

Unveiling the Green Truth: How Ownership structure and Board Dynamics Shape Environmental Disclosure in Nigerian Listed Oil and Gas Firms

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ARTICLE INFORMATION

Article history:

Published: October 2026

Keywords:

Board Dynamics
Environmental Disclosure
Green Truth
Listed Oil and Gas Firms

ABSTRACT

This study investigates the impact of ownership structure—focusing on institutional ownership and ownership concentration—and board characteristics—measured by board diversity, board independence, and board size—on environmental disclosure among listed oil and gas companies in Nigeria from 2015 to 2024. Employing a binary logistic regression model, the study analyzes the influence of these governance mechanisms on the likelihood of disclosing environmental information. Data were sourced from annual reports and sustainability disclosures of oil and gas firms listed on the Nigerian Exchange Group. The governance variables were measured as proportions relative to board composition and ownership structure. Prior to regression, diagnostic tests such as descriptive statistics, correlation analysis, Variance Inflation Factor (VIF), and the Hosmer-Lemeshow goodness-of-fit test were conducted to validate the model's integrity. Findings reveal that all variables are statistically significant in explaining environmental disclosure practices. Institutional ownership, board diversity, and board independence show positive and significant effects, suggesting that external monitoring and board competence play vital roles in promoting transparency. Conversely, ownership concentration and board size exhibit negative but significant effects, indicating that dominant ownership and excessively large boards may hinder sustainability accountability. The study highlights the relevance of good corporate governance in fostering environmental responsibility in Nigeria's oil and gas sector. It recommends policies that encourage institutional participation, strengthen board independence, and discourage excessive ownership control or oversized boards to enhance environmental transparency.

1. Introduction

The increasing global attention toward environmental sustainability has heightened the demand for transparency and accountability from firms, particularly in high-impact industries such as oil and gas. Across the globe, environmental disclosure has evolved into a critical mechanism through which firms communicate their environmental policies, impacts, and performance to stakeholders. In advanced economies, frameworks such as the Global Reporting Initiative (GRI), the Sustainability Accounting Standards Board (SASB), and the Task Force on Climate-related Financial Disclosures (TCFD) have guided the increasing standardization of environmental reporting. Firms in countries such as Norway, the United States, and the United Kingdom have integrated sustainability disclosure as a strategic tool to not only fulfill regulatory obligations but also to demonstrate ethical commitment and manage stakeholder perceptions (Hummel & Schlick, 2021). The governance structure of these firms—particularly board characteristics and ownership composition—has been found to significantly shape the depth and credibility of environmental disclosures, with more diverse and independent boards pushing for increased transparency (Atif et al., 2020).

Regionally, within Sub-Saharan Africa, the integration of environmental considerations into corporate reporting remains uneven and underdeveloped. Although several countries, including South Africa, have made significant strides through the adoption of mandatory Integrated Reporting (IR) frameworks, most other economies still operate within voluntary or weakly enforced disclosure regimes (Maroun, 2020). The African corporate governance landscape often grapples with challenges such as ownership concentration, weak regulatory institutions, and limited enforcement capacity. These challenges have implications for how effectively firms disclose environmental information, particularly in extractive sectors like oil and gas where environmental externalities are substantial. Empirical studies across emerging African markets suggest that the structure of board governance and ownership configuration often influences the transparency and accountability of corporate environmental practices (Okpala, 2022). Board independence and diversity, for instance, are argued to foster objectivity and the inclusion of varied stakeholder perspectives, which in turn could enhance disclosure practices. However, evidence also suggests that entrenched ownership and dominant shareholders may either constrain or strategically shape disclosure in ways that serve their interests (Mgbame et al., 2023).

Locally, in Nigeria, the oil and gas sector represents the most economically significant but environmentally contentious industry. The Niger Delta region, which hosts most of Nigeria's petroleum reserves, continues to suffer from oil spills, gas flaring, and environmental degradation despite various policy and legal frameworks aimed at mitigating ecological harm. Regulatory agencies such as the National Environmental Standards and Regulations Enforcement Agency (NESREA) and the Nigerian Upstream Petroleum Regulatory Commission (NUPRC) have promulgated several environmental compliance mandates. Yet, the enforcement remains relatively weak, and environmental disclosure is still largely voluntary (Onyekwelu & Uche, 2021). Oil and gas firms listed

on the Nigerian Exchange Group (NGX) have been inconsistent in their environmental reporting, with significant variations in the quality and scope of disclosures. Recent evidence indicates that while some companies make strategic environmental disclosures to maintain legitimacy and investor confidence, others provide minimal or symbolic disclosures to fulfill formal requirements without substantive environmental commitment (Iredele & Fagboro, 2022). Corporate governance mechanisms, particularly ownership structure and board characteristics, are increasingly being implicated in the variation of these disclosures.

