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BOARD STRUCTURE AND SUSTAINABILITY REPORTING OF NON-FINANCIAL COMPANIES IN NIGERIA: THE MODERATING ROLE OF FIRM SIZE

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Abstract

Despite growing expectations for corporate transparency and accountability, sustainability reporting among listed manufacturing firms in Nigeria remains a concern, potentially limiting stakeholders' ability to assess corporate environmental, social, and governance (ESG) performance. This study examines the effects of board independence, board size, and board meetings on sustainability reporting (SR), focusing on the moderating role of firm size. Using a longitudinal dataset of 215 firm-year observations covering 2020–2024, the study employs panel regression analysis. The findings reveal that board independence has a significant positive effect on SR, while board size and board meeting frequency exhibit positive but statistically insignificant effects. Firm size positively and significantly moderates the relationship between board meetings and SR. However, its moderating effects on the relationships between board independence and SR and between board size and SR are negative but statistically insignificant. These findings highlight the importance of board independence in strengthening sustainability disclosure among Nigerian manufacturing firms. They also suggest that the contribution of board meetings to sustainability reporting may depend on firm size. The study has implications for regulators seeking to strengthen sustainability disclosure requirements in line with relevant frameworks, including the Global Reporting Initiative (GRI), and for firms aiming to improve board oversight and accountability. By providing evidence on the direct and moderating effects of board structure and firm size, the study contributes to the sustainability reporting literature in emerging economies and underscores the need for effective governance mechanisms to promote corporate transparency and accountability.

Keywords: board structure, sustainability disclosure, non-financial companies, Nigeria

1. Introduction

Sustainability reporting (SR) has become an increasingly important component of corporate accountability, extending conventional financial reporting to encompass the environmental, social, economic, and governance consequences of corporate activities. Through sustainability disclosures, firms communicate information that enables investors

and other stakeholders to evaluate corporate strategies, risks, impacts and prospects for long-term value creation (Eccles et al., 2014; Hahn & Kühnen, 2013; Kühn et al., 2018).

The increasing importance of sustainability information is further reflected in the development of the International Sustainability Standards Board (ISSB) Standards, IFRS S1 and IFRS S2, which establish a global baseline for sustainability- and climate-related financial disclosures and explicitly require information about governance processes for overseeing sustainability-related risks and opportunities (IFRS Foundation, 2023a). Thus, sustainability reporting is increasingly connected to corporate governance, strategic decision-making and accountability rather than being viewed merely as a voluntary communication exercise.

The relevance of SR is particularly pronounced in emerging economies such as Nigeria, where corporate activities have substantial implications for employment, communities, natural resources and environmental quality. Sustainability disclosure provides firms with an avenue for demonstrating accountability to stakeholders and communicating their responses to environmental and social challenges. It may also reduce information asymmetry between companies and stakeholders by providing information that is not adequately captured in conventional financial statements (Dhaliwal et al., 2011). However, the extent and quality of sustainability reporting vary considerably among firms, suggesting that organisational and governance characteristics may influence corporate disclosure decisions (Bao et al., 2024; Velte, 2023).

Corporate governance, particularly board structure, is therefore an important potential determinant of SR. The board is responsible for strategic oversight, monitoring management and ensuring accountability, and its composition and functioning can influence the extent to which sustainability issues receive managerial attention.

Board independence may strengthen monitoring and reduce managerial opportunism, thereby encouraging greater transparency (Fama & Jensen, 1983; Jizi et al., 2014). Larger boards may provide broader expertise, experience and stakeholder perspectives that facilitate attention to complex sustainability issues, although coordination problems may reduce their effectiveness (Jensen, 1993).

Board meeting frequency may similarly provide opportunities for directors to discuss sustainability risks, stakeholder expectations and reporting practices and to monitor management's response to such issues (Vafeas, 1999). These arguments suggest that board independence, board size and board meetings may influence sustainability reporting, although the direction and magnitude of these relationships remain context dependent.

Recent empirical evidence confirms this lack of consensus. Using 370 listed firms across 50 countries, Alta'any et al. (2026) find that board size has a positive association with sustainability reporting, whereas board independence is negatively associated with SR in their international sample. Their findings also indicate that the effects of board characteristics vary across economic, environmental, and social disclosure dimensions.

Similarly, evidence from 110 listed non-financial firms across 10 Sub-Saharan African countries indicates positive effects of board size, board meetings and board independence on sustainability reporting (Erin & Ackers, 2024). Conversely, research on 78 state-owned enterprises across Sub-Saharan Africa finds no significant relationship between selected board characteristics and sustainability reporting, suggesting that

institutional and organisational contexts may condition the governance–SR relationship (Ikpor et al., 2024; Maa'ruf & Madawaki, 2024).

