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Corporate Governance Mechanisms and Sustainability Reporting Practices of Listed Multinational Companies in Nigeria: A Panel GMM Approach

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Abstract

The study examined the effect of board characteristics, audit committee attributes, and ownership structure on sustainability reporting practices of listed multinational companies in Nigeria. Principal Component Analysis was used to derive the composite indexes of board characteristics, audit committee attributes, and ownership structure using the secondary data obtained from annual reports of the ten (10) purposively selected listed multinational companies. System generalized method of moment (GMM) was subsequently used to analyze the data. Results show that board characteristics (p-value 0.013) and ownership structure (p-value 0.041) positively and significantly influence sustainability reporting practices of the listed multinational companies. Besides, audit committee attributes (p-value 0.210) positively influence sustainability reporting practices, but the effect is not significant. Furthermore, results reveal that the combined effect of audit committee attributes and board characteristics, board characteristics and ownership structure, and ownership structure and audit committee attributes positively and significantly influence sustainability reporting practices of listed multinational companies in Nigeria. The study concludes that board characteristics and ownership structure are the two major important corporate governance mechanisms that influence sustainability reporting practices of multinational companies in Nigeria.

Keywords: *Corporate governance, Stakeholder theory, Sustainability reporting, Principal component analysis, Generalized method of moment*

1. INTRODUCTION

Despite the global awareness of sustainable development and the big multinationals' efforts to protect social and environmental values, the practice of sustainability reporting disclosure among businesses operating in Nigeria, particularly multinational companies, has not received much research attention

(Masud et al., 2018; Umukoro et al, 2019; Adejumo et al. 2025). Furthermore, although a lot of research has been done on sustainability information disclosures, there is little research effort on how the combined corporate governance mechanisms (Audit committee attributes, Board Characteristics, and Ownership structure) influence sustainability reporting disclosures collectively. Prior studies have focused on how each of the components of these mechanisms influence sustainability reporting (Aliyu, 2019; Buallay & Al-Ajmi, 2020;Adeyemi et al., 2021; Asaolu, et al., 2022; Anyigbah et al., 2023;Adejumo et al. 2025), financial performance (Nasiru et al. 2020), and financial reporting quality (Ololade & Adekanmi, 2019; Afolabi et al, 2023). For instance, audit committee attributes and board characteristics, which consist of size, independence, meetings, financial expertise, diversity, have been examined individually in relation to sustainability disclosures, financial reporting quality and financial performance. However, none of these attributes and characteristics operate in isolation, they interact for effective corporate governance. Hence, this study attempts to examine the effect of corporate governance mechanisms (audit committee attributes, board characteristics, and ownership structure) on sustainability reporting practices of multinational companies using the composite index of each of the corporate governance mechanisms.

In recent years, there has been an increased focus on sustainability reporting on the environment, society, economy, and governance that are critical to the long-term sustainability and efficiency of enterprises. There is currently a significant drive towards more sustainability reporting based on common standards, supported by growing stakeholders' needs for consistent and comparable data. Over the past ten years, Sustainability Reporting (SR) has transitioned from voluntary to frequently mandated activity, and many companies are currently disclosing information on sustainability (Palmer et al., 2018; Mion & Adaui, 2020; Gerwing et al*.,* 2022). The ability of a firm to incorporate sustainability culture and practices into its operations is crucial for growth and reputation among other benefits as the world steadily becomes more environmentally conscious. Also, to obtain legitimacy and earn reputation in line with legitimacy theory, corporate companies disclose sustainability information.

The rate at which the economy transitions to one that is more climate-sustainable is largely determined by organizations. But, to fulfill this duty of seamless transition to a sustainability reporting process, they require governance procedures that guarantee they are aware of the effects of their actions on the environment, and when making corporate decisions relating to society and the environment (Hobbs, 2023). Over two decades, regulators, managers, company leadership, and researchers have steadily turned their attention to the principles and practices of corporate governance (Elmaghri et al., 2018). This is due to growing worries regarding the rise in business failure cases as well as misleading financial and environmental disclosures that result in business scandals and the collapse of major companies (Sokil et al., 2020; Tibiletti, et al*.,* 2020; Gerged et al., 2021). Hence, organizations, including those in Nigeria, must relate responsibly with the environment, society and economy to earn a corporate reputation among the stakeholders.