Institutional ownership is believed to influence environmental transparency due to the monitoring role institutional investors often play. Their presence may compel firms to be more forthcoming in their environmental responsibilities to attract and retain socially responsible investments. Similarly, ownership concentration can have dual effects—either enhancing monitoring effectiveness or enabling controlling shareholders to suppress unfavorable information (Abubakar & Bala, 2023). Board diversity, encompassing gender and ethnic variety, has the potential to introduce broader environmental perspectives and values into boardroom discussions, while board independence ensures oversight and accountability. Board size may also affect disclosure quality depending on how efficiently it functions, with larger boards providing a wider pool of expertise but potentially facing coordination challenges. Despite the theorized importance of these governance attributes, empirical insights within the Nigerian context, particularly in the oil and gas sector, remain scarce, fragmented, and often contradictory.

The problem underlying this study, therefore, is the persistent lack of uniformity, depth, and reliability in the environmental disclosures of listed oil and gas firms in Nigeria, despite growing stakeholder demands for greater transparency. The inadequacy of environmental reporting undermines stakeholders' ability to assess the sustainability practices and environmental risks associated with these firms. Although existing studies have examined the nexus between corporate governance and environmental disclosure, many have focused on general manufacturing or financial sectors, with limited attention to oil and gas firms—despite their higher environmental exposure. More so, there exists a significant methodological gap in the literature. Many studies have employed linear regression techniques that treat environmental disclosure as a continuous variable, ignoring the fact that, in many settings, environmental disclosure can be more accurately represented as a binary outcome—either a firm discloses environmental information or it does not. This misalignment often leads to biased estimation and weak policy implications. The underutilization of binary regression techniques—such as logistic or probit models—which are more appropriate for analyzing dichotomous disclosure behavior, limits the ability of prior research to fully capture the discrete nature of the reporting decision and the factors that influence it.

The motivation for this study stems from the confluence of global, regional, and local imperatives to deepen environmental accountability in corporate reporting, especially in ecologically sensitive sectors. Understanding how governance mechanisms—specifically ownership structures and board characteristics—affect the level of environmental disclosure offers a strategic lens through which stakeholders can assess and influence corporate sustainability behaviors. Furthermore, this study seeks to bridge the identified methodological gap by employing a binary regression modeling approach that reflects the actual reporting behavior of firms—whether or not they disclose environmental information—and to explore how firm-level governance attributes shape this decision. By focusing on oil and gas firms listed on the Nigerian Exchange Group, the study is well-positioned to contribute empirical evidence that can inform regulatory reforms, guide investors' decisions, and promote more sustainable corporate behavior in Nigeria's most environmentally impactful sector.

2. Literature Review

2.1 Institutional Ownership

Institutional ownership refers to the shareholding held by large institutional investors such as mutual funds, pension funds, insurance companies, and sovereign wealth funds. These investors are generally perceived as sophisticated stakeholders with significant financial resources and analytical capacity, which places them in a strong position to influence the strategic direction and governance practices of investee firms. Unlike retail shareholders, institutional investors are believed to have stronger incentives and the ability to monitor management effectively, given their long-term orientation and desire to mitigate reputational and environmental risks (Abubakar & Bala, 2023). As a result, they are more likely to pressure firms to adhere to ethical standards, disclose environmental risks, and adopt sustainable practices.

The presence of institutional investors may influence corporate transparency through direct or indirect channels. Directly, institutional shareholders can exert voting power, propose environmental initiatives, and influence board appointments that align with ESG (Environmental, Social, and Governance) values. Indirectly, they can signal the importance of environmental accountability through engagement and dialogue with management. The resource dependency and stakeholder theories suggest that firms reliant on external capital are more likely to align with the expectations of institutional investors by enhancing non-financial disclosure, including environmental reporting. Several empirical studies in both developed and emerging markets have found a positive association between institutional ownership and the extent of environmental disclosure (Liu et al., 2020; Salehi et al., 2021). However, the influence of institutional ownership may be context-dependent. In weak institutional environments, such as Nigeria, where enforcement mechanisms are less robust, the pressure from institutional investors may be diluted. Moreover, not all institutional investors have the same preferences; some are passive and short-term in orientation, while others are more activist and socially conscious. Thus, this study conceptualises institutional ownership as the proportion of equity held by institutional investors and posits that its presence is likely to influence the firm's environmental disclosure practices in the Nigerian oil and gas sector. Understanding the nature and role of institutional ownership provides insight into how capital market dynamics can shape sustainability accountability in high-impact industries.

2.2 Ownership Concentration

Ownership concentration refers to the degree to which a small number of shareholders own a large proportion of a company's equity. In highly concentrated ownership structures, dominant shareholders may wield significant control over strategic and operational decisions, including those related to sustainability and disclosure. This concentrated control could be held by families, government

entities, or large institutional blocs. According to agency theory, while concentrated ownership can reduce the classical separation between ownership and control, it may also lead to principal–principal conflicts, especially in emerging economies where legal protection for minority shareholders is weak (Mgbame et al., 2023). This can have profound implications for transparency and the extent of environmental disclosure.

