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BOARD ATTRIBUTES AND ENVIRONMENTAL SUSTAINABILITY REPORTING: THE INFLUENCE OF OWNERSHIP STRUCTURE

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ABSTRACT

This study aims to investigate the influence of ownership structure on the extent to which the board attributes in Sub-Saharan Africa (SSA) promote environmental Sustainability Reporting. Using the dynamic panel-data estimation method, the paper uses 1,970 firm-year observations manually extracted from publicly listed non-financial firms' financial reports in SSA from 2012 to 2021. The paper finds that the block ownership structure does not significantly moderate board attributes and environmental sustainability reporting in publicly listed SSA forms. Also, Government-owned firms moderate board independence and environmental sustainability reporting. The paper further finds that foreign ownership structure influences the relationship between board gender diversity and environmental sustainability reporting in SSA. The paper finds that the relationship between board attributes and ecological sustainability reporting differs and depends on the ownership structure type. These findings imply that corporate governance reforms in the ownership structure should be implemented to improve environmental reporting in SSA. To strengthen sustainability reporting, policymakers in SSA should prioritize the development of robust regulatory frameworks and consider the nature of ownership structure since the influence of corporate governance characteristics depends on the type of ownership structure. The paper presents a new perspective on board attributes and environmental sustainability literature by uncovering the influence of ownership structure on board attributes and environmental sustainability reporting in SSA. The paper contributes to board attributes and environmental sustainability literature and holds significant theoretical, conceptual, and practical implications.

KEYWORDS: Corporate Governance; Environmental Sustainability Reporting; Ownership Structure; Sub- Saharan Africa (SSA)

JEL CLASSIFICATION: K22, L26, M21

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INTRODUCTION

The global landscape is witnessing a growing demand for reporting on environmental sustainability from stakeholders, driven by factors such as climate change, evolving consumer preferences, and environmental incidents (Dienes et al., 2016). As a result, the concept of corporate sustainability focused on long-term value for consumers and employees, among others, by developing an environmental strategy (Shah,2019). This concept has seamlessly integrated into managers' decision-making processes (Windolph et al., 2014), accounting practices, and reporting standards (Chau & Gray, 2010), fostering

risk management, cost optimization, streamlined decision-making, and bolstered corporate credibility (Buallay, 2022). Reporting on environmental sustainability provides firms with a platform to showcase their commitment to global sustainable development (Ahmed, Asare & Musah, 2019; Henri et al., 2016).

However, as discussed in existing literature, the extent of reporting on environmental sustainability by firms is intricately linked to the corporate governance frameworks within these firms (Islam et al., 2022). The decision-making processes of corporate governance hold pivotal importance, as they unlock the genuine value of businesses irrespective of their industry or size.

Despite numerous studies on corporate governance and environmental sustainability, the findings of these studies remain mixed, inconclusive, and limited. Studies that distinctively address the mixed findings in prior empirical studies remain limited. Prior studies related to this did not unpack the different dimensions of sustainability (Kosgei, 2023; Nguyen et al., 2023). It is imperative to note that sustainability reporting has different dimensions, namely, environmental, social, and economic reporting and the effect of each onboard attribute may be different. In this paper, we argue that aggregating sustainability reporting into an index has led to oversimplifying a multi-dimensional construct. In this paper, we deviate from prior studies and unpack the various dimensions of sustainability reporting and focus on environmental sustainability reporting, in which SSA plays a critical role in the attainment of Sustainable Development Goals (SDG). The authors further contend that ownership structure plays a critical role in the relationship between board attributes and environmental sustainability. There are conceptual and theoretical bases to conjecture that ownership structure matters in the relationship between corporate governance and environmental sustainability. This is because the motivations of managers and board members to champion reporting on environmental sustainability are thought to hinge on the existing ownership structures of firms (Khan et al., 2020). These ownership structures determine the extent of control and authority stakeholders hold in business decision-making processes (Abdallah & Ismail, 2017). Consequently, the prevailing principal-agent dilemma within firms, rooted in agency theory, is notably intertwined with their ownership structures. This principal-agent theory varies across different firm ownership types, such as block holding, family, institutional, managerial, and governmental ownership. As a result, the apparent principal-agent challenge posited by the agency theory implies a possible influence on the role of ownership structure in the relationship between corporate governance and environmental sustainability reporting.

Therefore, this paper aims to examine the influence of different types of ownership structures on the relationship between board attributes and environmental sustainability. The focus of prior empirical studies related to this has mainly centered on corporate governance and financial outcomes at the expense of non-financial outcomes like environmental sustainability (Tkachenko et al., 2020; Dienes et al., 2016). Although environmental sustainability reporting is becoming more prevalent in the developed world, its practice and adoption are still extremely low in developing countries, especially among firms in SSA (Marquis & Qian, 2014). The corporate strategic planning of firms in SSA largely focuses on immediate financial performances, often overlooking the importance of environmental sustainability. The immaturity of the capital markets of the sub-region seems to be a contributory factor to this situation. Most studies on corporate governance and environmental sustainability are, therefore, largely within the context of businesses in Western and developed nations, such as the USA, Canada, the UK, and Australia (Tkachenko et al., 2020; Sassen & Fischer, 2016). The fact that the focus of these studies is on developed nations is unsurprising, as environmental sustainability reporting is mandatory for countries in the global north (Europe and North America), where capital markets are more developed.