The choice of listed multinational companies in Nigeria as a focus of the study is motivated by two reasons. First, multinational firms have the most prominent impact on the environment (Osemene & Faghemi, 2019). Economic pursuit in most sectors making up multinational industry is mostly explorative and exploitative, and results in environmental degradation, global warming, gas flaring, climate change, carbon emission, biodiversity loss, and human rights violations (Abdullah et al*.,* 2018). Second, Nigeria, as a developing country, is included in poor countries with an obvious lack of

standardization, significant levels of corruption, inadequate regulation, and a lack of transparency and accountability in sustainability repointing (Mahmood et al., 2018; Osemene & Fagbemi, 2019). Moreover, Yunus et al. (2018) argued that developing countries lack a sufficiently strong legal framework to regulate multinationals and protect social and environmental rights. Therefore, the study attempts to fill the gap in literature by computing the composite index for each of the corporate governance mechanisms and examine the effect of corporate governance mechanisms on sustainability reporting practices of the listed multinational companies in Nigeria.

2. LITERATURE REVIEW

2.1 Overview of sustainability reporting in Nigeria

The Global Reporting Initiative (GRI, 2021) defines sustainability reporting as the process by which a company informs the public about its impacts on the economy, environment, and/or society and, consequently, its contributions, whether favorable or unfavorable, to the goal of sustainable development. Informing and holding companies accountable for their progress toward sustainability development is the goal of sustainability reporting, which is also referred to as environmental reporting, triple bottom line reporting, corporate responsibility reporting, or non-financial reporting (Ghani et al, 2018). Comparing sustainability reporting to traditional financial reporting, which primarily concentrates on financial success, enables a business to inform stakeholders about its obligations (De Villiers & Sharma, 2017; Aulia Indy et al. 2022).

According to Nasiru et al. (2020), sustainability is a corporate commitment to long-term growth, expansion of the economy, and efforts to enhance the quality of life for employees, their families, local communities, and society at large. Companies are now required to accept accountability for their deeds and disclose the ways in which they impact society and the larger environment in which they function. Non-financial data, like social and environmental performance statistics, are being sought after by investors, financial analysts, and other stakeholders to make better and more informed investment decisions (Ghani et al., 2018).Before now, the consensus was that an organization's consideration of its environmental impact was part of its social responsibility, with only occasionally having implications for the company's legal, ethical, or moral standing; it was widely believed that this consideration had no impact on the company's business model or consumer expectations. However, several factors have compelled corporations to alter their plans and increase expenditure on sustainability projects over time.

There are numerous reasons why sustainability is crucial for Nigeria as a developing nation (Ikpor et al. 2020). First, Nigeria has several social and environmental issues, including bribery, corruption, poor labor practices and decent work, and human rights violations; additionally, environmental issues include pollution, land degradation, and biodiversity loss. These issues indicate that efforts should be made to mold sustainability disclosure practices due to the high risks posed by the companies' actions. Second, sustainability reporting acts as a bridge between management and society to reduce pressure from various stakeholder groups because it reduces the knowledge asymmetry between stakeholders and companies (Masud et al. 2018). Furthermore, sustainability is regarded as a transparent, credible, and opportunistic way to give external parties and those interacting with the organization social, environmental, and economic information.

2.2 Corporate Governance

In commercial activities, a firm must abide by a system of rules and practices known as corporate governance (Selfdie, 2023). In essence, corporate governance attempts to establish harmony among all parties involved in business operations, including clients, the host community, suppliers, business leaders, and other stakeholders. Corporate governance is an essential component of any corporation since it gives organizations instructions on how to structure their business operations. This includes administration, implementing strategies, tracking progress toward goals, and disclosing data. The term corporate governance describes how a company is managed to ensure that its owners or stakeholders receive a fair return on their investment while also serving the needs of other stakeholders. So, rather than having a single definition, corporate governance can be seen from a variety of perspectives.

According to Qamruzzaman (2022), corporate governance is the successful application of ethical principles. Corporate governance is the system used to manage and control businesses. It involves controlling and observing the market system, as well as the personalities and relationships between the main corporate organs both internally and externally (Rouf et al., 2022). While Buallay and Al-Ajmi (2020) argue that a carefully crafted corporate governance policy must be implemented effectively for a business to succeed, Alam et al. (2022) posit that poor corporate governance can hurt the economy and the stability of the financial system as well as real, serious social and environmental repercussions.

Besides, Ozili (2020), states that corporate governance (CG) is a set of rules and procedures that assist in balancing the usually conflicting interests of stakeholders and constitute the basis of successful company operations. However, over the past few years, the term governance has expanded to include a wider range of business activities monitoring, such as the impact on society and the environment. Board characteristics are one of the three key parts of corporate governance literature. The ownership structure and the audit committee's attributes are others.

2.3 Empirical Review

2.3.1 Board Characteristics

Important corporate governance (CG) practices for sustainability reporting and transparency are the qualities of the board (Makarenko et al., 2020).Similarly, previous studies (Anyigbahet al. 2023; Githaiga & Kosgei, 2022; Peng et al. 2022) opine that characteristic such as CEO duality, board independence, gender diversity, size, and frequency of board meetings, can be used to assess board features. Furthermore, the research conducted by Garcia-Sanchez et al., (2020), Konadu et al., (2022), and Shahab et al., (2022) offers empirical proof that a sustainability committee, female directors, the board's independence, and the board's size all contribute to a board of directors' pro-environmental behaviour. One of the greatest corporate management structures, the board of directors, provides a substantial supply of quality for sustained competitiveness (Nursimloo et al., 2020).