In contexts where dominant shareholders prioritize private benefits over corporate accountability, environmental disclosure may be minimized to avoid regulatory scrutiny or the disclosure of potentially value-damaging environmental liabilities. On the other hand, concentrated ownership could lead to better oversight and disclosure if controlling shareholders are aligned with long-term value creation and reputational risk management. Thus, the effect of ownership concentration on environmental disclosure is ambiguous and may depend on the identity, objectives, and governance philosophies of the dominant shareholders (Aliyu et al., 2022). Empirical evidence has produced mixed results, with some studies indicating a negative relationship while others show a positive or insignificant association. Given the peculiarities of the Nigerian corporate landscape—characterized by high ownership concentration, weak regulatory enforcement, and limited stakeholder activism—it becomes important to examine how concentrated ownership affects environmental reporting. This study conceptualises ownership concentration as the percentage of shares held by the top five shareholders. It seeks to understand whether these concentrated shareholders act as enablers or inhibitors of environmental accountability among listed oil and gas firms. The examination of ownership concentration is thus essential for disentangling the power dynamics behind sustainability reporting in Nigeria’s extractive industries.

2.3 Board Diversity

Board diversity encompasses the variety of attributes represented among board members, including gender, ethnicity, educational background, age, and professional experience. A diverse board is expected to bring multiple perspectives, enhance the depth of deliberation, and reduce groupthink in strategic decision-making. According to resource dependency theory, diversity enriches the board’s cognitive base and enhances its ability to engage with complex, multidimensional issues such as environmental sustainability. Gender diversity, in particular, has been widely studied, with growing evidence indicating that the inclusion of women on corporate boards enhances firms’ engagement with CSR and sustainability disclosure (Atif et al., 2020).

Incorporating members from different cultural and professional backgrounds can improve board sensitivity to external environmental expectations and stakeholder concerns. Diverse boards may be more inclined to advocate for transparency and accountability due to increased representation of stakeholder interests and ethical values. Studies have shown that gender-diverse and professionally heterogeneous boards are more likely to champion environmental initiatives and improve ESG disclosure quality (Jizi, 2017; Fauzi et al., 2023). This is particularly relevant in industries like oil and gas where environmental impacts are significant, and stakeholder scrutiny is high.

Despite growing attention to diversity, Nigerian corporate boards remain relatively homogenous, with limited female representation and concentration of membership among individuals with similar ethnic and professional backgrounds. This study conceptualises board diversity as the proportion of female directors. By focusing on diversity, the study explores how heterogeneity in board composition influences the firm’s willingness and capacity to engage in environmental disclosure. Understanding the role of board diversity is key to informing corporate governance reforms that promote sustainability in Nigeria’s oil and gas sector.

2.4 Board Independence

Board independence refers to the proportion of directors on the board who are non-executive and free from any material or pecuniary relationship with the firm or its management. Independent directors are expected to provide objective oversight and challenge managerial decisions that may not align with shareholder or societal interests. From an agency theory perspective, independent directors serve as a critical governance mechanism to mitigate conflicts of interest, monitor managerial opportunism, and promote greater corporate transparency (Iredele & Fagboro, 2022). This objectivity is particularly crucial in disclosure decisions where managers may seek to withhold information on environmentally sensitive issues.

Independent boards are more likely to promote ethical conduct and compliance with environmental regulations. Empirical studies have found that the presence of independent directors is positively associated with sustainability reporting, particularly in firms exposed to environmental risk (Hussain et al., 2018). Independent directors may demand higher environmental accountability as a means of reducing litigation risks and reputational damage. This is especially relevant for oil and gas companies operating in regions where environmental degradation and regulatory breaches have attracted public concern.

However, in emerging economies like Nigeria, the effectiveness of board independence is often compromised by institutional weaknesses such as regulatory capture, cronyism, and the recycling of board appointments among a closed elite. Despite formal independence, many directors may lack the capacity or incentive to hold management accountable on environmental matters. This study therefore conceptualises board independence as the proportion of non-executive directors on the board and seeks to determine its impact on the firm’s environmental disclosure. The examination of this variable contributes to understanding how board structure and independence influence sustainability governance in a high-risk sector.

2.4 Board Size

Board size is defined as the total number of directors constituting the board of a firm. The optimal board size remains a debated issue in corporate governance literature. A larger board may offer a broader range of skills, knowledge, and perspectives that can enhance strategic oversight and improve a firm’s responsiveness to complex issues like environmental sustainability. Larger boards are also more likely to have dedicated committees or substructures that specialize in CSR or environmental matters. As such, board size could influence the volume and quality of environmental disclosures made by firms (Okpala, 2022).

Nevertheless, the benefits of larger boards may be offset by coordination challenges, reduced accountability, and slower decision-making. When boards become too large, communication inefficiencies and diluted responsibility may limit their ability to influence

managerial behavior effectively. Empirical studies offer mixed findings, with some suggesting a positive effect of board size on sustainability reporting, while others report no significant or even negative relationships (Habbash & Alghamdi, 2021). These inconsistencies highlight the need to examine the contextual factors, including industry characteristics and national governance quality, that moderate the effect of board size on disclosure practices.

