

Impact of Corporate Governance on Environmental Disclosure of Listed Industrial Goods Companies in Nigeria

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Abstract

This study examined the impact of corporate governance on environmental disclosure among listed industrial goods companies in Nigeria. The industrial goods sector, comprising cement, steel, chemicals, paints, and packaging materials companies, contributes significantly to environmental degradation through carbon emissions, waste generation, and pollution, thereby necessitating greater corporate accountability through environmental disclosure. The study was anchored on Agency Theory and supported by Stakeholder Theory and Resource-Based Theory. An ex-post facto research design was adopted. The population comprised 13 industrial goods companies listed on the Nigerian Exchange Group, from which a sample of 9 companies was selected and studied over a seven-year period (2018–2024). Secondary data were obtained from the annual reports and accounts of the sampled companies. Corporate governance was proxied by board independence, board gender diversity, audit committee independence, managerial ownership, and board meetings, while environmental disclosure served as the dependent variable, with firm size and firm age included as control variables. Data were analyzed using descriptive statistics, correlation analysis, and panel regression techniques. The findings revealed that board gender diversity had a positive and significant effect on environmental disclosure, while board meetings also exerted a positive and significant influence. Conversely, board independence and audit committee independence had negative but insignificant effects, whereas managerial ownership showed a positive but insignificant effect. Firm size exhibited a positive and significant relationship with environmental disclosure. The study contributes to Agency Theory by demonstrating that selected internal corporate governance mechanisms, particularly board gender diversity and board meetings, enhance environmental transparency within Nigeria's industrial goods sector. The findings also provide practical evidence for corporate boards, regulators, and policymakers seeking to strengthen sustainability reporting and corporate environmental accountability. The study concludes that strengthening board diversity and improving board effectiveness can significantly enhance environmental disclosure. It recommends that listed industrial goods companies increase female representation on their boards to improve environmental transparency and sustainability reporting.

Keywords: Board gender diversity; board meetings; corporate governance; environmental disclosure; industrial goods companies; Nigeria.

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1. Introduction

The global emphasis on environmental sustainability has intensified over the past two decades due to the increasing threats posed by climate change, biodiversity loss, pollution, and resource depletion. As organizations are increasingly held accountable for their environmental footprints, corporate governance has emerged as a critical mechanism for promoting transparency and environmental accountability through effective disclosure practices. Industrial activities remain among the major contributors to greenhouse gas emissions, environmental degradation, and ecological imbalance, particularly in developing economies where regulatory enforcement is often weak (Intergovernmental Panel on Climate Change [IPCC], 2023; United Nations Environment Programme [UNEP], 2024). Consequently, stakeholders—including investors, regulators, customers, and host communities—are increasingly demanding greater corporate accountability and transparency regarding firms' environmental performance.

Environmental disclosure refers to the communication of information relating to a firm's environmental policies, practices, performance, and impacts through corporate reports or sustainability disclosures. Such disclosures include information on carbon emissions, energy consumption, waste management, pollution control, environmental investments, and compliance with environmental regulations (Global Reporting Initiative [GRI], 2024). Environmental disclosure has become an essential component of corporate reporting because it enhances transparency, reduces information asymmetry, improves corporate legitimacy, and strengthens stakeholder confidence (Aifuwa & Embele, 2023). Firms disclose environmental information for several strategic, regulatory, and ethical reasons. Strategically, environmental disclosure enhances corporate reputation, strengthens stakeholder trust, and improves access to investment by demonstrating a firm's commitment to sustainable business practices (Freeman et al., 2020). It also reduces information asymmetry between management and stakeholders, thereby enabling investors, creditors, and other users of corporate reports to make informed decisions regarding a firm's environmental risks and long-term performance (Aifuwa & Embele, 2023). Furthermore, firms disclose environmental information to comply with environmental regulations, sustainability reporting standards, and stock exchange listing requirements, while responding to increasing pressure from customers, host communities, non-governmental organizations, and environmental advocacy groups (GRI, 2024). Such disclosures enable firms to demonstrate accountability, maintain their legitimacy to operate, reduce reputational risks, and gain competitive advantage by signalling responsible environmental stewardship to stakeholders (Suchman, 1995; Freeman et al., 2020).