Board size is one of the aspects of the board that has received the most attention for several reasons (Tibiletti et al., 2020). First, the number of directors may have an impact on the board's function and, in turn, the performance and transparency of the company. Second, group dynamics are taken into consideration in the study of the board of directors, which can improve the effectiveness of decision-making. Cho and Ryu (2022) listed some disadvantages of large boards about coordination, such as

the possibility of difficulties reaching a consensus with meeting scheduling, which could lead to less effective decision-making.

According to Chairina and Tjahjadi (2023), an independent board is made up of independent non-executive directors who are not affiliated with any organization and were not originally employed by the corporation. They advise the CEO and protect stakeholders' interests while performing their autonomous responsibilities as supervisors. Olayinka and Owolabi (2021) claim that by bolstering governance procedures and curbing managers' opportunistic behavior, the addition of independent non-executive directors may enhance reporting quality and the company's reputation. Furthermore, board diversity refers to the characteristics that comprise a board of directors. Gender is one of the key components of board diversity (Chairina & Tjahjadi, 2023).Diversity as a variable measuring board can be divided into two groups: those which are easily observable (e.g., gender, age, and ethnicity) and those that are less obvious (e.g., education, religion, and work experience). According to Makarenko et al., (2020), one of the key factors affecting corporate governance would be the board of directors' level of expertise. Besides, a strong financial - centric board will safeguard company assets by lessening the issue of opportunists and enhancing sustainability reporting.

The board's ability to comprehend and evaluate financial reports and formulate important financial decisions for the company is improved when it includes individuals with financial experience. Despite the numerous research on the impact of board characteristics on sustainability reporting, none has combined the individual board attributes and examined its influence on sustainability reporting Based on the discussions above and prior studies, this study proposes the following hypothesis:

> **H_{O1}:** The composite index of board characteristics has no significant effect on the sustainability reporting practices of listed multinational companies in Nigeria.

2.3.2 Audit Committee Attributes

An audit committee is a committee of the board of directors that oversees internal corporate procedures (Hendrati et al., 2023). Companies that reveal their social responsibilities gain a lot from having an audit committee because it lessens conflicts between management and shareholders. The independent audit committee's market value is higher than that of the board of directors, particularly if its members have financial experience (Abigail & Dharmastuti, 2022). The audit committee's existence is dependent on the corporate governance structure. The audit committee, a board subcommittee tasked with overseeing an organization's financial reporting process, internal control structure, internal audit functions, and external audit services, has been the target of several legislative reforms (Mustafa et al., 2018). Surprisingly, there is a lot of financial market malfeasance going on globally, which has forced governments to implement some reforms to strengthen internal and external corporate governance systems. The audit committee can be a great asset to the board when it comes to developing, implementing, monitoring, evaluating, and upholding corporate procedures for the benefit of the company and its stakeholders (Abiola & Arowolo, 2020).

According to Sarkar (2022), audit committee size features are considered the most important corporate governance tools when it comes to sustainability reporting procedures. Several other studies further support the idea that audit committee size and business sustainability practices are significantly correlated (Hendrati et al., 2023; Bually and Al-Ajmi, 2019). Also, audit committee independence is a concept used to explain a situation where any member of an audit committee is not

found performing the duty of executive director (Asaolu et al. 2022). The audit committee's independence allows it to handle the agency's issue and insider expropriation. According to Wang and Sun (2021), this audit committee variable's strong characteristics are the independent directors' capacity to properly supervise companies and their low likelihood of becoming a tool of management. Furthermore, diversity in audit committees is gender diversity. Gender diversity is the term used to describe the presence of women on the audit committee. Studies have indicated that the quality of sustainability reporting and gender diversity are positively correlated (Chairina & Tjahjadi, 2023). To raise the bar for oversight and decision-making, female directors also tend to take a more democratic and participatory approach to leadership.

Regular board meetings are often associated with better oversight functions, which may influence the quality of corporate reporting. The audit committee meeting is one of the most important components for examining the organization's financial and non-financial reporting process (Almunawwaroh & Setiawan, 2023). The audit committee meeting, according to Aprianti et al. (2021), is a significant ritual where critical decisions regarding corporate strategy are made. The audit committee's members are therefore required to attend meetings frequently. Unlike previous studies (Sarkar, 2022; Mustafa et al. 2018; Asaolu et al. 2022) that concentrate on specific audit committee attributes, this study computes the composite index of audit committee attributes using the principal component analysis. This broader approach is notable for reducing a large set of variables while maintaining the original dataset. Therefore, based on the discussion above, this study proposes the following hypothesis:

> **H_{O2}:** The composite index of audit committee attributes has no significant effect on sustainability reporting practices of listed multinational companies in Nigeria.