Evidence from Nigeria is equally mixed. Mohammed et al. (2024), examining listed Nigerian firms over 2013–2022, report that board size and board independence positively and significantly influence sustainability reporting. However, when board commitment is introduced as a moderator, the effects of board size and independence change, illustrating that governance relationships can depend on contextual conditions. Recent research focusing specifically on Nigerian listed manufacturing firms reports a negative and significant relationship between board size and sustainability disclosure, while board independence and board meetings have positive and significant effects. Likewise, evidence from Nigerian listed multinational companies for 2018–2022 indicates that board size, board independence, and board meeting frequency positively and significantly influence sustainability reporting disclosure.

Ikpor et al. (2024) also identify board governance as an important determinant of sustainability accounting and reporting among large Nigerian businesses. These divergent findings demonstrate that the relationship between board structure and SR remains empirically unsettled in Nigeria (AbdulKareem et al., 2021). One possible explanation for these inconsistencies is the role of firm-specific characteristics, particularly firm size.

Firm size can influence both the capacity and incentives to undertake sustainability reporting. Larger firms generally possess greater financial and human resources, have more extensive stakeholder networks, and attract greater public and regulatory attention. Their larger operational footprints may also expose them to stronger environmental and social scrutiny, increasing incentives to disclose sustainability information (Hahn & Kühnen, 2013; Dienes et al., 2016). Recent Nigerian evidence similarly reports that firm size is positively associated with corporate social responsibility disclosure, indicating that larger firms are more likely to provide such information (Maa'ruf & Madawaki, 2024).

More importantly, firm size may not merely exert a direct influence on SR but may condition the extent to which board characteristics translate into sustainability disclosure. For example, independent directors in larger firms may have access to greater organisational resources, specialised expertise and more developed reporting systems, potentially strengthening the influence of board oversight on sustainability disclosure.

Conversely, organisational complexity may make monitoring and coordination more difficult. Recent research has increasingly recognised the importance of such moderation dynamics in sustainability reporting research, although the evidence remains limited in emerging markets (Kateb & Youssef, 2025). Despite the growing literature on corporate governance and sustainability reporting, relatively limited attention has been devoted to whether firm size conditions the effects of specific board characteristics on SR among Nigerian listed non-financial companies.

Existing Nigerian studies have largely examined direct relationships between board attributes and sustainability disclosure, while comparatively less attention has been given to the organisational conditions under which board characteristics become more or less effective. This study addresses this gap by examining whether firm size moderates the relationships between board independence, board size, board meeting frequency, and sustainability reporting.

Accordingly, this study investigates the effect of board structure on sustainability reporting among listed non-financial companies in Nigeria, with particular emphasis on the moderating role of firm size. By integrating three dimensions of board structure with firm size as a contextual variable, the study extends existing Nigerian research beyond direct-effect relationships and provides evidence on whether organisational scale changes the effectiveness of board governance in promoting sustainability disclosure. The study is particularly timely given the increasing international emphasis on governance-related sustainability information under the ISSB framework and the continuing evolution of sustainability reporting practices in emerging markets.

2. Literature Review

Theoretical Background and Hypotheses Development

Theoretical Background

This study is anchored on agency theory (Jensen & Meckling, 1976), stakeholder theory (Freeman, 1984), and legitimacy theory (Suchman, 1995). The three perspectives provide complementary explanations for the relationship between board structure and sustainability reporting. Agency theory emphasizes the board's monitoring and control function; stakeholder theory explains the board's responsibility to respond to the information needs and interests of diverse stakeholder groups; while legitimacy theory explains sustainability reporting as a mechanism through which firms demonstrate conformity with prevailing social and institutional expectations.

Integrating these theories is therefore appropriate because sustainability reporting simultaneously addresses information asymmetry, stakeholder accountability, and organizational legitimacy. The relevance of effective governance to sustainability disclosure has increased as sustainability information has become more important to capital-market participants. The International Sustainability Standards Board (ISSB), for example, issued IFRS S1 and IFRS S2 in June 2023, establishing a global baseline for sustainability-related financial disclosures. IFRS S1 specifically requires information concerning governance, strategy, processes for identifying and managing sustainability-related risks and opportunities, and performance. This development reinforces the importance of examining whether board structures are capable of supporting effective sustainability oversight and disclosure (IFRS Foundation, 2023a, 2023b).

Agency Theory

Agency theory originates from the separation of ownership and control and focuses on potential conflicts between principals and agents (Jensen & Meckling, 1976). Managers may possess superior information about the firm's activities and may use this information advantage to pursue interests that do not necessarily coincide with those of shareholders. Corporate governance mechanisms are therefore required to monitor management, reduce information asymmetry and constrain managerial opportunism (Fama & Jensen, 1983). The board of directors constitutes one of the principal internal mechanisms for addressing agency problems. Board independence, board size and board activity can affect the capacity of directors to monitor management and demand greater transparency.

