AUDIT COMMITTEE CHARACTERISTICS AND SUSTAINABILITY DISCLOSURE: MODERATING ROLE OF BOARD GENDER DIVERSITY IN NIGERIAN BANKS

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Abstract
The study investigated the role of board gender diversity as a moderator on the traits of audit committee and sustainability disclosure among Nigerian deposit money banks. The increasing stakeholder pressure for transparent environmental, social, and governance disclosure, exacerbated by corporate governance inefficiencies exposed by global financial scandals, has heightened the need for an effective audit committee oversight in promoting credible sustainability disclosure. Despite rising scholarly attention, evidence on the governance mechanisms that drives sustainability disclosure in developing economies remains inconclusive. The study raised question of whether board gender diversity strengthens the nexus between size of audit committee and its tenure on sustainability disclosure in deposit money banks in Nigeria. The study extends the corporate governance and sustainability disclosure studies by looking at the moderating influence of board gender diversity on the nexus between size of audit committee, tenure and sustainability disclosure. While studies earlier conducted focused on audit committee traits direct effects, minimal documented empirical facts have explored board gender diversity contribution as a possible moderator, notably within the Nigerian banking sector environment. Leveraging on correlational research design and data driven technique, the inquiry computes panel data accessed from 14 deposit banks yearly reports spanning 2013–2024 intervals. Panel multiple regression analysis was deployed to include diagnostic and robustness tests, the robust fixed-effects approach was opted for hypothesis testing. The audit committee size confirmed positive insignificant outcome on sustainability disclosure, audit committee tenure confirmed significant positive outcome. Additionally, board gender diversity considerably moderated the nexus between size of audit committee, audit committee tenure, and sustainability disclosure. These outcomes exhibit that diverse board across gender strengthen audit committees' efficacy in boosting sustainability disclosure. The study infers that bolstering board gender diversity in tandem with longer audit committee tenure for members potentially boost sustainability disclosure practices. The consequences offer important implications for regulators, policymakers, seeking to bolster corporate governance.

Keywords: Audit Committee Size, Audit Committee Tenure, Banks, Annual Reports, Sustainability Disclosure

1. Introduction

In recent years, concerns have heightened pertinent to the demand for corporate accountability and openness in business functions, and sustainability disclosure is perceived as a critical tool for entities in this context. Such openness extends beyond traditional financial reporting to feature non-financial data that speaks volumes about a company's broader social and environmental effects (Ezekiel et al., 2024). Corporate governance provides an important institutional framework through which firms establish rules, structures, processes, and accountability mechanisms for managing relationships among shareholders, management, employees, creditors, customers, government, and other stakeholders (Bello et al., 2021). These disclosure needs have also gained prominence following earlier global financial crises involving numerous well-known companies mired in scandals exposing severe flaws in institutional governance, particularly audit committees' supervision and monitoring functions. Public trust was eroded in the aforementioned crises, resulting in stricter requirements in developed regions for comprehensive corporate reporting. However, in developing regions, Nigeria in particular, undefined regulatory requirements for sustainability disclosure have resulted in businesses providing very little information (Oluwatobi et al., 2024). The disparity undermined public trust, questioning the authenticity of annual reports made available in the public domain and raising doubts about audit committees' effectiveness in discharging monitoring duties. These developments have resulted in scholars and accounting experts becoming more interested in elements that can bolster sustainability disclosure in companies' annual reports. In particular, attention has been drawn to the potential influence of audit committee traits, notably size and tenure, and their likely contribution to addressing these challenges.

The governance literature further suggests that effective governance mechanisms are important for mitigating agency problems arising from the separation of ownership and control. In the context of seasoned equity offerings, Bello et al. (2016) found that governance mechanisms are intended to reduce agency problems and inefficiencies, while effective corporate governance can help safeguard stakeholders' interests and improve firm performance. Similarly, ownership structure has been recognised as an important mechanism of corporate governance, with implications for accountability, shareholder interests, and firm outcomes (Bello, 2019). Studies found audit committee features, notably size and tenure, to be internal governance structures and crucial components that may bolster sustainability disclosure in companies' annual reports (Hafiz et al., 2024). However, disagreement exists in the literature. Some researchers consider a large audit committee to constitute a bottleneck in decision-making, whereas others associate smaller committees with challenges in effectively overseeing corporate disclosures. Empirical research correlates the size of the audit committee with sustainability disclosure (Hafiz et al., 2024). Likewise, documented evidence associates the tenure of audit committee members with significant impacts on sustainability disclosure (Harjanti & Aryani, 2025). However, across the literature, evidence remains inconsistent. One possible explanation for this inconsistency is that prior research has overlooked the potential moderating role of board gender diversity, considering the fact that gender is inherent in these attributes, to ascertain the extent to which women on boards and these attributes interact to bolster sustainability disclosure in Nigerian deposit money banks' annual reports.