Corporate governance refers to the system by which companies are directed and controlled through the relationships among the board of directors, management, shareholders, and other stakeholders (Organisation for Economic Co-operation and Development [OECD], 2023). It comprises the structures, processes, and mechanisms that ensure accountability, transparency, fairness, and ethical decision-making in the management of corporate affairs (Tricker, 2024). Effective corporate governance enhances organizational performance by ensuring that managers act in the best interests of shareholders while addressing the legitimate concerns of other stakeholders, including environmental responsibility and sustainability reporting (Aifuwa & Embele, 2023). In Nigeria, the Nigerian Code of Corporate Governance (2018) remains the principal governance framework, while the Financial Reporting Council of Nigeria continues to encourage listed companies to strengthen environmental, social, and governance (ESG) reporting practices in line with international best practices (Financial Reporting Council of Nigeria [FRCN], 2023). Board characteristics influence environmental disclosure because the board of directors is primarily responsible for formulating corporate policies, overseeing

management decisions, monitoring compliance with environmental regulations, and ensuring accountability to shareholders and other stakeholders (OECD, 2023). The composition and attributes of the board—including its independence, gender diversity, expertise, ownership structure, and meeting frequency—determine the quality of oversight and the extent to which environmental issues are incorporated into corporate decision-making (Tricker, 2024). For instance, independent directors are more likely to promote transparency and protect stakeholder interests by demanding comprehensive environmental reporting, while gender-diverse boards often introduce broader perspectives that encourage sustainability initiatives and improved disclosure practices (Aifuwa & Embele, 2023). Similarly, active boards that meet regularly are better positioned to review environmental risks, monitor compliance with environmental regulations, and ensure timely sustainability reporting (Naciti, 2019). Consequently, firms with effective board characteristics are generally expected to provide more comprehensive and credible environmental disclosures, thereby enhancing corporate legitimacy, reducing information asymmetry, and strengthening stakeholder confidence (Freeman et al., 2020; Suchman, 1995).

Nigeria's industrial goods sector, comprising companies operating in cement, steel, chemicals, paints, ceramics, building materials, and packaging industries, plays a significant role in national economic development. However, the sector is characterized by intensive energy consumption, extensive extraction of natural resources, substantial greenhouse gas emissions, and waste generation, making it one of the country's most environmentally sensitive industries (National Bureau of Statistics [NBS], 2024). The industrial goods sector deserves separate investigation because its production processes generate substantially higher environmental risks and ecological footprints than many other sectors of the Nigerian economy. For example, cement and steel manufacturing are among the largest contributors to carbon dioxide emissions and resource depletion, while chemical and paint manufacturing generate hazardous wastes that require effective environmental management and disclosure (Intergovernmental Panel on Climate Change [IPCC], 2023). Furthermore, unlike the banking and telecommunications sectors, where environmental impacts are largely indirect, industrial goods companies interact directly with the natural environment through manufacturing operations, making environmental disclosure particularly relevant for evaluating their sustainability performance. Despite these unique environmental challenges, empirical evidence on the corporate governance determinants of environmental disclosure within Nigeria's industrial goods sector remains relatively limited compared with studies focusing on the oil and gas, financial, and consumer goods sectors. This gap underscores the need for a sector-specific investigation to provide empirical evidence that can inform corporate governance practices, regulatory policies, and sustainability reporting within the industry.

Despite the increasing emphasis on sustainability reporting and corporate governance reforms in Nigeria, environmental disclosure among listed industrial goods companies remains inconsistent and relatively inadequate. Many firms continue to provide limited or selective environmental information despite operating in industries with significant environmental impacts. The voluntary nature of most environmental disclosures, coupled with differences in corporate governance practices across firms, has resulted in considerable variations in the quality and extent of environmental reporting. This situation limits stakeholders' ability to assess firms' environmental performance and raises concerns regarding whether existing corporate governance mechanisms are sufficiently effective in promoting environmental transparency and accountability (Financial Reporting Council of Nigeria [FRCN], 2023; PricewaterhouseCoopers Nigeria [PwC Nigeria], 2024). Although environmental reporting has gained increasing attention following global sustainability initiatives and the adoption of ESG

reporting frameworks, environmental disclosure among Nigerian industrial goods companies remains largely voluntary and uneven. Several firms provide only limited environmental information despite operating in environmentally sensitive industries. Consequently, stakeholders encounter significant challenges in evaluating firms' environmental performance, regulatory compliance, and sustainability commitments.

These raises concerns regarding whether existing corporate governance mechanisms are sufficiently effective in promoting comprehensive environmental disclosure.

Several empirical studies have examined the relationship between corporate governance and environmental disclosure, but their findings remain inconclusive. Masud et al. (2019) found that board independence and board gender diversity significantly improved the quality of environmental disclosure among listed companies in South Asia, suggesting that stronger governance mechanisms enhance corporate transparency. In contrast, Osemene (2021) reported that while board independence positively influenced environmental disclosure in selected African countries, managerial ownership had no significant effect, indicating that not all governance mechanisms contribute equally to disclosure practices. Similarly, Aifuwa and Embele (2023) found that board gender diversity positively influenced environmental disclosure among Nigerian listed firms, whereas the effects of board independence and audit committee characteristics were statistically insignificant. Likewise, Al-Qudah et al. (2024) reported that board diversity and board activity significantly enhanced sustainability reporting, while Ibrahim and Yusuf (2024) observed that some governance variables exhibited weak or insignificant relationships with environmental disclosure among Nigerian manufacturing firms.