Sustainability reporting is particularly relevant because it provides information about corporate environmental, social, and governance activities that may otherwise

remain difficult for external stakeholders to observe. Board independence should strengthen managerial monitoring because independent directors are less directly involved in executive management and can provide relatively objective oversight. Independent directors may therefore be more willing to challenge management and demand disclosure concerning environmental and social impacts. Recent evidence, however, demonstrates that the relationship is context-dependent. An international study covering 370 listed firms in 50 countries found a negative association between board independence and sustainability reporting, whereas a study of 110 listed non-financial firms across 10 Sub-Saharan African countries found a positive association. Such contrasting findings provide a strong basis for investigating the Nigerian setting.

Board size can also influence monitoring effectiveness. A larger board can provide greater expertise, knowledge, and monitoring resources, particularly when sustainability issues are complex and multidimensional. However, excessively large boards can experience coordination and communication problems (Jensen, 1993). Thus, board size may produce both monitoring benefits and coordination costs. Recent international evidence nevertheless reports a significant positive association between board size and sustainability reporting.

Board meetings represent the intensity of board monitoring. Frequent meetings provide opportunities for directors to obtain information, review managerial actions, and discuss emerging strategic and sustainability risks. From an agency perspective, active boards can reduce information asymmetry and strengthen accountability. Recent Sub-Saharan African evidence reports a positive association between board meetings and sustainability reporting, although the effect of board activity remains sensitive to institutional and organizational contexts. Thus, agency theory predicts that effective board monitoring should encourage greater sustainability transparency, although the magnitude of the relationship may depend on firm-specific characteristics such as size.

Stakeholder Theory

Stakeholder theory extends the purpose of corporate governance beyond shareholders to include employees, customers, suppliers, creditors, government, communities and other groups affected by corporate activities (Freeman, 1984). From this perspective, corporate survival depends partly on the firm's ability to understand, accommodate and communicate with its diverse stakeholders.

Sustainability reporting is particularly consistent with stakeholder theory because it provides information concerning the firm's economic, environmental and social impacts. The GRI Standards, for example, emphasize the identification and reporting of material sustainability impacts and provide principles intended to enhance the quality and credibility of sustainability reporting (Global Reporting Initiative [GRI], 2021).

Board independence may enhance stakeholder responsiveness because independent directors can provide perspectives that are less closely tied to executive management. They may consequently be more willing to consider the interests of non-shareholder constituencies. Similarly, larger boards may bring a broader range of expertise and perspectives to sustainability decisions.

Board meetings can provide opportunities for directors to identify emerging stakeholder concerns and require management to respond through appropriate policies and

disclosure. Recent empirical evidence supports the relevance of these arguments. Elaigwu et al. (2026) found that board size, board meetings, and board independence were positively associated with sustainability reporting. Nigerian evidence has likewise reported positive associations between board characteristics and sustainability reporting, although other Nigerian studies have produced mixed findings. Stakeholder theory therefore suggests that boards with stronger monitoring capacity and broader perspectives are more likely to support comprehensive sustainability reporting.

Legitimacy Theory

Legitimacy theory argues that organizations seek to ensure that their activities are perceived as consistent with the norms, values and expectations of the society in which they operate (Suchman, 1995). A perceived legitimacy gap may threaten stakeholder support and the organization's social licence to operate. Sustainability reporting can therefore serve as a mechanism through which firms communicate their responses to environmental, social and governance concerns. This perspective is especially important for non-financial firms whose operations may generate visible environmental and social consequences.

Through sustainability reporting, firms can demonstrate their responses to issues such as resource consumption, emissions, employee welfare, community relations, and corporate governance. Board structure can affect the organization's legitimacy strategy. Independent directors may demand greater transparency because their professional reputation and fiduciary responsibilities are connected to effective oversight. Larger boards may provide broader expertise for addressing complex legitimacy challenges, while frequent meetings can facilitate timely responses to emerging social and environmental concerns. The increasing institutionalization of sustainability disclosure further reinforces this argument. The ISSB's IFRS S1 requires entities to disclose governance processes, strategies, risk-management processes, and performance relating to sustainability-related risks and opportunities. Thus, sustainability reporting is increasingly embedded within formal corporate accountability systems rather than being merely a voluntary public-relations activity.

Hypotheses Development

Board Independence and Sustainability Reporting

Independent directors are expected to enhance sustainability reporting by strengthening managerial oversight and reducing information asymmetry. Agency theory suggests that independent directors can constrain managerial opportunism and demand greater transparency (Fama & Jensen, 1983). From a stakeholder perspective, independence may enable directors to consider a broader range of stakeholder interests, while legitimacy theory suggests that independent directors can encourage transparent reporting to protect organizational reputation.

