas firms, while the maximum value of 1.000 confirms that at least one firm fully disclosed all four effluent indicators, and the minimum value of 0.000 indicates complete non-disclosure by at least one firm in the sample. The standard deviation value of 0.261 shows relatively low variation in disclosure levels across firms, whereas the positive skewness of 1.76 and kurtosis value of 4.69 suggest a distribution that is heavily skewed to the right and more peaked than a normal distribution. The Jarque-Bera probability value of 0.000 confirms that the distribution of environmental disclosure (ED) is not normal. Leverage (LEV) has a mean value of 1.609, suggesting that some of the sampled firms carry more debt than equity, which is typical in capital-intensive industries like oil and gas. However, the range is very wide, with a maximum value of 15.44 and a minimum value of -21.35. The standard deviation value of 4.43 further emphasizes the large dispersion in leverage levels among the firms, while the negative skewness value of -1.20 and kurtosis value of 13.81 indicate a highly peaked distribution with heavy tails.

Table 2: Descriptive Statistics Result

	ED	LEV	FSZ	ACS
Mean	0.128571	1.609193	8.042686	5.785714
Median	0.000000	1.686835	7.842672	6.000000
Maximum	1.000000	15.44258	9.992167	8.000000
Minimum	0.000000	-21.35047	6.943113	4.000000
Std. Dev.	0.261486	4.427542	0.591644	0.976430
Skewness	1.760667	-1.195472	0.868806	0.344644
Kurtosis	4.685378	13.81005	3.718218	3.260282
Jarque-Bera	44.45085	357.5069	10.31081	1.583359
Probability	0.000000	0.000000	0.005768	0.453083
Sum	9.000000	112.6435	562.9880	405.0000
Sum Sq. Dev.	4.717857	1352.616	24.15294	65.78571
Observations	70	70	70	70

Source: Authors' Computation E-Views 10.0

Firm Size (FSZ) provides insight into the scale of operations of each sampled firm, with a mean value of 8.04 and a standard deviation value of 0.59, indicating low to moderate variability in firm sizes. Audit Committee Size (ACS) showed an average value of 5.79, reflecting compliance across most firms, while the skewness value of 0.34 and Jarque-Bera probability of 0.4531 confirm that the distribution of audit committee size does not significantly deviate from normality.

A) Regression Diagnostics

Table 3: Model Diagnostics

Test Types	Technique of Diagnostics	Statistic	Degrees of Freedom (df)	Probability (p-value)
Cross-Section Dependence Test	Breusch-Pagan LM	38.02882	21	0.0128
Cross-Section Heteroskedasticity LR Test	Likelihood Ratio	1563.119	7	0.0000

Source: Authors' Computation E-Views 10.0

The Cross-Section Dependence Test, as shown in Table 3, employs the Breusch-Pagan LM test to determine whether there is significant correlation in the residuals across different cross-sectional units. The essence of this test is to identify whether cross-sectional units are independent of each other, a critical assumption in traditional panel data models. Since the p-value of 0.0128 is statistically significant at the 5% level, the null hypothesis of no cross-sectional dependence is rejected,

implying that the residuals across firms are correlated and suggesting the presence of common shocks or spillover effects within the industry. Therefore, an estimation technique that corrects for cross-sectional dependence, such as Panel-Corrected Standard Errors (PCSE), is considered more appropriate. Further, the Cross-Section Heteroskedasticity LR Test uses the Likelihood Ratio (LR) method to assess whether the residuals from the regression model are homoskedastic. The p-value of 0.0000 indicates strong statistical significance, leading to the rejection of the null hypothesis of homoskedasticity. Consequently, Period weights and Period-Weighted Panel-Corrected Standard Errors (PCSE) were applied, while the hypotheses were tested using Panel Estimated Generalized Least Squares (EGLS) to ensure efficient and reliable parameter estimates.

