

Modelling the Effect of Monitoring Mechanisms on Environmental Disclosure of Listed Firms in Nigeria

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ABSTRACT

The growing prevalence of environmental issues globally has intensified the demand for greater transparency and accountability in corporate Environmental Disclosure (ED). In Nigeria, however, ED practices remain largely discretionary, with no formal regulatory framework mandating such disclosures. The study thus investigates the combined effect of the latent constructs of board and audit committee monitoring mechanisms on the extent of ED among firms listed in Nigeria. Adopting a survey research design, the study analysed audited annual reports of 95 listed firms on the Nigerian Exchange Group (NGX) from 2012 to 2021. The Global Reporting Index (GRI) was employed to assess the level of ED across firms providing a standardised basis for measurement. Structural Equation Modelling (SEM) technique was utilised to estimate the relationships between the identified monitoring mechanisms and ED practices. The findings reveal that both board and audit committee monitoring mechanisms have a significant positive impact on ED. Based on the findings, the study recommends that Nigerian firms should pay more attention to fostering diverse boards and including experienced members. In addition, ED and regulators should consider enacting policies that will mandate minimum qualifications or certifications for audit committee members. Additionally, industry specific governance codes could be considered to ensure that audit practices align with firms' specific attributes.

Keywords: Environmental Disclosure (ED), Modelling, Monitoring Mechanisms

1. INTRODUCTION

The volume of information provided by listed firms regarding the environment is of global concern, with the agitation for firms' commitments towards a green environment becoming compulsory in Europe, America and some developed nations. The monitoring mechanism is crucial in ensuring that regulations are followed and safeguarding shareholder rights, particularly minority shareholders. This is achieved through the use of monitoring tools and measures. Two categories of monitoring mechanisms examined in this study are Board Monitoring Attributes (BMATB) and Audit Committee Monitoring Attributes (ACMATB). BMATB and ACMATB are characteristics that enable the board to monitor activities of firms and evaluate their compliance with certain corporate practices (Fariha et al., 2022).

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Directors are charged with the control role of monitoring decisions and actions taken by managers to protect stockholders' interests. They ensure management aligns with the interests of the owners of the firms.

Directors also have the responsibility of ratifying important decisions to minimise agency costs and ensure shareholders' interests are protected. The proxies used to measure BMATB include Board Independence (BOINDP), Board Environmental Committee (BENVC), Board Environmental Expert (ENVEXP), CEO Gender Diversity (CEOGD) and Board Nationality (BNAT). The ACMATB, which was also proxied by Audit Committee Meetings (ACOMTG), independence, gender diversity, and financial expertise, is also charged with the oversight functions.

In Nigeria, the Global Reporting Index (GRI) framework has been gradually adopted as a guide for corporate sustainability reporting, particularly among firms listed on the Nigerian Exchange Group (NGX). Although Environmental Disclosure (ED) is not mandatory, the NGX Sustainability Disclosure guidelines encourage firms to align their Environmental, Social and Governance (ESG) disclosures with recognised global standards such as the GRI (Fadipe & Aderaju, 2025).

The study introduces Structural Equation Modelling (SEM), a relatively new analytical tool. Unlike regression models, SEM can evaluate the psychometric characteristics of latent construct measures and investigate their relationships (Blalock, 1962; Habelmo, 1943). The study aimed to explore the impact of various monitoring mechanisms holistically, on the quality of ED among listed firms in Nigeria. The formulated hypothesis suggested that monitoring mechanisms have no significant effect on ED. The study examined the collective influence of monitoring mechanisms on ED practices, thereby enriching the understanding of corporate governance and environmental disclosure within the Nigerian corporate environment. Accordingly, the study proposed the following hypothesis:

H₀: Monitoring mechanisms have no significant effect on environmental disclosure.

2. LITERATURE REVIEW

The extant literature on monitoring mechanisms and ED is reviewed as follows:

2.1 Board Independence and Environmental Disclosure (ED)

Zaid et al. (2020) delved on the impact of stakeholder engagement mechanisms on corporate social responsibility policies (CSR), employing BOINDP as a moderating variable. The study found BOINDP to be positive and significant in moderating the relationship between a firm's ownership structure and its engagement in CSR policies. However, the findings were restricted to the institutional context of Palestine.