Nonetheless, most of these studies largely investigated the role of board attributes in promoting environmental sustainability reporting without emphasis on the influence of the ownership structure of firms. This paper will, therefore, contribute to the extant literature on board attributes and environmental

sustainability reporting by providing comprehensive evidence on the influence of ownership structures on board attributes and environmental sustainability reporting relationship in the context of SSA.

Consequently, the paper seeks to address theoretical, conceptual, contextual, and methodological gaps in prior studies and significantly contribute to international environmental sustainability literature. To address the theoretical gap, the paper adopts an integrated theoretical approach as opposed to a single theoretical perspective, which is prevalent in prior studies related to board attributes and environmental sustainability. To fulfill the conceptual gap identified, the paper examines the influence of various ownership structures, such as concentrated ownership, institutional ownership, foreign ownership, and government ownership, on the relationship between corporate governance and environmental sustainability reporting. The contextual gap is addressed by examining environmental sustainability in SSA, where the environmental issue is of strategic importance to the international community, yet its reporting is limited. Methodologically, the paper adopts a dynamic system generalized method of moments, which is capable of addressing various forms of endogeneity, which has been a major issue in corporate governance studies.

The contribution of this paper is in multiple folds. It contributes to extant literature on board attributes and sustainability from an important region like SSA, where sustainability reporting is mainly voluntary compared to developed economies with statutory requirements for sustainability reporting. Therefore, is important to examine the influence of ownership structure on the link between board attributes and environmental sustainability. Second, board attributes and their relationship with financial and non-financial outcomes such as sustainability could exhibit reverse causality, and therefore, the application of pooled regression estimators may produce inconsistent results, leading to doubtful conclusions and policy implications. Therefore, the paper uses dynamic system generalized methods of moments to control for reverse causality and endogeneity, which have been major issues in sustainability reporting research. Third, the paper examines the influence of extensive ownership structures on the relationship between corporate governance and environmental sustainability. To the best of our knowledge, this is the first study that seeks to examine the influence of ownership structure on the relationship between board attributes and environmental sustainability in the unique setting of SSA. The paper attempts to fill the gaps by updating, extending, and explaining the influence of various ownership structures on the relationship between corporate governance and environmental sustainability.

The paper finds that block ownership structure does not influence board attributes and environmental sustainability reporting in SSA. Also, Government ownership structure influences board independence and environmental sustainability reporting. The paper further finds that foreign ownership structure influences the relationship between board gender diversity and environmental sustainability reporting. Generally, the paper finds that the relationship between board attributes and environmental sustainability reporting differs and is dependent on the type of ownership structure.
The rest of the paper is structured as follows. Section 2 presents the literature review whereas methodology is captured in section 3. The results of the study are also captured in section 4. The conclusion and implications are presented in Section 5.

1 LITERATURE REVIEW

1.1 Theoretical Perspective

The interrelationship between the corporate governance, ownership structure, and environmental sustainability reporting of firms is perceived in the extant literature to be firmly grounded in socioemotional theories. This component of the theoretical foundation concerns the socioemotional wealth theory (Marques *et al.*, 2014), which is gaining interest in understanding the sustainability reporting

of firms. The legitimacy theory underscores the significance of non-economic values as drivers of human behavior. This perspective stands in contrast to analyses that portray individuals as solely motivated by economic factors and suggest that those with authority and superior information may exploit others. The primary goal of the socioemotional wealth theory's development was to explain why some enterprises operate for reasons other than profit (Prencipe et al., 2014). For instance, Deephouse and Jaskiewicz (2013) consider the concept of socioemotional wealth in the emotive value acquired by a family from a firm in the context of family companies. Socioemotional wealth, as stressed by Lamb and Butler, (2016), is the intangible benefits that business owners derive from operating their companies. Fulfilling the need for belonging, affect, and intimacy; exercising authority and maintaining influence and control within the firm; carrying on family values through the firm; protecting family firm social capital and the family dynasty; fulfilling familial obligations; and being able to act altruistically to family members, while using firm resources, are all socioemotional goals (Lamb and Butler 2016).

1.2 The Influence of Ownership Structure on Board attributes and Environmental sustainability reporting.

1.2.1 Board Attributes, Ownership Concentration, and Environmental Sustainability Reporting

Agency theory suggests that when there is a small number of owners, firms may have more severe agency conflicts. There may be fewer agency conflicts between shareholders and management in closely held companies, especially those owned by families. Conflicts between the majority and minority shareholders are more likely to arise in such firms, and dominant shareholders may try to increase their wealth at the expense of minority shareholders (Musah et al., 2022). Furthermore, entrenchment theory correlates high levels of concentrated ownership with sub-par performance. High ownership concentration has a detrimental impact on underpricing, as measured by market-adjusted excess returns (Arora & Singh, 2022). By asserting themselves in the top management or as executive board members, controlling shareholders can affect board decision-making, corporate strategies, and, ultimately, sustainability reporting. This is supported by the fact that studies examining the correlation between corporate concentration and sustainability reporting have yielded contradictory findings. The impact of concentrated or block-holding ownership on sustainability reporting is favorable in some research (Dal Maso et al., 2018; Li Patel & Ramani, 2020). This research identified sustainability reporting as a means of adding value and offering the firm some degree of competitive edge in the industry, which can convert into higher profit (Dal Maso et al., 2018). The studies that found a negative correlation between concentrated or block-holding ownership and sustainability reporting (Elmagrhi Ntim & Elamer, 2019; Chen et al., 2021) concluded that businesses saw sustainability compliance as an added burden that reduced profitability. Furthermore, the existing governance research highlights the importance of board attributes in sustainability reporting (Odriozola & Baraibar-Diez, 2017; Bansal & Singh, 2022). These findings provide credence to the idea that concentrated or block-holding ownership may influence the association between board attributes and sustainability reporting. This paper, therefore hypothesizes that:

H_1: Concentrated ownership moderates the effect of board attributes on environmental sustainability.