Table 4: Regression Analysis Result

Method: Panel EGLS (Period weights)				
Linear estimation after one-step weighting matrix				
Period weights (PCSE) standard errors & covariance (d.f. corrected)				
Variables	Coefficient	Std. Error	t-Statistic	Prob.
LEV	0.000168	0.005350	0.031394	0.9750
FSZ	0.112244	0.046888	2.393844	0.0195
ACS	-0.075598	0.023584	-3.205536	0.0021
C	-0.365842	0.365690	-1.000415	0.3208
Weighted Statistics				
R-squared	0.151486	Mean dependent var		0.119780
Adjusted R-squared	0.112917	S.D. dependent var		0.243161
S.E. of regression	0.236852	Sum squared resid		3.702515
F-statistic	3.927676	Durbin-Watson stat		1.693494
Prob(F-statistic)	0.012154			

Source: Authors' Computation E-Views 10.0

As presented in Table 4, the overall validity and robustness of the model were confirmed through a statistically significant F-statistic probability value of 0.0122, which is below the 5% threshold, confirming that the joint inclusion of leverage, firm size, and audit committee size significantly explains variations in effluent disclosure levels among listed oil and gas firms in Nigeria. Additionally, the Durbin-Watson statistic of 1.693 suggests no strong evidence of serial correlation in the residuals, thereby enhancing the efficiency and reliability of the coefficient estimates. Hence, the model is deemed statistically sound for inference.

B) Discussion of Findings

The regression results as presented in table 4 reveal that leverage has an insignificant effect on effluent disclosure suggests that a firm's capital structure and dependence on external debt do not play a meaningful role in shaping environmental transparency practices within the Nigerian oil and gas sector, as environmental disclosure is more likely driven by regulatory and reputational concerns than by debt-financing decisions, while debt providers in emerging markets may lack ESG-focused screening protocols. This result aligns with Ndukwe and John (2015), Dibia and Onwuchekwa (2015), Iyafekhe *et al.* (2020), and Handoyo and Angela (2021), although it contrasts with Salawu *et al.* (2021) and Kalash (2020). Further, the significant positive effect of firm size on effluent disclosure implies that larger firms are more likely to disclose environmental information because they face greater scrutiny and possess the administrative capacity and internal systems necessary to report environmental data, corroborating studies conducted by Nyikwagh and Igyuse (2025), Setyorini and Ishak (2012), Uyagu *et al.* (2017), Ohidoa *et al.* (2016), Adekanmi (2022), and Onuoha and Okoye (2024), despite contrasting findings by Ebiringa *et al.* (2013) and Ofoegbu and Megbuluba (2016). Moreover, the finding that audit committee size has a significant negative effect on effluent disclosure implies that larger audit committees may be less effective due to coordination challenges, bureaucratic tendencies, and lack of ESG expertise, thereby suggesting that the quality, focus, and technical skill set of committee members matter more than size, consistent with Iyafekhe *et al.* (2020), Ndukwe and John (2015), Musa *et al.* (2015), and Atang and Eyisi (2020), although contrasting with Salawu *et al.* (2021).

V. CONCLUSION

This study, which is anchored on the effect of firm attributes on environmental effluent disclosure of listed oil and gas firms in Nigeria, concludes that while leverage has insignificant influence on effluent disclosure, firm size and audit committee structure are significant determinants of environmental transparency practices within the sector. Utilizing panel regression analysis complemented with heteroskedasticity and cross-sectional dependence tests as post-regression analytical tools, an approach that strengthens the robustness and reliability of the findings, the study highlights that larger firms are better positioned to undertake comprehensive environmental reporting due to greater visibility, stakeholder engagement,

administrative capacity, and resource availability. Conversely, the negative effect of audit committee size implies that expanded governance structures do not automatically translate into improved disclosure outcomes and may instead reflect inefficiencies, superficial compliance, and weak environmental oversight mechanisms. The findings suggest that environmental disclosure practices among listed oil and gas firms are shaped more by internal governance structure and organizational scale than by financial leverage or capital structure concerns. These findings are practically relevant to the study because they identify the firm and governance characteristics that should receive greater managerial and regulatory attention when developing policies aimed at improving transparency, quality, and accountability of effluent information disclosure in Nigeria's oil and gas industry. Consequently, the study recommends that ESG-conscious investors, creditors, banks, and institutional investors should integrate effluent disclosure into their environmental due diligence frameworks for financing and investment decisions in order to strengthen environmental accountability and sustainability transparency. Additionally, it advocates that senior executives and strategic planning units of oil and gas firms integrate effluent disclosure into enterprise risk management and sustainability strategies, while corporate governance regulators and board nomination committees should prioritize competence, environmental expertise, and functional effectiveness over numerical expansion in audit committee composition.