The mixed findings suggest that the influence of corporate governance on environmental disclosure is context-specific and may vary across countries, industries, institutional environments, and governance structures. Furthermore, most previous studies relied on cross-country datasets, focused on financial institutions or manufacturing firms as a broad category, or combined several industries without examining the unique environmental characteristics of Nigeria's industrial goods sector. Consequently, evidence on how specific board characteristics influence environmental disclosure within this environmentally sensitive sector remains limited, thereby justifying the present study.

Furthermore, empirical findings remain inconsistent. These inconsistencies may be attributed to differences in institutional environments, corporate governance structures, regulatory enforcement, sample characteristics, measurement of environmental disclosure, and estimation techniques employed by previous studies.

Consequently, there is limited sector-specific evidence on the corporate governance mechanisms that influence environmental disclosure among listed industrial goods companies in Nigeria. Board gender diversity is considered important because female directors are often associated with greater ethical sensitivity, broader stakeholder orientation, and stronger support for sustainability initiatives, which may enhance the quality and extent of environmental disclosure (Aifuwa & Embele, 2023). Audit committee independence is expected to strengthen oversight, improve the credibility of environmental reporting, and ensure compliance with sustainability reporting requirements through effective monitoring of management (Organisation for Economic Co-operation and Development [OECD], 2023). Managerial ownership may influence disclosure decisions by aligning managers' interests with those of shareholders; however, higher ownership concentration may also reduce managers' incentives to provide extensive voluntary environmental information (Jensen & Meckling, 1976). Similarly, board meetings provide opportunities for directors to deliberate on environmental risks, sustainability strategies, regulatory compliance, and disclosure policies, making board

activity an important determinant of environmental reporting (Naciti, 2019). Board independence is also expected to promote objective oversight and enhance transparency because independent directors are more likely to protect stakeholder interests and encourage comprehensive environmental disclosure (Tricker, 2024).

Despite the theoretical importance of these governance mechanisms, existing evidence on their influence remains mixed and inconclusive, particularly within Nigeria's industrial goods sector, which is characterized by significant environmental impacts and increasing stakeholder demand for environmental accountability. This gap provides the motivation for the present study, which examines how this corporate governance mechanisms influence environmental disclosure among listed industrial goods companies in Nigeria.

In view of the foregoing, this study examines the impact of board gender diversity, audit committee independence, managerial ownership, board meetings, and board independence on the environmental disclosure of listed industrial goods companies in Nigeria.

2. Literature Review

2.1 Environmental Disclosure

Environmental disclosure refers to the communication of information regarding an organization's interactions with the natural environment, including its environmental policies, practices, performance, and impacts (Gerged, 2024). It is an umbrella term describing the various means through which companies disclose information on their environmental activities to stakeholders (Mukherjee & Pattanayak, 2023). Such information includes environmental policies, greenhouse gas emissions, energy consumption, water usage, waste management, pollution control measures, environmental expenditures, biodiversity conservation initiatives, environmental compliance, and stakeholder engagement. The primary objective of environmental disclosure is to provide stakeholders with relevant information that enables them to evaluate an organization's environmental performance, sustainability initiatives, and environmental risks (Global Reporting Initiative [GRI], 2024).

Environmental disclosure may be classified as voluntary or mandatory. Voluntary environmental disclosure refers to environmental information that firms disclose beyond statutory or regulatory requirements in order to demonstrate environmental responsibility, strengthen corporate reputation, attract investors, and respond to stakeholder expectations (Gerged, 2024). Such disclosures are often motivated by the desire to gain competitive advantage, improve corporate legitimacy, and enhance stakeholder confidence. In contrast, mandatory environmental disclosure consists of information that organizations are legally required to disclose under environmental laws, stock exchange listing requirements, accounting regulations, and sustainability reporting standards established by governments and regulatory agencies (Mukherjee & Pattanayak, 2023). The growing concern over climate change and sustainable development has encouraged many countries to strengthen mandatory sustainability reporting requirements to improve corporate transparency and accountability.

Environmental disclosure has become a fundamental component of Environmental, Social and Governance (ESG) reporting, which provides stakeholders with comprehensive information on a firm's environmental performance, social responsibility, and governance practices. ESG reporting extends beyond traditional financial reporting by incorporating sustainability-related information that enables investors and other stakeholders to assess an organization's long-term value creation, risk exposure, and commitment to sustainable development (Organisation for Economic Co-operation and Development [OECD], 2023). As global investors increasingly integrate ESG factors into investment decisions, companies are under greater pressure to provide high-quality environmental disclosures that demonstrate responsible environmental stewardship and effective governance.