2.3.3 Ownership Structures

Ownership structure, in general, looks at the stakes that shareholders have in a company. Because of their sizable shareholdings, ownership has been seen as an essential component of effective control over a firm and a powerful structure of corporate governance that is utilized to impact social, ethical, and environmental issues (Alnabsha et al., 2018). Ownership is a significant and genuine stakeholder group for businesses, and as such, they have an impact on how those businesses manage their environmental disclosure policies. According to Mahdi et al., (2023), the quality of sustainability reporting could be affected by the ownership structure of the organization. Following earlier research, the ownership structure is thought to be the factor that determines how influence is distributed within an economic institution and the caliber of disclosure in sustainability reporting. Furthermore, Moses et al. (2020) assert that an organization's ownership structure has a critical and significant role in its success or failure.

The percentage of shares that management owns or the total number of equity shares that a manager owns is known as managerial ownership. Junias et al. (2020) and Adejumo et al (2025), assert that management ownership has a substantial impact on the business's financial operations and can be used as a stand-in for giving sustainability reporting more consideration. Involving stakeholders, especially managerial stakeholders, is essential from their point of view to achieve corporate goals. Also, institutional investors—such as banks, insurance companies, and investment firms—have been seen as a key component of effective control over a company and a powerful structure of corporate governance that is used to affect social, ethical, and environmental issues (Mujiani et al. 2021). Institutional ownership is the percentage of shares held by these investors (Alnabsha et al., 2018).

Besides, foreign ownership is defined by Mahdi et al. (2023) as "the presence of a foreign investor holding a significant portion of an economic concern's shares." Foreign investors have little direct or indirect influence over the local economy's structure, according to Moses et al. (2023). Prior studies (Hassan et al., 2022; Mahdi et al., 2023; Correa-Garcia et al., 2020) show a strong correlation between foreign ownership and sustainability reporting. The results of Hassan et al. (2020) examination of the relationship between foreign ownership and sustainability reporting in Pakistani commercial banks revealed that foreign ownership influences the disclosure of sustainability disclosures. According to previous studies, government ownership is defined as the government owning a sizable portion of the economic entity's shares (Mahdi et al, 2023). Since the government wants to use ownership to further social welfare and achieve political goals, its involvement in business results in more transparency, homogeneity of interests, and a sharp reduction in information asymmetry (Aboudahr, 2022).

A body of literature asserts that family ownership is defined as when one family controls most shares and manages a certain economic unit (Mahdi et al, 2023). The positive point of this type of ownership is the ability of family members to supervise the performance of the management directly and monitor the actions of the economic unit. Negative aspects include, however, not diversifying the investment portfolio to reduce risk and prioritizing family interests over maximizing the economic unit's value (Anwar & Malik, 2020).While previous studies have examined the specific ownership structure on sustainability reporting (Mahdi et al. 2023; Moses et al. 2022; Alnabsha et al 2018), none of the studies (Mujiani et al. 2021; Aboudahr, 2022) addressed the combined ownership structures on sustainability reporting in the context of multinational companies using principal component analysis. Hence, we hypothesize that:

> **H_{O3}:** There is no significant effect of the composite index of ownership structures on sustainability reporting practices of listed multinational companies in Nigeria

3. METHODOLOGY

An ex-post facto panel research design was used for this study. The research design allows data to be gathered from secondary sources for quantitative analysis to achieve research objectives. The study's target population consisted of all 15 listed multinational companies in Nigeria Exchange Group as at 31stDecember 2022. The study made use of 10 listed non-financial multinational corporations from six different sectors-oil and gas, consumer goods, industrial products, healthcare, conglomerates, and the construction industry. This study focused on listed non-financial enterprises because of the readily available information and the ease of access to annual reports that are required by law to be prepared and disclosed. The study used secondary data from the annual reports or stand-alone sustainability reports for each company for the years 2018 to 2022. The study period was ideal for several reasons, including the first that the Nigeria Exchange Group released its sustainability criteria in 2018, the second that the Nigeria Financial Reporting Council (NFRC) code of corporate governance structure incorporated the need for a sustainability-driven governance structure, and the third that the Global Reporting Initiatives (GRI) modified the existing guidelines and standards for sustainability reporting. Also, listed companies are more regulated and accountable, and disclose more high-quality information (Masud et al, 2018).