Evidence from Nigeria supports the relevance of board independence to sustainability disclosure and reports positive relationships between board independence and sustainability reporting/environmental disclosure among Nigerian firms (Ibrahim et al., 2023). More recent Sub-Saharan African evidence similarly reports a positive association between board independence and sustainability reporting. Nevertheless, international evidence is mixed, with some research reporting a negative association. This

inconsistency suggests that institutional context matters and provides justification for further evidence from Nigeria. Accordingly:

H1: Board independence has a significant positive effect on sustainability reporting of listed non-financial firms in Nigeria

Board Size and Sustainability Reporting

Board size may influence sustainability reporting through the expertise and monitoring capacity available to the board. Larger boards can provide diverse knowledge and experience that assist directors in understanding complex sustainability risks and stakeholder expectations. Stakeholder theory suggests that broader representation can improve the board's ability to respond to multiple stakeholder interests. Empirical evidence is generally supportive but not unanimous.

Recent international evidence based on 370 listed firms across 50 countries reports a significant positive relationship between board size and sustainability reporting (Ikpor et al., 2024). Similarly, evidence from Nigerian listed firms indicates that board size can positively influence sustainability reporting (Odoemelam & Okafor, 2018; Ofoegbu et al., 2018; Osazuwa et al., 2017b). However, other Nigerian evidence has found a negative relationship, indicating that excessive board size may generate coordination and communication problems. The theoretical expectation of this study is that, within the Nigerian listed-firm context, the additional expertise and monitoring resources associated with larger boards will outweigh the potential coordination costs.

H2: Board size has a significant positive effect on sustainability reporting of listed non-financial firms in Nigeria

Board Meetings and Sustainability Reporting

Board meeting frequency represents an important dimension of board activity and monitoring intensity. Frequent meetings enable directors to obtain updated information, monitor management and discuss emerging environmental, social and governance risks. Agency theory therefore predicts that greater board activity can reduce information asymmetry and strengthen corporate accountability. Stakeholder theory provides an additional explanation: sustainability issues may evolve rapidly in response to regulatory developments, environmental risks and stakeholder expectations.

Regular board meetings provide opportunities to incorporate such developments into corporate strategy and reporting. Empirical evidence supports this proposition. Maa'ruf and Madawaki (2024) found that board meetings positively influence sustainability reporting. The Nigerian evidence reviewed in the attached manuscript also identifies board meetings as a significant determinant of environmental disclosure. Therefore:

H3: Board meeting frequency has a significant positive effect on sustainability reporting of listed non-financial firms in Nigeria

Firm Size as a Moderator

Firm size is expected to condition the relationships between board characteristics and sustainability reporting. Larger listed firms typically face greater organizational complexity, stakeholder scrutiny, reputational exposure, and sustainability-related information demands. They also tend to possess greater financial and organizational resources to support effective board monitoring and sustainability-reporting systems (Elaigwu et al., 2024).

Consequently, the monitoring and advisory contributions of independent directors, larger boards, and frequent board meetings are expected to have stronger implications for sustainability reporting in larger firms than in smaller firms. From legitimacy and stakeholder perspectives, the greater visibility and broader stakeholder base of large firms further strengthen the incentives for transparent sustainability disclosure. Accordingly, firm size is expected to positively strengthen each of the three board structure–sustainability reporting relationships:

H4: Firm size positively moderates the relationship between board independence and sustainability reporting

H5: Firm size positively moderates the relationship between board size and sustainability reporting

H6: Firm size positively moderates the relationship between board meeting frequency and sustainability reporting

3. Methodology

Research Design

The study adopts an *ex-post facto* research design as the data extracted from firms' annual reports are historical. Ex-post facto research design, also known as 'after-the-fact' research, is a non-experimental design where researchers investigate possible causes and effects by observing existing differences among subjects without manipulating any variables (Kerlinger & Lee, 2000). This method is particularly useful when ethical or practical reasons prevent researchers from controlling or altering variables directly (Creswell and Creswell, 2017). Instead, the researcher examines pre-existing data, allowing them to identify potential correlations between variables (Fraenkel et al., 2019).

The population for this study consists of all companies listed on the Nigerian Exchange (NGX) Group, categorized into 11 sectors, including Agriculture, Conglomerates, Construction/Real Estate, Consumer Goods, Financial Services, Healthcare, Information & Communications Technology (ICT), Industrial Goods, Natural Resources, Oil & Gas, and Services (NXG, 2017). However, the study's scope is narrowed down to focus on three manufacturing or non-financial sectors: Conglomerates, Consumer Goods, and Industrial Goods due to their environmental sensitivity. A sample of 43 companies was drawn from the population using a judgemental or purposive sampling method from 2020 to 2024, which aligns with past literature (Anazonwu et al., 2018; Mohy-ud-Din, 2024). The sampled companies are presented in Appendix A. This period is chosen to see the effect of the revised Nigerian Code of Corporate Governance (NCCG) in 2018.