H_{1a}: Concentrated ownership moderates the linkage between board size and environmental sustainability reporting.

H_{1b}: Concentrated ownership moderates the linkage between board independence and environmental sustainability reporting.

H_{1c}: Concentrated ownership moderates the linkage between board gender diversity and environmental sustainability reporting.

1.2.2 Board Attributes, Institutional Ownership, and Environmental Sustainability Reporting

From prior empirical literature, it is evident that the attributes of the board have a notable impact on sustainability reporting (Dienes et al., 2016; Katmon et al., 2019; Bansal & Singh, 2022). Independent board members, larger boards, and boards with diverse membership all exert a significant influence on sustainability reporting, as supported by the current body of literature (Dienes et al., 2016; Katmon et al., 2019). To what extent board composition affects sustainability reporting, however, is said to depend on the structure of individual business boards (Chau & Gray, 2010; Erin et al., 2016). Habbash, (2015) found that the significant and favorable effect of role duality on sustainability reporting was moderated by institutional ownership structure. Matta (2017) finds that the positive impact of board composition on environmental sustainability reporting is moderated by institutional ownership structure. Haider and Nishitani (2022) observe that stockholder groups and independent board directors can serve as incentives for management to produce reliable sustainability reports. This study's findings suggest that institutional ownership, board independence, and sustainability assurance collectively contribute to upholding managerial accountability toward external stakeholders. Based on the reviewed studies, this study hypothesizes that:

H_2: Institutional ownership moderates the effect of board attributes on environmental sustainability.

H_{2a}: Institutional ownership moderates the linkage between board size and environmental sustainability reporting.

H_{2b}: Institutional ownership moderates the linkage between board independence and environmental sustainability reporting.

H_{2c}: Institutional ownership moderates the linkage between gender diversity and environmental sustainability reporting.

1.2.3 Board attributes, foreign ownership, and environmental sustainability reporting

Several authors have found that the composition of boards significantly affects how businesses report on their sustainability efforts (Katmon et al., 2019; Bansal & Singh, 2022). Sustainability reporting is significantly affected by board independence, board size, and board diversity, according to the corporate governance literature (Katmon et al., 2019; Bansal and Singh 2022). The extent to which board composition affects sustainability reporting will be determined by the board's structure. For instance, in the current governance literature, foreign ownership is considered to promote a higher level of voluntary sustainability reporting (Dienes, Sassen & Fischer, 2016). This study therefore hypothesizes that:

H_3: Foreign ownership moderates the effect of board attributes on sustainability.

H_{3a}: Foreign ownership moderates the linkage between board size and environmental sustainability reporting.

H_{3b}: Foreign ownership moderates the linkage between board independence and environmental sustainability reporting.

H_{3c}: Foreign ownership moderates the linkage between gender diversity and environmental sustainability reporting.

1.1.4 Board attributes, government ownership, and environmental sustainability reporting

Companies' sustainability reports are said to be highly influenced by the makeup of their boards (Katmon et al., 2019; Bansal & Singh, 2022). Sustainability reporting is significantly affected by board independence, board size, and board diversity, according to the corporate governance literature (Katmon et al., 2019; Bansal & Singh, 2022). However, the extent to which board composition affects sustainability reporting is determined by the ownership structure. According to the existing literature, for example, government ownership structures promote more extensive sustainability reporting (Figueira et al., 2018). This is because many governments have a vested interest in maintaining a positive image among their foreign partners and are thus politically compelled to comply with international norms and rules. The study therefore hypothesizes that:

H_4: Government ownership moderates the effect of board attributes on environmental sustainability.

H_{4a}: Government ownership moderates the linkage between board size and environmental sustainability reporting.

H_{4b}: Government ownership moderates the linkage between board independence and environmental sustainability reporting.

H_{4c}: Government ownership moderates the linkage between board gender diversity and environmental sustainability reporting.

2 RESEARCH METHODOLOGY

2.1 Data Set and Source

The study population comprises all non-financial firms listed on the Stock Exchanges of sub-Saharan African countries as of 31 December 2021. With the focus of the study on six countries with the required data, the accessible population consisted of all non-financial firms listed on the Stock Exchanges of Nigeria; Ghana; Kenya; South Africa; Zimbabwe, and Mauritius as of 31 December 2021.

The paper uses panel data from the annual financial statements of the selected firms operating within the sub-Saharan African region. The inherent nature of the data gives rise to a panel data framework characterized by both time-series and cross-sectional dimensions. The final dataset used in this study was manually extracted from listed companies in Nigeria, Ghana, Kenya, South Africa, Zimbabwe, and Mauritius. The availability of the requisite data drove the selection of these countries and the years selected. The firms met three critical conditions before they were included in the sample. First, the firm should have issued a report and have all the required data from 2012-2021. Second, the firm should have been listed on the stock exchange from the selected countries. Third, the issued report should be written in English. Firms that did not meet the above criteria were excluded from the sample. Finally, 197 firms from the six selected countries were included in the study.

