

# Corporate Governance and Environmental Sustainability Reporting: The Nigerian Perspective.

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**Abstract:** Environmental Sustainability reporting enhances the quality of financial reporting by revealing the corporate investments in the care of the environment. As a result of the deficiency of traditional financial reporting in information disclosure to stakeholders on the impact of negative externality resulting from company operations, the need for environmental sustainability reporting has become a global phenomenon. This study explored the effect of corporate governance dimensions of board size, board independence, chief executive officer (CEO) duality, female directorship and board ownership on environmental sustainability reporting.

The study adopted *ex-post facto* research design. The population of the study comprised 169 quoted companies on the Nigerian Stock Exchange (NSE) as at December 31, 2018. Samples of 42 quoted companies were selected through stratified and purposive sampling techniques for the period of 10years (2010-2019). Data were sourced from published audited annual report and accounts of the sample companies. Data were analyzed using descriptive and inferential statistics.

The findings revealed that corporate governance (CG) had positive and significant effect on environmental sustainability reporting (ENSR) of selected quoted companies in Nigeria ( $Adj R^2 = 0.178$ , Wald-Stat = 80.23,  $p < 0.05$ ). Board size, board independence and female director have positive and significant effect on ENSR (BS = 0.141, t-test = 6.176,  $p < 0.05$ , BI = 0.120, t-test = 2.955,  $p < 0.05$ , FD = 0.133, t-test = 4.965,  $p < 0.05$ ). However, CEO duality has positive and insignificant effect on ENSR while board ownership has negative and insignificant effect on ENSR (CD = 0.046, t-test= 1.800,  $p > 0.05$  and BO = -0.001, t-test= -0.453,  $p > 0.05$ ).

The study concluded that corporate governance has a significant effect on environmental sustainability reporting in quoted companies in Nigeria. The shareholders should include more female and independent directors on board, as a greater proportion of female directors will boost environmental sustainability reporting. Also, consideration for board membership should not be based on share ownership and the role of chairman and CEO should be separated.

**Keywords:** Board Ownership, Board Independence, Board Size, CEO duality, Environmental Sustainability Reporting, Female Directors, Resource Dependency Theory.

## Introduction

Environmental sustainability practices enhance the focus of firms on environmental protection, preservation and improvement of natural resources for the benefit of next generation (Kocmanova, Hrebicek & Docekalova, 2011). The emergence of Global Reporting Initiative (GRI) in 1997 was in response to the public outcry resulting from environmental damage caused by Exxon Valdez oil spill. According to Scaltegger and Burritt (2010), the awareness of sustainability reporting emanated from the aftermath of environmental disasters and market turmoil that put pressure on organizations to include environmental issues in annual reports.

Reporting in business commenced in the form of issuance of financial report. Historically, the focus of corporate reporting was mainly about providing information on the financial performance to the investors (Clayton, Rogerson & Rampedi, 2015). According to Deegan (2002) environmental reporting provides information related to the environmental implication of the organization's processes.

Environmental disclosure broadens the responsibility of the firms beyond the conventional role of reporting financial information (Gray, Owen & Maunders, 1987).

However, financial reporting did not address the information needs of the diverse stakeholders of the company. This has led to the growing agitation by stakeholders demanding for non-financial information to be reported along with the reporting of financial information (Ecclez & Krzuz, 2010).

Specifically, stakeholders expect transparency in the way organizations utilize environment, the welfare of employees and the well-being of communities (White, 2009). According to the account of Buhr (2007), in the 1970s, organizations placed emphasis on social responsibility whereby communities and employees' interest were paramount. By the late 1980s to early 1990s, there was a shift from social responsibility to environmental accountability reporting (Buhr, 2007; Larrinaga & Gonzalez, 2007). Many big corporations that have contributed to the economic expansion around the world have been criticized as a result of the negative impacts of their expansion on the environment thereby leading to social upheavals, pollution and resource depletion (Reverte, 2009).

