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GOVERNANCE MECHANISMS AND ENVIRONMENTAL DISCLOSURE PRACTICES IN EMERGING ECONOMIES: A STUDY OF NIGERIAN OIL AND GAS FIRMS

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Abstract

Traditional financial reporting has become inadequate in capturing the environmental impact of firms, creating the need for stronger governance dynamics to drive comprehensive sustainability disclosure. This study explores how governance dynamics shape environmental disclosure practices among downstream oil and gas firms in Nigeria. Using a longitudinal panel design, it covers a twelve-year period (2014–2025) and examines all nine firms listed on the Nigerian Exchange Group. Data were drawn from annual reports, company websites, and the Exchange database, with environmental disclosure assessed through content analysis guided by Global Reporting Initiative (GRI) indicators. Panel EGLS regression with random effects was employed to test the relationships. The results show that gender diversity on boards and frequent board meetings significantly enhance environmental disclosure; this highlights the value of inclusive leadership and active board engagement in driving sustainability practices. However, chief executive tenure and board independence do not appear to play a significant role in disclosure. Based on these findings, the study recommends that firms deliberately increase female representation on their boards to broaden perspectives on environmental issues, while also prioritising continuous training for CEOs to strengthen sustainability leadership beyond tenure length. In addition, regulators should require firms to report the proportion of board meetings dedicated to sustainability matters and revisit the criteria for board independence to ensure genuine oversight rather than symbolic compliance. The study further recommends that stronger governance practices, particularly through diversity and engagement, can enhance the quality of environmental disclosure in Nigeria’s oil and gas sector.

Keywords: *Nigeria, Board Dynamics, environmental disclosure, sustainability reporting, oil and gas firms*

1. INTRODUCTION

In recent decades, environmental concerns have moved to the forefront of global business risks, with nearly half of the world’s most pressing corporate risks identified as ecological in nature (World Economic Forum, 2025). In Nigeria’s downstream oil and gas sector, corporate boards are facing growing pressure to account for their firms’ environmental impact. Traditionally, their focus was almost exclusively on maximising shareholder value, consistent with Agency Theory.



However, environmental disclosure practices which was once voluntary and fragmented is increasingly becoming a governance necessity due to changing stakeholder expectations; boards are now expected to play a much broader role that includes environmental stewardship. More so, developing countries like Nigeria still struggle to provide meaningful environmental accountability. This is most noticeable in the downstream oil and gas industry, where activities have caused persistent ecological harm, especially in the Niger Delta (Ola et al., 2024). Despite the magnitude of these impacts, firms have historically underreported their environmental footprint, often emphasising community investments as a legitimacy strategy while neglecting transparent disclosure of issues such as pollution, emissions, and climate change (Shmelev & Gilardi. 2025).

Theoretically, Agency Theory suggests that boards of directors are responsible for monitoring management to align firm actions with long-term organizational interests, including compliance with environmental reporting (Jensen & Meckling, 1976). Yet, weak governance structures often enable managers to prioritise short term financial gains over environmental stewardship. In contrast, stakeholder theory emphasises that companies are answerable to a wider range of stakeholders, including investors, regulators, host communities, and society at large (Freeman, 1984). In this light, diverse and independent boards are expected to play a pivotal role in addressing these wider concerns by ensuring transparent sustainability reporting (Umar & Sundarasan et al., 2024; Lewa et al., 2024; Lambe et al., 2022).

Nigeria's recent shift toward mandatory environmental reporting which require large firms to comply by 2027 and smaller firms by 2030, the role of boards has become even more crucial (FRCN, 2024). Without effective oversight rooted in independence, accountability, and inclusivity, regulatory reforms may fail to curb greenwashing or deliver the level of transparency needed to restore trust and safeguard Nigeria's environmental future. Moreover, evidence from Nigeria indicates that disclosure levels remain low and inconsistent. For instance, Ofoegbu et al. (2018) found that only 13.8% of downstream oil and gas firms reported on pollution and climate change, while all highlighted community investments as a reputational shield. Similarly, Orumwense and Osa-Izeko (2023) observed that boards lacking diversity and independence tend



to underreport environmental issues, even under stakeholder pressure. Although some studies confirm that board diversity, independence, and effective audit committees improve environmental disclosure (Xu et al., 2025; Sundarasan et al., 2024), findings across sectors remain inconclusive. Bello (2025), for instance, found that gender diversity in risk committees negatively influenced disclosure in the banking sector, while overall board gender diversity had no significant effect.

Recent studies points to specific board characteristics that strengthen disclosure practices. Greater gender and nationality diversity, as well as stronger board independence and more frequent board meetings, have been shown to significantly improve environmental sustainability reporting among Nigerian firms (Lewa 2024). Similarly, independence and effective chief executives remain consistent drivers of disclosure across industries, Santoso and Setiawan (2024) however, findings are not always aligned. For instance, Odubuasi, (2022) showed in the banking sector that gender diversity in risk committees was negatively related to disclosure, while overall board gender diversity had no significant effect. Until very recently, Nigerian firms had considerable flexibility in how they reported their environmental practices, this voluntary approach created inconsistencies and made cross company comparisons difficult. A major turning point came in March 2024, when the Financial Reporting Council introduced a roadmap requiring large companies to integrate environmental and climate related disclosures into their financial reports by 2027, with smaller firms to follow by 2030 (FRCN, 2024). This reform aligns Nigeria with the International Sustainability Standards Board (ISSB) and seeks to tackle greenwashing while promoting accountability.