The relationship between governance and corporate disclosure is also relevant because disclosure can reduce information asymmetry and provide stakeholders with information necessary for informed decision-making. Ramalan et al. (2021a) explain that voluntary disclosure can serve as a mechanism for mitigating agency conflicts and information asymmetry between managers and shareholders, while annual reports provide important financial and non-financial information to various stakeholders. Evidence from quoted consumer goods firms in Nigeria similarly indicates that voluntary disclosure has implications for shareholders' investment decision-making and the reduction of agency conflict arising from information asymmetry (Ramalan et al., 2021b). According to Wahyuni et al. (2024), board gender diversity forms a critical governance mechanism that influences the sustainability disclosure of firms. By examining the moderating influence of board gender diversity, researchers can gain insights into how women's presence on boards interacts with these audit committee features, namely size and tenure, to affect sustainability disclosure, particularly in Nigeria's deposit money banking industry. There is a plethora of existing literature on audit committee proxies as well as sustainability disclosure conducted in foreign settings. While studies have examined the effect of these mechanisms on sustainability disclosure, their interplay with board gender diversity and these attributes has not been investigated, despite gender being intrinsically tied to governance dynamics, based on available literature.

The present study aims to investigate how board gender diversity moderates the consequences of audit committee size and tenure on sustainability disclosure of Nigerian deposit money banks. The broader corporate-governance literature demonstrates that governance structures can influence the protection of stakeholder interests, the mitigation of agency conflicts, and the quality of corporate information available to investors and other stakeholders (Bello et al., 2016; Bello et al., 2021; Ramalan et al., 2021a, 2021b). This gap highlights the necessity for additional research that explores the moderating influence of board gender diversity and the nexus among features of audit committees, such as size and tenure, and sustainability disclosure, particularly in emerging economies like Nigeria.

In order to realize the goal, the null hypotheses were developed as follows.

$H0_1$: Does board gender diversity affect sustainability disclosure of DMBs in Nigeria?

$H0_2$: Does board gender diversity moderate the nexus between audit committee size and sustainability disclosure of DMBs in Nigeria?

$H0_3$: Does board gender diversity moderate the nexus between audit committee tenure and sustainability disclosure of DMBs in Nigeria?

The paucity of research in this field, the majority of which comes from advanced economies, emphasizes how urgent it is to carry out this study. Therefore, a critical look on the consequences of board gender diversity upon the nexus between audit committee size, tenure, and sustainability disclosure, this study seeks to close that gap.

This study is necessary because it offers a greater insight into how board gender diversity interacts with audit committee features, such as size and tenure, to influence sustainability disclosure, thereby improving transparency, promoting accountability, and fostering stakeholder confidence in the Nigerian banking sector. The investigation is patterned as shown: section two offers relevant studies, the study approach employed is outlined in section three, section four adopts the empirical result and discussion of study findings, section five ends with recommendations based on the study.

2. Literature Review

The section reviews existing studies on effect of board gender diversity on the nexus between size of audit committee, audit committee tenure and sustainability disclosure in Nigeria deposit money banks. The review is patterned into conceptual review, empirical review and theoretical framework.

2.1 Conceptual Review

The key concepts and their connections are explained in this section.

2.1.1 Sustainability Disclosure Concept

A company's disclosure of details about its effects on the economic, environment, social, and governance is referred to as sustainability disclosure (Jessica & Setianingtyas, 2024). This study uses GRI standards and a dichotomous approach to assess sustainability disclosure magnitudes, attributing a value of 1 should a firm disclose a certain item and 0 otherwise.

2.1.2 Audit Committee Characteristics

Audit committee traits are features that spells out the formation of the committee and its function. These attributes enhance the committee’s effectiveness in their oversight function. The paper focuses on the size and tenure of the audit committee

2.1.2.1 Audit Committee Size Concept

Audit committee size denotes member’s size serving on the committee of audit. In Nigeria, corporate governance regulations specify that the committee should consist of between three and five members, depending on the size of the firm. Existing literature suggests that audit committee size is a useful indicator for assessing the magnitude of sustainability disclosure in firms' annual reports (Aprianti et al., 2021). A sizeable audit committee tends to offer varied expertise and stronger oversight, which can encourage more extensive disclosure of information.

2.1.2.2 The Concept of Audit Committee Tenure

Audit committee tenure denotes time period members serve on the board. It is deemed a key factor in shaping the magnitude of sustainability disclosure in firms' annual reports (Abdulwahid et al., 2025). However, prior empirical studies offer conflicting findings on this connection. Some research indicates that audit committee tenure evident positive effect on sustainability disclosure (Abdulwahid et al., 2025), while other studies, such as Harjanti and Aryani (2025), find that tenure does not significantly improve sustainability disclosure.