According to Rao, Tilt and Lester (2012), firms around the world have started responding to this criticism by demonstrating accountability in disclosing the consequences of their activities on the environmental spheres of the society. Though, sustainability was initially directed at environmental aspect but there is need for more organizations to embrace it so as address the widening social and ethical issues leading to community-firm crisis (Kolk, 2008). Voluntary disclosure of the peculiarities in the business environment assists an organization in deriving maximum benefit from the world economy. This is due to the fact that responsibility for accountability is not limited to the shareholders but to the wider spectrum of stakeholders.

Becker (2012) identified three major characteristics of sustainability: continuance, orientation and relationship. Continuance has to do with the ability of humans to maintain systems, orientation means that sustainability should be goal driven and relationship means ability of human being to develop systems to preserve organizations for today and the future. From this definition, it is clear that there is a link between a well-developed corporate governance system and sustainability reporting (Buallay & Al-Ajmi, 2019). Ghazali (2010) posited that the adoption of best corporate governance practices will ultimately enhance the achievement of long-term corporate objectives. Since environmental sustainability reporting, this study examines the impact of corporate governance on environmental sustainability reporting in selected quoted companies in Nigeria. The hypothesis of the study is, corporate governance has no significant effect on environmental sustainability reporting in Nigeria.

### **Literature Review.**

Environmental sustainability reporting can be defined as a critical means of promoting transparency in the communication of information to stakeholders about organizations' strategy with respect to the preservation of natural environment (Comyns, 2016; Perrault & Clark, 2016). It is an important tool for gaining competitive advantage, enhance better economic performance, strengthen the organization's legitimacy and reputation (De Villiers, Naiker & Staden, 2011).

Global Reporting Initiatives (2011) also defined environmental sustainability reporting as a dimension of sustainability reporting that concerns with the impact of organizations on living and non-living natural systems such as ecosystems, land, air and water. According to GRI, there are twelve (12) sub-divisions for environmental performance indicators: materials, energy, water, biodiversity, emissions, waste management, products and services, compliance, transport, overall expenditure on environmental protection, supplier environmental assessment and environmental grievance mechanism.

Also, Ofoegbu and Megbuluba (2016), concluded that firm size influences the quality of corporate environmental reporting disclosure. Therefore, environmental sustainability reporting is the communication of information about corporate responsibility in caring and nurturing the environment by adhering strictly to regulatory requirements and investing in environmental preservation.

Several studies investigated the impact of corporate governance on environmental sustainability reporting from different parts of the world. Umukoro, Uwuigbe, Adegboyega, Ajetunmobi and Nwaze (2019) examined the impact of board expertise on sustainability in Nigerian banks. The study concluded that there is no significant relationship between board expertise (level of experience of the board on environmental issues) on environmental sustainability reporting. However, Otuya, Akporien and Ofeimum (2019) investigated the influence of corporate governance process on sustainability reporting in the oil and gas companies in Nigeria. The finding of the study reveals that board expertise i.e., board activity and board globalizing are positively and insignificantly related to sustainability reporting.

Rao, Tilt and Lester (2012) evaluated the effect of environmental reporting on corporate governance in firms listed on Karachi Stock Exchange in Pakistan. The study reveals that there is a relationship between environmental reporting and proportion of independent directors and female directors on board. However, Aliyu (2018) evaluated the influence of board expertise on corporate environmental reporting in non-financial listed firms in Nigeria. The study concluded there is no significant relationship between corporate governance and corporate environmental reporting. Though, board independence has positive and significant relationship with

corporate environmental reporting while there is no significant relationship between board size and corporate environmental reporting.

Chang and Zhang (2015) examined the effect of corporate ownership on environmental information disclosure. The study concluded that institutional ownership and ownership concentration have significant effect on voluntary environmental information disclosure. However, Masud, Nurunnabi, and Bae (2018) studied the influence of corporate governance on environmental sustainability performance (ESRP). The study found that there is no association between ESRP and family ownership.

Villier, Naiker and Staden (2011) in their study of the effect of environmental performance on board expertise found that there is a positive relationship between environmental performance and board independence. Though, environmental performance is insignificantly related to CEO duality. However, Haladu and Bt Salim (2016) investigated the effect of board characteristics on sustainability reporting with environmental agencies as the moderating factor. The finding reveals that there is a negative and significant relationship between environmental disclosure and the environmental expertise of board members.