2.2 Model specification

Multiple periods across a multiplicity of firms characterized the paper. Thus, the paper relies on paneled data for the analysis. This form of data permits the modeling of variations in the behavior of different firms over time.
The general regression model defining the relationship between the independent variable, the assumed moderator, control variables (firm-specific characteristics), and the dependent is shown in Equation 1.

$$Y_{it} = \beta_0 + \sum_{n=1}^{k} \beta X_{it} + \sum_{n=1}^{k} \beta \lambda_{it} + \sum_{n=1}^{k} \beta \nu_{it} + \sum_{n=1}^{k} \beta \psi_{it} + \mu_{it} \quad \text{Equation (1)}$$

Where;

Y_{it}	=	Environmental sustainability Reporting of the *i*th firm at the time period t
β_0	=	Intercept
X_{it}	=	firm-specific characteristics of *i*th firm at the time period t
λ_{it}	=	board composition characteristics of *i*th firm at the time period t
ν_{it}	=	board structure characteristics of *i*th firm at the time period t
Ψ_{it}	=	Ownership structure of *i*th firm at the time period t
B	=	coefficient of the independent variables
μ_{it}	=	error or the disturbance term
n =1……k	=	from the first variable to the *kth* variable
$i = 1, 2, 3,, N$	=	firm index or the cross-sectional dimension
$t = 1, 2, 3, N$	=	times series dimension

The generalized moment method (GMM) estimation approach is used in this study. The data for the study satisfies the design criteria of a "small" T and big N panels (Phillips, 2019), as it comprises a substantial number of persons (N = 667 listed non-financial enterprises) and a limited number of periods (T = 10). The independent variables are not strictly exogenous as they correlate with previous and possible current errors. To address the fixed individual effect issues, a large number of individual-specific characteristics in the current data must be taken into account. In panel data, there are additional issues with heteroscedasticity and autocorrelation inside individuals but not across them; for this reason, a more reliable approach such as the GMM estimation method must be used. GMM is based on

$$E SUR_{it} = \delta SUR_{it-1} + \beta_1 CTRY_{it} + \beta_2 IND_{it} + \beta_3 FIRA_{it} + \beta_4 FSZ_{it} + \beta_5 PTBV_{it} + \beta_6 LEV_{it} + \beta_7 BODI_{it} + \beta_8 BOGD_{it} + \beta_9 BODS_{it} + \beta_{12} CSR_{it} + \beta_{13} BMET_{it} + \beta_{14} BGDV_{it} + \beta_{15} BLOW_{it} + \beta_{16} INSO_{it} + \beta_{17} GOVO_{it} + \beta_{18} FR_{it} + \beta_{19} MN_{it} + \beta_{20} FM_{it} + \sigma_i + \mu_{it} \quad \text{Equation (2)}$$

With a persistent dependent variable, the deduced original equation (2), or level, is thought to be a random walk model. First differences (FDs) are used as instruments in the level form expression of equation (2). The added lag dependence (SURit-1) in this equation is thought to correspond with the error term (μi) and the fixed effect (σi), which are the unobserved particular individual features. Individual-specific patterns of heteroskedasticity and serial correlation may be present in the idiosyncratic disturbances (those that are not related to the fixed effects) (Roodman, 2009). The first differencing GMM solves the correlation issue between the lag dependent and the fixed effect. Nevertheless, Equations 3, 4, 5, and 6 were created following the initial differentiation, taking into account the assessment of the moderation notion.

$$SUR_{it} - SUR_{it-1} = SUR_{it-1} - SUR_{it-2} + CTRY_{it} - CTRY_{it-1} + IND_{it} - IND_{it-1} + LEV_{it} - LEV_{it-1} + PTBV_{it} - PTBV_{it-1} + FSIZ_{it} - FSIZ_{it-1} + FIRA_{it} - FIRA_{it-1} + \mu_{it} - \mu_{it-1} \quad \text{Equation (3)}$$

$$SLIQ_{it} - SLIQ_{it-1} = SUR_{it-1} - SUR_{it-2} + CTRY_{it} - CTRY_{it-1} + IND_{it} - IND_{it-1} + LEV_{it} - LEV_{it-1} +$$
$$PTBV_{it} - PTBV_{it-1} + FSIZ_{it} - FSIZ_{it-1} + FIRA_{it} - FIRA_{it-1} + BODI_{it} - BODI_{it-1} + BOGD_{it} - BOGD_{it-1} \quad \text{Equation (4)}$$
$$+BODS_{it} - BODS_{it-1} + AUDI_{it} - AUDI_{it-1} + BRC_{it} - BRC_{it-1} + CSR_{it} - CSR_{it-1} + BMET_{it} - BMET_{it-1}$$
$$+BGDV_{it} - BGDV_{it-1} + \mu_{it} - \mu_{it-1}$$
$$SUR_{it} - SUR_{it-1} = SUR_{it-1} - SUR_{it-2} + CTRY_{it} - CTRY_{it-1} + IND_{it} - IND_{it-1} + LEV_{it} - LEV_{it-1} +$$
$$PTBV_{it} - PTBV_{it-1} + FSIZ_{it} - FSIZ_{it-1} + FIRA_{it} - FIRA_{it-1} + BODI_{it} - BODI_{it-1} + BOGD_{it} - BOGD_{it-1}$$
$$+BODS_{it} - BODS_{it-1} + AUDI_{it} - AUDI_{it-1} + BRC_{it} - BRC_{it-1} + CSR_{it} - CSR_{it-1} + BMET_{it} - BMET_{it-1}$$
$$+BGDV_{it} - BGDV_{it-1} + BLOW_{it} - BLOW_{it-1} + INSO_{it} - INSO_{it-1} + GOVO_{it} - GOVO_{it-1} \quad \text{Equation (5)}$$
$$+MN_{it} - MN_{it-1} + FM_{it} - FM_{it-1} + \mu_{it} - \mu_{it-1}$$
$$SUR_{it} - SUR_{it-1} = SUR_{it-1} - SUR_{it-2} + CTRY_{it} - CTRY_{it-1} + IND_{it} - IND_{it-1} + LEV_{it} - LEV_{it-1} +$$
$$PTBV_{it} - PTBV_{it-1} + FSIZ_{it} - FSIZ_{it-1} + FIRA_{it} - FIRA_{it-1} + BODI_{it} - BODI_{it-1} + BOGD_{it} - BOGD_{it-1}$$
$$+BODS_{it} - BODS_{it-1} + AUDI_{it} - AUDI_{it-1} + BRC_{it} - BRC_{it-1} + CSR_{it} - CSR_{it-1} + BMET_{it} - BMET_{it-1}$$
$$+BGDV_{it} - BGDV_{it-1} + BLOW_{it} - BLOW_{it-1} + INSO_{it} - INSO_{it-1} + GOVO_{it} - GOVO_{it-1} \quad \text{Equation (6)}$$
$$+MN_{it} - MN_{it-1} + FM_{it} - FM_{it-1} + Interactions(independent * Moderators) + \mu_{it} - \mu_{it-1}$$