The introduction of the International Sustainability Standards Board (ISSB) by the IFRS Foundation has significantly advanced global sustainability reporting. In 2023, the ISSB issued IFRS S1: General Requirements for Disclosure of Sustainability-related Financial Information and IFRS S2: Climate-related Disclosures, which establish globally consistent standards for reporting sustainability-related risks and opportunities (International Sustainability Standards Board [ISSB], 2023). IFRS S1 requires organizations to disclose material sustainability-related information that may affect enterprise value, while IFRS S2 specifically requires disclosure of climate-related governance, strategy, risk management, and performance metrics. These standards improve the consistency, comparability, reliability, and decision usefulness of sustainability information for investors, regulators, and other stakeholders, while complementing reporting frameworks such as the Global Reporting Initiative (GRI).

Environmental disclosure also plays a significant role in reducing information asymmetry between corporate management and stakeholders. Information asymmetry occurs when managers possess more information about a firm's environmental performance and risks than shareholders, investors, creditors, and regulators (Healy & Palepu, 2001). Through comprehensive environmental disclosure, firms provide transparent and credible information regarding their environmental policies, risks, compliance status, and sustainability initiatives, thereby reducing uncertainty and enabling stakeholders to make informed investment and governance decisions. Consequently, improved environmental disclosure enhances market efficiency, lowers agency costs, strengthens investor confidence, and facilitates access to capital.

Furthermore, environmental disclosure contributes to corporate legitimacy and accountability. According to legitimacy theory, organizations disclose environmental information to demonstrate that their operations conform to societal norms, values, and expectations, thereby maintaining their social licence to operate (Suchman, 1995). Companies operating in environmentally sensitive industries often disclose environmental information to manage public perceptions, reduce reputational risks, and demonstrate compliance with environmental regulations. Similarly, accountability theory argues that corporations have a responsibility to account for the environmental consequences of their activities to stakeholders who are directly or indirectly affected by their operations. Transparent environmental reporting therefore enhances accountability by enabling stakeholders to evaluate corporate environmental performance and hold organizations responsible for their environmental impacts.

To evaluate the extent and quality of environmental reporting, many researchers employ environmental disclosure indices. An environmental disclosure index is a systematic measurement tool used to assess the quantity and quality of environmental information disclosed by firms based on predetermined disclosure items (Mukherjee & Pattanayak, 2023). These indices are commonly developed using internationally recognized reporting frameworks such as the Global Reporting Initiative (GRI), ISSB Sustainability Disclosure Standards, Carbon Disclosure Project (CDP), and national sustainability reporting guidelines. Typical disclosure items include greenhouse gas emissions, energy consumption, water management, waste management, pollution control, biodiversity conservation, environmental expenditures, environmental compliance, climate change initiatives, environmental targets, and sustainability governance. Environmental disclosure indices may be weighted or unweighted and are widely used in empirical studies to compare environmental reporting practices across firms, industries, and countries, thereby providing an objective measure of environmental disclosure performance.

2.2 Corporate Governance

Corporate governance refers to the system by which companies are directed and controlled through the relationships among the board of directors, management, shareholders, and other stakeholders (Organisation for Economic Co-operation and Development [OECD], 2023). It is concerned with the structures and processes for decision-making, accountability, and control. In Nigeria, the 2018 Code of Corporate Governance is the key regulatory document. It outlines principles for board composition, meetings, risk management, and sustainability, promoting ethical conduct and transparency.

Concept of Corporate Governance

Corporate governance refers to the system by which companies are directed and controlled through the relationships among the board of directors, management, shareholders, and other stakeholders (Organisation for Economic Co-operation and Development [OECD], 2023). It encompasses the structures, principles, and processes through which corporate objectives are established, managerial decisions are monitored, organizational performance is evaluated, and accountability is ensured. According to Tricker (2024), corporate governance provides the framework through which organizations balance the interests of shareholders with those of employees, customers, creditors, regulators, host communities, and other stakeholders while promoting transparency, fairness, ethical conduct, and long-term sustainability.

The primary objective of corporate governance is to ensure that organizations are managed efficiently, responsibly, and in the best interests of shareholders and other stakeholders. Effective corporate governance reduces agency conflicts between owners and managers, strengthens accountability, improves transparency, enhances investor confidence, promotes sound risk management, and supports sustainable organizational performance (OECD, 2023). In recent years, corporate governance has assumed greater importance because stakeholders increasingly expect organizations not only to maximize financial performance but also to demonstrate environmental responsibility, social accountability, and ethical business conduct through effective Environmental, Social and Governance (ESG) practices.