In contrast, Pucheta-Martínez et al. (2021) reported a negative relationship between ESG performance and BOINDP in their study. The study obtained data from several countries, without considering country-specific priorities regarding ESG performance disclosure. The study also did not provide a clear definition of emerging countries from which data was obtained. The variation in findings may result from differences in board composition thresholds, industry regulation intensity, or country-specific governance practices.

2.2 Board Environmental Expert and Environmental Disclosure (ED)

Shui et al. (2022) explored the sources of environmental innovation, drawing on Agency Theory to support their findings. The study concluded that a positive relationship exists between ENVXP, and the quality of environmental information provided by reporting firms. However, in terms of configuration analysis, the study considered only the Chief Executive Officer (CEO) rather than the broader top management team in driving environmental innovation. In addition, the sample was limited to public firms, and the timeframe for the data collection was not disclosed.

Fu et al. (2020) examined whether the presence of Chief Sustainability Officers (CSOs) influences corporate social responsibility (CSR) disclosure and whether it enables a deeper understanding of executive impact on corporate social performance. Their study reported a negative relationship between ENVXP and CSR disclosure. The study also assumed that social engagement is the responsibility of CSOs rather than CEOs. Furthermore, the data collected also did not include firms across all industries, limiting the generalisability of the findings.

2.3 Board Nationality Diversity and Environmental Disclosure (ED)

Olanrewaju et al. (2020), examined how board influences corporate social responsibility within the settings of a developed nation. Deploying a Panel Corrected Standard Error (PCSE) regression model and drawing on Stakeholder Theory, their findings indicated a noteworthy positive relationship between board nationality diversity and quality of ED. However, their analysis was limited to oil and gas companies, with specific emphasis on CSR. In contrast, Egbunike and Okoro (2018) found no significant link between the nationality of board members and corporate reporting practices. Their research, which assessed the effect of board diversity on sustainability disclosures, focused on listed manufacturing companies in Nigeria. Nonetheless, the scope of their study was confined to three sectors; Conglomerates, Consumer Goods and Industrial Sector. The study examined sustainability reporting broadly without anchoring the analysis to a specific theoretical framework.

2.4 Board Environmental Committee and Environmental Disclosure (ED)

Uyar et al. (2021) carried out a study on CSR committees, using CEO duality as a moderating variable for ED. Data were obtained from Thomson Reuters Eikon database between 2011 and 2018. The study established a positive and significant relationship between CEO duality and ED. However, the study was limited to healthcare firms and did not account for variations in CSR regulations across different countries. Similarly, Tingbani et al. (2020) explored the impact of gender diversity and environmental committees on voluntary ED, using qualitative data obtained from 215 firms listed on London Stock Exchange. Their findings revealed no significant relationship between the establishment of environmental committees and voluntary ED practices by listed firms. This finding, which was framed within the Resource Dependency Theory, is however limited to the context of developed nations.

2.5 CEO Gender Diversity and Environmental Disclosure (ED)

Gender diversity on corporate boards is increasingly perceived as a factor in enhancing quality of governance and ensuring improved decision making. Empirical studies have shown that firms with gender sensitivity tend to exhibit stronger financial performance and foster robust management practices (Lu et al., 2025). Cordeiro et al. (2020) studied the relationship between ownership control and female board diversity in influencing corporate environmental performance using the Kinder, Lydenberg, Domini (KLD) database between 2010 and 2015. The data were subjected to content

analysis. The study concluded that a positive relationship exists between gender diversity and the quality of environmental performance disclosure. The focus was on U.S.-based companies, with the percentage of women directors serving as the key independent variable.