The first differencing is achieved by transforming the original equation (2). Thus, equations (3, 4, 5, and 6) are expressed in FD form with levels as instruments. Hence, system GMM uses more instruments than FD GMM. The differencing eliminates the fixed effect (σ_i) as this component does not vary over time. In estimating, unlike the FD GMM, the system GMM uses both the differenced and the level equations. In the presence of heteroscedasticity and serial autocorrelation, the Windmeijer standard error option is used (Windmeijer, 2005). It is also essential to note that the usual system GMM estimator uses both the differenced and levels data. However, system GMM estimates can instead employ the levels data and forward orthogonal deviations if, and only if, the condition of the instrument in the theorem is satisfied (Phillips, 2019). Notwithstanding the elimination of the fixed effect, the lagged dependent variable is still potentially endogenous, because the lag dependent variable ($SLIQ_{it-1}$) in the equation (3 and 4) in the term $SLIQ_{it-1} = SLIQ_{it-1} - SLIQ_{it-2}$ could correlate with the μ_{it} in the term $\Delta \mu_{it} = \mu_{it} - \mu_{it-1}$. Similarly, the predetermined variables in the equation (3 and 4) that are not necessarily exogenous become potentially endogenous as they could also be related to μ_{it-+1}. Thus, longer lags of the regressors remain orthogonal to the error and available as instruments, in contrast to the mean-deviation transformation. (Arellano & Bover, 1995).

As an alternative to subtracting the preceding observation from the concurrent observations, it subtracts the means of all future available observations of a variable. This second transformation reduces data loss as it is computable for all observations, except the last for each individual, irrespective of the number of gaps. In forward orthogonal transformation, lagged observations do not enter the equation, but are rather validated as instruments. To ensure efficient and consistent estimators of system GMM, a series of GMM tests in dynamic data models is performed. Among these tests are the Arellano-Bond test of serial correlation; the Sargan/Hansen test of over-identification restrictions; and the differences in the Sargan/Hansen test of exogeneity (Roodman, 2009). The first serial correlation tests the appropriateness of the data for the dynamic model, whereas the second serial correlation tests the goodness of the lag dependent as an instrument. The Sargan/Hansen test of over-identification restrictions tests the validity of the instruments. The Sargan/Hansen test of exogeneity also tests whether the subsets of instruments used in the level's equations are exogenous. These steps are necessary to justify the adoption of the system GMM and the 2SLS estimation methods.

3 RESULTS AND DISCUSSION

3.1 Descriptive statistics

In this section of the study, descriptive statistics in the form of means and standard deviations on the various components of corporate governance, ownership structure, and environmental sustainability disclosure are presented.

3.1.1 Board Attributes

The descriptive statistics for board attribute variables such as board size, board independence, and board gender diversity, including mean values and standard deviations, are shown in Table 1.

Table 1 **Corporate governance characteristics**

Country	B size	Bfgd (%)	Bind (%)
Ghana	8.3±2.6	15.4±15.7	76.6±14.9
Kenya	9.4±3.1	16.5±12.4	77.6±11.6
Mauritius	10.1±2.1	6.7±7.7	79.1±10.9
Nigeria	9.0±2.8	13.1±12.3	69.5±13.7
South Africa	10.1±2.9	20.0±13.5	70.7±11.04
Zimbabwe	8.6±2.1	11.9±12.5	76.1±42.9
Total	**9.5±2.8**	**16.0±13.4**	**72.3±18.2**

Note: Results are means/averages plus or minus standard deviations.
Variables: Board Size (BSize), Board Female Gender Diversity (BFGD), Board Independence (Bind)

(*Source*: Extracted from Blay, 2024)

Table 1 shows that the average board size of listed SSA firms between 2012 and 2021 was 9.5±2.8 members. The board size of 10 Mauritian and South African listed businesses was slightly above the sub-region average. Ghana's board size of 8.3 was the smallest of the countries. Notwithstanding the enormous variations in the recommended effective board size of listed businesses, the average board size of approximately 10 members in the listed sub-Saharan African businesses is in line with SEC's recommended size of between 8 and 16 members and with the Cadbury Committee's suggested ideal board size of 8 to 10 members (Cadbury Report, 1992). It can, therefore, be concluded that listed sub-Saharan African businesses have board sizes that are sufficient for effective functioning.