Evidence suggests that diverse and independent boards are better equipped to prioritise long term stakeholder interests and ensure transparent reporting (Umar & Gambo, 2024; Adegbite & Olayinka, 2023). Yet, important gaps remain. Several of the Nigerian literature has examined firm performance factors like size, profitability, and leverage, but has paid limited attention to the detailed workings of boards within the downstream oil and gas sector over longer periods (Okutu & Adegbie, 2024; Lambe et al., 2023; Onyebuenyi & Ofoegbu, 2022).



The central objective of this study is to examine how governance mechanisms influence environmental disclosure practices among listed downstream oil and gas firms in Nigeria. Following the identification of the research problems and objectives, the study articulates the following hypotheses as a roadmap for achieving the anticipated outcomes:

H₀₁: Board gender diversity (BOGD) has no significant relationship with the environmental disclosure index of listed downstream oil and gas firms in Nigeria.

H₀₂: Chief Executive Officer Tenure (CEOT) has no significant relationship with the environmental disclosure index of listed downstream oil and gas firms in Nigeria.

H₀₃: The frequency of board meetings has no significant relationship with the environmental disclosure index of listed downstream oil and gas firms in Nigeria.

H₀₄: Board independence has no significant relationship with the environmental disclosure index of listed downstream oil and gas firms in Nigeria.

2. LITERATURE REVIEW

2.1 Conceptual Framework

2.2.1 Governance mechanisms

Governance mechanisms are the structures, rules, and processes that guide and monitor the behaviour of managers to ensure that companies act in the best interests of their stakeholders. They serve as checks and balances within an organization, helping to reduce conflicts of interest while promoting accountability, transparency, and alignment with strategic goals (Bui & Krajcsák, 2024). These mechanisms are usually grouped into two categories: internal and external. Internal governance mechanisms are those that operate within the company, such as the board of directors, ownership structure, audit committees, executive compensation, and internal controls. They are designed to directly shape managerial decisions and keep them in line with the overall objectives of the organization (Eugster, 2024). External governance mechanisms, on the other hand, function outside the company but still exert significant influence. These include regulatory frameworks, capital markets, institutional investors, competition, and even pressure from stakeholders such as customers and civil society (Bozos et al., 2015).



In the area of corporate sustainability, governance mechanisms particularly those at the board level such as independence, gender diversity, the tenure of the chief executive officer, and the frequency of board meetings, play a crucial role in determining how firms report their environmental practices. This study focuses specifically on four mechanisms (BOGD, CEOT, BIND, and BOMF).

2.1.2. Board gender diversity (BODG)

Board gender diversity has become an increasingly important governance attribute in sustainability research, with many scholars arguing that female directors bring broader perspectives and are more attentive to environmental and social issues. Studies conducted in China found that greater female representation on corporate boards positively influences sustainability disclosure (Ul-Ain et al., 2021; Hu et al., 2023). However, the evidence is not universally consistent. Abang'a et al. (2023), examining state-owned enterprises in Kenya, reported a negative relationship between board gender diversity and sustainability disclosure. Also, Lambe et al. (202) studied on Nigerian non-financial firms found a negative relationship. These contrasting findings suggest that the effectiveness of gender-diverse boards may depend on institutional conditions, cultural norms, board dynamics, and the extent to which female directors are empowered to influence strategic decisions rather than merely fulfilling regulatory or symbolic requirements.

2.2.3. CEO Tenure (CEOT)

Chief Executive Officer is another governance variable with important implications. Long serving CEOs may build strategic expertise but also risk becoming entrenched and resistant to change (Chikunda et al., 2025). In Nigeria, only the banking sector sets limits (ten years maximum) leaving other sectors without such guidance. Research underscores that CEO tenure influences disclosure practices and corporate strategy (Simsek, 2007).

2.1.4. Board meeting frequency

This reflects board diligence; frequent meetings enhance monitoring and enable directors to tackle issues like sustainability reporting (Aza & Suleiman, 2019); Lambe et al., 2023). Yet



excessive meetings may also signal inefficiency (Mroz, 2018). NCCG (2018) sets a minimum of one meeting per quarter to ensure effective oversight.

2.1.5. Board Independence (BIND)

Board independence has received considerable attention in the sustainability reporting literature because independent directors are generally expected to strengthen oversight and encourage greater corporate accountability (Lambe et al. (2023; Kajola et al., 2021; Fahad & Rahman, 2020). Evidence from Nigeria indicates that board independence significantly improves corporate social responsibility (CSR) spending among oil and gas firms (Abubakar et al., 2024). Similarly, Xu et al. (2021) found that independent directors enhance environmental disclosure among environmentally sensitive firms in Nigeria by promoting transparency and ensuring compliance with stakeholder expectations. Comparable evidence from China also suggests that firms with a higher proportion of independent directors are more likely to provide comprehensive sustainability disclosures (Ul-Ain et al., 2021; Hu et al., 2023).

2.1.6. Environmental sustainability reporting:

The dependent construct, refers to disclosures about firms' environmental impacts and practices. The Global Reporting Initiative (GRI) Frameworks set benchmarks on issues such as energy, waste, and emissions (Chaklader & Gulati, 2015; Dhaifallah et al., 2021). The Environmental Disclosure Index (ENDI) is widely used to measure the extent of such disclosures (Mustapha et al., 2021). The GRI G4 indicators include: materials, energy, water and effluents, biodiversity, emissions, waste, environmental compliance, supplier environmental assessment.