In contrast, Tingbani et al. (2020) explored the impact of gender diversity on voluntary disclosure. Qualitative data from 215 firms listed on London Stock Exchange were gathered and analysed, and the findings were framed with the Resources Dependency Theory. The study found no significant relationship between gender diversity and voluntary ED. As one of the limitations, the study was carried out in London, a developed nation, and generalisation of the findings may not be appropriate, especially in the context of developing countries such as Nigeria.

2.6 Audit Committee Gender Diversity and Environmental Disclosure (ED)

The study by Abdi et al. (2020) established a significant positive effect of audit committee gender diversity on corporate sustainability reporting. The study investigated the effect of audit characteristics on the level of sustainability reporting among firms listed on the Iranian stock exchange, based on data gathered between 2014 and 2018. McLaughlin et al. (2021) empirically analysed specific characteristics of an audit committee that could be associated with the likelihood of corporate sanctions. The findings indicated a negative and insignificant relationship between gender and the likelihood of corporate sanctions. The study focused on companies in the United Kingdom (UK), with particular emphasis on corporate scandals. A similar result might have been obtained had the study concentrated on quality of ED.

2.7 Audit Committee Meetings and Environmental Disclosure (ED)

Amin et al. (2021) examined the impact of audit committee characteristics on corporate biodiversity disclosure. Qualitative data were gathered from insurance firms between the years 2012 and 2018. The findings showed a positive significant relationship between ACOMTG and the disclosure of biodiversity-related information. However, the study was not grounded in any theoretical framework and was limited to companies operating in Japan. Masmoudi (2021) investigated the effect of audit committee characteristics on financial reporting quality. Using data from 90 Dutch firms, the study applied ordinary least squares regression analysis. The results revealed a negative and insignificant relationship between ACOMTG and the quality of financial reporting. Beyond the focus on developed countries, the study's direction was also tailored towards financial reporting rather than environmental disclosure.

2.8 Audit Committee Financial Expertise and Environmental Disclosure (ED)

Amin et al. (2021) examined the impact of audit committee financial expertise on ED. The study used secondary data collected from firms operating in Japan between 2012 and 2018, employing panel regression analysis. The findings revealed a positive significant relationship between audit committee financial expertise and ED. However, the study was not grounded in any specified theory. In contrast, Oziegbe and Ofe (2020) found that audit committee financial expertise was not significantly related to ED. Their findings were based on data collected from Nigerian banks with international authorisation between 2014 and 2017. The data were subjected to content analysis and multiple regression analysis. The study was limited by its small sample size and by focusing exclusively on the banking sector.

2.9 Audit Committee Independence and Environmental Disclosure (ED)

Nasiru (2017) examined the relationship between corporate governance mechanisms and the quality of corporate social and ED among listed firms in Nigeria. The study was anchored on multiple theories. Content analysis and Feasible Generalised Least Square (FGLS) were applied to analyse the data. The findings revealed a significant positive relationship between the audit committee and the quality of social and ED disclosure. The study covered a five-year period (2010–2014) and addressed social and ED from a general perspective. In contrast, Qeshta (2021) who examined the impact of the audit committee characteristics on the performance of the insurance companies listed on the Bahrain Bourse from 2012 to 2019, found no significant association between ACIND and the performance of the insurance firms under consideration. The study, however, was limited to insurance-based firms in Bahrain.

In the Nigerian context, ED practices in Nigeria can be explained through Agency Theory, which highlights the need for agents to reduce information gaps between themselves and the principals. The theory encourages transparency, thereby positioning disclosure as a tool for enhancing trust and strengthening monitoring mechanisms.

3. RESEARCH METHODS

The study examines the impact of monitoring mechanisms on the quality of ED. The population includes all 162 listed firms across 11 sectors (NGX-Plc, 2021). A filtering process was applied to prioritise firms with consistent financial reporting quality, ensuring that only firms endorsed by the NGX were considered. An adjusted population of 95 firms was chosen to provide industry-specific insights into ED practices. The adjusted population was selected based on specific criteria: firms must have been listed on the NGX prior to 2012 and remained active throughout the study period; possessed accessible annual reports; and were not in financial distress. This study collected secondary data from NGX annual reports from 2012-2021, reflecting increased stakeholder agitation, global concern, and regulatory reforms. Data were accessed through the NGX website and official firm's websites. The study applied major environmental performance indicators from the NGX 2018 Sustainability Disclosure Guidelines aligned with the GRI framework, adapting them to Nigerian context. Analysis of a Moment Structures (AMOS) was employed as the statistical software for the data analysis.