Interest Conflicts

There is no conflict of interest.

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VI. REFERENCES

- [1] R. Abdullah, Z. Ismail, and M. Smith, "Audit committees' involvement and the effects of quality in the internal audit function on corporate governance," *International Journal of Auditing*, vol. 22, no. 3, pp. 385–403, 2018.
- [2] H. Achraf, A. El-Ammari, and A. Bouri, "Impact of audit committee quality on the financial performance of conventional and Islamic banks," *Journal of Risk Financial Management*, vol. 14, no. 4, pp. 1–24, 2021.
- [3] P. Morris, L. Phalippou, and B. Wu, "How deadly is financial leverage? Evidence from care homes during the COVID-19 crisis," *Management Science*, vol. 72, no. 3, pp. 1769–1795, 2026.
- [4] A. D. Adekanmi, "Firm's attributes and sustainability reporting of listed non-financial firms Nigeria," *KIU Interdisciplinary Journal of Humanities and Social Sciences*, vol. 3, no. 1, pp. 346–366, 2022.
- [5] S. Adeniyi and H. O. Adebayo, "Effect of financial leverage on voluntary corporate social disclosure among listed firms on Nigerian Stock Exchange: A study of selected manufacturing firms," *Academic Journal of Economic Studies*, vol. 4, no. 3, pp. 18–24, 2018.
- [6] A. Adepoju, "Determinants of multidimensional poverty transitions among rural households in Nigeria," paper presented at the *Proceedings of the International Association of Agricultural Economists*, Vancouver, British Columbia, 2018.
- [7] O. O. Akinlo and O. O. Iredele, "Corporate environmental disclosures and market value of quoted companies in Nigeria," *The Business & Management Review*, vol. 5, no. 3, 2014.
- [8] W. Ali, J. G. Frynas, and Z. Mahmood, "Determinants of corporate social responsibility (CSR) disclosure in developed and developing countries: A literature review," *Corporate Social Responsibility and Environmental Management*, vol. 24, pp. 273–294, 2017.
- [9] M. Allegrini and G. Greco, "Corporate boards, audit committees and voluntary disclosure: Evidence from Italian listed companies," *Journal of Management and Governance*, vol. 15, no. 3, pp. 1–30, 2013.
- [10] F. A. Almaqtari, H. M. Al-Hattami, K. M. Al-Nuzaili, and M. A. Al-Bukhrani, "Corporate governance in India: A systematic review and synthesis for future research," *Cogent Business & Management*, vol. 7, no. 1, Art. no. 1803579, 2020.
- [11] A. E. Andriana and I. Anisykurlillah, "The effects of environmental performance, profit margin, firm size, and environmental disclosure on economic performance," *Accounting Analysis Journal*, vol. 8, no. 2, pp. 143–150, 2019.
- [12] P. Ane, "An assessment of the quality of environmental information disclosure of corporation in China," *Systems Engineers Procedia*, vol. 5, pp. 420–426, 2012.
- [13] F. E. Arong, C. I. Ezugwu, and M. I. Egbere, "Environmental cost management and profitability of oil sector in Nigeria," *Journal of Good Governance and Sustainable Development in Africa (JGGSDA)*, vol. 2, no. 2, pp. 181–192, 2014.
- [14] G. T. Atang and S. A. Eyisi, "Determinants of environmental disclosures of listed manufacturing firms in Nigeria," *International Journal of Management Studies and Social Science Research*, vol. 2, no. 1, pp. 1–8, 2020.
- [15] J. L. Bakare, I. Lambe, and O. J. Arumona, "Firm age and firm liquidity on environmental reporting of listed consumer goods companies in Nigeria," *International Journal of Business Management and Economic Review*, vol. 8, no. 1, pp. 66–78, 2025.
- [16] B. E. Bassey, S. O. Effiok, and E. O. Etun, "The impact of environmental accounting and reporting on organizational performance of selected oil and gas companies in Niger-Delta region of Nigeria," *Research Journal of Finance and Accounting*, vol. 4, no. 3, 2013.
- [17] C. Bello and L. Sensini, "Financing decisions in the hotel industry," *International Journal of Academic Research in Accounting, Finance and Management Sciences*, vol. 10, no. 2, pp. 9–14, 2020.
- [18] K. Bewley and Y. Li, "Disclosure of environmental information by Canadian manufacturing companies: A voluntary disclosure perspective," *Advances in Environmental Accounting and Management*, vol. 1, pp. 201–226, 2000.
- [19] G. Braam, L. Uit de Weerd, M. Harek, and M. Huijbregts, "Determinants of corporate environmental reporting: The importance of environmental performance and assurance," *Journal of Cleaner Production*, vol. 129, pp. 724–734, 2016.
- [20] S. Chouaibi and J. Chouaibi, "Social and ethical practices and firm value: The moderating effect of green innovation: Evidence from international ESG data," *International Journal of Ethics and Systems*, vol. 37, no. 3, pp. 442–465, 2021.
- [21] G. Chukwu and N. Nwabochi, "Audit committee characteristics and timeliness of corporate financial reporting in the Nigerian insurance industry," *International Journal of Managerial Studies and Research*, vol. 7, no. 4, pp. 86–95, 2019.
- [22] F. Darus, H. I. Zuki, and H. Yusoff, "The path to sustainability, understanding organizations' environmental initiatives and climate change in an emerging economy," *European Journal of Management and Business Economics*, vol. 29, no. 1, pp. 84–96, 2020.