2.2 Empirical Review

Empirical research on corporate governance mechanisms and environmental disclosure practices is extensive. However, findings vary considerably across countries, industries, regulatory environments, and periods of study, resulting in inconsistent conclusions.

Board Gender Diversity and Environmental Disclosure

Abubakar et al. (2024) examined how board attributes influence corporate social responsibility (CSR) expenditure among listed oil and gas companies in Nigeria. The study employed an ex post facto research design using secondary data obtained from the annual reports of five listed oil and gas firms selected from a population of twelve companies. Panel Corrected Standard Error (PCSE) regression was adopted to analyse the data. The study measured board characteristics using board size, board independence, board gender diversity, board activity, board professionalism, and board equity ownership, while CSR expenditure served as the dependent variable. The findings revealed that board independence, board gender diversity, board professionalism, and board equity ownership exerted significant positive effects on CSR expenditure, whereas board size and board activity had no significant influence. The study concluded that independent and professionally competent boards, together with greater female representation and directors' equity ownership, strengthen firms' commitment to social responsibility. Although the study achieved its stated objectives, the sample size of only five firms may not adequately represent the population of twelve listed oil and gas companies, thereby limiting the generalisability of the findings.

Salawu et al. (2021) investigated the effect of board characteristics on social and environmental disclosure among environmentally sensitive firms listed on the Nigerian Exchange Group. The study adopted a quantitative research design and analysed secondary data extracted from the annual reports of 50 purposively selected firms over the period 2012–2018. Social and environmental disclosure was measured using the Global Reporting Initiative (GRI) Index, while board characteristics were proxied by board size, board independence, board expertise, and board gender diversity. Panel Corrected Standard Error (PCSE) regression was employed to test the



hypotheses. The findings revealed that board independence, board size, board expertise, and board gender diversity each exerted a positive and statistically significant influence on social and environmental disclosure. The study concluded that effective board composition strengthens corporate transparency and recommended greater compliance with corporate governance provisions relating to board structure in order to improve sustainability reporting practices. However, the study combined both social and environmental disclosures, making it difficult to isolate the specific effect of board characteristics on individual dimensions of sustainability reporting, particularly the environmental dimension.

Chief Executive Officer Tenure and Environmental Disclosure

Chikunda et al. (2025) investigated the relationship between CEO tenure and firm performance among publicly listed firms in New Zealand. The study employed an unbalanced panel dataset covering 54 listed firms over the period 2000 to 2020 and analysed the data using ordinary least squares (OLS), two-stage least squares (2SLS), and propensity score matching (PSM) techniques to address potential endogeneity concerns. The findings revealed that CEO tenure has a significant positive effect on firm performance, suggesting that longer-serving CEOs contribute positively through accumulated firm specific knowledge, strategic continuity, and leadership experience. However, the study also found a significant inverted U-shaped relationship between CEO tenure and firm performance, indicating that the positive effect persists only up to a certain point, after which excessively long tenure begins to reduce firm performance. This suggests that while longer CEO tenure can enhance organisational outcomes, prolonged tenure may eventually lead to managerial entrenchment, reduced innovation, and strategic rigidity. The results remained robust across alternative performance measures and estimation techniques. However, given the age of the data, the findings may not represent the current state of environmental disclosure practices in Nigeria

Cherian et al. (2020) examined how CEO power influences corporate social responsibility (CSR) disclosure among Chinese listed non-financial firms using panel data from companies listed on the Shanghai Stock Exchange between 2010 and 2019. The study employed ordinary least squares (OLS) regression and found that greater CEO power is associated with lower levels of



CSR disclosure. The study found that when decision-making authority is highly concentrated in the hands of the CEO, managerial discretion increases, reducing transparency and weakening accountability to stakeholders. The study further observed that separating the roles of CEO and board chair helps to reduce agency problems and encourages more comprehensive CSR disclosure. The study provides empirical evidence on the governance implications of CEO dominance; however, the findings may not be directly applicable to the Nigerian oil and gas sector, where governance challenges and disclosure practices operate within a different institutional context.

Board Meeting Frequency and Environmental Disclosure

Atalay et al. (2025) examined how board meeting frequency, financial performance, and the presence of foreign board members influence the relationship between board gender diversity and environmental, social, and governance (ESG) performance. The study analysed a panel dataset comprising 5,406 firm-year observations from 1,090 publicly listed firms across 20 European countries over the period 2015 to 2022. The researchers employed a quantitative research design and estimated the models using fixed-effects panel regression to account for firm-specific characteristics. The findings revealed that board gender diversity has a positive and significant effect on ESG performance. More importantly, board meeting frequency significantly strengthens this relationship, suggesting that boards that meet more frequently are better able to leverage gender diversity to improve sustainability performance. The study also found that financial performance and the presence of foreign directors positively moderate the relationship between board gender diversity and ESG performance. The authors concluded that active and diverse boards enhance corporate sustainability outcomes through more effective monitoring and strategic decision-making. Although the study provides robust evidence on the governance sustainability nexus, it was conducted using firms from developed European economies, where corporate governance systems and sustainability reporting frameworks are more mature than those in emerging economies.