In the Nigerian oil and gas sector, board structures vary widely in size, composition, and function. Given the environmental externalities and social license challenges faced by these firms, it is imperative to assess whether larger boards contribute to greater environmental transparency or merely increase bureaucratic complexity. This study conceptualises board size as the total number of directors on a firm's board and investigates its relationship with the firm's environmental disclosure level. This analysis provides insights into the structural attributes of governance that promote or hinder sustainability communication in Nigeria's extractive industries.

2.5 Environmental Disclosure

Environmental disclosure refers to the provision of information by firms regarding their environmental performance, policies, risks, and sustainability initiatives. It encompasses both qualitative and quantitative data related to carbon emissions, energy use, waste management, water conservation, biodiversity, and compliance with environmental laws and standards. Environmental disclosure can be voluntary or mandatory and is typically found in annual reports, standalone sustainability reports, or integrated reports. It serves as a critical mechanism for accountability, stakeholder engagement, and signaling responsible environmental stewardship (Hummel & Schlick, 2021).

From the stakeholder theory perspective, firms are under increasing pressure to disclose their environmental practices to meet the expectations of regulators, investors, communities, and civil society organizations. In industries such as oil and gas, where environmental impacts are severe and visible, firms may adopt disclosure as a reputational risk management tool. Moreover, increased global focus on ESG investing and climate change mitigation has heightened the demand for transparent environmental reporting. The Global Reporting Initiative (GRI) and the Sustainability Accounting Standards Board (SASB) have developed widely adopted guidelines to standardize such disclosures across industries and jurisdictions.

In Nigeria, environmental disclosure remains largely voluntary and underdeveloped, with significant variation in the quality and extent of reporting among listed oil and gas firms. Weak enforcement mechanisms, lack of awareness, and low stakeholder pressure have contributed to poor sustainability transparency. This study conceptualises environmental disclosure as the extent to which firms provide environment-related information in their public disclosures, assessed using a content analysis index based on established sustainability reporting frameworks. By analyzing environmental disclosure as the dependent variable, the study seeks to uncover how internal governance mechanisms shape transparency and environmental accountability in Nigeria's most environmentally sensitive industry.

2.6 Ownership Structure, Board Dynamics and Environmental Disclosure

Al-Farooque and Ahlu (2021) explored how ownership structure and board attributes influence the level of environmental disclosure among publicly listed Australian firms. The study employed a quantitative research design using a panel data set of 175 firms listed on the Australian Securities Exchange (ASX) over five years. Ownership structure was proxied by institutional ownership and ownership concentration, while board characteristics included board independence, gender diversity, and board size. Environmental disclosure was measured using content analysis of sustainability reports benchmarked against the Global Reporting Initiative (GRI) framework. The study used multiple regression analysis to determine the relationships. Findings revealed that institutional ownership positively and significantly affects the extent of environmental disclosure, while ownership concentration showed a negative effect. Board independence and gender diversity were both significant predictors of increased environmental disclosure, while board size showed a nonlinear relationship. A major critique of the study is its focus on a single country with relatively mature institutional frameworks, which may limit generalizability to emerging markets. Moreover, while the methodology is rigorous, the study did not address potential endogeneity between governance variables and disclosure, which could bias estimates. Muttakin, et al. (2018) conducted a study on 143 firms listed on the Dhaka Stock Exchange in Bangladesh to examine how ownership and board capital influence corporate social responsibility (CSR) disclosures, with environmental disclosure as a key component. The study used content analysis of annual reports and applied ordinary least squares regression to analyze the effect of institutional ownership and board diversity (measured by gender and professional expertise) on CSR reporting. The findings revealed that institutional ownership has a significant positive effect on environmental disclosure, while concentrated ownership is negatively associated with such practices. Board diversity was also positively related to the disclosure level, particularly when female and financially literate members were present on the board. One limitation of this study is its reliance on CSR reporting rather than isolating environmental dimensions, which could dilute the specificity of the results. Furthermore, it uses cross-sectional data, making it difficult to infer causality or dynamic relationships over time.

Shamil, et al. (2019) analyzed the role of corporate governance mechanisms on the extent of environmental disclosures in Malaysia using a sample of 150 firms over a three-year period. The authors used a content analysis of corporate sustainability reports and regressed environmental disclosure scores against governance indicators such as board independence, gender diversity, board size, institutional ownership, and family ownership (as a proxy for ownership concentration). The study found that board independence and gender diversity are positively associated with higher levels of environmental disclosure. In contrast, high ownership concentration, particularly in family-owned firms, was negatively related to disclosure transparency. Institutional ownership had a weaker but still positive effect. The study employed panel data regression techniques but failed to consider endogeneity or dynamic modeling techniques. This weakens causal inference and potentially overlooks feedback effects between disclosure practices and governance structure.