The mean board female gender diversity (BFGD) in SSA was 16%. South Africa's board female gender diversity of 20% was above the region's average; whereas the 15% in Ghana, 16.5% in Kenya, and 13.1% in Nigeria were below the sub-region average. The board female gender diversity of 6.7% in Mauritius was the lowest of the SSA countries studied. The mean female gender diversity on the boards of the sub-Saharan African firms, of 16%, is an indication that there is limited representation of females on the boards of listed sub-Saharan African firms. Thus, the female gender diversity of the boards does not meet the legislative requirement of 40%, as in many European countries like Norway; Belgium; Italy; Denmark; Greece; France; Spain; the Netherlands; Finland, and Slovenia (Garcia-Solarte et al., 2018; Usman, Farooq *et al.*, 2019).

With 79% board independence (Bind), Mauritian listed businesses have the highest board independence, compared to Nigerian listed businesses with 69.5% board independence. The percentage of board ownership of the listed SSA businesses was 11.5% between 2012 and 2021. The listed sub-Saharan

African businesses have a high level of board independence, of 72%, which implies that more than half of the board members of the listed companies are independent directors. This level of independence on the boards is consistent with the recommendations of the European market of board independence standards for either half or the majority, of independent directors (Bansal & Singh, 2022).

3.1.2 Ownership structure of listed firms

This section of the study describes the ownership structure of the listed businesses in sub-Saharan Africa. The ownership structure variables that were considered were block ownership (Blkown); block institutional ownership (Blkinsown); block government ownership (Blkgovown); and block foreign ownership (Blkforown). The descriptive statistics of these variables, in the form of mean values and standard deviations, are presented in Table 2.

Table 2 **Ownership structure**

Country	Blkown (%)	Blkinsown (%)	Blkgovown (%)	Blkforown (1,0)
Ghana	74.5±9.8	65.2±24.6	9.7±20.6	0.4±.4
Kenya	69.3±16.2	65.5±19.1	10.2±20.5	0.3±.4
Mauritius	58.7±16.7	57.7±18.1	0.7±1.9	
Nigeria	55.8±21.5	48.9±26.3	0.5±2.1	0.5±.5
South Africa	46.0±22.5	43.9±25.5	5.8±8.7	0.1±.2
Zimbabwe	71.4±14.3	71.2±14.4	5.9±13.4	0.2±.4
Total	**55.1±22.6**	**51.67±25.7**	**4.6±10.7**	**.21±.4**

Note: Results are means/averages plus or minus standard deviations
Variables: Block Ownership (Blkown), Block Institutional Ownership (BlkInsown), Block Government Ownership (Blkgovown), Block Foreign Ownership (Blkforown);

(*Source*: Extracted from Blay, 2024)

Table 2 shows that Ghana and Zimbabwe, with block ownership (Blkown) percentages of 74.5 and 71.4, respectively, have listed businesses that are, comparatively, more characterized by block ownership. The countries with listed businesses that are more institutional in ownership were Zimbabwe (71.2%); Ghana (65.2%) and Kenya (65.5%). It is, therefore, obvious that the ownership of the listed businesses of Zimbabwe, Ghana, and Kenya is characteristically institutional. The extent of government and foreign ownership of the listed SSA businesses was very limited in the study period of 2012 to 2021.

The ownership structure of the listed sub-Saharan African businesses was largely blocking ownership, and the largest block was owned by institutions. The countries with the highest level of institutional block ownership business structures were Zimbabwe, Kenya, and Ghana. From the minimal level of foreign ownership in sub-Saharan African businesses, it can be inferred that the institutions investing in many sub-Saharan businesses are local or indigenous. The growing prevalence of institutional ownership within the ownership structures of numerous businesses in sub-Saharan Africa is attributed to the efficacy of their monitoring function (Sakawa & Watanabel, 2020). Institutional owners can supervise and monitor the firms in which they have ownership. Their monitoring activities can be efficiently performed because they have financial incentives due to their stakes in these companies (Jiang & Liu, 2021; Moradi et al., 2022) Furthermore, institutional shareholders are likely to possess industry-specific knowledge surpassing that of smaller shareholders, leading to cost-effective and efficient monitoring (Baghdadi et al., 2018; Li et al., 2022). As a result, it is claimed that institutional shareholders aid in building sustainable corporate

governance procedures and in improving sustainable business performance in a stakeholder-oriented system (Sakawa & Watanabel, 2020).

3.1.3 Environmental Sustainability Reporting

This section of the study describes the environmental sustainability reporting practices of the listed businesses in sub-Saharan Africa. The mean values and standard deviations of environmental sustainability disclosure (envdisclos) have been presented in Table 3.

Table 3 **Environmental Sustainability Reporting**

Country	**envdis~s**
Ghana	3.0±10.4
Kenya	18.9±21.5
Mauritius	26.0±27.7
Nigeria	6.8±16.8
South Africa	39.1±23.6
Zimbabwe	17.6±25.6
Total	**24.3±26.2**

Note: Results are means/averages, plus or minus standard deviations

(Source: Extracted Blay, 2024)

Table 3 shows that listed firms in Ghana and Nigeria do not have environmental sustainability governance committees. Listed businesses with environmental sustainability committees are more prevalent in South Africa. It is, therefore, obvious that environmental sustainability disclosure among SSA businesses was very limited. The level of environmental sustainability disclosure practices was comparatively higher in Mauritius and South Africa relative to Ghana and Nigeria. Generally, environmental sustainability disclosure practices among the listed SSA businesses were (24.3%).