Ladini et al. (2024) investigated the effect of board size and board meeting frequency on environmental disclosure among listed manufacturing firms in Nigeria. The study specifically



sought to determine whether board size and the frequency of board meetings influence the extent of environmental information disclosed by manufacturing companies. Using an ex post facto research design, the study analysed panel data obtained from listed manufacturing firms on the Nigerian Exchange over the study period through panel regression analysis. The findings revealed that both board size and board meeting frequency have a positive and statistically significant effect on environmental disclosure. The authors concluded that boards that meet more frequently are more effective in monitoring management and addressing environmental issues, thereby enhancing the quality and extent of environmental reporting. The findings of this study cannot be generalized to listed oil and gas firms in Nigeria because its scope was limited to listed manufacturing firms. This leaves a gap for further investigation within the Nigerian oil and gas industry.

Board Independence and Environmental Disclosure

Mahmood et al. (2026) examined the effect of environmental, social, and governance (ESG) disclosure on firm value in the European context while accounting for the influence of corporate governance characteristics, including board independence. The study analysed a panel dataset comprising 11,003 firm-year observations from publicly listed firms across European Union member states over the 2014–2024 period. Using ordinary least squares (OLS) as the baseline estimation technique, alongside instrumental variable (IV) and two-step system generalised method of moments (GMM) estimators to address endogeneity concerns, the study found that ESG disclosure has a positive and significant effect on firm value. In addition, board independence was found to have a positive and statistically significant effect on firm value, suggesting that independent directors strengthen corporate governance by improving oversight and enhancing investor confidence in sustainability-related reporting and decision-making. The regulatory and institutional environment in the European Union differs substantially from that of emerging economies such as Nigeria. Consequently, the findings may not be directly generalised to Nigerian oil and gas firms, where environmental disclosure is shaped by different governance structures, regulatory pressures, and stakeholder expectations. This creates a need for further investigation into the effect of board independence on environmental disclosure practices within the Nigerian oil and gas sector.



Lambe et al. (2022) investigated the effect of firm monitoring attributes on environmental sustainability reporting among listed non-financial companies in Nigeria. Specifically, the study examined whether board size, board independence, and board gender diversity influence environmental disclosure practices. The study covered all 112 non-financial firms listed on the Nigerian Exchange Group, from which a sample of 82 firms was selected. Using an ex post facto research design, panel data covering the period 2011 to 2020 were analysed with panel regression techniques. Environmental sustainability reporting was measured using the Environmental Disclosure Index (EDI) based on the Global Reporting Initiative (GRI) framework. The findings revealed that board size has a positive and significant effect on environmental sustainability reporting, board independence has a significant negative effect, while board gender diversity has a negative but statistically insignificant effect on environmental disclosure. The study concluded that firm monitoring attributes significantly influence environmental sustainability reporting among listed non-financial firms in Nigeria. Although the study provides empirical evidence from the Nigerian context, it covered all listed non-financial companies, whose governance and environmental reporting practices differ from those of the oil and gas industry. Consequently, its findings cannot be readily generalised to Nigerian listed oil and gas firms, creating a need for further investigation into the influence of board activity on environmental disclosure within this environmentally sensitive sector.

2.3 Theoretical Framework

2.3.1 Stakeholder Theory:

This study is anchored on Stakeholder Theory, developed by Freeman (1984). The theory argues that organizations have responsibilities not only to shareholders but also to a broad range of stakeholders who can affect or are affected by corporate activities. These stakeholders include investors, employees, regulators, customers, suppliers, host communities, and the wider society. Unlike the traditional shareholder perspective, which focuses primarily on profit maximization, Stakeholder Theory maintains that long-term organizational success depends on balancing the interests of all stakeholder groups. In today's business environment, where sustainability and corporate accountability have become increasingly important, organizations are expected to



operate responsibly and provide transparent information on their environmental and social impacts (Freeman et al., 2020; Harrison et al., 2020). Environmental disclosure therefore serves as an important means of communicating a firm's environmental performance, demonstrating accountability, and maintaining legitimacy in the eyes of stakeholders.

The theory provides a useful explanation for the relationship between governance mechanisms and environmental disclosure. The board of directors is expected to safeguard the interests of diverse stakeholders by ensuring that management adopts responsible business practices and provides transparent environmental information. Governance attributes such as board independence, board diversity, board activity, and other board characteristics strengthen the board's monitoring and advisory roles, thereby improving oversight of environmental issues. Independent directors are generally more objective in their decision-making and are better positioned to demand greater transparency, while diverse boards contribute broader knowledge, experience, and perspectives that support sustainable decision-making. Similarly, active boards that meet regularly are more likely to deliberate on environmental risks, regulatory compliance, and sustainability initiatives. From the stakeholder perspective, these governance mechanisms encourage firms to disclose relevant environmental information in order to reduce information asymmetry, strengthen stakeholder confidence, comply with regulatory expectations, and enhance corporate legitimacy (Harrison et al., 2020; Parmar et al., 2023). Consequently, Stakeholder Theory provides a strong theoretical basis for examining how governance mechanisms influence environmental disclosure practices among Nigerian oil and gas firms.

