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Corporate Governance on Environmental Protection Index of Sustainability Reporting in Oil and Gas Companies Quoted in Nigeria

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Abstract:

Adequate sustainability of environmental reporting reveals the extent of transparency and corporate efforts in protecting the environment. The study investigated the effect of corporate governance on environmental protection index of sustainability reporting in oil and gas companies quoted in Nigeria. The research design adopted was ex-post-facto. The population of the study is the entire 12 oil and gas companies listed in the Nigerian stock exchange market from which 8 companies were selected using judgmental sampling technique. The data analyzed were obtained from the financial statement of the selected companies for the period of 15 years ranging from 2006 to 2020. Environmental disclosure checklist in line with Global Reporting Initiatives was adopted to measure the proxies of environmental protection index of sustainability. Multiple regression was used in analyzing the data. It was revealed that corporate governance had significant effect on environmental protection, (AdjR2 = 0.123; Walt-test = 39.29; P-value = 0.000). Also, Firm size and firm leverage significantly moderated the effect of corporate governance on environmental protection, (AdjR2 = 0.216; F-Statistics = 34.58; P-value = 0.000). The study concluded that corporate governance significantly impact on environmental protection and also that firm size and firm leverage moderated the effect of corporate governance on environmental protection, it was recommended that the management should ensure strong commitments and adequate disclosure of all environmental protection policies, and set full compliance as priority; also that government should provide an enabling business operating environment which will enhance effective environmental sustainability reporting.

Keywords: Corporate governance, Environmental reporting, Environmental protection index, Firm size

1. Background to the Study

Essentially, oil and gas companies ought to comply and account for effort of environment protection in the course of their operational activities since environmental accounting disclosure relates to the establishment of sufficient, acceptable, necessary and timely environmental information stakeholders need that impacts their corporate values (Lu, Ren, Yao, Ojao, Strielkowski & Streimikis, 2019; Zhang, Loh & Wu, 2020). Incidentally, the extend of compliance to guidelines in line with accounting rules to enhance recognition of measures and environmental issues by oil and gas companies for the preparation of environmental financial reports remain aversive and unreliable in literature (Milojevic, Mariusz, Terzi & Prasolov, 2020; Nabit & Hitzel, 2020).

The problems affecting environmental sustainability reporting have been extensively analyzed to an impressive level in Australia, Canada, United Kingdom and other European countries (Perrault & Clark 2016). In Europe, the studies of Nosratabadi, Pinter, Mosavi and Semperger (2020); Saona, Muro, Martin, Baier-Fuentes (2019) documented that there was a growing concern and increasing demand on corporate organizations to perform conscientiously on social responsibilities encompassing environmental policies, respect to juridical legal framework of compliance with standards and laws, and ethical and cultural beliefs of the society. According to Mahmood, Kouser, Ali and Ahmad (2018), corporate sustainability reporting was another global concern, as a growing number of scholars have argued that corporate organizations operational activities have huge impact on the external environment, and that was why these companies should be held responsible and accountable to shareholders and to a wider audience than simply its shareholders alone.

Environmental sustainability reporting practice was considerably impacted by the extent of corporate performance of public corporations and the effective regulatory framework in each countries jurisdiction and each of this jurisdiction have peculiar challenges (Husted & Filho, 2016). There were challenges of sustainability reporting and compliance, this largely depends on differences of enforcement, and much of these challenges have been in the United

States and United Kingdom based on recent studies (Dell'Atti, Trotta, Jannuzzi&Demaria, 2019). In Europe, evidences abound that there have been mixed compliances due to legal and regulatory enforcement challenges in sustainability reporting (Munoz, Zhao & Yang, 2017). The three components of the regulatory power of a standards include: the first was designed as the established common purpose, the second was the legitimacy which was the authority of the jurisdiction based on multiple shareholders and the third one was the monitoring which was established for rules implementation and compliance enforcement through the monitoring of practice, all these components, unfortunately, were falling below the expected threshold (Munoz, Zhao & Yang, 2018; Slager, Gond& Moon, 2018). Cupertino, Consolandi and Vercelli (2019) stated that in some cases, some corporation in the oil pollution sensitive related field can develop their own framework for sustainability reporting, however, there were sanctions for defaults and partial or noncompliance.

Evidently, there were challenges of uneven quality of compliance among nations and countries, for instance in Italy, the quality of environmental sustainability reporting and disclosure among oil and gas companies was high, yet it encompasses complex dimensions and diverse range of corporate compliances among the companies and this reflects in their performances, in relation to labour practices, human rights protection, product responsibility efforts and environmental management measures (Izzo, Ciaburri&Tiscini, 2020; Lozano, Huisinigh (2011). In United Kingdom, the case of diffusion of voluntary sustainability reporting quite problematic and this has been greatly criticized (Benneth, Schaltegger, Zvezdov, 2017, Andon, Free &O'Dwyer, 2016; Hall, Millo& Barman, 2015). There were disturbing cases of transparency about companies' environmental sustainability commitment, Ouvrard, Jasimuddin and Spiga (2020) highlighted that unfortunately in European countries, though strong evidence have shown a considerable environmental sustainability reporting, yet there were not clear cut roadmap for global integration efforts to improve environmental sustainability reporting, as a result there were inadequate human wellbeing and capabilities, lack of environmental sustainability and just economies, inadequate food system and poor nutrition pattern, deficiency energy decarbonization with universal access, and problems of inequalities of urban and semi urban development (Global Sustainability Report, 2019).