Corporate governance is implemented through various governance mechanisms, which are the structures, policies, and monitoring processes designed to ensure that managers act in accordance with organizational objectives and stakeholder expectations. These governance mechanisms are generally classified into internal and external governance mechanisms.

Internal governance mechanisms are organizational structures and processes that operate within the company to monitor management, improve decision-making, and enhance accountability. They include the board of directors, board independence, board gender diversity, audit committees, managerial ownership, board meetings, executive compensation, internal control systems, and internal audit functions (Tricker, 2024). These mechanisms directly influence /corporate policies, strategic decisions, risk management, and the quality of financial and non-financial disclosures, including environmental disclosure.

In contrast, external governance mechanisms operate outside the organization and provide additional oversight of corporate activities. These include government regulations, stock exchange listing requirements, external auditing, market competition, institutional investors, financial analysts, creditors, the media, and legal and regulatory institutions (OECD, 2023). External governance mechanisms promote corporate accountability by compelling firms to comply with laws, reporting standards, and stakeholder expectations while discouraging opportunistic managerial behaviour.

In Nigeria, corporate governance is principally regulated by the Nigerian Code of Corporate Governance (2018) issued by the Financial Reporting Council of Nigeria (FRCN). The Code provides principles relating to board composition, board independence, board meetings, audit committees, internal controls, risk management, sustainability reporting, and stakeholder

engagement. The Code encourages listed companies to adopt sound governance practices that enhance transparency, accountability, ethical conduct, and long-term organizational sustainability (Financial Reporting Council of Nigeria [FRCN], 2023).

This study focuses specifically on internal corporate governance mechanisms because they represent the governance structures through which the board directly influences organizational policies and disclosure practices. Specifically, the study examines board gender diversity, audit committee independence, managerial ownership, board meetings, and board independence as internal governance mechanisms that are expected to influence the extent and quality of environmental disclosure among listed industrial goods companies in Nigeria. Understanding how these internal governance mechanisms affect environmental disclosure provides important empirical evidence for strengthening corporate governance practices and improving sustainability reporting within the Nigerian industrial goods sector.

2.3 Corporate Governance Mechanisms and Environmental Disclosure

Board Gender Diversity: The presence of women on boards is believed to enhance transparency and cater to a wider range of stakeholder concerns (Tapver et al., 2020). Studies have shown that female directors often bring different perspectives and ethical considerations, leading to greater attention to social and environmental issues (Jahid et al., 2020; Al-Shaer & Zaman, 2016). Female directors are generally associated with greater ethical sensitivity, stronger stakeholder orientation, and a more collaborative approach to corporate decision-making, all of which contribute to improved environmental disclosure. Compared with male directors, women are often more likely to advocate for transparency, corporate social responsibility, and sustainable business practices because they tend to place greater emphasis on long-term organizational sustainability rather than short-term financial performance (Bear et al., 2010). Their presence on corporate boards broadens the diversity of perspectives available during board deliberations, leading to more comprehensive discussions of environmental risks, climate change, pollution control, resource conservation, and sustainability reporting (Jahid et al., 2020). Furthermore, female directors strengthen board independence by encouraging rigorous monitoring of management and promoting greater accountability in corporate reporting (Al-Shaer & Zaman, 2016). From the perspective of stakeholder theory, gender-diverse boards are better able to recognize and respond to the environmental information needs of investors, regulators, host communities, customers, and other stakeholders, thereby encouraging more transparent and comprehensive environmental disclosure (Freeman et al., 2020). Consequently, firms with greater female representation on their boards are generally expected to disclose higher-quality environmental information, reduce information asymmetry, enhance corporate legitimacy, and strengthen stakeholder confidence in the organization's environmental performance (Aifuwa & Embele, 2023).

Audit Committee Independence: Independence is considered crucial for audit committees to monitor management effectively. While some studies found a positive link between audit committee independence and voluntary disclosure (Tashakor, 2014), others found it to be insignificant (Klein, 2002). Independent audit committees strengthen corporate governance by providing objective oversight of management and reducing the likelihood of managerial bias in corporate reporting. Because independent committee members are free from executive influence, they are better positioned to critically review financial and non-financial disclosures, ensure compliance with regulatory requirements, and promote transparency and accountability (Organisation for Economic Co-operation and Development [OECD], 2023). In the context of environmental reporting, an independent audit committee enhances the credibility and reliability of environmental disclosures by ensuring that information relating to carbon emissions, environmental expenditures, pollution control, regulatory compliance, and

sustainability initiatives is complete, accurate, and fairly presented. Independent audit committees also encourage management to adopt recognized sustainability reporting frameworks, strengthen internal controls over environmental information, and improve compliance with Environmental, Social and Governance (ESG) reporting requirements (Aifuwa & Embele, 2023). Consequently, firms with more independent audit committees are generally expected to provide higher-quality environmental disclosures, thereby reducing information asymmetry, enhancing stakeholder confidence, and strengthening corporate legitimacy.