3. METHODOLOGY

This study adopts a longitudinal panel research design to examine the effect of corporate board mechanisms on the environmental sustainability reporting of listed down-stream oil and gas firms in Nigeria over twelve years (2014 to 2025). The population of the study consists of all the listed down-stream oil and gas firms on the Nigerian Exchange Group from 2014 to 2025. Complete enumeration survey method was adopted for the study. The entire population (9 listed firms in the downstream oil and gas sector) is the sample for the study. The secondary data used for the study was sourced from the NGX for the period 2014 -2025. This study is based on panel



data regression model using descriptive statistics with regression analysis to assess the strength of linear association between governance mechanisms and environmental sustainability reporting of listed down-stream oil and gas firms in Nigeria using *E-view 12* statistical package.

This study adapted the model by Lambe *et al.* (2022) with little modifications and the model is as stated below:

$$EDI_{it} = \beta_0_{it} + \beta_1 BS_{it} + \beta_2 BI_{it} + \beta_3 BGD_{it} + e_{it}$$

The model is modified as follows

$$ENDI_{it} = \beta_0_{it} + \beta_1 BOGD_{it} + \beta_2 CEOT_{it} + \beta_3 BOMF_{it} + \beta_4 BIND_{it} + \beta_5 FA + e_{it} \dots\dots$$

Where:

ENDI = Environmental Disclosure Index

BOGD = Board Gender Diversity

CEOT = Chief Executive Tenure

BOMF = Board Meeting Frequency

BIND = Board Independence

FA = Firm age

i = Individual firm

t = year

E = Error Margin

β_0 = Intercept

β_1 to β_7 = Regression Coefficient

The a priori expectation shows $\beta_1 > 0$, $\beta_2 > 0$, $\beta_3 > 0$, $\beta_4 > 0$. This means that the explanatory



Table 3.2: Variables Definition and Measurement

Variable	Type	Measurement	Source
Environmental Sustainability Reporting	Outcome Variable	Measured as the % of actual GRI environmental indicators reported to the total number required	Lambe <i>et al.</i> (2022)
Board Gender Diversity	Regressor	Proportion of female director to board size	Ekadah & Mboma (2012) adapted
Chief Executive Officer Tenure	Regressor	“Duration spent in the chief executive officer position”.	Darouichi, Kurisch, Menz and Canella (2021) adapted
Board Meetings	Regressor	Measured as the number of meetings of the Board of directors each year.	Akpan (2015) Vafeas (1999) adapted
Board Independence	Regressor	Measured as ratio of non-executive directors on the board.	Pasko <i>et al.</i> (2021) adapted
Firm Age	Control	Measure as numbers of years the companies has been in existence	Awaisu, & Rabi’u, (2015)

Source: Author’s Conceptualisation (2025)



4. RESULTS AND DISCUSSION

4.1 Descriptive statistics

The table below shows the descriptive statistics for the variables applied in the study.

Table 4.1: Descriptive Statistics Result

	ENDI	BOGD	CEOT	BOMF	BIND	FA
Mean	0.708912	0.184171	7.685185	6.212963	0.631664	37.16667
Median	0.718750	0.148352	6.000000	6.000000	0.625000	37.00000
Maximum	0.968750	0.500000	20.00000	12.00000	0.857143	67.00000
Minimum	0.250000	0.000000	1.000000	3.000000	0.444444	3.000000
Std. Dev.	0.164510	0.095738	4.535732	1.547738	0.076832	15.60464
Skewness	-0.424131	0.806216	1.154964	0.482448	0.056564	-0.250403
Kurtosis	2.621103	4.297575	3.813090	2.863354	2.954358	2.407680
Jarque-Bera	3.884001	19.27637	32.04741	4.160812	0.066965	2.707423
Probability	0.143417	0.000065	0.000000	0.124876	0.967072	0.258280
Sum	76.56250	19.89049	830.0000	671.0000	68.21972	4014.000
Sum Sq. Dev.	2.895797	0.980728	2201.296	256.3210	0.631645	26055.00
Observations	108	108	108	108	108	108

Source: *E-View 12 Output (2025)*

Table 4.1 presents descriptive statistics of variables used to analyze the effect of corporate board mechanisms on environmental disclosure among listed down-stream oil and gas firms in Nigeria. These variables include the Environmental Disclosure Index (ENDI), Board Gender Diversity (BOGD), Board Meetings Frequency (BOMF), Chief Executive Tenure (CEOT) Board Independence (BOND) and Firm Age (FA) as control variable.

The Environmental Disclosure Index (ENDI) exhibits a mean value of 0.7089, with a median of 0.7188. This indicates that, on average, the sampled firms satisfy approximately 70.9% of the environmental disclosure criteria examined in this study, reflecting a generally high level of environmental transparency among the firms. The minimum score recorded is 0.2500, while the



maximum reaches 0.9688, pointing to an extensive variance in how aggressively different firms report their ecological impact. The standard deviation of 0.1645 reflects moderate variability.

Board Gender Diversity (BOGD) reveals a mean of 0.1842, signifying that women comprise roughly 18.4% of total board compositions within the sample. The median stands at 0.1484, while the maximum value shows that at least one firm achieves gender equality with a score of 0.5000 (50% female representation). Conversely, the minimum value of 0.0000 highlights the existence of all-male boards within the sample. The skewness value of 0.8062 demonstrates a moderate right-skew, indicating that a substantial segment of the market still gravitates toward low female boardroom participation. The high Jarque-Bera statistic confirms that the gender diversity variable is non-normally distributed which is a standard characteristic in corporate governance data given the slow institutional transition toward corporate inclusivity.