Notwithstanding the generally low level of environmental disclosure or reporting among listed businesses in sub-Saharan Africa, Mauritius and South Africa have the highest percentage of environmental sustainability disclosure. The high level of environmental sustainability reporting in these countries could be attributed to the mandatory measures instituted in these countries. For instance, the higher environmental sustainability disclosure of South African listed firms could be attributed to the instituted mandatory reporting measures in the form of the King Reports on Corporate Governance and the B-BEE legislation in the country (Wachira & Berndt, 2019). Although all the sub-Saharan African countries considered in this study have some form of regulation that both explicitly and implicitly encourages the issue of environmental sustainability disclosures, there are variations in the application of the regulations (Wachira & Mathuva, 2022). There is evidence of a high level of mandatory environmental sustainability reporting demands in South Africa and Mauritius, relative to the other countries (Wachira & Mathuva, 2019). The inter-correlation between the study's numerous variables is also examined but for the sake of brevity, they are not discussed and are available upon request.

3.2 Regression Results

The results of the Arellano-Bond dynamic panel-data estimation two-step system GMM are presented in Table 4. The hierarchical regression modeling method, involving three models, was utilized in testing the moderation concept.

Table 4 **Governance, ownership, and environmental sustainability disclosure**

Envdisclos	**Model 1**	**Model 2**	**Model 3**
Constant	-11.162(4.339)**	-6.423(4.826)	2.900(13.33)
Envdisclos (L1.)	1.334(.080)***	1.335(.077)***	1.354(.093)***
Mbv	-.001(.001)	-.001(.001)	-.001(.001)
Dta	-.002(.000)***	-.002(.000)***	-.002(.000)***
Bsize	-.207(.221)	-.246(.221)	-.010(.453)
Bfgd	.197(.047)***	.197(.046)***	.215(.122)
Bind	.025(.009)***	.026(.009)***	-.041(.089)
Blkown		.015(.092)	.378(.404)
Blkinsown		-.101(.093)	-.894(.373)**
Blkgovown		.046(.117)	.440(.169)**
Blkforown		-.988(2.758)	.461(.467)
blkown×bsize			-.043(.025)
blkown×bfgd			-.003(.007)
blkown×bind			.002(.002)
blkinsown×bsize			.043(.026)
blkinsown×bfgd			.005(.007)
blkinsown×bind			-.002(.002)
blkgovown×bsize			.003(.014)
blkgovown×bfgd			-.002(.004)
blkgovown×bind			-.013(.004)***
blkforown×bsize			.034(.464)
blkforown×bfgd			-.321(.122)***
blkforown×bind			-.050(.101)
Specification tests			
AR(2) in first differences	0.902	0.901	0.885
H-test of overid. Rest	0.927	0.911	0.900

Note: Standard Errors in the Parentheses, *** and ** denotes significance at 1%(0.001) and 5%(0.05) respectively.
Control variables: Market-to-Book Value (Mbv) and Debt-to-Asset Ratio (Dta); **Independent Variables**: Board Size (BSize), Board Female Gender Diversity (BFGD), Board Independence (Bind), **Moderating Variables**: Block Ownership (Blkown), Block Institutional Ownership (Blkinsown), Block Government Ownership (Blkgovown), Block Foreign Ownership (Blkforown); **Dependent Variable**: Environmental Sustainability Disclosure (Envdisclos).

(*Source*: Extracted from Blay, 2024)

3.2.1 Block Ownership as a moderator in the corporate governance and environmental sustainability disclosure relationship

Model 3 of Table 4.4 shows that block ownership (blkown) did not influence the relationship between corporate governance variables in predicting the environmental sustainability disclosure of the listed SSA firms. This is because all the coefficients of interaction terms of block ownership and corporate

governance characteristics were statistically insignificant. This implies the influence of board characteristics (gender diversity, independence, size, and ownership). Thus, the hypothesis (H_1) that a block-holding ownership structure moderates the relationship between board composition and sustainability reporting was not supported. This implies that in SSA the relationship between board composition and environmental sustainability reporting is dependent on the block-holding ownership structure of the listed firms. As a result, the hypothesis conjecturing that the block-holding ownership structure moderates the connection between board structure (H1) and environmental sustainability reporting did not find substantial empirical support.

3.2.2 Institutional block ownership as a moderator in the corporate governance and environmental sustainability disclosure relationship

Except for remuneration committee independence (RCInd), the influence of all other characteristics of the remuneration committee on the environmental sustainability disclosure of the listed SSA businesses was not significantly moderated by institutional ownership (BLKInsOwn). However, the effect of remuneration committee independence (RCInd) on environmental sustainability disclosure was negatively and significantly moderated by the type of block institutional ownership (BLKInsOwn) of the businesses. This finding, therefore, supports the hypothesis (H2b) that institutional ownership moderates the linkage between board independence and sustainability reporting. This finding is supported by several studies in the extant literature that reported a significant moderating role of institutional ownership in the linkage between board composition and environmental sustainability reporting (Matta, 2017; Masud, Nurunnabi & Bae, 2018). Scholars have proposed that different categories of stockholders and independent members of the board can motivate managerial teams to produce credible sustainability reports, to uphold managerial responsibility towards external stakeholders. This highlights the interconnectedness among institutional ownership, board autonomy, and sustainability verification, as suggested by Haider and Nishitani (2022).