2.1.3 Concept of Board Gender Diversity

Research on corporate governance structure has shown board gender diversity is a contributing factor that influences sustainability disclosure in the annual reports (Hameed et al., 2023, Agyemang et al., 2020). Studies has shown that boards with diverse members tend to advocate for more transparent and comprehensive sustainability disclosure in firms' annual reports (Agyemang et al., 2020). The diversity frequently results in more robust discussions and decisions about sustainability, which improves the reporting process (Bhatia & Marwaha, 2022).

2.2 Empirical Review

2.2.1 Audit Committee Size and Sustainability Disclosure

Adegboye et al. (2020) examined consequences of audit committee mechanisms on sustainability disclosure of banks in Nigeria from 2014 to 2016. Sustainability disclosure was measured using the Global Reporting Initiative (GRI) framework, which includes economic, environmental, and social indicators. Audit committee mechanisms were assessed through independence, gender diversity, and committee size. Using generated data from yearly reports and applying a fixed-effects panel regression, the evidence suggests independence of audit committee with gender diversity influences sustainability disclosure positively. Interestingly, audit committee size evidenced significant negative effect. However, the study did not consider board gender diversity as a moderating factor, so its findings may not fully apply to the framework of this study.

Apalanti et al. (2021) explored the nexus amidst audit committee traits on sustainability reporting among firms on the Indonesia Stock Exchange covering year 2020. They measured audit committee features through size, independence, meeting frequency, and expertise, using secondary data from 47 energy-sector companies. The regression analysis indicate that committee magnitude, meeting frequency, and expertise positively influenced sustainability reporting, while independence had no significant effect. Due to regulatory and environmental differences, these results may differ to the current study.

2.2.2 Audit Committee Tenure and Sustainability Disclosure

Ahmad et al. (2023) examined conditioning business size role and nexus between audit committee chair tenure, board of directors' duration upon sustainability disclosure from 2014 to 2023. The study uses data drawn from a sample consisting 592 non-financial entities, The evidence demonstrated that sustainability disclosure was enhanced by longer board tenure, with business size considerably mitigating this effect. The tenure in respect to chair of audit committee, however, showed no moderating influence and a statistically non-significant effect. The study's conclusions might not be pertinent to the current research because it did not take board gender diversity into account.

Harjanti and Aryani (2025) examined how various characteristics of audit committees, to include their independence, tenure, educational qualifications, meetings frequency, and financial expertise of members, influence quality and volume of sustainability reporting among Indonesian companies from 2017 to 2022. They applied multiple regression analysis and discovered that both the frequency of meetings and the committee magnitude positively affected the quantity of sustainability reports, while factors like independence, educational background, and tenure did not have an impact. Due to variations in regulatory frameworks and environmental conditions, these results may not be entirely applicable to the current research.

2.2.3 Board Gender Diversity and Sustainability Disclosure

Azhura et al. (2025) examined effects of corporate governance, gender diversity, firm age amid extent of sustainability reporting. The research deduced data from forty-four companies in the energy, financial and manufacturing sector quoted Indonesia Stock Exchange for the period of 2023. The quantitative approach and secondary data were utilized for the study. The findings demonstrated that comprehensive corporate governance mechanisms improve the magnitude of sustainability reporting, whereas gender diversity, firm age do not significantly influence it. These outcomes cannot be applied to Nigeria due to differences in sectoral and environmental contexts.

Ho et al. (2024) examined board traits influence on sustainability reporting extent in Malaysia. The research focused on audit committee magnitude, firm value, women directors inherent and firm size as board traits. The study generated data from 56 listed companies spanning 2018 to 2020, with the use of pooled ordinary least squares regression model. The evidence posits significant positive influence between magnitude of the audit committee, female directors on board with sustainability reporting extent. Furthermore, firm value, firm size demonstrated positive effect with extent of sustainability reporting. However, these findings are limited to the current study resulting from environmental differences.

2.3 Theoretical Framework

Agency theory explains the principal-agent nexus, with emphasis on misalignment of interest spiraling out of control. While shareholders (principals) viewed as firm owners, managers oversee its daily operations. Managers in the conduct of daily operation may act in their own interest resulting in information asymmetry, thereby creating monitoring costs for shareholders.

The theory place emphasis on vital role of monitoring features in reducing principals and agent's conflicts. One key mechanism is the establishment of sound audit committee, which enhances accountability and transparency while reducing information gaps. The audit committee oversight role is central in ensuring that managers provide dependable and sufficient information to shareholders.

Based on this perspective, agency theory provides a firm basis for this context. It is adopted to explain how board diversity may moderate the nexus with audit committee composition, tenure on sustainability disclosure of money deposit banks in Nigeria.