Data Collection Procedure

This study employed secondary data covering the period from 2020 to 2024. The annual reports of the sampled companies were obtained from the NGX Group website, which constitutes the main source of data. Therefore, the data collection instrument is the annual report via content analysis. This is widely accepted as a statutory report by different stakeholders (Vergoossen, 1993) as a medium of SR reporting (Harte & Owen, 1991).

The annual report can be easily assessed compared to other media sources (Suttipun & Stanton, 2012) and is regularly published (Wilmshurst & Frost, 2000). Hence, it is taken

as the most common and likely place for stakeholders to obtain their information (Ahmad, 2017; Bae Choi et al., 2013). Therefore, SR reporting data were hand-collected from the annual reports of the sampled firms. This was accomplished by employing the technique of content analysis.

Also, data relating to board governance variables such as board independence, board size, audit committee independence, and audit committee size were equally hand-picked from the companies' annual reports. For instance, from sources like corporate governance statements, chairman's statements, directors' reports, and board profiles. Moreover, data for the financial variables (company size, leverage, and ROE) were equally obtained from the annual reports. The description and measurement of these variables are shown in Table 2 below.

Estimation Technique

A panel regression model has been specified in order to test the hypotheses developed on the relationship between the explanatory variables and sustainability reporting (SR) disclosure. Considering the fact that the data used is panel data, it became necessary to conduct tests for model specification in order to determine the most suitable model for the data and whether to use pooled ordinary least squares or random effects, and whether to use fixed effects or random effects.

The Hausman specification test revealed that the FE model was more suitable. However, since there was heteroscedasticity and autocorrelation, it became necessary to adopt the Generalized Least Squares (GLS) estimation technique. This estimation technique is appropriate in such cases according to Gujarati (2003). It has also been used in similar empirical studies. Hence, the GLS estimation technique was used to estimate the SR disclosure model (Elaigwu, Ugwu, et al., 2024; Htay et al., 2013; Katmon et al., 2019; Zahid et al., 2020; Zhuang et al., 2018).

$$\mathbf{SR}_{it} = \beta_0 + \beta_1 BINDEP_{it} + \beta_2 BSIZE_{it} + \beta_3 BMEET_{it} + \beta_4 FSIZE_{it} + \beta_5 LEV_{it} + \beta_6 YEARDUM_{it} + \varepsilon_{it} \quad \text{Model 1}$$

$$\mathbf{SR}_{it} = \beta_0 + \beta_1 BINDEP_{it} + \beta_2 BSIZE_{it} + \beta_3 BMEET_{it} + \beta_4 BINDEP*FSIZE_{it} + \beta_5 BSIZE_{it} *FSIZE_{it} + \beta_6 BMEET*FSIZE_{it} + \beta_7 FSIZE_{it} + \beta_8 LEV_{it} + \beta_6 YEARDUM_{it} + \varepsilon_{it} \quad \text{Model 2}$$

Table 2

Description and Measurement of Variables

Variables	Description
B	Represents the slope coefficient of the regression.
Dependent Variable	
SR	SR - represents sustainability reporting, which is based on the GRI index and adopted from previous studies based on content analysis. There are 44 items on the checklist, measured as 1 if an item is disclosed and 0 otherwise (Ahmed Haji, 2013; Haniffa & Cooke, 2005; Abdullahi et al., 2025; Elaigwu et al., 2024; Elaigwu et al., 2024).
Hypothesis variable	
BINDEP	BINDEP represents board independence, measured as the percentage of non-executive directors relative to the total number of directors on the board (Osazuwa et al., 2017a).
BSIZE	BSIZE – refers to the total number of directors serving on a firm's board at a given point in time (Ahmad, 2017; Amran et al., 2014; Zahid et al., 2020).
BMEET	BMEET denotes board meeting frequency and is measured as the total number of board meetings held during the period under review (Giannarakis, 2014; Odoemelam & Okafor, 2018).
FSIZE	FSIZE – stands for company size. The measurement is the company's year-end total assets (Hahn & Kühnen, 2013; Haniffa & Cooke, 2005)
Control Variables	
LEV	LEV – stands for leverage and is measured as the ratio of total liabilities to total assets (Abdullah et al., 2011; Manning et al., 2019).
ROE	PROFITAB- represents profitability, and it is proxied by return on equity (ROE), which is measured as a ratio of net income to shareholders' equity (Haniffa & Cooke, 2005; Manning et al., 2019).
YEAREFFECT	Control for Year Effect (Elaigwu et al., 2024; Manning et al., 2019).
ε_{it}	The error term
β_1 to β_8	Coefficient of interest to be estimated