King' Ori, Naibei, Sang and Kipkosgei (2019) investigated the relationship between environmental sustainability disclosures and board characteristics in Kenya. The study reveals that board independence has positive and insignificant effect on environmental sustainability disclosures. Furthermore, Odoemelam and Okafor (2018) investigated the influence of corporate governance on environmental disclosures of non-financial listed firms in Nigeria. The finding reveals that board independence and environmental committee were statistically significant in relations to environmental disclosures while board size is statistically insignificant. Also, Naseer and Rashid (2018) analyzed the relationship between corporate governance and environmental reporting in Pakistan. The study concluded that higher proportion of independent directors, board size, CEO duality and board ownership are associated with quality of environmental reporting.

Ofoegbu and Megbuluba (2016) examined the impact of firm size on corporate environmental accounting information disclosure. The finding revealed that firm size positively influences the quality of corporate environmental disclosure. Furthermore, Umukoro, Uwuigbe, Adegboyega, Ajetunmobi and Nwaze (2019) examined the impact of board expertise on sustainability in Nigerian banks. The study concluded that there is no significant relationship between board expertise and environmental sustainability reporting. The study revealed that board members do not have expertise on environmental sustainability reporting. Also, Rubino and Napoli (2020) investigated the impact of corporate governance on corporate environmental reporting in listed Italian firms and found that large board size has a positive effect on corporate environmental performance.

### **Resource Dependency Theory (RDT)**

Resource dependency theory was propounded by Pfeffer and Salancik (1978). The theory emanated from their publications known as, "The External control of organizations: A resource dependence perspective". The theory posits that organization depends on resources that originate from its environment and that organizations' behaviour is shaped by external resources required such as raw material. According to the theorists, the directors perform their function through the use of their skills and experience that connect external stakeholders such as social groups, suppliers, customers and policy makers (Inua & Emeni, 2019).

The theory was structured and reviewed around the five perspectives that Pfeffer and Salancik propose firms can formulate to minimize their dependence on the external environment and they are mergers/vertical integration, joint ventures and other interorganizational relationships, boards of directors, political action, and executive succession (Hillman, Withers & Collins, 2009). The one of interest to this work is the perspective of how board size affects the performance of a firm.

In the opinion of the resource dependency theorists, a firm is viewed as an open system that depends on the environment for all resources required to operate (Whijetlake, Ekanayake & Perera, 2015). However, overdependence on the environment for resources can hamper the operations of the organization (Mudiyanselage, *et al*, 2018) and also reduce organizational autonomy which can lead to uncertainty in the future of the organization (Rivas, 2012). The board as an important resource can assist an organization in minimizing the damage that may be caused by environmental dependence (Rivas, 2012; Whijetlake, *et al*, 2015). The theory suggests that corporate governance through the board of directors is an important link between the firm and resources required to be sustainable. The resources are man, material, machine and money which can be further classified into financial and non-financial resources.

Several studies support the notion that board size influences the firm performance since board is regarded in this theory as an intangible resource that assists an organization in mitigating the hazard of environmental dependence. Sanders and Carpenter (2017) supported the view that board size is related to a firm's level of internationalization, thereby reducing environmental dependence. The meta-analyses by Dalton, Daily, Johnson, and Ellstrand (1999), also found a positive relationship between board size and firm financial performance.

Clegg and Rura-Polley (1998) criticized Resource Dependency theory in that it was wrongly situated on too narrow concept of power over controlling resources objectively but ignores the social perspective to the control of resources. Pearce and Zahra (1992) also criticized the theory on the basis that the size and the composition of the board are not contingent only on the external environment but also on the strategic direction of the organization and its prior financial performance. RDT is the theoretical framework for this study because the theory rests on the assumption that organization depends on resources that originate from its environment and that organizations' behaviour is shaped by external resources. To this extent, environmental sustainability reporting is critical for resource acquisition by the firm.