3. 1 Model Specification

For this study, the models of Anyigbah et al. (2023) and Wang and Sun (2021) were adapted to examine the impact of corporate governance processes on sustainability reporting practices. Panel regression models were used to evaluate the hypotheses. To ascertain the degree to which each corporate mechanism influences sustainability disclosure, the following multiple regression is used.

$$SRP = \beta_0 + \beta_1 SRP_{t-1} + \beta_2 BINDEX + \beta_3 AINDEX + \beta_4 OINDEX + \beta_5 FSIZE + \beta_6 LEV + \beta_7 ROA + \varepsilon_{it}$$

Where:

SRP = Sustainability reporting disclosure index measured using content analysis of GRI content. When items of Economic, Social, and Environmental are disclosed, it is scored 1, and otherwise 0.

SRP_{t-1} = lag of sustainability reporting disclosure index

BINDEX = The board characteristics (Size, independence, financial expertise, meeting and diversity) composite index. It involves generating a composite index for all the board characteristics by using principal component analysis (PCA).

AINDEX = The audit committee attributes (Size, independence, financial expertise, meeting and diversity) composite index. It involves generating a composite index for all the audit committee attributes using principal component analysis (PCA).

OINDEX = The ownership structure (Managerial, family, institutional, government, and family ownerships) composite index. This study applies (PCA) to construct a composite ownership structure index.

Control variables

FSIZE = Firm size. It is measured as the logarithm of total assets.

LEV = Leverage. Ratio of total liability to total asset.

ROA = Return on asset. Net income is divided by total assets.

$\beta_o - \beta_7$ = The coefficient of the variables to be estimated

ε = Stochastic Error term

3.2 Composite index

A composite index is computed for each stream of corporate governance mechanism indicators using principal component analysis (PCA), which was proposed by Pearson (1901) and further developed by Hotelling (1933). The method is unique in that it can extract information from a high-dimensional set of indicators and then convert the indicators into new indices that show significant information on distinct dimensions and are uncorrelated with each other. It is also noteworthy for reducing many

variables while preserving the original dataset. The results of PCA for each stream of corporate governance are shown in Table 1a- 1c.
The results in Table 1a display that the first component for the board characteristics series is chosen given that the eigen value accounts for 1.615 % representing the highest percentage of the total variation. Additionally, the remaining components' eigen values are almost close to one implying that they are also significant loadings. Overall, the variables meet all necessary rules of thumb to be considered in computing the board characteristics index.

Also, Table 1b illustrates the results of the principal component analysis (PCA). The findings indicate that the first component for the audit committee characteristics variable is selected as it accounts for the highest percentage of the total variation, with the eigenvalue accounting for 2.182%. The remaining components also have eigenvalues that are approximately one, suggesting that they are significant loadings. In summary, the variables meet all the necessary criteria to be considered in calculating the audit committee index.

Finally, the results of the PCA as displayed in Table 1c reveal that the first component for the ownership structure is chosen, as it accounts for the highest proportion of the total variation, with the eigenvalue accounting for 3.110%. The remaining first three components also have eigenvalues close to unity, suggesting that they are significant loadings. In conclusion, the variables fulfil all the necessary criteria to be considered when computing the ownership structure index.

Table 1a. Principal component analysis for board characteristics index

Eigenvalues: (Sum = 5, Average = 1)

Number	Value	Difference	Proportion	Cumulative Value	Cumulative Proportion
1	1.615897	0.405414	0.3232	1.615897	0.3232
2	1.210483	0.269399	0.2421	2.826380	0.5653
3	0.941084	0.195966	0.1882	3.767463	0.7535
4	0.745117	0.257698	0.1490	4.512580	0.9025
5	0.487420	---	0.0975	5.000000	1.0000

Eigenvectors (loadings):

Variable	PC 1	PC 2	PC 3	PC 4	PC 5
BSIZE	0.601989	0.136449	0.226889	-0.509192	0.555190
BINDEP	0.548242	0.011432	-0.028050	0.819213	0.165540
BDIVER	-0.555847	0.428195	0.188846	0.242593	0.642782
BFIEXP	0.145696	0.763409	0.384935	0.005608	-0.497768
BFIMET	-0.082745	-0.463797	0.874012	0.103589	-0.058468

Table1b. Principal component analysis for audit committee index

Eigenvalues: (Sum = 5, Average = 1)

Number	Value	Difference	Proportion	Cumulative Value	Cumulative Proportion
1	2.182045	0.937524	0.4364	2.182045	0.4364
2	1.244520	0.386603	0.2489	3.426565	0.6853
3	0.857917	0.142400	0.1716	4.284482	0.8569
4	0.715518	0.715518	0.1431	5.000000	1.0000
5	2.19E-16	---	0.0000	5.000000	1.0000

Eigenvectors (loadings):