Table 1 Population and Adjusted Population

S/N	Sector	Population	Cumulative Value (A)	Adjusted Population	Cumulative Value (B)
1	Agriculture	5	5	4	4
2	Conglomerates	5	10	4	8
3	Construction/Real Estate	8	18	2	10
4	Consumer goods	20	38	16	26
5	Financial Services	51	89	36	62
6	Health care	10	99	4	66
7	ICT	10	109	5	71
8	Industrial goods	13	122	6	77
9	Natural Resources	4	126	1	78
10	Oil and Gas	11	137	6	84
11	Services	25	162	11	95

The models for the study determine the relationship between monitoring mechanisms and the quality of ED.

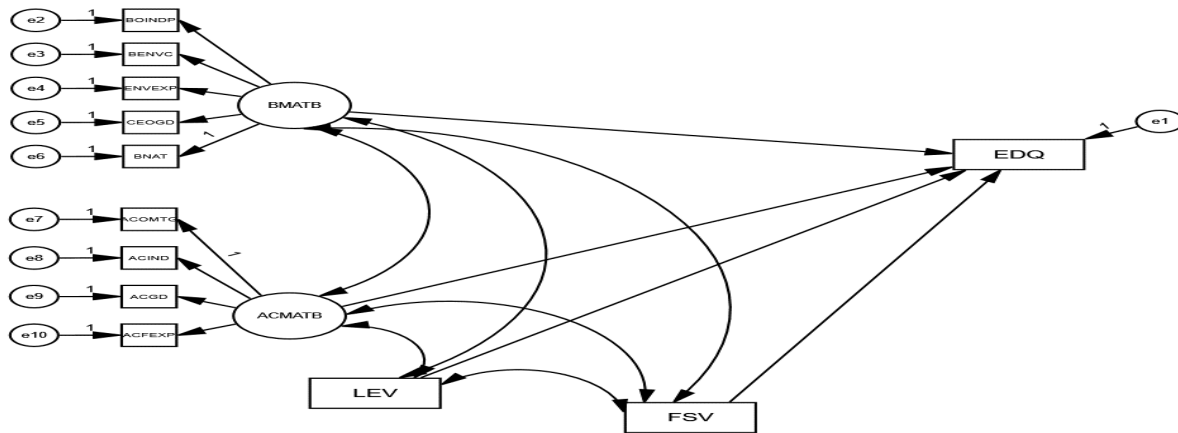


Figure 1. The Path Diagram Predicting the Effect of Complex Constructs on the Dependent Variable

Where:

ED = Environmental Disclosure

BOINDP = Board Independence

BENVC = Board Environmental Committee

ENVEXP = Board Environmental Expertise

CEOGD = CEO Gender Diversity

BNAT = Board Nationality

ACOMTG = Audit Committee Meeting Frequency

ACIND = Audit Committee Independence

ACGD = Audit Committee Gender

ACFEXP = Audit Committee Financial Expertise

LEV = Leverage

FSV = Firm Size

4. RESULTS AND DISCUSSION

Table 2 Direct Effect of Monitoring Mechanism on ED

SEM Path ways			Standardised (β)	S.E.	C.R.	p
BNAT	<---	BMATB	.604			
CEOGD	<---	BMATB	.641	.070	16.419	***
ENVEXP	<---	BMATB	.726	.070	17.840	***
BENVC	<---	BMATB	.678	.071	17.292	***
BOINDP	<---	BMATB	.812	.057	19.580	***
ACFEXP	<---	ACMATB	-.436	.009	-13.358	***
ACGD	<---	ACMATB	-.684	.008	-20.674	***
ACIND	<---	ACMATB	-.606	.009	-18.418	***
ACOMTG	<---	ACMATB	.698			
ED	<---	BMATB	.537	.148	5.789	***
ED	<---	ACMATB	-.352***	.020	-2.721	.004
ED	<---	LEV	-.013	.000	-.726	.468
ED	<---	FSV	.120***	.000	6.572	***