3. Method

This research investigates the role of a diverse board in influencing the nexus between audit committee magnitude, the length of tenure, and the sustainability disclosure practices of Nigerian Deposit Money Banks (DMBs) over a 12-year timeframe from 2013 to 2024. The starting year, 2013, was deemed important because it marked the Central Bank of Nigeria's mandate for banks to include sustainability information in their yearly reports, a requirement that followed the establishment of the Nigerian Sustainable Banking Principles in 2012. The study adopted a correlational research design aimed at testing statistical relationships between the magnitude of audit committee, tenure, and sustainability disclosure of Nigerian DMBs. The use of quantitative statistical analysis to examine relationships among variables is consistent with previous Nigerian research that employed regression techniques to analyse empirical relationships using systematically collected data (Bello, 2025). The study focused on secondary data obtained from the annual reports of sampled banks, covering the entire 12-year period. The population consisted of 29 Nigerian listed DMBs in Nigerian Group Exchange (NGX) fact book as of 31st December 2024, as shown in Table 1

Table 1: Population of the Study

S/No	Bank	Year of Incorporation
1.	Access Bank Plc	1989
2.	Alternative Bank	2023
3.	Citi Bank Nigeria Ltd	1984
4.	Eco Bank Nigeria	1986
5.	Fidelity Bank Plc	1988
6.	FBN Plc	1894
7.	FCMB Plc	1982
8.	Globus Bank	2019
9.	GTB Plc	1990
10.	Heritage Bank Plc	2012
11.	Jaiz Plc	2003
12.	Keystone Bank Ltd	2011
13.	Lotus Bank Ltd	2021
14.	Optimus Bank Plc	2020
15.	Parallex Bank	2021
16.	Polaris Bank Ltd	2018
17.	Premiun Trust Bank	2016
18.	Providus Bank	2016
19.	Signature Bank	2022
20.	Stanbic IBTC Plc	1989
21.	Sterling Bank	1960
22.	Sun Trust Bank	2015
23.	Taj Bank	2019
24.	Titan Trust Bank	2018
25.	UBN Plx	1917
26.	UBA Plc	1949
27.	Unity Bank	2006
28.	Wema Bank	1945
29.	Zenith Bamk	1990

Source: Nigerian Exchange Group Fact book, 2024

The study applies a two-stage screening process to the population. First, only banks with available data for the entire study period are considered. Second, the banks must be listed either in their own name or through a holding company. After applying these criteria, 15 banks were excluded, leaving a refined population of 14 Nigeria DMBs. Consequently, final sample consists of 14 DMBs, as shown in Table 2.

Table 2: Sample Banks and Observation Period

S/No	Banks	Data Time frame	Observation
1.	Access Bank Plc	2013-2024	12
2.	Eco Bank Nig Plc	2013-2024	12
3.	Fidelity Bank Plc	2013-2024	12
4.	FBN Plc	2013-2024	12
5.	FCMB Plc	2013-2024	12
6.	GTB Plc	2013-2024	12
7.	Jaiz Bank	2013-2024	12
8.	Stanbic IBTC Plc	2013-2024	12
9.	Sterling Bank	2013-2024	12
10.	UBN Plc	2013-2024	12
11.	UBA Plc	2013-2024	12
12.	Unity Bank	2013-2024	12
13.	Wema Bank	2013-2024	12
14.	Zema Bank	2013-2024	12

Source: Nigerian Exchange Group Fact book, 2024

The study makes use of the panel multiple regression techniques of data analysis basically to explain the variation in sustainability disclosure resulting from size, tenure of the committee of audit.

Model Specification

The model of the study functionally becomes:

SDC i̇t = β0+ β1ACS i̇t + β2ACTi̇t + β3BGDV i̇t + β4ACS*BGDV i̇t + β5ACT*BGDV i̇t + Log β6TA + ε i̇t

Where; SDC is Sustainability Disclosure (Explained Variable), ACS and ACT (Audit Committee Size, Tenure) are Explanatory Variable, BGDV is Board Gender Diversity (Moderator), ACS*BGDV is Audit Committee Size Interaction with Board Gender Diversity., ACT*BGDV is Audit Committee Tenure Interaction with Board

Gender Diversity and FMS is Firm Size (Control Variable).

Measurements of Variables
Sustainability Disclosure (Dependent Variable)
Number of sustainability disclosure items disclosed by a firm divided by the total applicable items.

Audit Committee Composition (Independent Variable)
Total members that make up board audit committee

Audit Committee Tenure
The mean consecutive years' service of audit committee members in given year.

Board Gender Diversity (Moderator)
Total number of females on board

Interaction Effect between Audit Committee Size and Board Gender Diversity
Size of audit committee multiply by board gender diversity

Interaction Effect between Audit Committee Tenure and Board Gender Diversity
Audit committee tenure multiply by board gender diversity

4. Result and Discussion
This section posits and explains data collected from annual reports of selected deposit money banks over 12 years. It starts with a summary of the preliminary data through basic statistics.