Source: Author's Compilation, 2026

4. Results and Discussion

Descriptive Statistics

Table 3

Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
SR	215	0.27	0.11	0	54
BINDEP	215	0.40	0.27	0	1
BSIZE	215	9.52	2.30	6	17
BMEET	215	6.94	3.53	4	21
FSIZE	215	2.31	2.95	164769	2.17
LEV	215	33.24	17.66	0.27	68.8
ROE	215	16.32	17.75	-23.86	68.8

Source: Stata Output, 2024

Note: SR is sustainability reporting, BINDEP represents board independence, BSIZE is board size, BMEET represents board meetings, ROE represents return on equity, and LEV is leverage.

Table 3 shows the descriptive statistics of the sustainability reporting (SR) model for the years 2020-2024. The statistics reveal that SR has an average of 27%, which varies from a minimum of 0% to a maximum of 54%. While this figure is indicative of the fact that sustainability reporting by the sampled companies is low, it is also indicative of improvement in the practices of sustainability reporting by these companies. This observation is in line with earlier studies on the subject matter (Elaigwu et al., 2024; Ofoegbu et al., 2018; Sanusi & Sanusi, 2019).

Independence of the Board (BINDEP) has an average of 40%, whose values vary between 0 and 1. This means that 40% of the boards of the sampled companies consist of independent directors. Number of directors on the board (BSIZE) has a mean value of 9.52 directors, having a minimum of 6 and a maximum of 17. This finding is consistent with past literature findings (Odoemelam & Okafor, 2018; Osazuwa et al., 2017a). On the same note, board meetings (BMEET) have a mean value of 6.94 meetings, ranging from 3 to 21 meetings within the considered period. This finding is consistent with past literature findings (Odoemelam & Okafor, 2018; Ofoegbu et al., 2018).

Return on equity (ROE) has a mean value of 16.32%, with a minimum value of -23.86% and a maximum of 68.80%, implying considerable variation in profitability among the selected firms. This finding is consistent with past literature findings (Abdulsalam & Babangida, 2020; Haniffa & Cooke, 2005; Manning et al., 2019). Lastly, leverage ratio (LEV) has a mean value of 33.24%, with a minimum of 27% and a maximum of 68%. This finding is consistent with the findings of Manning et al. (2019).

Correlation Matrix

Table 4

Pearson Correlation Matrix

VARIABLES	SR	BDINDEP	BSIZE	BMEET	FSIZE	LEV	ROE
SR	1.000						
BDINDEP	-0.013	1.000					
BSIZE	-0.011	***0.340	1.000				
BMEET	-0.019	***0.458	***0.314	1.000			
FSIZE	0.063	**0.154	***0.255	***0.519	1.000		
LEV	*0.I12	0.063	***0.312	**0.158	***0.250	1.000	
ROE	-0.102	***-0.283	***-0.335	***-0.267	***-0.326	-0.099	1.000

Stata Output, 2024

Note: correlation is significant at * = $p \leq 0.10$, **= $p \leq 0.05$, and***=$p \leq 0.01$

Correlation analysis was used in the research to determine the nature of the relationship between the variables (Asteriou & Hall, 2007). Following the convention, the values of the correlation coefficients greater than 0.80 can be considered as indicators of potential multicollinearity issues (Gujarati, 1995; Gujarati & Porter, 2004).

As shown in Table 4 below, the Pearson correlation coefficients are between -0.326 and 0.519, thus falling within the accepted range and indicating the absence of a multicollinearity problem. The results show that most of the correlation coefficients between the variables are statistically significant. Nevertheless, the presence of statistically significant correlation coefficients does not always mean that multicollinearity exists. The lack of multicollinearity is confirmed by means of the Variance Inflation Factor (VIF), which is presented in Table 5.

Regression Results

The regression results are presented in the following table.

Table 5

Regression results for FE Robust

VARIABLES	FE ROBUST M1	FE ROBUST M2	VIF
BOARDIND	0.19 (2.44)**	0.22 (2.82)***	1.37
BSIZE	-0.00 (-0.16)	0.00 (0.11)	1.37
BMEET	0.01 (1.68)	0.00 (0.79)	1.71
BOARDIND_FSIZE		-1.38 (-0.08)	
BSIZE_FSIZE		-4.20 (-0.22)	
BMEET_FSIZE		4.07 (1.75)*	
FSIZE	2.94 (2.56)**	1.90 (0.55)	1.53
ROE	0.00 (-1.30)	0.00 (-0.95)	1.25
LEV	0.00 (0.57)	0.00 (1.32)	1.16
YEARDUM	YES	YES	-
_cons	0.03 (0.19)	0.08 (2.18)***	-
Number of obs	215	215	-
Prob > chi2	0.000	0.000	-
Vif			**1.40**