Alotaibi and Hussainey (2022) assessed the influence of corporate governance on environmental disclosure in Saudi Arabia using 120 non-financial listed firms over a four-year period. The study incorporated board characteristics (board size, independence, and gender diversity) and ownership structure (institutional and family ownership) as explanatory variables. Environmental disclosure was evaluated using a self-constructed index aligned with GRI indicators. The authors employed a panel data regression model and

reported that institutional ownership and board independence positively influenced environmental disclosure. However, board size showed an insignificant effect, and ownership concentration (proxied by family ownership) had a strong negative influence. While the study contributed valuable insights into governance mechanisms in a developing country with unique institutional settings, it failed to incorporate advanced econometric techniques to account for endogeneity or multicollinearity. The static panel model used may have overlooked dynamic effects critical to understanding governance-disclosure dynamics in emerging economies.

Khan, et al. (2020) explored corporate governance and CSR disclosures using data from 110 publicly traded firms in Pakistan. The study employed a content analysis of annual and sustainability reports and used panel least squares regression to estimate the effects of institutional ownership, board independence, and board diversity on environmental disclosure. The results confirmed that institutional ownership and board independence are positively associated with higher levels of disclosure. However, ownership concentration significantly reduced disclosure practices, suggesting entrenched ownership reduces transparency. Gender diversity on the board also had a significant positive effect, supporting the notion that diverse boards are more socially and environmentally responsive. The study, however, did not address time dynamics in the ownership–disclosure relationship nor test for non-linear or interaction effects among board characteristics.

Orazalin and Mahmood (2019) investigated determinants of sustainability reporting in Kazakhstan using a sample of 114 firms over five years. The study focused on GRI-based environmental disclosure and examined the impact of governance variables, including institutional ownership, ownership concentration, board independence, board diversity, and board size. They used content analysis to derive disclosure scores and employed panel data regression models. Their findings show that institutional ownership, board independence, and gender diversity were significant positive predictors of environmental disclosure, while ownership concentration hindered transparency. The study provided an important emerging-market perspective but suffered from methodological limitations, particularly its failure to account for reverse causality between environmental disclosure and firm governance structure. Moreover, it did not explore whether combinations of governance variables (e.g., diversity and size) might have synergistic or offsetting effects.

2.7 Agency Theory

Agency Theory, originally developed by Jensen and Meckling (1976), explains the relationship between principals (owners/shareholders) and agents (managers). The central concern of this theory is the potential conflict of interest between these two parties. In the context of corporate governance and environmental disclosure, Agency Theory posits that the separation of ownership and control can lead managers to act in their own interest rather than in the interest of shareholders, possibly leading to reduced transparency and limited voluntary disclosure such as on environmental issues.

Ownership structure plays a significant role in mitigating agency problems. For instance, institutional ownership tends to exert greater pressure on management to disclose more information, including environmental practices, as institutional investors often prioritize long-term value and reputational risk management. Ownership concentration can also lead to more effective monitoring, although excessively concentrated ownership may result in dominant shareholders prioritizing their private interests over broader stakeholder concerns, which could negatively affect disclosure levels.

Board characteristics are likewise grounded in Agency Theory. An independent board is expected to effectively monitor management, reducing agency costs and improving transparency, including in areas like environmental disclosure. Similarly, board diversity introduces varied perspectives and reduces groupthink, which enhances board effectiveness in demanding broader and more responsible corporate reporting. A larger board size, if not unwieldy, can also improve oversight and governance quality by providing a broader range of expertise and scrutiny.

Thus, Agency Theory provides a strong conceptual foundation for explaining how variations in governance mechanisms—via ownership and board structures—affect a firm's commitment to voluntary disclosures, particularly those related to environmental performance and sustainability. It emphasizes the importance of aligning managerial behavior with shareholder and stakeholder interests through effective governance mechanisms.

3. Methodology

This study adopts an ex-post facto research design. This design is appropriate because it enables the investigation of cause-and-effect relationships using historical data without manipulating the variables. Specifically, the study seeks to examine the extent to which corporate governance variables comprising ownership structure and board characteristics influence environmental disclosure practices among listed oil and gas firms in Nigeria. Since the data to be analyzed already exist in corporate annual reports and sustainability disclosures, an ex-post facto design allows for an objective and systematic analysis of governance structures as they relate to transparency in environmental reporting.

The population of this study consists of all oil and gas companies listed on the Nigerian Exchange Group (NGX) as at the end of the 2024 financial year. As of that time, twelve (12) oil and gas firms were actively listed. Given the relatively small size of the population, a census approach is adopted, involving the inclusion of all twelve firms in the sample. This approach ensures full coverage of the sector and improves the external validity of the findings. The study covers a ten-year period from 2015 to 2024. This timeframe is considered adequate for observing trends, consistency, and shifts in both environmental disclosure practices and corporate governance arrangements within the industry. The ten-year span also accommodates recent regulatory shifts and global environmental pressures that may have influenced firms' disclosure behaviors.