Variable	PC 1	PC 2	PC 3	PC 4	PC 5
ADCOSZ	-0.660017	-0.044975	0.127610	0.214640	0.707107
ADCOEX	0.093025	0.695664	-0.332907	0.629739	-2.13E-16
ADCOID	0.660017	0.044975	-0.127610	-0.214640	0.707107
ADCOME	0.345996	-0.322270	0.615679	0.630371	-4.16E-17
ADCOVE	-0.019688	0.638865	0.691045	-0.337521	-6.51E-18

Table 1c. Principal component analysis for ownership structure index

Number	Value	Difference	Proportion	Cumulative Value	Cumulative Proportion
1	3.110835	1.967948	0.6222	3.110835	0.6222
2	1.142887	0.478935	0.2286	4.253723	0.8507
3	0.663952	0.597247	0.1328	4.917675	0.9835
4	0.066705	0.051084	0.0133	4.984379	0.9969
5	0.015621	---	0.0031	5.000000	1.0000

Eigenvectors (loadings):

Variable	PC 1	PC 2	PC 3	PC 4	PC 5
MOWN	-0.509535	0.373284	-0.001690	0.681205	0.370122
IOWN	0.396671	0.552998	-0.479739	0.258574	-0.489730
GOWN	-0.428176	0.584720	-0.111901	-0.676698	0.065773
FOWN	0.546364	0.150996	-0.229656	-0.100989	0.784695
FAWN	0.318086	0.436068	0.839395	0.031312	-0.055692

4. RESULTS

4.1 Descriptive analysis

To identify the behavior of the series under examination, this study first provides descriptive statistics. Table 2 shows the variables' descriptive statistics, and the sustainability reporting mean is 0.521 with a standard deviation of 0.067, indicating low variability in the variable. The highest average among the control variables is associated with firm size, while the lowest average pertains to returns on assets (ROA). The highest standard deviation value is reported for leverage, and the lowest is reported for ROA, indicating low variation in these series. The skewness distribution shows that whereas the other variables are positively skewed, sustainability reporting, the board characteristics index, and company size are adversely skewed. Additionally, the board characteristics index,

ownership structure index, leverage, and ROA are leptokurtic, whereas sustainability reporting, audit committee index, and firm size are platykurtic because the variables are less than three, according to the kurtosis distribution, which illustrates the flatness or peakedness of the distribution. Except for the business size, board characteristics index, and audit committee index, practically all the variables are not normally distributed.

Table 2 Descriptive statistics

Variables	SRP	BINDEX	AINDEX	OINDEX	FSZE	LEVR	ROA
Mean	0.521	3.771	1.380	1.070	18.670	2.720	0.034
Median	0.535	0.079	0.883	0.696	18.699	1.338	0.027
Maximum	0.611	3.152	2.810	4.615	20.213	13.511	0.264
Minimum	0.404	2.778	1.858	1.335	16.569	0.391	0.092
Std.Dev	0.067	1.284	1.526	1.714	0.963	3.049	0.068
Skewness	-0.451	-0.098	0.196	1.681	-0.345	1.932	0.976
Kurtosis	1.899	3.235	1.317	4.506	2.436	6.427	5.592
J.Bera	4.223	0.196	6.127	28.295	1.652	55.591	21.941
Prob	0.012	0.906	0.044	0.000	0.437	0.000	0.000

Source: Authors' compilation (2025)

4.2 Correlation analysis

Additionally, Table 3 displays the correlation matrix between the variables. It shows correlations. The correlation analysis shows that all of the variables are positively correlated with sustainability reporting, suggesting that a rise in these indicators encourages greater disclosure of the analyzed firms' economic, social, and environmental operations; on the other hand, the ownership structure index and leverage are negatively correlated with sustainability reporting, indicating that an increase in ownership concentration and leverage discourages the disclosure of the considered firms' business operations. Overall, the correlation analysis shows that there are no worries regarding potential multicollinearity among the variables, as the highest value of the correlation coefficient (0.597) is moderately low.

Table 3 Correlation matrix

SRP	1.000						
BINDEX	0.030	1.000					
AINDEX	0.225	0.297	1.000				
OINDEX	-0.597	0.331	0.033	1.000			
FSZE	0.118	0.277	0.060	0.220	1.000		
LEVR	-0.199	0.014	0.099	0.351	0.427	1.000	
ROA	0.112	-0.090	-0.057	-0.223	0.218	0.305	1.000

Source: Authors' compilation (2025)

4.3 Stationarity Test

To prevent erroneous results, this study expands the analysis by examining the variables' stationarity qualities. To determine the stationarity check, the panel unit root tests developed by Levin et al., (2000) and Im et al., (2003) are used. The outcomes of the panel unit root tests are shown in Table 4. Except for leverage and the audit committee index, the LLC results demonstrate that none of the variables are stationary at the level. However, after being exposed to the initial difference, the remaining variables become stationary. Likewise, the results of the LLC unit root test and the IPS panel unit root test are similar, albeit the coefficient values are different.