Managerial Ownership: Managerial ownership refers to the proportion of a company's shares held by its managers and executive directors. It is an important internal corporate governance mechanism because it influences managers' incentives and decision-making regarding corporate performance and disclosure practices. According to Jensen and Meckling (1976), managerial ownership can reduce agency conflicts by aligning the interests of managers with those of shareholders, thereby encouraging managers to pursue long-term value creation rather than short-term personal benefits.

Agency Theory provides two competing explanations for the relationship between managerial ownership and environmental disclosure. The Alignment Hypothesis argues that as managerial ownership increases, managers' interests become more closely aligned with those of shareholders. Consequently, managers are more likely to invest in environmental sustainability initiatives and provide transparent environmental disclosures because improved environmental performance enhances corporate reputation, reduces regulatory and litigation risks, and contributes to long-term firm value (Jensen & Meckling, 1976). Under this perspective, managerial ownership is expected to have a positive influence on environmental disclosure.

In contrast, the Entrenchment Hypothesis suggests that when managerial ownership becomes excessively high, managers may acquire sufficient control to pursue their personal interests with limited oversight from shareholders or the board. Entrenched managers may perceive extensive environmental disclosure as costly, unnecessary, or likely to expose the firm to increased regulatory scrutiny and stakeholder criticism. As a result, they may choose to limit voluntary environmental disclosure in order to preserve managerial discretion and protect private benefits (Morck et al., 1988). Under this perspective, managerial ownership may have a negative or insignificant effect on environmental disclosure.

These competing theoretical perspectives help explain the inconsistent findings reported in empirical studies. For example, Arcay and Vazquez (2005) found that managerial ownership positively influenced corporate disclosure, supporting the Alignment Hypothesis. In contrast, Eng and Mak (2003) reported no significant relationship, suggesting that the effect of managerial ownership depends on factors such as ownership concentration, board effectiveness, institutional environment, and the regulatory framework within which firms operate. Consequently, the influence of managerial ownership on environmental disclosure remains an empirical issue that requires further investigation, particularly within the Nigerian industrial goods sector.

Board Meetings: Board meetings provide directors with opportunities to oversee management, evaluate corporate performance, and make strategic decisions. However, it is the effectiveness of board meetings, rather than their frequency alone, that enhances environmental disclosure. Effective board meetings enable directors to assess environmental risks, review Environmental, Social and Governance (ESG) reports, monitor compliance with environmental regulations, and formulate sustainability strategies that improve the quality and credibility of environmental reporting (Stein & Zhao, 2019). The Nigerian Code of Corporate Governance recommends that boards meet at least once every quarter. Empirical evidence

remains mixed, with Fauzyyah and Rachmawati (2018) reporting a positive relationship between board meetings and environmental disclosure, whereas Nour et al. (2020) found the relationship to be statistically insignificant.

Board Independence: Independent directors enhance environmental disclosure by providing objective oversight of management and minimizing managerial opportunism. Their independence enables them to challenge management decisions, demand greater transparency, and ensure that environmental information disclosed to stakeholders is accurate, complete, and consistent with applicable reporting standards (Fama & Jensen, 1983). In addition, independent directors safeguard the interests of shareholders and other stakeholders by ensuring that environmental risks, regulatory compliance, and sustainability issues receive adequate board attention, thereby improving the credibility and quality of environmental disclosure (Organisation for Economic Co-operation and Development [OECD], 2023).

2.4 Theoretical Framework

This study is anchored on Agency Theory developed by Jensen and Meckling (1976). Agency Theory is adopted as the anchor theory because it provides the most appropriate explanation for the relationship between corporate governance mechanisms and environmental disclosure. The theory posits that conflicts of interest arise when managers (agents) pursue personal objectives that may not align with the interests of shareholders (principals). These conflicts create agency problems and information asymmetry, as managers often possess more information about the firm's operations and environmental performance than shareholders. Internal corporate governance mechanisms such as board independence, board gender diversity, audit committee independence, managerial ownership, and board meetings are designed to monitor managerial behaviour, reduce opportunistic actions, enhance accountability, and improve transparency. Environmental disclosure therefore serves as an important governance mechanism through which managers communicate environmental performance, sustainability initiatives, and environmental risks to shareholders and other stakeholders, thereby reducing information asymmetry and agency costs. For these reasons, Agency Theory provides the principal theoretical foundation for explaining how corporate governance mechanisms influence environmental disclosure in this study.