- [23] N. Dibia and J. Onwuchekwa, "Determinants of environmental disclosures in Nigeria: A case study of oil and gas companies," *International Journal of Finance and Accounting*, vol. 4, no. 3, pp. 145–152, 2015.
- [24] J. Dyduch and J. Krasodomka, "Determinants of corporate social responsibility disclosure: An empirical study of Polish listed companies," *Journal of Sustainability*, pp. 1–24, 2017.
- [25] O. T. Ebiringa, E. Yadirichukwu, E. E. Chigbu, and O. J. Ogochukwu, "Effect of firm size and profitability on corporate social disclosures: The Nigerian oil and gas sector in focus," *British Journal of Economics, Management & Trade*, vol. 3, no. 4, pp. 563–574, 2013.
- [26] A. P. Egbunike and N. Tarilaye, "Firm's specific attributes and voluntary environmental disclosure in Nigeria: Evidence from listed manufacturing companies," *Academy of Accounting and Financial Studies Journal*, vol. 21, no. 3, pp. 1–9, 2017.
- [27] C. E. Ezeagba, J. Akamelu, and C. Umeoduagu, "Environmental accounting disclosures and financial performance: A study of selected food and beverage companies in Nigeria," *International Journal of Academic Research in Business and Social Sciences*, vol. 7, no. 9, pp. 162–174, 2017.
- [28] Y. Feng and F. He, "The effect of environmental information disclosure on environmental quality: Evidence from Chinese cities," *Journal of Cleaner Production*, vol. 276, Art. no. 124027, 2020.
- [29] M. T. Fulop, "The impact of audit committees on the performance of business entities," *Acta Polytechnica Hungarica*, vol. 16, no. 7, pp. 61–77, 2019.
- [30] M. Geerts, M. Dooms, and L. Stas, "Determinants of sustainability reporting in the present institutional context: The case of port managing bodies," *Sustainability*, vol. 13, Art. no. 3148, 2021.
- [31] M. Goto and T. Sueyoshi, "Sustainable development and corporate social responsibility in Japanese manufacturing companies," *Sustainable Development*, vol. 28, pp. 844–856, 2020.
- [32] S. Handoyo and P. Angela, "The determinants of environmental disclosure quality: Empirical evidence from Indonesia," *Journal of Accounting Auditing and Business*, vol. 4, no. 1, pp. 1–13, 2021.
- [33] S. Handoyo, S. Mulyani, E. K. Ghani, and S. Soedarsono, "Firm characteristics, business environment, strategic orientation, and performance," *Administrative Sciences*, vol. 13, no. 3, Art. no. 74, 2023.
- [34] R. M. Haniffa and T. E. Cooke, "Culture, corporate governance and disclosure in Malaysian corporations," *ABACUS*, vol. 38, no. 3, pp. 27–60, 2002.
- [35] M. H. Herold, "Demystifying the link between institutional theory and stakeholder theory in sustainability reporting," *Economics, Management and Sustainability*, vol. 3, pp. 6–19, 2018.
- [36] T. Hossain, M. Adams, and T. R. Walker, "Role of sustainability in global seaports," *Ocean & Coastal Management*, vol. 202, Art. no. 105435, 2021.
- [37] D. Z. Huang, "Environmental, social and governance (ESG) activity and firm performance: A review and consolidation," *Accounting & Finance*, vol. 61, pp. 335–360, 2021.
- [38] A. Intal and V. Diyanty, "The impact of political connections and the effectiveness of board of commissioner and audit committees on audit fees," *Australasian Accounting, Business and Finance Journal*, vol. 11, no. 7, pp. 53–70, 2017.
- [39] O. Isik, E. A. Unal, and Y. Unal, "The effect of firm size on profitability: Evidence from Turkish manufacturing sector," *Journal of Business, Economics and Finance*, vol. 6, no. 4, pp. 301–308, 2017.
- [40] C. Iyafekhe, O. A. Utomwen, I. Eguavoen, and N. O. Egbare, "Moderating effect of foreign-domestic ownership ratio on firm attributes and environmental disclosure in Nigerian oil and gas quoted companies," *Gusau Journal of Accounting and Finance*, vol. 1, no. 1, pp. 1–18, 2020.
- [41] I. Kalash, "Environmental disclosure: Determinants and effects on financial performance? Empirical evidence from Turkey," *Sosyoekonomi*, vol. 28, no. 46, pp. 95–115, 2020.