Table 4. Panel root tests

	LLC	LLC	IPS	IPS
	Level	First difference	Level	First difference
SRP	-2.395	-6.625*	-2.633	-6.225*
BDEX	-2.561	-7.020*	-2.505	-7.483*
AUDEX	-5.097*	-8.268*	-4.868*	-8.838*
MODEX	-2.426	-6.229*	-2.702	-6.228*
FSIZE	-2.148	-7.136*	-2.120	-7.226*
LEVR	-4.035*	-5.874*	-3.203*	-7.174*
ROA	-2.111	-8.378*	-2.165	-9.051*

Note: * , ** , and *** indicate significance at 1%, 5%, and 10%.

Source: Authors' Compilation (2025)

4.4 GMM Results and discussion of findings

Using the system-generalized method of moments (GMM) technique put out by Blundell and Bond (1998), the combined effect of the three dimensions of corporate governance processes on sustainability reporting in Nigeria. Because it can handle the problems of endogeneity and unobserved intercept heterogeneity that frequently occurs with other approaches, the system GMM technique is preferred. Conventional methods like fixed effects estimators or traditional ordinary least squares (OLS) might yield skewed and inconsistent findings, particularly when there may be a correlation between the idiosyncratic error factor and lagged dependent variables. The GMM results are presented in Table 5. The results reveal that the lagged coefficient of the dependent variables is positive and statistically significant, indicating that prior sustainability reporting by the examined firms has a bearing on their current disclosures.

The estimated coefficient for composite board characteristics is positively and significantly associated with sustainability reporting in Nigeria. This finding indicates that expanding board characteristics can enhance equity distribution, competitive advantage, minimize agency conflict, and promote accountability and credibility of the analyzed firm, which consequently promotes sustainability reporting in Nigeria. This finding is consistent with the studies conducted by Razak et al. (2023) and Adeyemi et al. (2021) but contradicts the results of Åžerife, and Baimurzin(2020) and Githaiga and Kosgei (2022).

Also, the estimated coefficient for the audit committee index is positive but insignificant, suggesting that the composite audit committee does not foster public declaration of environmental, economic, and social operations of the listed firms due to incessant fraud and corruption, a weak institutional framework, and poor financial monitoring regulatory bodies that have plagued the economy.

However, the estimated coefficient for composite ownership is positive and significant, indicating that increasing composite ownership concentration stimulates effective management of firm resources, reduces management expropriation of resources, and removes information asymmetries. This leads to sustainability reporting for the firms considered in Nigeria. This finding is consistent with the studies conducted by Fauzi and Locke (2012), Monteiro and Aibar-Guzman (2010), Hassan et al. (2022), Adeniyi and Fadipe (2018), Correa-Garcia et al. (2020), and Gimbason and Yahaya (2024).

Turning to the interactive outcomes, the results show that the combined effect of audit committee attributes and board characteristics positively influence sustainability reporting in Nigeria. This finding implies that fostering stable and robust audit committee expertise enhances the productivity of board characteristics to achieve company performance and accountability, which consequently promotes sustainability reporting in Nigeria. This outcome further implies that monitoring audit committee attributes further strengthens the effective performance of board directors to achieve company objectives as found by Salawu et al, (2024),thereby fostering credible sustainability reporting for chosen firms in Nigeria. This finding is contrary to the study of Kumar et al. (2022) which found an insignificant effect of board size and big4 auditing on sustainability disclosure in India.

Furthermore, the estimated coefficient of the combined effect of board characteristics and ownership structure exerts a positive and significant impact on sustainability reporting in Nigeria. This result points out that board characteristics play a positive moderating role in the nexus between ownership structure and sustainability reporting in Nigeria. This outcome also implies that fostering good board characteristics would ensure an effective ownership structure, thereby facilitating effective disclosure of the environmental, social, and economic activities of analyzed companies in Nigeria. This outcome is consistent with the findings of Haider and Nishitani (2022), who uncovered similar results in the case of Japanese companies.

The complementary effect of ownership structure and audit committee attributes exert positive and significant effect on sustainability reporting in Nigeria. This outcome suggests that ensuring monitoring ownership structure provides favorable atmosphere for the effective audit committee expertise that creates competitive advantage and thus promote credible sustainability reporting of listed firms in Nigeria. This finding also demonstrates that providing sound and effective ownership selection process coupled with good financial audit monitoring is critical to fostering sustainability reporting of listed firms in Nigeria. This finding aligns with the argument of Djaddang et al. (2017) that ensuring independent audit committee fosters ownership structure thereby promoting sustainability reporting.