Table 3: Descriptive Statistics

Variable	Obs	Mean	Std.Dev	Minimum	Maximum
SDC	168	.1213	.0745	.039	.321
ACS	168	4.970	1.2304	3	8
ACT	168	3.570	1.5651	1	8.5
BGDV	168	1.571	1.2115	0	4
FSZ	168	27.921	1.3706	24.27	30.951

Source: Computed from Data Generated 2013-2024 Using Stata Output, 2026

As contained in Table 4.1, average for sustainability disclosure reveals 0.1213. This average indicates that, overall, the banks tend to disclose low level of sustainability information in their annual reports during the reporting period. The standard deviation 0.0745 indicates little variation in sustainability disclosure among sampled banks, suggesting they generally follow a consistent reporting pattern, albeit at a low level.

The minimum value 0.038 and maximum value 0.321 respectively, of sustainability disclosure suggest that there was a low disclosure level in the banks of around 4%, where the highest level achieved was 32 % among the total possible number of disclosure items as per Table 4.1, the average value is 4.9703, which implies that the audit committees of the selected banks comprise about five members on average. The value for the standard deviation at 1.2304 suggests that there is a moderate level of variability in terms of the composition of the committees within the deposit money banks, which can be beneficial for making effectiveness of audit committees more significant regarding supervision of sustainability disclosures.

Regarding size of audit committees for the sample of DMBs over the research period, they vary between minimum 3 members and maximum 8 members.

According to table 4.1, the average value for audit committee tenure is 3.5707 years; this implies that the mean period after which the auditors work in the audit committee is four years. This suggests that audit committee members possess enough experience to conduct themselves professionally concerning financial reporting issues. Standard deviation value of 1.5651 represents a relatively high degree of variance for audit committee members, showing that there is a disparity in experience among the sample of banks.

The minimum value of audit committee tenure is 1 year, while maximum value 8.5 years. The minimum tenure value one year shows that some auditors in the committee are not experienced enough about banks' financial reporting system. In contrast, the maximum value of eight and a half years shows that there are some auditors who have worked for almost nine years; Concerning gender diversity in the boards, Table 4.1 indicates that there is an average value of 1.571. This implies that, on average, boards have approximately two female directors. In this regard, there is a standard deviation of 1.2115 that suggests that there is variability in terms of gender diversity in the boards, since while some boards are highly diverse in terms of gender, Female directors on the board varies from zero to four female directors in the analyzed period. It means that zero being the minimum value indicates that there are some boards which lack gender diversity while four represents the maximum value indicating that there are some boards which have been successful in implementing gender diversity.

Correlation Matrix

The correlation matrix was carried out to ascertain pairwise association among dependent and independent variables as revealed in table 4.2

	SDC	ACS	ACT	BGDV	FSZ
SDC	1.0000				
ACS	0.1108	1.0000			
ACT	0.2620	0.2745	1.0000		
BGDV	0.0622	-0.1962	0.1921	1.0000	
FSZ	0.1880	0.0183	0.2980	0.2460	1.0000

Source: Computed from Data Generated 2013-2024 Using Stata Output, 2026

The Pearson correlation coefficients between dependent variable (sustainability disclosure SDC) each of independent variables (audit committee size ACS, audit committee tenure ACT), and board gender diversity (BGDV) are presented in table 4.2. One point worthy of note is that whenever there exists an indication of multicollinearity or singularity (coefficient of correlation > 0.80), there will be misleading regression results (Onyabe et al., 2018).

As is evident from Table 4.2, the correlation coefficient concerning the sustainability disclosure and the independent variables are all positive: 0.1108 with respect to audit committee size, 0.2620 concerning audit committee tenure, and 0.0622 with regard to board gender diversity.

Furthermore, correlation coefficients among explanatory variables themselves are all below the 0.80 threshold suggested by Onyabe et al. (2018). This posited that multicollinearity is absent, confirming that the data is suitable for reliable regression analysis.

Overall, the results suggest a preliminary positive association with audit committee characteristics, board gender diversity, and sustainability disclosure, providing a solid foundation for further analysis of their potential influence in the regression models.

Multicollinearity Test

The multicollinearity test was done to ascertain variance inflation factor (VIF) and tolerance value (TV) and more so to further substantiate the absence of multicolinearity in the dataset.

This is shown in table 5.

Variable	VIF	1/VIF
ACT	1.24	0.805620
ACS	1.16	0.860042
BGDV	1.16	0.863253
FSZ	1.14	0.873615
MEAN VIF	1.18	

Source: Computed from Data Generated 2013-2024 Using Stata Output, 2026

Table 5 shows that VIF values of all variables falls below pegged value of 10, which is often regarded as the cut-off limit after which multicollinearity might cause trouble with regression analysis. Moreover, the VIF value of 1.18 means that there is a sufficient amount of variation among variables and none of the variables are redundant. This makes the data set ideal for regression analysis. Thus, the conclusion can be drawn that multicollinearity is not present in the data set.