Table 2 results from the SEM shed light on the relationships between BMATB, ACMATB and ED, both with and without the inclusion of control variables LEV and FSV. The path from BMATB to ED was found to be significant and positive ($\beta = 0.613$, $p < 0.001$), indicating that BMATB has a substantial positive influence on ED. This finding aligns with the concept that a well-structured board plays a pivotal role in ensuring transparency and accountability (Arayssi et al., 2020). The positive relationship between BMATB and ED also conforms with Agency Theory, which asserts that boards act in the best interests of shareholders (Fama & Jensen, 1983). A proficient and diverse board is more likely to prioritise ED as stipulated corporate governance requirements (Shahab et al., 2018).

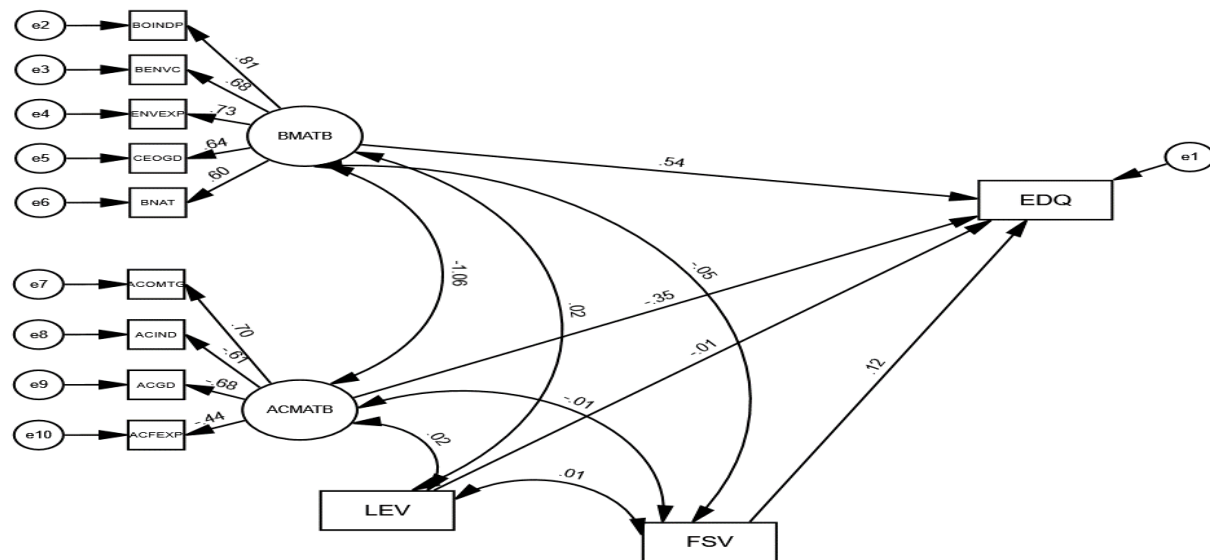


Figure 2. SEM Showing Monitoring Mechanism and ED

As presented in Figure 2, the direct path from LEV to ED was not significant, suggesting that firm leverage does not independently influence ED. In contrast, the path from FSV to ED was significant and positive ($\beta = 0.120$, $p < 0.001$), indicating that firm size positively affects ED, possibly due to the greater resources and capacity of larger firms for environmental reporting (Dakhlallh et al., 2020). When control variables LEV and FSV were included, the path from BMATB to ED remained significant and positive ($\beta = 0.54$, $p < 0.001$), reinforcing the positive impact of BMATB on ED. Conversely, the path from ACMATB to ED with control variables, was significant and negative ($\beta = -0.352$, $p = 0.004$), suggesting a persistent inverse relationship between ACMATB and ED.