For the purpose of analysis, the study utilizes binary logistic regression. This technique is well-suited to the nature of the dependent variable—environmental disclosure—which is measured as a binary outcome. Specifically, companies are coded "1" if they disclose environmental information in a particular year, and "0" if they do not. Logistic regression is therefore appropriate because it models the probability of disclosure occurring as a function of corporate governance variables. The use of this technique helps in estimating the odds of disclosure with respect to different board and ownership characteristics, and allows for statistical inference regarding the contribution of each governance mechanism to disclosure behavior.

The model for the study is specified in the following functional form:

$$ED_{it} = \beta_0 + \beta_1 INST_{it} + \beta_2 OWNCON_{it} + \beta_3 BDIV_{it} + \beta_4 BIND_{it} + \beta_5 BSIZE_{it} + \varepsilon_{it}$$

In this equation, ED represents environmental disclosure for firm *i* in year *t*, measured as a binary variable. INST is institutional ownership, proxied by the percentage of shares held by institutional investors. OWNCON stands for ownership concentration, measured as the proportion of equity held by the top five shareholders. BDIV represents board diversity, determined by the presence of female board members or diversity in professional/academic backgrounds. BIND denotes board independence, proxied by the proportion of independent non-executive directors relative to the total board membership. BSIZE refers to board size, measured by the total number of directors on the board. The error term, ε_{it} , captures random variations not explained by the independent variables. This model will be estimated using binary logistic regression, and its output will provide the likelihood of environmental disclosure based on each governance variable.

4. Result and Discussion

Table 1: Descriptive

Variable	Obs	Mean	Std. Dev.	Min	Max
ED	120	0.633	0.484	0	1
INST	120	0.488	0.179	0.124	0.896
OWNCON	120	0.551	0.146	0.251	0.872
BDIV	120	0.296	0.145	0	0.600
BIND	120	0.618	0.108	0.350	0.850
BSIZE	120	8.192	1.713	5	13

Source: Stata Output, 2025

The mean value of environmental disclosure is 0.633, indicating that approximately 63.3% of the sampled firms made some form of environmental disclosure during the study period. With a standard deviation of 0.484, there is moderate variability in disclosure practices among firms. The minimum value is 0 and the maximum is 1, confirming that this variable is binary. The implication is that a significant proportion of firms are complying with environmental disclosure expectations, but a considerable number (approximately 36.7%) still fall short. This variability could be influenced by differences in ownership structures, board composition, industry pressure, or regulatory oversight. The average institutional ownership stands at 0.488, meaning that institutional investors own about 48.8% of the equity in the sampled firms. The standard deviation of 0.179 indicates a fair level of variability across firms, with the lowest institutional ownership at 12.4% and the highest at 89.6%. This distribution suggests that while some firms are heavily dominated by institutional investors, others remain largely controlled by individuals or families. Higher institutional ownership is typically associated with stronger monitoring and governance, which could positively influence transparency practices such as environmental disclosure. However, if institutional investors are passive, their influence may not translate into greater accountability or sustainability reporting. Ownership concentration has a mean value of 0.551, suggesting that, on average, the top 5 shareholders hold about 55.1% of a firm's total shares. The standard deviation is 0.146, with a range from 25.1% to 87.2%. This indicates a high level of concentration in many firms, which is characteristic of emerging markets like Nigeria. High ownership concentration may lead to entrenchment of dominant shareholders, potentially reducing the firm's incentive to disclose environmental information, especially if such disclosure threatens private control benefits. However, in some cases, concentrated ownership may also lead to better alignment of interests and improved oversight, depending on the motives of the dominant shareholders.

The average board diversity score is 0.296, meaning that approximately 29.6% of board members are female in the sampled firms. The variability and the range reveal substantial differences in board composition across companies, with some boards having no female representation and others having up to 60%. This finding reflects the ongoing but uneven efforts to promote gender diversity on corporate boards in Nigeria. Diversity is linked to broader perspectives and improved decision-making, which may positively affect corporate social responsibility, including environmental disclosure. However, where diversity is tokenistic or not supported by inclusive culture, its impact on disclosure practices may be limited.

Board independence has a mean of 0.618, indicating that about 61.8% of board members are non-executive or independent directors. The standard deviation and the range suggest significant variation in board independence across firms. Independent directors are crucial for enhancing objectivity, reducing agency costs, and improving the board's ability to monitor management. Firms with more independent boards are theoretically more inclined to promote transparency, including environmental and sustainability disclosures. However, the effectiveness of independent directors can be undermined by factors like lack of expertise or capture by dominant shareholders, which may mute their expected influence on disclosure quality.

The average board size is approximately 8 members, with the smallest board comprising 5 directors and the largest having 13. This distribution aligns with governance codes in many jurisdictions, including Nigeria, which recommend a board size that is neither too small to limit expertise nor too large to impede decision-making. The size of the board could influence environmental disclosure positively by increasing the pool of knowledge, experience, and oversight. However, excessively large boards may suffer from coordination challenges and free-riding, potentially reducing their effectiveness in enforcing transparency initiatives.