3.2.3 Foreign block ownership as a moderator in the board attributes and environmental Sustainability relationship

Model 3 of Table 4.4 shows that the relationship between various characteristics of the board of the listed SSA businesses in the form of board size (BSize), board independence (Bind), and the environmental sustainability disclosure of the businesses, was not significantly moderated by foreign block ownership (BLKForOwn). These findings suggest that the hypotheses that foreign ownership moderates the linkage between board size and sustainability reporting (H_{3a}) and that foreign ownership moderates the linkage between board independence and sustainability reporting (H_{3b}), were not supported. However, the relationship between female gender board diversity (BFGD) and the environmental sustainability disclosure of the businesses(H_{3c}) was negatively and significantly moderated by foreign block ownership (BLKForOwn) (β=-.321, P<.01). This finding, therefore, that foreign ownership moderates the linkage between gender diversity and sustainability reporting. This implies that the impact of female gender board diversity on environmental sustainability disclosure would be less with more foreign block holding, and more with less foreign block holding. When the acquired foreign block holding is of relatively short- or medium-term, this condition of reduced, or a negative influence of foreign ownership on environmental sustainability disclosure is likely to occur (Abu Qudan & Suwaidan, 2019; Saini & Singhania, 2019; Sharma et al., 2020).

3.2.4 Government ownership as a moderator in the corporate governance and environmental sustainability disclosure relationship

From Model 3 of Table 4.4, no evidence is obtained to prove that the relationship between board size (BSize), board female gender diversity (BFGD), and environmental sustainability disclosure is significantly moderated by government block ownership (BLKGovOwn). This implies that government block ownership did not significantly moderate the effect of board size, and board female gender diversity on the environmental sustainability disclosure of the SSA businesses. Therefore, the study's findings do not support the hypothesis that government block ownership moderates the link between board size and sustainability reporting (H4a); nor do they support the hypothesis that government block ownership moderates the link between board gender diversity and sustainability reporting (H4c).

However, the significant effect of the independence of the board (Bind) on the environmental sustainability disclosure of the SSA businesses was negatively moderated by government block ownership (β=-.013, P<.01). This implies that, with more government block holding, the impact of board independence on environmental sustainability disclosure would be lower; whereas with less government block holding, the impact of board independence on environmental sustainability disclosure would be higher. This finding supports the hypothesis (H_{4b}) that government block ownership moderates the linkage between board independence and sustainability reporting. This is likely to happen in a business environment where the impact of government block holding on environmental sustainability is negative (Saini & Singhania, 2019; Sharma et al., 2020).

CONCLUSIONS AND IMPLICATIONS

Despite global interest in environmental sustainability, its reporting in SSA appears to be limited. Demonstrated effort in research as to why environmental reporting in SSA is limited is also limited and few examine the relationship between corporate governance and sustainability. Although theoretical and conceptual propositions predict that ownership structure could influence the relationship between corporate governance and sustainability, empirical evidence on the moderating effect of ownership structure and environmental sustainability reporting in SSA is discernably lacking. Therefore, this paper seeks to examine the influence of various ownership structures on the relationship between corporate governance and environmental sustainability,

Using the GMM estimator, the paper finds that block ownership structure does not moderate corporate governance characteristics and environmental sustainability reporting in SSA. Also, Government-owned firms moderate board independence, audit committee size, independence, and environmental sustainability reporting. The paper further finds that foreign ownership structure influences the relationship between board gender diversity, remuneration committee size, and environmental sustainability reporting. Generally, the paper finds that the relationship between corporate governance characteristics and environmental sustainability reporting differs and is dependent on the type of ownership structure.

The paper can fill the contextual, theoretical, and methodological gaps in the extant literature on the influence of various ownership structures on the relationship between corporate governance characteristics and environmental sustainability. SSA differs in terms of political, institutional, and ownership structures, all of which influence the relationship between corporate governance and environmental sustainability. Based on the findings of this paper, empirical evidence is obtained to conclude that in SSA, institutional and foreign ownership structures moderate the remuneration committee characteristics and environmental sustainability. The paper fills the vacuum in the extent of literature on the adoption of GMM which is considered to be robust to examine corporate governance and environmental sustainability.

The findings of the paper have important ramifications for practitioners, policymakers, and regulatory institutions. The paper highlights the skewed emphasis on corporate governance and environmental sustainability by drawing the attention of policymakers and practitioners that the influence of certain board structures on environmental sustainability is dependent on the type of ownership structure. The findings suggesting that some ownership structures moderate the relationship between some corporate governance characteristics and environmental sustainability has implications for proactive engagement from policymakers, including environmental ministries and regulatory bodies. Developing robust and effective regulatory and law enforcement frameworks for SSA is crucial to elevate the standard of environmental sustainability reporting. Furthermore, governments in the SSA can leverage tax exemption policies as a mechanism to incentivize and encourage environmental sustainability reporting.
With some ownership structure empirically proven in this paper to moderate the effect of some corporate governance characteristics on environmental sustainability reporting, strategies must be implemented to establish the appropriate ownership structure to stimulate higher levels of sustainability reporting.

The paper has some limitations that ought to be acknowledged. The paper relies on secondary data from some selected firms in SSA. Future studies could adopt primary data through interviews and this could add other perspectives to the influence of ownership structure on corporate governance and environmental sustainability. The sample for the study was mainly listed firms in selected SSA which could affect the generalization of findings to non-listed firms. Studies specifically targeting non-listed firms in this area could be the focus of future studies.

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This study did not require research ethics approval.

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