### 3. Methodology

#### 3.1 Sample selection

169 firms were listed on the Nigerian Stock Exchange as at 31 December, 2018 out of which 42 firms were selected as the sample for period of 2010 to 2019. The period chosen is between the world economic meltdown of 2009 and Covid-19 pandemic of 2020. The Nigerian Stock Exchange categorized listed firms into 11 sectors of the economy as indicated in table 1 below. Stratified and purposive sampling techniques were used in selecting the sample. The rationale for the selection of the 42 companies is based on the following; first, the selected companies must have been listed for about 10 years or more, that is from 2010-2019. Second, the selected listed firms must have up-to date records, that is; they must have been publishing annual financial reports for the period. Third, the company must have been reporting components of social sustainability reporting in the financial statement or standalone sustainability report for the period. Content analysis was done to extract data from the financial report of the sampled companies. The sample size is indicated in Table 1:

**Table 1: Distribution of the Sample**

S/N	Sectors	Listed Firms	Sampled Firms	% Of Sampled Firms Per Sector
1	Agriculture	5	3	60
2	Conglomerate	6	-	0
3	Construction/Real Estate	8	1	13
4	Financial Services	57	10	18
5	Health Care	10	3	30
6	ICT	7	2	29
7	Industrial Goods	14	4	14
8	Natural Resources	4	2	50
9	Oil and Gas	12	9	75
10	Services	25	1	4
11	Consumer Goods	21	7	33
	Total	169	42	25

Source: Nigerian Stock Exchange and authors' computation

#### 3.2 Model Specification and measurement of variables

The model for the study is stated below:

$$ENSR_{it} = \beta_0 + \beta_1 BS_{it} + \beta_2 BI_{it} + \beta_3 CD_{it} + \beta_4 FD_{it} + \beta_5 BO_{it} + U_{it}$$

Environmental sustainability reporting (ENSR) is measured by the aggregate score of the arithmetic mean for each indicator under environmental category in accordance with GRI-4. The performance indicators as disclosed in the Global Reporting Initiative (GRI-4) disclosure guidelines is developed into a checklist with which the actual disclosure in the annual reports of the sampled firms will be compared (Mahmood, *et al.*, 2018). The approach used by Nazari, Herremans and Warsame (2015) was adopted for this study. The parameters of environmental sustainability reporting are twelve (12) and the score ranges from 0-1 depending on the level of disclosure. This method ensures equality in the weight irrespective of the number of indicators in each category. Board size (BS) is measured by the number of directors on board ( Shamil, *et al.*, 2014; Aliyu, 2018), Board Independence (BI) is measured by the proportion of independent directors to total number of directors (Mudiyanselage, *et al.*, 2018), CEO duality (CD) is denoted as “0” if the chairman’s role and Chief Executive Officers’ are performed by one person otherwise “1” (Liao, *et al.*, 2015), Female director (FD) is measured by the number of female directors to total number of directors , board ownership (BO) is measured by the percentage of shares owned by directors (Wijethilake, 2015).

### Descriptive Statistics

The study consists of annual data for the period 2010-2019 for forty-two listed companies on the Nigerian Stock Exchange (NSE). The descriptive statistics presented in table 1 below are the mean, median, maximum, minimum and standard deviations and the numbers of observations for each of the dependent and independent variables. The dependent variable is Environmental Sustainability Reporting (ENSR). The independent variables are Board Size (BS), Board Independence (BI), CEO Duality (CD), Female Director (FD), and Board Ownership (BO).

**Table 2: Descriptive Statistics of Corporate Governance and Environmental Sustainability Reporting**

Variables	Mean	Median	Maximum	Minimum	Std. Dev.	Obs
ENSR	0.065	0.000	0.667	0.000	0.121	420
BS	10.711	10.000	20.000	4.000	3.496	420
BI	0.208	0.212	0.556	0.067	0.101	420
CD	0.986	1.000	1.000	0.000	0.119	420
FD	0.115	0.103	0.500	0.000	0.114	420
BO	11.217	0.295	85.440	0.000	21.963	420

**Source: Researcher’s Study, 2021**

**Notes:** Table 2 shows the mean, median, maximum, minimum, standard deviation of the variables. The dependent variable is Environmental Sustainability Reporting (ENSR). The independent variables are Board Size (BS), Board Independence (BI), CEO Duality (CD), Female Director (FD), Board Ownership (BO). All the values were calculated from the 420 companies-year observations for forty-two listed companies in Nigeria. The estimation process was facilitated using E-views 10.