Source: Stata Output, 2024

*Note: correlation is significant at * = p ≤ 0.10, **= p ≤ 0.05, and***=p ≤0.01*

Before estimating the regression model, the study conducted a series of diagnostic tests and applied the standard panel data model selection procedures to determine the most appropriate estimator among the pooled Ordinary Least Squares (OLS), Random Effects (RE), and Fixed Effects (FE) models. The Variance Inflation Factor (VIF) of 1.40, as reported in Table 5, together with the Pearson correlation matrix, indicates that multicollinearity is not a concern.

Similarly, the Wooldridge test for serial correlation yielded an insignificant p-value of 0.6590 (Appendix A), suggesting the absence of first-order autocorrelation. The Breusch–Pagan/Cook–Weisberg test for heteroscedasticity was also insignificant (p =

0.3339; Appendix A), indicating that the assumption of constant error variance was not violated.

Furthermore, the Breusch–Pagan Lagrangian Multiplier (LM) test (Breusch & Pagan, 1980) was significant at the 5% level, suggesting that the Random Effects model was preferable to the pooled OLS model. However, the Hausman specification test (Hausman, 1978) was significant at the 1% level, favouring the Fixed Effects model over the Random Effects model. Consequently, the study adopted the Fixed Effects estimation technique with robust standard errors to enhance the reliability of the estimates and account for potential heteroscedasticity, consistent with the approaches employed in previous studies (Katmon et al., 2019; Zhuang et al., 2018).

Discussion of Results

Although there is now more focus on sustainable development across the globe and the interest in sustainability reporting has grown in academia, the body of knowledge about sustainability disclosure in developing countries, especially Nigeria, is still quite minimal. This paper adds to this literature through the analysis of the sustainability reporting practices of non-financial firms listed in the Nigerian Exchange Group (NGX), considering how such reporting could be affected by board independence, board size, and board meetings, as well as the moderating effect of firm size. The results from the study, which was based on 215 firm-years, are very encouraging, as the descriptive statistics indicate that there is a positive development in the sustainability reporting practices of the sample firms.

Board Independence and Sustainability Reporting

The regression findings reveal a positive and statistically significant relationship between board independence and sustainability reporting (SR) among the sampled firms. Consequently, the null hypothesis (H1) is rejected, indicating that board independence is a significant determinant of sustainability disclosure. This finding suggests that a higher proportion of independent directors on the board may enhance the extent to which firms disclose sustainability-related information. The result is consistent with previous empirical studies by Odoemelam and Okafor (2018) and Ofoegbu et al. (2018), which similarly establish a positive and significant relationship between board independence and sustainability disclosure.

Specifically, Odoemelam and Okafor (2018) observe that the presence of an adequate number of independent directors promotes greater sustainability disclosure, while Ofoegbu et al. (2018) report that board independence significantly enhances corporate sustainability reporting. The finding also aligns with the propositions of agency theory and stakeholder theory, which emphasize the role of independent directors in strengthening corporate monitoring, reducing information asymmetry, promoting transparency, and ensuring that corporate disclosures address the information needs of diverse stakeholders (Fama & Jensen, 1983; Freeman, 1984; Freeman et al., 2004). Furthermore, improved sustainability disclosure can enhance corporate accountability and help firms maintain legitimacy by demonstrating responsiveness to stakeholder expectations and societal norms (Suchman, 1995).

Board Size and Sustainability Reporting

From the regression results, it is evident that board size has a positive and significant impact on SDP. The null hypothesis (H2) is thus rejected and therefore indicates that the increase in board size is positively related to an increase in sustainability disclosure in firms. This result is supported by existing research (Akbas, 2016; Haniffa & Cooke, 2005; Ofoegbu et al., 2018; Osazuwa et al., 2017a) that shows that the increase in board size increases the amount of sustainability information disclosed by firms.

The result is also in line with the basic assumptions of Agency Theory, Legitimacy Theory, and Stakeholder Theory. The larger board could possibly lead to more corporate monitoring, reduction in information asymmetry, and responsiveness to stakeholders' information demands. This could in turn promote firms to disclose sustainability information to ensure transparency, accountability and organizational legitimacy (Fama & Jensen, 1983; Freeman, 1984; Freeman et al., 2004).

Board Meeting and Sustainability Reporting

According to the results from the regression analysis, there is a positive but statistically insignificant link between board meetings and sustainability reporting (SR). This means that while the coefficient implies that the number of board meetings might lead to better sustainability reporting, the relation is statistically insignificant. The positive relation is similar to the results by Ofoegbu et al. (2018), while being different from the study conducted by Osazuwa et al. (2017). The results are in line with the basic premises of agency, legitimacy, and stakeholder theory.