The study is further supported by Stakeholder Theory, which posits that companies have responsibilities not only to shareholders but also to a wide range of stakeholders, including employees, customers, regulators, host communities, and investors (Freeman, 1984). This perspective explains why firms disclose environmental information to meet stakeholders' expectations and maintain corporate legitimacy. The study is also supported by Resource-Based Theory, which argues that valuable organizational resources, including the expertise, experience, diversity, and competencies of the board of directors, can provide a sustainable competitive advantage (Wernerfelt, 1984). Together, these supporting theories complement Agency Theory by providing additional explanations for why effective corporate governance mechanisms promote improved environmental transparency and sustainability reporting.

3. Methodology

The study adopted an ex-post facto research design because it utilized historical financial and corporate governance data obtained from published annual reports without manipulating the study variables. This design is appropriate for investigating causal relationships using observable corporate characteristics over time.

The population consisted of Eleven (13) industrial goods companies listed on the Nigerian Exchange Group (NGX) as of December 31, 2024. A purposive sample of nine (9) companies was selected based on data availability for a period of seven years (2018–2024).

The variables and their measurements are detailed in Table 1:

Table 1: Measurement of Variables

Variables	Acronym	Measurement
Environmental Disclosure	ENVD	Content analysis score based on a disclosure index adapted from Hutumo (1995) and Suleiman et al. (2014). Score = Total items disclosed / Maximum possible items (0-1).
Board Gender Diversity	BGD	Proportion of female directors to the total number of directors on the board.
Audit Committee Independence	ACI	Proportion of independent audit committee members to the total number of audit committee members.
Managerial Ownership	MGOW	Proportion of shares held by the management (directors) of the company.
Board Meetings	BM	Number of board meetings held during the financial year.
Board Independence	BI	Proportion of independent non-executive directors to the total number of directors on the board.
Firm Size (Control)	FRMS	Natural logarithm of total assets.
Firm Age (Control)	FRMA	Number of years since the company was listed on the stock exchange.

Data were analyzed using descriptive statistics, a correlation matrix, and panel regression analysis. The study employed the Panel Corrected Standard Errors (PCSE) estimation technique to address potential issues of heteroskedasticity and contemporaneous correlation (Beck & Katz, 1995). The econometric model is specified as follows:

$$ENVD_{it} = \beta_0 + \beta_1 BGD_{it} + \beta_2 ACI_{it} + \beta_3 MGOW_{it} + \beta_4 BM_{it} + \beta_5 BI_{it} + \beta_6 FRMS_{it} + \beta_7 FRMA_{it} + \varepsilon_{it}$$

4. Results and Discussion

Table 2: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
ENVD	0.2167	0.1611	0.05	0.5
BGD	0.2303	0.0965	0.0833	0.5
ACI	0.2495	0.1207	0	0.4
MGOW	0.1202	0.2009	0.0001	0.5980
BM	5.6032	0.7304	4	6
BI	0.2784	0.1000	0.1111	0.5
FRMS	23.7003	2.7620	20.2250	31.0263
FRMA	32.6667	13.4236	6	51

Source: Author's Computation (2026)

Table 2 provides a summary of the descriptive statistics. The average environmental disclosure (ENVD) score was 0.2167 (or 21.67%), indicating a relatively low level of environmental reporting among the sampled industrial goods companies. Board gender diversity (BGD) averaged 23%, while board independence (BI) averaged 27.8%. Managerial ownership (MGOW) showed high variation, from 0.01% to 59.8%.

4.1 Regression Results

Table 3: Panel Regression Results (PCSE)

ENVD	Coef.	Std. Err.	z	P> z
BGD	0.3981279	0.1275914	3.12	0.002
ACI	-0.1153122	0.1491139	-0.77	0.439
MGOW	0.3019701	0.2249738	1.34	0.180
BM	0.0725888	0.0438538	1.66	0.098
BI	-0.2741078	0.215711	-1.27	0.204
FRMS	0.0373184	0.0054449	6.85	0.000
FRMA	-0.0014647	0.0013194	-1.11	0.267
_cons	-1.049551	0.2519971	-4.16	0.000
R-Square	0.5192			
Waldchi2	403.28			
Prob>Chi2	0.0000			

Panel Data Information Number of firms (N) = 9 Number of years (T) = 7 (2018–2024) Total observations (N × T) = 63

Source: Author's Computation (2026)

The regression results are presented in Table 3. The R-squared value of 0.5192 indicates that the selected corporate governance mechanisms and control variables jointly explain about 52% of the variation in environmental disclosure. The Wald chi² statistic is significant at the 1% level, indicating the model's overall good fit. Diagnostic tests for normality, multicollinearity, and heteroskedasticity were conducted and confirmed the robustness of the model. The VIF test showed no evidence of multicollinearity (Mean VIF = 1.77).