### Interpretation

**Environmental Sustainability Reporting (ENSR):** The mean value is 0.065, and the standard deviation is 0.121. The mean value of 6.5% means that averagely, the sampled firms report environmental sustainability practices to the tune of about 6.5% in accordance with the GRI-4 guidelines. The value is very low, which means that the environmental sustainability reporting practice of quoted companies in Nigeria is below average. The standard deviation of 12.1% shows that the level of divergence in reporting environmental sustainability is relatively low among quoted companies. The minimum value of 0 (zero) and maximum value of 0.667 connotes that some quoted companies in Nigeria ignore the reporting of environmental sustainability practices while the level of reporting environmental sustainability practices is high in other companies.

**Board Size (BS):** The mean is 10.711, and the standard deviation is 3.496. The mean of 1071% indicates that there's great variation of board size of the sampled companies. This is supported with the minimum value of 4 and a maximum value of 20. The standard deviation of 349.6% indicates that there's relatively high variation in the board size of the sampled companies.

**Board Independence (BI):** The mean is 0.208, and the standard deviation is 0.101. The mean value of 20.8% shows that on the average, the board of the sampled firms have higher proportion of independent directors on their boards, which means they are well experienced in their business operations. This is supported with the minimum value of 0.067 and a maximum value of 0.556. The standard deviation of 10.1% indicates that there's relatively low variation in the independence operating manner of the sampled companies.

**CEO Duality (CD):** The mean is 0.986, and the standard deviation is 0.119. The mean of 98.6% shows that on the average, the sampled firms do not practice CEO duality. This is supported with the minimum value of 0 (zero) and a maximum value of 1 (one). The standard deviation of 11.9% indicates that there's relatively low variation in the CEO duality practices of the sampled companies.

**Female Director (FD):** The mean value is 0.115, and the standard deviation is 0.114. The mean of 11.5% shows that averagely the sampled companies have relatively low number of female directors. This implies that averagely the companies are directed by female directors. The standard deviation of 11.4% indicates relatively low variation in the female directors of the sampled companies. The minimum value of 0 (zero) and maximum value of 0.5 shows that some of the sampled firms do not include female directors on their boards while others include female directors.

**Board Ownership (BO):** The mean is 11.217, and the standard deviation is 21.963. The standard deviation of 2196.3% indicates that there's great variation of board ownership of the sampled companies. The minimum value of 0 (zero) and maximum value of 85.44 shows that some of the sampled firms are not owned by the directors on board while others are owned by the directors on board.

**Pearson Correlation**

**Table 3: Correlation Coefficients of Corporate Governance and Environmental Sustainability Reporting**

Variable	ENSR	BS	BI	CD	FD	BO	CS	CA	VIF
ENSR	1.000								N/A
BS	<b>0.286</b>	1.000							1.850
BI	<b>0.239</b>	<b>-0.114</b>	1.000						1.050
CD	0.065	<b>0.157</b>	-0.022	1.000					1.170
FD	<b>0.338</b>	<b>0.136</b>	0.077	<b>-0.231</b>	1.000				1.300
BO	-0.059	<b>-0.097</b>	0.034	0.037	<b>0.110</b>	1.000			1.080

**Source: Researcher’s Study, 2021.**

**Notes:** Table 3 shows the correlation coefficient. The dependent variable is Environmental Sustainability Reporting (ENSR). The independent variables are Board Size (BS), Board Independence (BI), CEO Duality (CD), Female Director (FD), Board Ownership (BO). The measure of multicollinearity is the Variance Inflation Factor (VIF). The correlations are below the major diagonal and the bold coefficients denotes statistically significant at 1 and 5 per cent level. All the values were calculated from the 420 companies-year observations for forty-two listed companies in Nigeria. The estimation process was facilitated using E-views 10.

Table 3 presents the correlation coefficient of dependent variable is Environmental Sustainability Reporting (ENSR). on explanatory variables which are Board Size (BS), Board Independence (BI), CEO Duality (CD), Female Director (FD), and Board Ownership (BO).