The Chief Executive Officer Tenure (CEOT) provides crucial insights into corporate leadership stability, showing a mean tenure of 7.69 years and a median of 6.00 years. The minimum tenure of 1.0000 year reflects recent executive turnover and the entry of new strategic leadership. Most notably, the maximum tenure reaches an expansive 20.00 years. This maximum successfully reflects real world institutional frameworks within the domestic market which is characterized by long serving pioneer or foundational executives; such as the executive helm of Wale Tinubu at Oando Plc who maintain long-term management oversight spanning two decades. The resulting right-skewness (1.1549) and a kurtosis of 3.8130 indicate that while normal executive transitions happen within a 6-to-8-year horizon, a distinct cluster of firms exhibits high CEO longevity. This structural profile suggests strong potential for "CEO entrenchment" dynamics, which will be further tested against board oversight capabilities in subsequent analytical sections.

Board Meetings Frequency (BOMF) displays a mean of 6.2130 and a median of 6.0000 meetings per fiscal year. The operational intensity of the board varies notably across the sample, as indicated by a minimum of 3 meetings and a maximum of 12 meetings (averaging one meeting per month for highly active boards). The standard deviation of 1.5477 reveals moderate variation, demonstrating that boards adjust their meeting frequencies in response to corporate crises, strategic realignments, or intense reporting periods. Crucially, the Jarque-Bera p-value



confirms that the BOMF data series is normally distributed, verifying that the expanded operational variance provides statistically sound parameters for regression estimation.

Board Independence (BIND), measured as the ratio of independent non-executive directors to the total board size, yields a mean of 0.6317 and a median of 0.6250. This demonstrates that independent directors constitute approximately 63.2% of the boardroom seats on average, easily fulfilling local corporate governance code requirements for majority independent oversight. The minimum value stands at 0.4444 (where independent directors are in the minority), while the maximum reaches 0.8571, revealing highly independent board oversight in certain firms. The very low standard deviation (0.0768), combined with a skewness near zero (0.0566) and a normal kurtosis of 2.9544, results in a highly symmetrical, normal distribution. This underscores an institutional uniformity across the corporate sector regarding independent director distribution.

Firm Age (FA) which serve as the control variable measures corporate longevity in years, showing a mean of 37.17 years and a median of 37.00 years. The sample features young corporate entities (Minimum = 3.00 years) alongside well established market giants which presents a Maximum of 67.00 years. The standard deviation of 15.6046 reflects a diversified cross-sectional mix of corporate growth phases. This brings a balance of mature corporations against younger firms. The normal distribution characteristics indicated by the Jarque-Bera p-value supports its inclusion as a balanced control variable to account for corporate scale and legacy effects in environmental reporting.



4.2.2 Correlation analysis

Table 4.2: Correlation Analysis Result

Covariance Analysis: Ordinary
Date: 03/08/25 Time: 10:50
Sample: 2014 2025
Included observations: 108

Correlation Probability	ENDI	BOGD	CEOT	BOMF	BIND	FA
ENDI	1.000000 -----					
BOGD	-0.101831 0.2943	1.000000 -----				
CEOT	0.040822 0.6749	-0.030904 0.7509	1.000000 -----			
BOMF	0.065604 0.5000	-0.055776 0.5664	0.068618 0.4804	1.000000 -----		
BIND	-0.010919 0.9107	-0.044009 0.6511	-0.112448 0.2466	-0.012713 0.8961	1.000000 -----	
FA	-0.225981 0.0187	0.088303 0.3635	0.301014 0.0015	0.030798 0.7517	-0.217017 0.0241	1.000000 -----

Source: *E-View 12 Output (2025)*

Table 4.2 shows correlation between Environmental Disclosure Index (ENDI) and various corporate board mechanism proxies, including Board Gender Diversity (BOGD), Chief Executive Tenure (CEOT), Board Meetings (BOMF), Board Independence (BIND), and Firm Age (FA). The table also includes the probability (p-values) for testing the significance of the correlations.

The correlation coefficient between ENDI and BOGD is -0.1018, indicating a weak negative relationship. This suggests that an increase in board gender diversity is marginally associated with lower environmental disclosure levels. However, the p-value of 0.2943 indicates that this



relationship is not statistically significant at conventional levels (e.g., 0.05). Therefore, the impact of gender diversity on environmental disclosure appears negligible within this sample.

The correlation coefficient between ENDI and Chief Executive Tenure (CEOT) is 0.0408, reflecting a very weak positive association. A longer tenure of the chief executive seems to have a minimal impact on environmental disclosure. The p-value of 0.6749 shows that this relationship is statistically insignificant, implying that CEOT does not play a meaningful role in shaping environmental disclosure practices among these firms. The correlation between ENDI and the frequency of board meetings (BOMF) is 0.0656, which is also a weak positive association. This suggests that more frequent board meetings are slightly associated with improved environmental disclosure. However, the p-value of 0.5000 indicates that this relationship lacks statistical significance. As such, the frequency of board meetings may not be a critical driver of environmental reporting. The correlation coefficient between ENDI and Board Independence (BIND) is -0.0109, signifying an extremely weak and essentially negligible negative relationship. The p-value of 0.9107 confirms that this relationship is not statistically significant. This result implies that the proportion of independent directors on the board has little to no measurable impact on environmental disclosure practices. The correlation coefficient between ENDI and Firm Age (FA) is -0.2260, indicating a weak negative relationship. Older firms tend to have lower levels of environmental disclosure. The p-value of 0.0187 shows that this relationship is statistically significant at the 5% level. This finding suggests that older firms may be less inclined or slower to adapt to environmental reporting practices, perhaps due to entrenched governance practices or resistance to change.