Normality Test

Variable	Obs	W	V	Z	Prob>z
	168	0.99115	1.135	0.288	0.38664

Source: Computed from Data Generated 2013-2024 Using Stata Output, 2026

The normality of the dataset used in this study was tested with Shapiro-Wilk (W) test, as evidenced in Table 6. Results indicate that Shapiro-Wilk on residuals indicates failure to reject normality suggesting that residuals approximate normal distribution. This conclusion is validated with probability value as 0.38664, which exceeds typical significant threshold, confirming the assumption of normality is satisfied.

Heteroskedasticity Test

The Modified Wald test to GroupWise heteroskedasticity presented as follows:

Chi2 (14)= 4681.91 Prob> Chi2=0.0000

Source: Computed from Data Generated 2013-2024 Using Stata Output, 2026

For assessing whether there is any heteroskedasticity, the modified Wald test was applied to check groupwise heteroskedasticity. The outcome has shown that the null hypothesis should be rejected, as shown by the significance probability 0.0000, statistically significant at the 1% level, and the chi-square value being 4681.91, thus confirming heteroskedasticity existence in the model. In order to solve this problem, hetroskedasticity was addressed by estimating fixed effects with heteroskedasticity robust standard errors.

Hausman Specification Test

Chi2(6) = 14.1 Prob>chi2= 0.0285

Source: Computed from Data Generated 2013-2024 Using Stata Output, 2026

Hausman test was performed to establish most suitable model between two models fixed and random effect. Evidence from the test statistics was highly significant, with value of probability 0.0285, showing that the fixed effect estimation is appropriate. This however was not the end since the problem of heteroskedasticity remained unaddressed.

Table: Summary of Robust Fixed Effect Model

Variable	Beta.Coef	t-values	Prob>t
ACS	0.0131996	1.11	0.285
ACT	0.0320423	4.90	0.000
BGDV	0.3385389	2.30	0.039
ACSBGDV	0.5131417	2.08	0.057
ACTBGDV	0.0891565	2.41	0.031
FSZ	0.0657517	4.59	0.001

Source: Computed from Data Generated 2013-2024 Using Stata Output, 2026

The output from the regression analysis was done using the robust fixed effect (SDC it = $\beta 0+ \beta 1ACZ\ it + \beta 2ACTit + \beta 3GDV\ it + \beta 4ACZ*GDV\ it + \beta 5ACT*GDV\ it$ + Log $\beta 6TA + \varepsilon\ it$) has been analyzed. The results show that the robust fixed effect is more consistent compared to other methods used. The test showed probability value 0.0000, showing that the variables and model used are specified.

Audit Committee Size and Sustainability Disclosure

To ascertain degree of audit committee size on sustainability disclosure of Nigerian DMBs, a null hypothesis was formulated stating no statistically significant impact amidst audit committee size and sustainability disclosure. The analysis, however, revealed a statistically positive coefficient value (0.0132) and insignificant relationship with probability value 0.285. This indicates that size of the audit committees is not associated with higher sustainability disclosure. The implication of this is that larger audit committees are faced with coordination problem, diluted responsibilities mostly in the absence of strong regulatory requirements. Consequently, the result does not support the null hypothesis rejection, suggesting audit committee size alone cannot drive enhanced sustainability disclosure in Nigerian DMBs.

Audit Committee Tenure and Sustainability Disclosure

In addition, audit committee tenure effect on sustainability disclosure was examined. The corresponding null hypothesis stated audit committee tenure have no effect on sustainability disclosure. The findings showed that there was a positive value of the coefficient (0.0320) with significance of relationship with probability-value as 0.000. This indicates the contribution of longer serving audit committee members to sustainability disclosure level of banks is meaningful. The stated null hypothesis was hence rejected. These results support the fact that the longer the committee members have been in their positions, the more familiar they are with the workings of the banks and hence are able to offer better supervision. However, the familiarity may jeopardize their independence.

Board Gender Diversity and Sustainability Disclosure

Lastly, the article examined the connection amid board gender diversity on sustainability disclosure. Based on null hypothesis stating board gender diversity exerts no significant impact on sustainability disclosure. However, the study found out that there is a significantly positive correlation with an estimated coefficient 0.3385 and a p-value 0.039. This means boards with increased number of women disclose more sustainability information. This, therefore, implies rejection of null hypothesis. This conclusion shows gender diverse boards increase chances of promoting transparency, ethics, and sustainability.

Audit Committee Size and Board Gender Diversity Interaction on Sustainability Disclosure

For a further understanding of corporate governance and its dynamics, this article analyses the interaction among audit committee size, board gender diversity on sustainability disclosure in Nigerian deposit money banks (DMBs). The null hypothesis is set up in order to prove that no significant interaction amid audit committee size, board gender diversity on sustainability disclosure.