4.2 Test of Hypotheses

Based on the regression results, the hypotheses were tested as follows:

H₀₁: Board Gender Diversity. A coefficient of 0.398 means that a one-unit increase in BGD increases ENVD by 0.398.

Since BGD is a proportion, a 10% increase in female representation increases ENVD by about 3.98 percentage points.

H₀₂: Audit Committee Independence. The coefficient for ACI is negative and insignificant (p=0.439). Therefore, **H₀₂ is not rejected.**

H₀₃: Managerial Ownership. The coefficient for MGOW is positive but insignificant (p=0.180). Therefore, **H₀₃ is not rejected.**

H₀₄: Board Meetings. The coefficient for BM is positive and statistically significant at the 10% level (p = 0.098), indicating weak evidence that board meetings positively influence environmental disclosure.

H₀₅: Board Independence. The coefficient for BI is negative and insignificant (p=0.204). Therefore, **H₀₅ is not rejected.**

4.3 Discussion of Findings

The positive and significant effect of board gender diversity aligns with the resource-based and stakeholder theories, suggesting that diverse boards bring varied perspectives that enhance corporate decision-making on sustainability. This finding is consistent with prior studies in Nigeria (Onuorah et al., 2018), Bangladesh (Jahid et al., 2020), and the UK (Al-Shaer & Zaman, 2016). It implies that increasing female representation on boards improves environmental accountability.

The positive and significant effect of board meetings supports the agency theory, indicating that more frequent board meetings provide a platform for better oversight and discussion of environmental issues. This finding is consistent with Fauzyyah & Rachmawati (2018) but

contradicts some other studies (Ahmad et al., 2017; Nour et al., 2020). It suggests that in the Nigerian context, board meetings are an effective governance mechanism for enhancing environmental disclosure.

The insignificant effects of audit committee independence, managerial ownership, and board independence are noteworthy. The lack of a significant effect of audit committee independence may be because audit committees in Nigeria are primarily focused on financial reporting, not environmental matters (Kibiya, Che-Ahmad & Amran, 2016). The insignificant effect of managerial ownership may be due to the generally low levels of managerial ownership in the sample (mean of 12%), which may not provide sufficient incentives. The negative but insignificant effect of board independence suggests that independent directors may not possess the necessary environmental expertise or may not prioritize it, consistent with the findings of Mahmood et al. (2018). The positive and highly significant effect of firm size indicates that larger industrial goods companies disclose more environmental information than smaller firms. This finding suggests that larger firms possess greater financial, human, and technological resources to implement environmental management systems and prepare comprehensive sustainability reports. In addition, larger firms are more visible to regulators, investors, host communities, and the general public, making them subject to greater public scrutiny and stakeholder pressure to demonstrate environmental accountability through transparent reporting. This finding is consistent with stakeholder and legitimacy theories, which argue that highly visible organizations are more likely to disclose environmental information to maintain public trust and legitimacy. The result also agrees with previous studies that reported a positive association between firm size and environmental disclosure, indicating that organizational size remains an important determinant of corporate environmental reporting.

5. Conclusion and Recommendations

5.1 Conclusion

This study examined the impact of corporate governance mechanisms on the environmental disclosure of listed industrial goods companies in Nigeria. The findings show that board gender diversity and board meetings are key governance mechanisms that significantly improve environmental disclosure. Audit committee independence, managerial ownership, and board independence were found to be insignificant in driving such disclosures. The study concludes that enhancing the governance structure, particularly by promoting gender diversity and ensuring more frequent and focused board meetings, is crucial for improving environmental transparency and accountability in Nigeria's industrial goods sector.

5.2 Recommendations

Based on the findings, the following recommendations are made:

1. Listed industrial goods companies should actively work to increase the number of female directors on their boards to leverage the positive effect of board gender diversity on environmental disclosure.
2. Companies should expand the statutory responsibilities of audit committees to explicitly include the review of environmental and sustainability issues.
3. While managerial ownership was insignificant, companies should consider linking managerial compensation and ownership incentives to environmental performance metrics to better align interests.
4. Boards should hold more frequent meetings dedicated to environmental and sustainability matters, ensuring these issues are a consistent part of the board's agenda.
5. Companies should ensure that independent directors possess relevant environmental expertise, perhaps by serving on sustainability committees, to make their oversight more effective.

6. The Securities and Exchange Commission (SEC) and the Nigerian Exchange Group (NGX) should consider instituting mandatory policies requiring minimum female representation on corporate boards and making specific environmental reporting guidelines more robust.
7. The Nigerian Code of Corporate Governance 2018 should be revised to explicitly mandate the role of audit committees in environmental oversight and to recommend a minimum number of board meetings dedicated to sustainability matters.

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