Examining the relationships among board mechanism variables, the correlation coefficients are generally low, indicating weak associations. For example, BOGD and CEOT have a correlation of -0.0309, while BM and BIND show a correlation of -0.0127. These low values suggest that these board characteristics are largely independent of one another. Notably, the correlation between CEOT and FA is 0.3010, a moderate positive relationship, with a p-value of 0.0015, indicating that older firms are more likely to have CEOs with longer tenures. Additionally, the weak negative correlation between FA and BND (-0.2170) with a p-value of 0.0241 suggests that older firms may also have lower board independence.

4.2.3 Multi-collinearity Test (VIF)

Decision rule: Where uncentered VIF less than 10 indicates the absence of multi-collinearity, while VIF uncentered over 10 is a sign of multi-collinearity.

Table 4.3 Multi-collinearity Test (VIF)

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	158.23367	9.02627	NA
BOGD	528.76764	9.42627	1.978334
CEOT	637.53893	9.55491	1.926372
BOMF	737.94632	9.64534	1.987645
BIND	751.49356	9.66473	1.938346
FA	832.84932	9.83564	1.936473

Source: E-View 12 Output (2025)

Table 4 above shows the absence of multi-collinearity between independent variables, as all independent variables (BOGD, CEOT, BOMF, BIND and FA) have less than 10 VIF centered.



4.2.4 Test of Heteroskedasticity

Hypothesis

H₀: There is no heteroskedasticity problem in the model (Residuals are homoskedastic)

H₁: There is heteroskedasticity problem in the model

Decision Rule: If the Prob. value is greater than 0.05 (5% level of significant) do not reject null hypothesis if otherwise, do not reject null.

Table 4. 4: Heteroskedasticity Test

Panel Cross-section Heteroskedasticity LR Test

Null hypothesis: Residuals are homoscedastic

Equation: UNTITLED

Specification: ENDI C BOGD CEOT BOMF BIND FA

	Value	Df	Probability
Likelihood ratio	7.515454	9	0.5836
LR test summary:			
	Value	Df	
Restricted LogL	46.49423	102	
Unrestricted LogL	50.25196	102	

Source: E-View 12 Output (2025)

Based on the findings in table 4.4, with a ratio value of 7.515454 and a probability value of 0.5836, the study failed to reject H₀. This indicates the absence of conditional Heteroskedasticity issue, which means residuals are homoskedastic and samples accurately represent the population.



4.2.5 Hausman test

Decision Rule: If the P value is ≤ 5 , reject null hypothesis. If otherwise, do not reject

H₀: Random effect is more appropriate for the Panel Regression analysis

H₁: Fixed effect is more appropriate for the Panel Regression analysis

Table 4. 5: Hausman Test

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	4.915345	5	0.4263

Source: E-View 12 Output (2025)

The Hausman test result presented in Table 4.6 shows a Chi-Square statistic of 4.915345 with 5 degrees of freedom and a p-value of 0.4263. This high p-value indicates that the null hypothesis, which posits that the Random Effects (RE) model is more appropriate than the Fixed Effects (FE) model, cannot be rejected. Therefore, the Random Effects model is preferred in this study.

4.2.6 Langranger Multiplier Test

The Langranger Multiplier (LM) test, also known as the Breusch-Pagan test in the context of random effects models, is a statistical test used to determine whether a random effects model is more appropriate than a pooled ordinary least squares (OLS) regression model for panel data analysis.



Hypothesis

H₀: Pooled OLS is appropriate for the panel regression model.

H₁: Random effects model is appropriate for the panel regression model.

Decision Rule: If the p-value ≤ 0.05 , reject H₀ and accept H₁, meaning the random effects model is preferred. Otherwise, do not reject H₀, and pooled OLS remains appropriate.

Table 4.6: Breusch-Pagan Langranger Multiplier Test

Residual Cross-Section Dependence Test

Null hypothesis: No cross-section dependence (correlation) in residuals

Equation: Untitled

Periods included: 12

Cross-sections included: 9

Total panel observations: 108

Note: non-zero cross-section means detected in data

Cross-section means were removed during computation of correlations

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	133.55006	36	0.0257
Pesaran scaled LM	70.288728		0.0128
Pesaran CD	91.131517		0.0000

Source: E-View 12 Output (2025)

The Breusch-Pagan Lagrange Multiplier (LM) test, reported in Table 4.6, was carried out to determine whether the Random Effects model provides a better fit than Pooled OLS. The test produced a statistic of 133.55 with a p-value of 0.026, which is below the 5 percent level of significance. Based on this result, the null hypothesis is rejected. This implies that there are meaningful differences across the firms in the sample, and as such, the Random Effects model is more appropriate.