The result shows a moderate and positive association between female director (0.338) and environmental sustainability reporting. Also, there is a weak and positive relationship between board size (0.286), board independence (0.239), and CEO duality (0.065). However, there is a weak and negative association between board ownership (-0.059) and ENSR. This implies that a moderate increase in female directors will lead to a moderate increase in ENSR. Also, a minimal increase in board size, board independence and CEO duality will lead to minimal increase in ENSR. However, a minimal increase in board ownership will lead to an insignificant fall in ENSR.

In addition, the variance inflation factor which is a measure of multicollinearity suggests that all the independent variables are not related with each other because they are less than 10 in absolute values.

**Table 4: Corporate Governance and Environmental Sustainability Reporting**

Variables	Coefficient	S.E	t-test	Prob.
Constant	-0.190***	0.033	-5.775	0.000
BS	0.141***	0.023	6.176	0.000
BI	0.120***	0.040	2.955	0.003
CD	0.046	0.025	1.800	0.072
FD	0.133***	0.027	4.965	0.000
BO	-0.001	0.000	-0.453	0.651
Diagnostic Test		Statistic	Prob.	
Adjusted R <sup>2</sup>		0.178		
Wald-Stat		80.23	0.000	
Hausman Test		14.63	0.012	

Breusch-Pagan LM test	243.33	0.000
Heteroscedasticity Test	276.431	0.000
Pesaran CSID	-1.165	0.244
Serial Correlation Test	2.827	0.100
Observations	420	

**Source: Researcher’s Study, 2021.**

**Notes:** Table 4.5 reports the feasible generalized least square (FGLS) regression results of the effects of corporate governance and environmental sustainability reporting of selected quoted companies in Nigeria. The dependent variable is Environmental Sustainability Reporting (ENSR). The independent variables are Board Size (BS), Board Independence (BI), CEO Duality (CD), Female Director (FD) and Board Ownership (BO) \* Significant at 10%, \*\* Significant at 5%, \*\*\* Significant at 1%.

Source: Researcher’s Study, 2021

**Interpretation of Diagnostic Test**

From Table 4, the diagnostic test reported are the Hausman test, the Breusch and Pagan Lagrangian multiplier test, the heteroskedasticity, the Wooldridge test for autocorrelation and the Pesaran’s test of cross-sectional independence, these tests were carried out so as to determine the appropriateness of the estimation technique for the specified model. First, the Hausman test was used to determine the appropriateness between the fixed effect and the random effect model. The null hypothesis of the Hausman specification test is that there is no correlation between the random effects and fixed effect model, thus the random effect estimates are efficient and consistent, and that the fixed effect estimates are inefficient. The Hausman statistic of 14.63 with a probability value of 0.01 is less than the 5% level of significance hence, the rejection of the null hypothesis. This implies that the random effect model is inefficient and inappropriate. To determine the appropriateness of the fixed effect model, there must not be presence of serial correlation and heteroscedasticity, but the results show evidence of heteroscedasticity, with a statistic of 276.431 and it is statistically significant at 1 per cent level. The significance of the heteroscedasticity test necessitates the use of Feasible Generalized Least Square (FGLS) which corrects for serial correlation and heteroscedasticity.

To determine the cross-sectional dependence between the selected quoted companies of the study, the Pesaran CSID test was used. The statistic of -1.165 and with a probability value of 0.24 is not statistically significant at 5% level of significance. This implies that the selected listed companies are cross sectional independence. The Breusch-Pagan/Cook-Weisberg test for heteroscedasticity was carried out to determine if the variance of the residual is constant. The null hypothesis of homoscedasticity was rejected and the alternative hypothesis of heteroscedasticity was accepted. This was because the test statistic of 276.431 is statistically significant at 1 per cent level. In testing for autocorrelation in the panel data, the Wooldridge test was used. The null hypothesis that the successive error terms are not correlated was not rejected because the statistic of 2.827 with a probability value of 0.100 which is greater than the 5% level of significance. Thus, the null hypothesis of no serial correlation was not rejected.