- [42] H. Khelif, A. Guidara, and M. Soussi, "Corporate social and environmental disclosure and corporate performance: Evidence from South Africa and Morocco," *Journal of Accounting in Emerging Economies*, vol. 5, no. 1, pp. 51–69, 2015.
- [43] G. Kiende and W. M. Karambu, "Effect of corporate environmental disclosure on financial performance of firms listed at Nairobi Securities Exchange, Kenya," *International Journal of Sustainability Management and Information Technologies*, vol. 2, no. 1, pp. 1–6, 2016.
- [44] C. R. Kothari and G. Garg, *Research Methodology: Methods and Techniques*. New Delhi, India: New Age International Publishers, 2014.
- [45] K. Levin and T. Fransen, "Understanding the 'emissions gap' in 5 charts," World Resources Institute Indonesia, Working Paper, 2017.
- [46] C. Li-Dang and C. Yang, "Measuring firm size in empirical corporate finance," *Journal of Banking & Finance*, vol. 86, pp. 159–176, 2018.
- [47] S. J. Musa, P. Teru, and M. Bakar, "Environmental accounting disclosure practice of Nigerian quoted firms," *Research Journal of Finance and Accounting*, vol. 6, no. 22, pp. 31–36, 2015.
- [48] O. D. Ndukwe and C. O. John, "Determinants of environmental disclosures in Nigeria: A case study of oil and gas companies," *International Journal of Finance and Accounting*, 2015.
- [49] N. Nkwoji, "Environmental accounting and profitability of selected quoted oil and gas companies in Nigeria," *Journal of Accounting and Financial Management*, vol. 7, no. 3, pp. 22–39, 2021.
- [50] M. N. Norhasimah, A. S. Norhabibi, A. Nor-Amiera, Q. A. Sheh-Muhammad, Sheh-Kamal, and M. A. Inalialah, "The effects of environmental disclosure on financial profitability in Malaysia," *Procedia Economics and Finance*, vol. 35, no. 4, pp. 117–126, 2016.
- [51] T. E. Notteboom and H. E. Haralambides, "Port management and governance in a post-COVID-19 era: Quo vadis?" *Maritime Economics & Logistics*, vol. 22, pp. 329–352, 2020.
- [52] T. Nyikwagh and S. Igyuse, "Effect of firm attributes on environmental disclosure of listed oil and gas firms in Nigeria," *UMM Journal of Accounting and Financial Management*, vol. 5, no. 1, pp. 192–201, 2025.
- [53] G. N. Ofoegbu and A. T. Megbuluba, "Corporate environmental accounting information disclosure in the Nigerian manufacturing firms," *International Journal of Management Sciences and Business Research*, vol. 5, no. 12, pp. 208–220, 2016.
- [54] G. N. Ofoegbu, N. Odoemelam, and R. G. Okafor, "Corporate board characteristics and environmental disclosure quantity: Evidence from South Africa (integrated reporting) and Nigeria (traditional reporting)," *Cogent Business & Management*, vol. 5, no. 1, Art. no. 1551510, 2018.
- [55] T. Ohioa, O. O. Omokhudu, and I. A. Oserogho, "Determinants of environmental disclosure," *International Journal of Advanced Academic Research: Social & Management Sciences*, vol. 2, no. 8, 2016.
- [56] O. O. Okafor, G. O. Nworie, and M. H. Onyebuchi, "Assessing financial returns through environmental responsibility disclosure among listed oil and gas firms in Nigeria," *International Journal of Research Publication and Reviews*, vol. 5, no. 4, pp. 545–557, 2024.
- [57] F. A. Okoye and G. Ikhu-Omorogbe, "The influence of company size on environmental accounting disclosure in Nigerian manufacturing sector," *Accounting Frontier*, vol. 5, no. 3, pp. 40–47, 2014.
- [58] A. Olagunju, T. E. Oloredo, A. A. Aderemi, T. M. Oladejo, and W. A. Lamidi, "Influence of firm attributes and governance on the quality of sustainability reports of Nigerian deposit money banks," *Istanbul Business Research*, vol. 54, no. 1, pp. 23–37, 2025.
- [59] J. Omar, "Determinants of corporate environmental disclosure on websites," *Universal Journal of Accounting and Finance*, vol. 2, no. 4, pp. 77–87, 2014.
- [60] N. E. Onuoha and G. O. Okoye, "Determinants of environmental sustainability information disclosure in developing countries: A literature review," *Multidisciplinary Journal of Vocational Education & Research*, vol. 6, no. 1, 2024.