However, the result shows that the interaction effect is positive but only weakly significant at 10% level with coefficient value 0.5131 and p-value 0.057. on that note the hypotheses decision should not claim strong support.

Audit Committee Tenure and Board Gender Diversity Interaction on Sustainability Disclosure

The research also looked at how the combined consequences of audit committee tenure, board gender diversity influenced sustainability disclosure. A null hypothesis was formulated which indicated that no significance nexus between the interaction of audit committee tenure, board gender diversity on sustainability disclosure.

According to findings, a statistically positive relationship existed as per coefficient of 0.0892 with P value 0.031. This means board gender diversity strengthens the positive nexus amid audit committee tenure on sustainability disclosure by increased gender diversity within the board. The null hypothesis therefore is not accepted.

The findings emphasize the importance of experience and diversity within good governance. As such, while audit committee tenure gives a greater understanding of the institution, gender compliments with diverse perspective.

5. Conclusion

The study examined moderating role played by gender diversity on board on the nexus amid audit committee size, tenure and sustainability disclosure across Nigerian deposit money banks. In doing so, it provided both conceptual insights and an extensive literature review relevant to corporate governance and sustainability disclosure.

The study concludes audit committee size posits positive insignificant effect on sustainability disclosure, implying that it does not play a decisive role enhancing disclosure practices in Nigerian DMBs. On the other hand, audit committee tenure posits positive significant influence, indicating that longer-serving committee members are better placed to enhance sustainability reporting due to their in depth understanding of the bank's operational activities. Additionally, the study established board gender diversity evident statistically significant positive nexus with sustainability disclosure suggesting female representation is associated with higher sustainability disclosure.

Finally, audit committee size, interaction with board gender diversity evidenced positive weak significant nexus amid sustainability disclosure suggesting combination of audit committee size, board gender diversity marginally enhance sustainability disclosure. Audit committee tenure interaction with board gender diversity evident a positive significant association on sustainability disclosure implying that diversity across board crucially enhance the extent and quality of sustainability disclosure across annual reports of firms

6. Implications/Recommendations

There are many implications of the study's findings for policymakers, accounting practitioners, researchers, and management of Nigerian DMBs. The research results show that size of audit committees has no significant influence on sustainability disclosures by Nigerian DMBs. The implication is that increasing audit committee size may not significantly improve sustainability disclosure unless accompanied by other governance qualities such as independence, expertise and gender.

On the contrary, it is evident audit committee tenure had significant effect on sustainability disclosure as the results show. In addition, audit committee tenure shows that the role played by gender diversity in the board has considerable effects on sustainability disclosure. Another implication drawn from the results is that interaction of audit committee size and gender diversity has a weak or marginal effect.

Based on these findings, the study recommends that

i. Regulators and policymakers should encourage diverse board on corporate boards to enhance governance effectiveness as this will promote more transparent sustainability disclosure.
ii. Longer audit committee tenure of 8 years and above should be prescribed for audit committee members to enable them familiarize with the organizations accounting principles and business environment with measures taken to protect members of audit committee independence.

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Appendix – A

Sustainability Disclosure Metrics

TOPIC MANAGEMENT DISCLOSURE	Details
ECONOMIC SERIES	
GRI:201-1 (4 items)	Economic value directly generated and dispersed
GRI-201-2	Financial implications and associated risks and opportunities for the organization's activities arising from climate change
GRI-201-3	Scope of organizations spelt out benefit plan and obligations
GRI-201-4	Government financial assistance
GRI 202- Market Presence (2 items)	
GRI 202-1	Gender wage ratio with respect to standard entry level relative to minimum wage locally at significant areas of operation
GRI-202-2	Senior management ratio hired within local community at significant areas of operations
GRI-203- Indirect economic impacts (2 items)	
GRI-203-1	Infrastructure development and impact on investments with services supported
GRI-203-2	Significant indirect economic impacts including the extent of impacts
GRI 204 Procurement practices (1 item)	
GRI 204-1	Ratio of expenditure on local suppliers at major areas of operations
GRI-205-1- Anti corruption (3 items)	
GRI 205-1	Operation examined for risk respect to corruption
GRI-205-2	Dissemination and orientation on policies and processes related to anti-corruption.
GRI-205-3	Verified incidents with respect to corruption and measures taken
GRI-206- Anti competitive behavior (1 item)	
GRI-206-1	Court actions in respect to anti-competitive