**Model of the study**

$$ENSR_{it} = \alpha_i + \beta_1 BS_{it} + \beta_2 BI_{it} + \beta_3 CD_{it} + \beta_4 FD_{it} + \beta_5 BO_{it} + \mu_{it}$$

$$ENSR_{it} = -0.190 + 0.141BS_{it} + 0.120BI_{it} + 0.046CD_{it} + 0.133FD_{it} - 0.001BO_{it}$$

T-Test	= -5.775	6.176	2.955	1.800	4.965	-0.453
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**Interpretation**

Table 4 shows the results of regression analysis of the effects of corporate governance on environmental sustainability reporting of selected quoted companies in Nigeria. The results show that board size, board independence, CEO duality and female director have positive relationship with environmental sustainability reporting of selected quoted companies in Nigeria while board ownership has negative relationship with environmental sustainability reporting of selected quoted companies in Nigeria.

In addition, there is evidence that board size, board independence and female director have significant relationship with environmental sustainability reporting of selected quoted companies in Nigeria (BS= 0.141, t-test= 6.176,  $p < 0.05$ , BI= 0.120, t-test= 2.955,  $p < 0.05$  and FD =0.133, t-test= 4.965,  $p < 0.05$ ). This implies that board size, board independence and female director are significant factors influencing changes in the environmental sustainability reporting of selected quoted companies in Nigeria.

Conversely, there is evidence that CEO duality and board ownership do not have significant relationship with the environmental sustainability reporting of selected quoted companies in Nigeria (CD = 0.046, t-test= 1.800,  $p > 0.05$  and BO = -0.001, t-test= -0.453,  $p > 0.05$ ). This implies that CEO duality and board ownership are not significant factors influencing changes in the environmental sustainability reporting of selected quoted companies in Nigeria.

Concerning the magnitude of the estimated parameters for the coefficients of the regression analysis, a unit increase in board size, board independence, CEO duality and female director will lead to 0.141, 0.120, 0.046 and 0.133 increase in the environmental sustainability reporting of selected listed companies in Nigeria respectively, while a unit increase in the board ownership will lead to 0.001 decrease in the environmental sustainability reporting of selected quoted companies in Nigeria.

The Adjusted R<sup>2</sup> which measure the proportion of changes in the environmental sustainability reporting of selected listed companies in Nigeria as a result of changes in board size, board independence, female director, board ownership and CEO duality explains about 18 per cent changes in the environmental sustainability reporting of selected quoted companies in Nigeria, while the remaining 82 per

cent were other factors explaining changes in the environmental sustainability reporting of selected quoted companies in Nigeria but were not captured in the model.

The Wald-Test of 80.23 is statistically significant with  $p < 0.05$  indicating that on the overall, the statistical significance of the model showed that the null hypothesis of corporate governance has no significant effect on environmental sustainability reporting in selected quoted companies in Nigeria. Thus, the alternative hypothesis that corporate governance has significant effect on environmental sustainability reporting in selected quoted companies in Nigeria was accepted.

### Discussion of Findings

The regression result of the model showed that corporate governance has significant effect on environmental sustainability reporting in selected quoted companies in Nigeria. This evidence agrees with the empirical findings of the following studies. For instance, Chang, *et al*, (2015) concluded that corporate governance dimensions of institutional ownership and ownership concentration have significant effect on voluntary environmental information disclosure. Also, Furthermore, Odoemelam, *et al*, (2018) revealed that board independence and environmental committee were statistically significant in relations to environmental disclosures while board size is statistically insignificant. Also, Naseer and Rashid (2018) concluded that higher proportion of independent directors, board size, CEO duality and board ownership are associated with quality of environmental reporting.

However, the evidence contradicts the following empirical studies; Aliyu (2018) concluded there is no significant relationship between corporate governance and corporate environmental reporting. Though, the result of the study is mixed in that board independence has positive and significant relationship with corporate environmental reporting while there is no significant relationship between board size and corporate environmental reporting. Haladu, *et al*, (2016) concluded that there is a negative and significant relationship between environmental disclosure and the environmental expertise of board members. Masud, *et al*, (2018) found that there is no association between ESRP and family ownership. Also, King' Ori, *et al*, (2019) revealed that board independence has positive and insignificant effect on environmental sustainability disclosures. Furthermore, Umukoro, *et al*, (2019) concluded that there is no significant relationship between board expertise and environmental sustainability reporting. The study revealed that board members do not have expertise on environmental sustainability reporting. Our own study did not consider board expertise.