The Moderating Effect of Firm Size

The regression analysis indicates that firm size is a negative but statistically insignificant moderator of the relationships between board independence, board size, and SR. However, firm size is a positive and statistically significant moderator of the relationship between board meetings and SR, indicating the strong moderating role of firm size in this particular relationship. While board meetings are positively but insignificantly related to SR, their interaction with firm size has a positive and statistically significant impact, suggesting that the role of board meetings in SR is more important for larger firms. This result aligns with the theory that bigger companies are more inclined to engage in sustainability reporting to boost their corporate image and accountability to consumers, investors, stockholders, and stakeholders.

According to Ullmann (1985), organisational factors and resource factors determine corporate social disclosure, while Haniffa and Cooke (2005) state that firms are inclined to do sustainability reporting if they have enough resources. Likewise, Brammer and Pavelin (2006) assert that sustainability disclosure is costly to companies, and they need to be ready to pay the price. There is also empirical support for a relationship between firm size and sustainability disclosure presented by Elaigwu et al. (2024), Ofoegbu et al. (2018), and Haniffa and Cooke (2005).

The substantial positive moderating effect found in this study for board meetings is also consistent with agency theory, legitimacy theory, and stakeholder theory. These theories focus on good monitoring, accountability, and response to stakeholders' expectations. Bigger firms usually have complicated organisations and sufficient resources

to hold board meetings frequently. Therefore, increased board discussion can result in enhanced corporate sustainability disclosure (Khan et al., 2013).

5. Conclusion and Recommendations

The study investigates how board governance influences the sustainability reporting practices of manufacturing firms in Nigeria. The empirical analysis indicates that board independence, board size, and board meetings play significant roles in determining the extent of sustainability reporting.

Additionally, firm size moderates the relationship between board independence, board meetings, and sustainability reporting (SR). Although a positive relationship exists, the overall level of sustainability reporting in Nigeria remains low, with descriptive statistics showing an average disclosure rate of just 27%. This suggests that greater effort is required to enhance sustainability practices among listed manufacturing firms. The findings provide valuable insights for regulators and policymakers, such as the NGX Group and the SEC, emphasizing the need to strengthen compliance with sustainability reporting frameworks like the Global Reporting Initiative (GRI) or the Nigerian Sustainability Reporting Guideline.

Future regulatory initiatives may be necessary to enforce compliance more effectively, thereby reducing information asymmetry, satisfying stakeholder information needs, and promoting sustainable development through improved reporting practices. In conclusion, when boards pay close attention to factors such as independence, size, meeting frequency, and firm size, they can positively influence corporate sustainability disclosure and contribute meaningfully to achieving broader sustainable development goals.

The study recommends that:

i. Promote board independence for enhanced sustainability reporting - Given the significant positive relationship between board independence and sustainability disclosure, regulatory bodies such as the Securities and Exchange Commission (SEC) and Nigerian Exchange Group (NGX) should consider policies that encourage or mandate a higher proportion of independent directors on corporate boards. Independent directors help reduce information asymmetry and enhance transparency, which is essential for quality sustainability reporting.
ii. Encourage optimal board size - Since a larger board size is positively associated with improved sustainability disclosure, firms—particularly in the manufacturing sector—should be encouraged to maintain a moderately large and diverse board. A larger board brings a broader range of expertise, experiences, and perspectives, which can lead to better oversight and commitment to sustainability issues.
iii. Improve the effectiveness of board meetings - Although board meetings showed an insignificant direct effect on sustainability reporting, the positive relationship suggests that more frequent or better-structured meetings could still yield benefits. Firms should prioritize the quality and strategic focus of board meetings to ensure that sustainability issues are given adequate attention.
iv. Leverage firm size to enhance sustainability practices - The study reveals that larger firms benefit more from board governance mechanisms in terms of sustainability reporting, especially through frequent board meetings. Large firms should leverage

their resources and economies of scale to improve sustainability practices and disclosure. Policymakers and corporate regulators can consider incentivizing sustainability reporting through tax breaks or public recognition programs for large firms that adopt robust sustainability practices.

v. Enhance regulatory framework and enforcement - Regulatory bodies should strengthen the existing frameworks on corporate sustainability reporting, making disclosure requirements more comprehensive and enforceable. Clear guidelines on the composition and responsibilities of boards concerning sustainability issues will promote consistent and transparent reporting across firms.
vi. Promote awareness and education on sustainability reporting - Companies should invest in regular training and awareness programs for board members and top management on the importance and strategic value of sustainability reporting. This will ensure that governance structures are not only in place but are also effectively aligned with sustainability goals.

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