Besides, the research findings illustrate that the estimated coefficient of firm size is positive and statistically significant across the models, implying that increasing firm size stimulates competitive advantage, improved management accountability, accurate financial monitoring quality, and reduced risk management responsibility, thereby promoting sustainable reporting of analyzed firms in Nigeria. This result also suggests that firm expansion resulting from increased internal control, board oversight, and effective management would consequently lead to public disclosure of the environmental, social, and economic operations of the listed firms in Nigeria. This evidence is

consistent with the findings of Adelowotan and Udofia (2021) and Wahyudi (2021), who also reported similar results in their investigations.

Furthermore, the results indicate that returns on assets (ROA) exert a positive and significant impact on sustainability reporting across the models, suggesting that improvements in the profitability of the analyzed firms enhance the financial performance, business expansion, credibility, and accountability of firms, thereby promoting sustainability disclosure in Nigeria. This finding also highlights that the surge in ROA expands the company's assets, corporate governance monitoring, and competitive advantage, which boosts the confidence of the stakeholders and thus promotes sustainability disclosure by the listed companies in Nigeria. This result aligns with those reported by Clarkson et al. (2008), Lu and Taylor (2018), and Shaban and Barakat (2023) in their investigation.

However, the estimated coefficient of leverage is negative and significant across the models. This outcome points out that increasing leverage spurs firms to divulge the disclosure of environmental, economic, and social activities as their associated costs exceed the potential benefits. This result also suggests that the rising leverage of the chosen companies increases the risk of financial distress and affects the efficiency and effectiveness of the management, which consequently limits sustainability reporting in Nigeria. This result is in congruence with those reported by Antara et al. (2020) and Andrikopoulos and Kriklani (2013).

Finally, the validity of the instrument variables is verified by two specification tests namely the Sargan test and autocorrelation of the differenced error terms. The Sargan test of over-identifying restriction is employed to check the endogeneity of the instrumental variables and the autocorrelation test of first and second order is utilized to potential serial autocorrelation between the differenced error terms. The outcomes show that the null hypothesis for the models is rejected, suggesting that the results are consistent and appropriate.

Table 5. GMM results

Variables	1	2	3
SRP_{t-1}	0.159***	0.284**	0.103*
	(0.068)	(0.032)	(0.000)
FSZE	0.310*	0.121*	0.132***
	(0.004)	(0.000)	(0.071)
LEVR	-0.101*	-0.491**	-0.188*
	(0.000)	(0.020)	(0.000)
ROA	0.508*	0.223*	0.143**
	(0.000)	(0.000)	(0.092)
BINDEX	0.424**		
	(0.013)		
AINDEX		0.174	
		(0.210)	
OINDEX			0.182**
			(0.041)
BINDEX*AINDEX	0.086*		
	(0.010)		
OINDEX*AINDEX		0.078*	

		(0.000)	
OINDEX*BINDEX			0.016*
			(0.002)
AR(1)	0.974	0.166	0.151
AR(2)	0.649	0.108	0.332
Sargan test	21.623	27.705	15.620

Note: * , ** , and *** indicate significance at 1%, 5%, and 10%.
Source: Authors' compilation (2025)

5. CONCLUSION AND RECOMMENDATIONS

This study examines the effect of board characteristics, audit committee attributes, and ownership structure on sustainability reporting practices of the listed multinational companies in Nigeria. Principal Component Analysis (PCA) was used to compute the composite index of the three corporate governance mechanisms and system generalized method of moment (GMM) was used as a data analytical technique to analyze the secondary data obtained from the annual reports of the sample of the listed multinational companies. GMM is most appropriate because it takes care of the problems of endogeneity and unobserved heterogeneity. The results reveal that board characteristics and ownership structure have a positive and significant effect on sustainability reporting practices of the listed multinational companies, while audit committee attributes have a positive but insignificant effect on sustainability reporting practices of the listed multinational companies in Nigeria. Furthermore, the results of the interaction of the combined effect of audit committee and board characteristics positively affect sustainability reporting in Nigeria. Similarly, the combined effect of board characteristics and ownership structure positively and significantly influence sustainability reporting practices. Likewise, the interacting effect of ownership structure and audit committee attributes exert positive and significant effect on sustainability reporting practices of the listed multinational firms in Nigeria. Finally, firm size and profitability positively and significantly influence sustainability reporting practices while leverage negatively and significantly influence sustainability reporting practices.

The study recommends that regulators, corporate stakeholders, and multinational companies should pay attention to holistic board characteristics, audit committee attributes, and ownership structure rather than giving attention to elements under each of these corporate governance mechanisms. All the elements under each of the corporate governance mechanisms operate interactively to secure good governance that meets the needs of all the corporate stakeholders.

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