- [61] G. E. Oyedokun, E. Egberioyinemi, and A. Tonademukaila, "Environmental accounting disclosure and firm value of industrial goods companies in Nigeria," *IOSR Journal of Economics and Finance (IOSR-JEF)*, vol. 10, no. 1, pp. 7–27, 2019.
- [62] A. O. Oyelade, "The impact of firm size on firm's performance in Nigeria: A comparative study of selected firms in the building industry in Nigeria," *Asian Development Policy Review*, vol. 7, no. 1, pp. 1–11, 2019.
- [63] M. A. Salawu, S. Mamman, M. T. Dahiru, A. Garba, and N. Yunusa, "Firm-specific attributes and environmental disclosure of listed oil and gas firms in Nigeria," *Global Journal Accounting*, vol. 7, no. 1, pp. 1–14, 2021.
- [64] K. Sam, S. Pegg, and A. O. Oladejo, "Mining from the pipeline: Artisanal oil refining as a consequence of failed CSR policies in the Niger Delta," *Journal of Environmental Management*, vol. 352, Art. no. 120038, 2024.
- [65] C. Sansone, P. Hilletoft, and D. Eriksson, "Critical operations capabilities for competitive manufacturing: A systematic review," *Industrial Management & Data Systems*, vol. 117, no. 5, pp. 801–837, 2017.
- [66] S. Sarumpaet, M. L. Nelwan, and D. N. Dewi, "The value relevance of environmental performance: Evidence from Indonesia," *Social Responsibility Journal*, vol. 13, no. 4, pp. 817–827, 2017.
- [67] J. Senn and S. Giordano-Spring, "The limits of environmental accounting disclosure: Enforcement of regulations, standards and interpretative strategies," *Accounting, Auditing & Accountability Journal*, vol. 33, pp. 1367–1393, 2020.
- [68] L. Sensini, "Factors driving capital structure of Italian SME," *International Business Management*, vol. 14, no. 7, pp. 217–225, 2020.
- [69] C. T. Setyorini and Z. Ishaq, "Corporate social and environmental disclosure," *International Journal of Business and Social Science*, vol. 3, no. 9, pp. 152–164, 2012.
- [70] M. S. Shabbir and O. Wisdom, "The relationship between corporate social responsibility, environmental investments and financial performance: Evidence from manufacturing companies," *Environmental Science and Pollution Research*, vol. 27, pp. 39946–39957, 2020.
- [71] B. Solikhah and U. Maulina, "Factors influencing environment disclosure quality and the moderating role of corporate governance," *Cogent Business & Management*, vol. 8, no. 1, pp. 1–18, 2021.
- [72] B. Solikhah, A. Wahyudin, and Subowo, "Carbon emissions of manufacturing companies in Indonesia Stock Exchange: A sustainable business perspective," *Journal of Physics: Conference Series*, vol. 1567, Art. no. 042086, 2020.
- [73] Y. Song, T. Feng, and W. Jiang, "The influence of green external integration on firm performance: Does firm size matter?" *Sustainability*, vol. 9, Art. no. 1328, 2017.