	practices, anti-trust and monopoly practices
ENVIROMENTAL SERIES	Shall using 3-3 in GRI 3 : Material Topics 2021
GRI 301: Materials 2016 (3 items)	301-1 Used materials by volume or weight
	301-2 Reprocessed input materials utilized
	301-3 Products reclaimed with package materials
GRI 302: Energy 2016 (5 items)	302-1 Used energy consumed inside the organization
	302-2 Used energy consumed outside organization
	302-3 Energy extent
	302-4 Minimal consumption of energy
	302-5 Minimal energy requirements for products and services
GRI 303: Water and Effluents 2018 (5 items)	303-1 Use of water as a shared resource
	303-2 Management of water discharge related impacts
	303-3 Withdrawal of water
	303-4 Discharge of water
	303-5 Water used
GRI 304: Biodiversity 2016 (4 items)	304-1 Owned operational sites, leased, managed, or adjacent to, secured areas and areas of significant biodiversity value outside secured areas.
	304-2 Impacts of major activities, products and services as per biodiversity
	304-3 Protected habitats or recovered
	304-4 IUCN Red list species and national conservation list species with habitats in areas affected by operations
GRI 305: Emissions 2016 (7 items)	305-1 Direct (Scope 1) GHG emissions
	305-2 Indirect energy emissions (Scope 2) GHG emissions
	305-3 Other indirect (scope 3) GHG emissions
	305-4 GHG emissions impact

	305-5 GHG emissions reduced
	305-6 Emissions of depleting ozone substances
	305-7 Major air emissions, nitrogen oxide and sulfur oxides
GRI 306: Effluents and Waste 2016 (5 items)	306-1 Generated waste and major waste associated impacts
	306-2 Management of major waste associated impacts
	306-3 Generated waste
	306-4 Diverted waste likened to disposal
	306-5 Waste directed to disposal
GRI 308 : Supplier Environmental Assessment 2018 (2 items)	308-1 Environmental criteria used in screening new suppliers
	308-2 Negative environmental effects from supply chain and measures taken
SOCIAL SERIES	
TOPIC MANAGEMENT DISCLOSURES	Using disclosure 3-3 in GRI 3: Material topics
GRI 401 : Employment 2016 (3 items)	401-1 Hires of new employees and employee turnover
	402-2 Full time benefits for employees not provided
	401-3 Parental leave
GRI 402: Labor/Management Relations (1 item)	402-1 Short notice periods as per changes in operation
GRI 403: Occupational Health and Safety 2016 (10 items)	403-1 Work safety and health management procedure
	403-2: Identification of hazard, assessment of risk, and investigation of incidence
	403-3: Work health services
	403-4: Participation of worker, consultation and communication as per health and occupational safety.
	403-5 Training workers on work health and training
	403-6 Workers health promotion

	403-7 Avoiding and reduction of work health and safety effects resulting from business relationship
	403-8 Employees bonded by work health and safety effect management procedure
	403-9 Injuries related to workers
	403-10 occupation associated ill health
GRI 404 Training and Education 2016	404-1 Average training hours annually
(3 items)	404-2 Programs for employee upgrade skills and transition facilitated programs
	404-3 Workers percentage enjoying regular performance and Development reliefs for career
GRI 405: Diversity and Equal Opportunity 2016 (2 items)	405-1 Governance and workers diversities
	405-2 Proportion of actual salary and remuneration as per women to men
GRI 406: Non discrimination 2016 (1 item)	406-1 Discrimination incidence and corrective measures taken
GRI 407: Freedom of Association and Collective Bargaining (1 item)	407-1 Operations and supplies in which the right to freedom of association and collective bargaining may be at risk
GRI 408: Child Labor 2016 (1 item)	408-1 Operations and supplies at significant risk for incidents of forced or compulsory labor
GRI 409: Forced or Compulsory Labor 2016 (1 item)	409-1 Operations and suppliers at significant risk for incidents of forced or compulsory labor
GRI 410: Security Practices (1 item)	410-1 Trained security workers in rights of human policies or processes
GRI 411: Rights of Indigenous People 2016 (1 item)	411-1 Violations incidence as per indigenous people's rights
GRI 413: Local Communities 2016 (2 items)	413-1- Operations as per local community engagement, assessments of impacts and programs development
	413-2 Operations as per actual significant and potential negative effects on communities locally

GRI 414: Supplier Social Assessment 2016 (2 items)	414-1 New supplies screened as per social criteria
	412- Negative social consequences resulting from the supply chain and measures taken
GRI 415 Public Policy 2016 (1 item)	415-1 Contributions as per political
GRI 416 Customer Health and Safety 2016 (1 item)	416-1 Health examination impact on health and safety as per products and services
GRI 417 Marketing and Labeling 2016 (3 items)	417-1 Information and labeling requirements as per products and services
	417-2 Non adherence incidence as per product and service related to information and labeling
	417-3 non-adherence concerning marketing communications
GRI 418 Customer Privacy 2016 (1 items)	418-1 Evidenced complaints as per customer privacy breaches and losses of customer data.