Table 2: Correlation Result

	ed	inst	owncon	bdiv	bind	bsize
ed	1.0000					
inst	0.4321	1.0000				
owncon	-0.2965	-0.3174	1.0000			
bdiv	0.3512	0.2817	-0.1745	1.0000		
bind	0.3984	0.3221	-0.2132	0.2375	1.0000	
bsize	0.2763	0.2451	-0.1957	0.2319	0.2970	1.0000

Source: Stata Output, 2025

The correlation results demonstrate significant relationships between ed (environmental disclosure) and the explanatory variables. ed is positively and significantly associated with inst (institutional ownership), showing a correlation coefficient of 0.4321 at the 1% level. This implies that as institutional shareholding increases, firms are more likely to engage in environmental disclosure, potentially due to pressure from institutional investors who are more focused on long-term sustainability and reputational concerns. On the contrary, owncon (ownership concentration) has a negative correlation with ed ($r = -0.2965$, $p < 0.01$), suggesting that firms with more concentrated ownership structures are less likely to disclose environmental-related information. This aligns with the argument that controlling owners may avoid disclosure to preserve private control benefits or evade regulatory scrutiny. In addition, board characteristics reveal positive relationships with environmental disclosure. bdiv (board diversity) exhibits a significant positive correlation with ed ($r = 0.3512$, $p < 0.01$), indicating that diverse boards, particularly those with more women or varied perspectives, enhance environmental transparency. Similarly, bind (board independence) is positively associated with ed ($r = 0.3984$, $p < 0.01$), suggesting that independent directors help enforce good governance, including the provision of non-financial disclosures such as environmental reporting. bsize (board size) also correlates positively with ed ($r = 0.2763$, $p < 0.01$), indicating that larger boards may bring greater oversight and policy drive that promote environmental accountability.

Table 3: Variance Inflation Factor (VIF)

Variable	VIF	1/VIF
Inst	1.82	0.5493
Owncon	1.75	0.5714
Bind	2.04	0.4902
Bdiv	1.63	0.6135
Bsize	1.92	0.5208
Mean VIF	1.83	

Source: Stata Output, 2025

The VIF values for all independent variables fall between 1.63 and 2.04, which are well below the common threshold of 5 or 10, depending on the literature. This indicates that multicollinearity is not a problem in this model. It means that none of the independent variables is excessively correlated with the others, and the estimates of the regression coefficients are likely to be stable and reliable. This gives confidence that the binary regression model, when later applied, will not be biased due to multicollinearity among predictors.

Table 4: Hosmer-Lemeshow test

Number of groups = 10
Hosmer-Lemeshow $\chi^2(8) = 7.12$
Prob > $\chi^2 = 0.523$

Source: Stata Output, 2025

The Hosmer–Lemeshow chi-square statistic is 7.12 with a p-value of 0.523. Since the p-value is greater than 0.05, we fail to reject the null hypothesis that the model fits the data well. This means there is no evidence of poor fit. The model's predicted probabilities align well with the observed outcomes of environmental disclosure.

Table 5: Regression Result

Logistic regression		Number of obs = 150				
		LR chi2(5) = 28.65				
		Prob > chi2 = 0.0000				
Log likelihood = -85.327		Pseudo R2 = 0.1433				
ed	Coefficient	Std. err.	z	P> z	[95% conf. interval]	
inst	3.215476	1.102536	2.92	0.004	1.054509	5.376443
owncon	-2.287149	1.043229	-2.19	0.029	-4.331858	-0.242441
bind	4.472382	1.298174	3.44	0.001	1.926936	7.017828
bdiv	0.378952	0.176403	2.15	0.032	0.033209	0.724695
bsize	-0.192043	0.084517	-2.27	0.023	-0.357694	-0.026391

Source: Stata Output, 2025

The overall model fit is strong (Pseudo $R^2 = 14.33\%$, LR $\chi^2 = 28.65$, $p < 0.001$), and previous tests (VIF, Hosmer–Lemeshow) confirm validity and no multicollinearity.

The analysis reveals that institutional ownership (inst) exerts a statistically significant and positive effect on the likelihood of environmental disclosure. This result suggests that firms with higher proportions of institutional investors are more likely to disclose environmental information. Institutional investors are often viewed as more informed, socially responsible, and long-term oriented. These characteristics make them strong advocates of sustainability practices, including environmental transparency. Recent empirical evidence supports this finding. For instance, Rao et al. (2020) observed that institutional ownership plays a critical role in promoting corporate sustainability disclosure in Asia-Pacific economies. Similarly, Amran et al. (2021) found that institutional investors demand greater accountability from firms in terms of ESG (Environmental, Social, and Governance) practices, leading to improved sustainability reporting. In the Nigerian context, institutional investors are gradually increasing their expectations for environmental transparency, especially in the wake of the global ESG movement and heightened stakeholder awareness.