- [74] V. Tauringana, "Sustainability reporting adoption in developing countries: Managerial perception-based determinants evidence from Uganda," *Journal of Accounting in Emerging Economies*, vol. 11, no. 2, pp. 149–175, 2021.
- [75] M. Temple, "The impact of audit committee size on the quality of financial reporting in quoted Nigerian banks," *International Journal of Advanced Academic Research: Social and Management Science*, vol. 2, no. 5, pp. 1–13, 2019.
- [76] E. J. Udo, "Environmental accounting disclosure practices in annual reports of listed oil and gas companies in Nigeria," *International Journal of Accounting and Finance*, vol. 8, no. 1, pp. 1–20, 2019.
- [77] U. Uwuijbe and J. Jimoh, "Corporate environmental disclosures in the Nigerian manufacturing industry: A study of selected firms," *An International Multidisciplinary Journal*, vol. 6, no. 3, pp. 71–83, 2012.
- [78] D. B. Uyagu, J. Okpanachi, T. Nyor, and L. M. Muhammad, "Effect of firm characteristics on environmental reporting practices of listed manufacturing firms in Nigeria," *Nigerian Journal of Management Sciences*, vol. 6, no. 1, pp. 139–148, 2017.
- [79] L. Vander-Lugt, P. De-Langen, and L. Hagdorn, "Beyond the landlord: Worldwide empirical analysis of port authority strategies," *International Journal of Shipping and Transport Logistics*, vol. 7, pp. 570–596, 2015.
- [80] T. Van-Ha, A. Sibghatullah, S. Soo-Chae, and T. M. Aldeehani, "The impact of environmental and social disclosure on earnings persistence," *International Journal of Energy Economics and Policy*, vol. 10, no. 6, pp. 690–696, 2020.
- [81] T. T. Vu and W. V. T. Dang, "Environmental commitment and firm financial performance: A moderated mediation study of environmental collaboration with suppliers and CEO gender," *International Journal of Ethics and Systems*, vol. 37, pp. 53–69, 2020.
- [82] A. Wahyuningsih and N. M. Mahdar, "Pengaruh size, leverage dan profitabilitas terhadap pengungkapan CSR pada perusahaan manufaktur yang terdaftar di Bursa Efek Indonesia," *Jurnal Bisnis Dan Komunikasi*, vol. 5, no. 1, pp. 27–36, 2018.
- [83] X. Wu, D. Dluhošová, and Z. Zmeškal, "Corporate social responsibility and profitability: The moderating role of firm type in Chinese appliance listed companies," *Energies*, vol. 14, Art. no. 227, 2021.
- [84] A. Yusuf, "Dynamic effects of energy consumption, economic growth, international trade and urbanization on environmental degradation in Nigeria," *Energy Strategy Reviews*, vol. 50, Art. no. 101228, 2023.
- [85] Z. B. Zhang, "Public participation, regulatory information disclosure and urban environmental governance: Based on panel data analysis of 35 key cities," *Theory and Practice of Finance and Economics*, vol. 42, pp. 109–116, 2021.
- [86] M. A. Zraiq and F. H. Fadzil, "The impact of audit committee characteristics on firm performance: Evidence from Jordan," *Scholars Journal of Applied Sciences and Research*, vol. 1, no. 5, pp. 39–42, 2018.