A noteworthy contrast exists between BMATB and ACMATB regarding their direct effects on EDQ. BMATB exerts a positive impact, emphasising the role of boards in promoting ED, while ACMATB demonstrates an inverse relationship, possibly indicating that audit committees might have a more complex influence on ED. This contrast underscores the importance of considering different monitoring mechanisms independently and in conjunction with other governance factors. Furthermore, firm size, as indicated by FSV, plays a significant role in promoting ED.

The Confirmatory Factor Analysis (CFA) results supported the construct validity of the model. The strong loadings of BNAT, CEOGD, ENVEXP, BENVC, and BOINDP on BMATB demonstrated that these variables are closely linked to BMATB. Similarly, the high loadings of ACFEXP, ACGD, ACIND, and ACOMTG on ACMATB indicated their strong association with ACMATB. This underlines the relevance of these variables in capturing the essence of BMATB and ACMATB.

Table 3 Goodness of Fit (GFI) Index of the SEM of Attributes Monitoring Mechanisms on ED Model

Model	X ²	Df	p	PCFI	NFI	CFI	RMSEA
Benchmark			>0.05	>0.90	>0.95	>0.90	<0.06
Model with control	518.241	47	.000	.95	.97	.905	.013

Note: GFI, goodness-of-fit index; NFI, normed fit index; CFI, comparative of fit index; Df, degree of freedom; RMSEA, root mean square error of approximation.

The model without control variables shows a significant GFI compared to the benchmark. The chi-squared statistic is $X^2 = 518.241$, with 47 degrees of freedom. The p-value is significant ($p < 0.001$), suggesting that the model aligns with the data. The NFI and CFI values remain above the recommended threshold of 0.90, indicating strong model fit (NFI = 0.97, CFI = 0.905). The PCFI is also above 0.90, indicating a perfect fit. The RMSEA value is below 0.06, implying an acceptable level of fit.

The SEM results indicate that BMATB, ACMATB collectively explain a substantial portion of the variance in ED. While the model perfectly aligns with the data, the improvement in fit indices, suggests a meaningful relationship between monitoring mechanisms and ED. Findings from the studies of Zaid et al. (2020), Olanrewaju et al. (2020) and Shui et al. (2022) among others, corroborate the findings that monitoring mechanisms impact ED.

The results provide empirical support that monitoring mechanisms, captured through BMATB and ACMATB, significantly influence ED. This suggests that firms with stronger board and audit committee monitoring attributes are more likely to engage in ED practices. Therefore, H_0 was rejected.

5. CONCLUSION AND IMPLICATION

This study investigates the multifaceted relationship between monitoring mechanisms and ED. The analysis, conducted through SEM, revealed noteworthy findings that shed light on the intricate dynamics of these factors. First, the assessment of monitoring mechanisms showed that BMATB has a substantial positive influence on ED. This confirms that a diverse board plays a pivotal role in prioritising ED as part of their corporate governance responsibilities. ACMATB also positively contributes to ED, although to a somewhat lesser extent compared to board attributes.

The independent variables function as a mechanism to limit managerial self-interest and enhance firms' responsiveness to stakeholders' concerns, therefore narrowing the information asymmetry gap. The findings of this study provide strong support for the theoretical framework underpinning the study. Consequently, it is concluded that effective oversight of managerial behaviour leads to improved quality of ED.

Leveraging the findings from the study regarding the effect of monitoring mechanisms on ED, the following recommendations are proposed:

- Firms should prioritise the composition of their boards to include diverse and competent members. This diversity should encompass different expertise, backgrounds, and experiences, especially those related to environmental matters.
- Audit committees should continue to expand their roles to cover environmental issues. Having expertise in environmental issues can positively contribute to ED. Firms should consider recruiting individuals with relevant experience in environmental matters to serve on audit committees.
- Regulators, such as the Financial Reporting Council of Nigeria, should consider enacting policies that mandate minimum qualifications or certifications for audit committee members.

Additionally, industry-specific governance codes could be developed to ensure that audit practices align with firms' specific attributes.

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