Ownership concentration (owncon) is found to negatively and significantly affect environmental disclosure. This means that firms with a higher proportion of shares controlled by a few large shareholders tend to disclose less environmental information. The possible explanation for this result lies in the reduced pressure from dispersed stakeholders, and the increased capacity of dominant shareholders to control strategic decisions, including what is disclosed. Highly concentrated ownership often leads to prioritization of short-term profit over long-term sustainability, as dominant shareholders may not be held accountable by a broad set of investors. This finding aligns with empirical evidence from European and emerging economies. A study by Dam and Scholtens (2021) in Central and Eastern Europe demonstrated that ownership concentration weakens the adoption of sustainability practices. Likewise, Ibrahim and Jaiyeoba (2022) found that in Nigeria, closely held firms are less transparent in ESG disclosures, citing weak institutional enforcement and limited stakeholder activism as key barriers.

Board independence (bind) shows a strong and positive relationship with environmental disclosure. The implication is that firms with more independent directors are significantly more likely to report on environmental issues. Independent directors are tasked with monitoring executive decisions and upholding stakeholder interests, including environmental concerns. Their presence reduces managerial entrenchment and encourages responsible governance. This result is in line with findings by García-Sánchez et al. (2021), who reported that independent directors contribute to the improvement of sustainability disclosures, particularly in countries with weak environmental regulations. In the Sub-Saharan African context, Ezejiofor and Olise (2020) found that board independence enhances transparency in non-financial disclosures, including environmental issues. Independent directors bring objectivity and external experience, often advocating for policies that balance profit and environmental protection.

The positive and significant effect of board diversity (bdiv) on environmental disclosure suggests that more diverse boards—particularly in terms of gender and professional backgrounds—are more inclined toward sustainability transparency. Diverse boards are believed to offer varied perspectives, broader stakeholder representation, and heightened ethical standards. These qualities make them more sensitive to ESG concerns and more responsive to pressures for environmental accountability. This finding is consistent with recent literature. For example, García Martín and Herrero (2019) demonstrated that gender-diverse boards in Spain were more engaged in sustainability initiatives. In Nigeria, Uwuiigbe et al. (2021) found that board diversity significantly affects sustainability reporting practices, especially among consumer and industrial goods firms. They argued that diverse boards are more likely to align with stakeholder interests and support broader social mandates, including environmental preservation.

Interestingly, the coefficient for board size (bsize) is negative and significant, indicating that larger boards are associated with a reduced likelihood of environmental disclosure. This finding challenges the notion that larger boards bring more resources and oversight capabilities. Instead, it suggests that overly large boards may suffer from coordination issues, slower decision-making, and diluted responsibility. These inefficiencies can inhibit proactive disclosure behaviors, especially when environmental issues are not prioritized. Similar evidence was found by Al-Shaer and Zaman (2019), who concluded that excessively large boards are less effective in promoting sustainability-related decisions in UK firms. Supporting this, Dibia and Onwuchekwa (2020) observed that in the Nigerian context, board size beyond a certain threshold becomes counterproductive for strategic outcomes, including corporate reporting. A smaller, more focused board may be more agile in responding to stakeholder demands for environmental transparency.

5. Conclusion and Recommendations

The findings from the logistic regression analysis lead to important conclusions about the determinants of environmental disclosure among listed firms in Nigeria. It is evident that institutional ownership, board independence, and board diversity are significant positive drivers of environmental disclosure. Firms with a high proportion of institutional investors, more independent directors, and diverse boards are more likely to engage in transparent environmental reporting. These governance attributes likely reflect enhanced monitoring, stakeholder responsiveness, and increased sensitivity to environmental and social issues. Conversely, ownership concentration and board size exhibit negative influences, suggesting that firms dominated by a few shareholders or with excessively large boards tend to disclose less environmental information. This highlights the challenges associated with agency conflicts and inefficiencies in board coordination, which can deter comprehensive sustainability reporting.

Based on these findings, several policy and managerial recommendations are proposed.

- First, regulatory bodies such as the Financial Reporting Council of Nigeria (FRCN) and the Nigerian Exchange Group (NGX) should develop frameworks that encourage and reward institutional investor participation in corporate governance. By strengthening the voice of institutional investors, firms may feel increased pressure to adopt more transparent environmental practices.
- Firms should be encouraged to diversify their boards, not only in terms of gender but also in terms of educational background, industry expertise, and nationality, as this has been shown to enhance sustainability responsiveness.
- Regulatory authorities should enforce stricter guidelines around board independence. A minimum threshold of independent directors should be mandated for all listed companies, as their presence significantly improves environmental disclosure practices.

- Efforts should be made to discourage excessive ownership concentration through the promotion of dispersed shareholding structures, which can enhance firm accountability.
- Companies should reassess their board composition strategies, ensuring that the board remains optimally sized to avoid inefficiencies that hinder proactive disclosure behaviors. Through these measures, environmental disclosure in Nigeria can be significantly improved, thereby contributing to better corporate sustainability outcomes and alignment with global ESG standards.

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