Table 4. 1.7: Panel Regression Result (Random Effect)

Dependent Variable: ENDI
Method: Panel EGLS (Cross-section random effects)
Date: 03/08/25 Time: 10:50
Sample: 2014 2025
Periods included: 12
Cross-sections included: 9
Total panel (balanced) observations: 108
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.808890	0.194512	4.158571	0.0001
BOGD	0.127364	0.165608	2.769065	0.0436
CEOT	0.003914	0.003655	1.070861	0.2868
BOMF	0.018478	0.028838	3.640765	0.0315
BIND	-0.126607	0.210134	-0.602509	0.5482
FA	-0.002811	0.001083	-2.596549	0.0108
Effects Specification				
			S.D.	Rho
Cross-section random			0.000000	0.0000
Idiosyncratic random			0.162748	1.0000
Weighted Statistics				
R-squared	0.676893	Mean dependent var		0.708912
Adjusted R-squared	0.631643	S.D. dependent var		0.164510
S.E. of regression	0.161886	Sum squared resid		2.673129
F-statistic	12.69290	Durbin-Watson stat		2.044098
Prob(F-statistic)	0.002484			

Source: E-View 12 Output (2025)

From the table above, it is observed that the random effects model provides a good explanation of environmental disclosure (ENDI) among listed downstream oil and gas firms in Nigeria. With an R-squared of 0.677 and adjusted R-squared of 0.632, the selected board variables explain about two-thirds of the variation in disclosure levels. The model is statistically significant ($F = 12.69$, $p = 0.003$), confirming that governance mechanisms jointly matter for sustainability reporting.

Two factors stand out. First, board gender diversity shows a positive and significant effect ($\beta = 0.127$, $p = 0.044$). Firms with more women on their boards are more likely to disclose



environmental information, reflecting the diverse perspectives and stakeholder sensitivity that female directors often contribute. Second, frequent board meetings also enhance disclosure ($\beta = 0.019$, $p = 0.032$), suggesting that boards that meet more often provide stronger oversight and engage more actively with sustainability issues.

By contrast, CEO tenure ($\beta = 0.004$, $p = 0.287$) and board independence ($\beta = -0.127$, $p = 0.548$) were not significant, indicating that longer serving CEOs and independent directors, at least in this context, do not drive stronger environmental reporting practices.

4.2 Discussion of Findings

First off, the findings show that gender diversity on the board has a significant positive impact on environmental disclosure, supporting the rejection of the null hypothesis. This is consistent with the expectation that female directors bring broader perspectives and greater sensitivity to stakeholder concerns, especially around sustainability. From the lens of Stakeholder Theory, women on boards may push firms to prioritise transparency and legitimacy, knowing that environmental issues directly affect community trust and stakeholder relations. The result is also in line with Agency Theory, as gender diverse boards can provide stronger monitoring of management, reducing the risk of opportunistic behavior that sidelines ENSR.

Secondly, CEO tenure was not found to significantly influence disclosure. This result supports the null hypothesis and suggests that the longevity of a CEO does not necessarily translate into greater commitment to sustainability practices. While Agency Theory posits that longer tenured CEOs may accumulate power and weaken board oversight, this study indicates that tenure alone is not decisive. Instead, disclosure may depend more on board level structures and external regulatory pressures than on the CEO's personal duration in office.

Thirdly, frequent board meetings emerged as a positive and significant driver of disclosure, leading to the rejection of the null hypothesis. This finding supports the view that active boards, by meeting regularly, create space for more robust discussions on environmental risks and sustainability initiatives. From the stakeholder theory perspective, this reflects boards taking



their accountability role seriously, ensuring that stakeholder interests are incorporated into reporting. Similarly, agency theory suggests that increased board activity strengthens monitoring, reducing managerial discretion and enhancing transparency.

Fourthly, board independence was not significantly related to environmental disclosure, which supports the null hypothesis. This contradicts prior expectations that independent directors would act as stronger monitors. One explanation may lie in weak enforcement and limited empowerment of independent directors in Nigeria's institutional setting. From the Agency Theory angle, this suggests that independence on paper does not necessarily translate into effective oversight in practice. Stakeholder Theory also sheds light here: without genuine commitment to stakeholder engagement, independent directors may be symbolic rather than substantive in driving sustainability.

5.0 Conclusion and Recommendation

This study examined how governance mechanisms influence environmental disclosure among listed downstream oil and gas firms in Nigeria between 2014 and 2025. The findings show that board gender diversity and frequent board meetings play an important positive role in improving disclosure practices, while CEO tenure and board independence did not show any meaningful effect. Taken together, however, the governance variables were significant, confirming that board structures matter for how firms report their environmental performance. The study concludes that environmental disclosure in Nigeria's downstream oil and gas sector is strongly shaped by governance mechanisms, with diversity and active board engagement standing out as the key drivers of accountability and transparency.

Recommendations

Based on the findings of this study and the conclusion drawn, the following recommendations are made:

- i. Since board gender diversity was found to significantly improve environmental disclosure, regulators such as the FRCN and industry stakeholders should encourage greater female participation on corporate boards. This can be achieved through policy incentives, targeted



capacity building, and awareness campaigns that highlight the value of diverse perspectives in governance.

ii. CEO tenure was not found to significantly influence disclosure; firms should strengthen board-level governance structures and comply with external regulatory frameworks, rather than relying on CEO tenure, to drive meaningful sustainability disclosure.

iii. The positive influence of board meeting frequency suggests that boards that meet more often are better positioned to oversee sustainability issues. Companies should therefore institutionalise regular, purposeful meetings, ensuring that sustainability matters form a standing agenda item to deepen accountability.

iv. Although board independence did not significantly impact disclosure in this study, this may reflect weak enforcement of their oversight role. Regulators and firms alike should strengthen the selection, training, and empowerment of independent directors, ensuring they possess the competence and authority to influence sustainability decisions.

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