### Conclusion and recommendations

The study concluded that corporate governance affects environmental sustainability reporting in Nigeria. The shareholders should ensure the inclusion of more women on board and greater proportion of independent directors so as to enhance the quality of environmental sustainability reporting. Also, consideration for board membership should not be based on share ownership and the role of chairman and CEO should be separated.

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## Appendix

### Environmental sustainability indicators

Code	Performance Indicators	Key words
Environmental Performance		
ENV <sub>1</sub> Material	<ul style="list-style-type: none"> <li>(a) Materials used by volume or weight.</li> <li>(b) Percentage of materials used that are recycled input materials.</li> </ul>	Weight, volume, material, renewable, non-renewable and recycled.
ENV <sub>2</sub> Energy	<ul style="list-style-type: none"> <li>(a) Energy consumption within the organization.</li> <li>(b) Indirect energy consumption outside the organization.</li> <li>(c) Energy intensity.</li> <li>(d) Reduction in the energy requirements of products and services.</li> </ul>	Joules, watt-hours, electricity consumption, heating consumption, cooling consumption, electricity sold, heating sold, cooling sold, reduction in energy consumption, fuel, electricity, heating, cooling, and reduction in energy.
ENV <sub>3</sub> Water	<ul style="list-style-type: none"> <li>(a) Total water withdrawal.</li> <li>(b) Water sources significantly affected by withdrawal of water.</li> <li>(c) Percentage and total volume of water recycled and reused.</li> </ul>	Surface water Ground water Size of water source Recycle or reused water
ENV <sub>4</sub> Water	<ul style="list-style-type: none"> <li>(a) Organization's site owned, leased, managed in, or adjacent to, protected areas, and areas of biodiversity value outside protected areas.</li> <li>(b) Description of significant impacts of activities, products and services on biodiversity in protected areas and areas of high biodiversity value outside protected areas.</li> </ul>	Geographical location, biodiversity, protected areas, habitat, conservations, species.
ENV <sub>5</sub> Emissions	<ul style="list-style-type: none"> <li>(a) Direct greenhouse gas emissions.</li> <li>(b) Energy indirect gas emissions by weight.</li> <li>(c) Reduction of GHG emissions.</li> <li>(d) Emission of ozone-depleting substances.</li> <li>(e) NO<sub>x</sub>, Sox, and other significant air emissions.</li> </ul>	GH emissions, reduction of air and ozone emissions.
ENV <sub>6</sub> Effluents and Waste	<ul style="list-style-type: none"> <li>(a) Total water discharge by quality and destinations.</li> <li>(b) Total weight of wastage by type and disposal method.</li> <li>(c) Total number and volume of</li> </ul>	Water discharge Water reuse, recycling, composting, recovery, energy

	significant spill (leak).	recovery, spill.
ENV <sub>7</sub> Products and Services	(a) Extent of impact mitigation of environmental impacts of products and services. (b) Percentage of products sold and their packaging materials that are reclaimed by category.	Impact mitigation. Percentage of reclaimed products.
ENV <sub>8</sub> Compliance	(a) Monetary value of significant fines and total number of non-monetary sanctions for non-compliance with environmental laws and regulations.	Fines, sanctions, monetary value, non-compliance.
ENV <sub>9</sub> Transport	(a) Significant environmental impact of transporting products and other goods and materials used for the organization's operations, and transporting members of the workforce.	Environmental impact, transporting.
ENV <sub>10</sub> Overall	(a) Total environmental protection expenditure and investment by type.	Environmental protection expenditures.
ENV <sub>11</sub> Supplier Environmental assessment	(a) Percentage of new supplier that were screened using environmental criteria. (b) Number of suppliers, subject environmental impact and assessment as potential negative environmental impact.	New suppliers, environmental criteria, screening.
ENV <sub>12</sub> Environmental Grievance Mechanism	(a) Number of grievances about environment impact.	Complaints, grievance

**Source: Adopted from Mahmood, et al., 2018**