Sutopo, Kot, Adiati and Ardila (2018) stated that environmental protection index encompasses efforts geared towards expenditure and whole investment on environmental pollution control equipment, cost associated to training education for environmental protection and environmental initiatives and environmental audits and external assurance. However, according to Susanto and Meiryani (2019), conservation of energy had effect on environmental sustainability reporting, that corporate governance and environmental sustainability was indispensable for an uninterrupted flow of operations for any corporate establishment in this case the oil and gas companies. Wickert, Scherer and Spencer (2016) posited that noise and vibration from firms heavy duty power plants and buzzing sounds from transformers including high-voltage power lines have the capacity to have negative and adverse effect on crowd, community the surrounding neighbors where the oil and gas companies operate. In protecting the environment, while the firms may not be isolated from the customers, the firms can implement noise and vibration prevention measures at the design stage to lower environmental effects (Syed, Saqib, Zeshan&Naz, 2020).

While many studies suggested that corporate governance can make decision that can effect environmental protection for instance siting plants that were soundproofing inbuilt (Nizam, Ng, Deandaru, Nagayey&Nkoba, 2019; Agirre-Aramburu& Gomez-Pescador, 2019). On the contrary, few others differ, and therefore belief that environmental protection should be restricted to manufacturing and oil and gas related corporations, suggesting that the effect of generator noise was normal and may not have much exaggerated adverse effect as revealed by Nizam *et al.*, (2019). The magnitude of effect lies with the firm size corporations, the volume of debts, environment protection sensitivity policy the board and the managers' idea of the probable hazard and negative effects of environmental protection, environmental sustainability reporting, as many studies in Nigeria have not established the level effects. Consequently, this work intends to examine the effect of corporate governance with and without firm size and firm leverage on environmental protection sustainability reporting in oil and gas companies in Nigeria.

1.1. Objectives of the Study

The objectives of the study are to:

- Evaluate the effect of corporate governance on environmental protection index of sustainability reporting in oil and gas companies quoted in Nigeria;
- Evaluate the moderating effect of firm size and firm leverage on the effect of corporate governance on environmental protection index of sustainability reporting of oil and gas companies quoted in Nigeria.

1.2. Research Hypotheses

- H₀₁: There is no significant effect of corporate governance on environmental protection index of sustainability reporting in oil and gas companies quoted in Nigeria.
- H₀₂: There was no significant moderating effect of firm size and firm leverage on the effect of environmental protection on sustainability reporting in oil and gas companies quoted in Nigeria.

2. Literature Review

Environmental protection in this study was all effort put in place by corporate organization to ensure protection of the earth and its inhabitant on the process of carrying on its operational activities among the oil and gas companies globally. The global stakeholders become more concerned with people' welfare and standard of living, corporations' staff welfare, the impact on the environment and local communities, and stakeholders will put pressure on the most visible organizations to address these problems (Bonilla, Front & Pacheco, 2014). Making effort was therefore a meant of

accepting the expectations placed by the stakeholders in protecting the environment and putting in report in a prescribed format such efforts and clear evidence of transparency, accountability and meeting those expectations (Bonilla *et al.*, 2014). Every stakeholder expect that oil and gas companies should respect, protect, and make efforts to restore the environment.

The core elements of environmental aspect of corporate sustainability expected from corporate organizations include the following: Firstly, organizations should utilize natural and manmade resources in an optimal and responsible manner and ensure the sustainability of resources by reducing, reusing, recycling and managing waste. Secondly, organizations should take measures to check and prevent pollution. They should assess the environmental damage and bear the cost of pollution abatement with due regard to public interest. Thirdly, companies should ensure that benefits arising out of access and commercialization of biological and other natural resources and associated traditional knowledge were shared equitably. Fourthly, Umokoro *et al.*, (2019) further documented that businesses should continuously seek to improve their environmental performance by adopting cleaner production methods, promoting use of energy efficient and environment friendly technologies and use of renewable energy. Fifth, organizations should develop Environment Management Systems (EMS) and contingency plans and processes that help them in preventing, mitigating and controlling environmental damages and disasters, which may be caused due to their operations or that of a member of their value chain (Weng, Chen & Chen, 2015). Sixthly, consistent with the study of Ali, Frynas and Mahmood (2017), the businesses should report their environmental performance, including the assessment of potential environmental risks associated with their operations, to their stakeholders in a fair and transparent manner. Seventhly, Businesses should proactively persuade and support their value chain to adopt this principle (Ahmed, 2017).

2.1. Theoretical Framework

This study was hinged on agency and signaling theory. Agency theory is more relevant because, corporate governance represents best practices framework that guarantees reconciliatory and monitoring function in the relationship between the shareholders and managers. Corporate governance ensure that the managers were monitored to act in the best interest of the shareholders while the managers were properly threatened, remunerated and their interest were not stamped by the shareholders' overbearing demands of higher rewards.

In the similar vein, signaling theory is relevant because the significant roles of environmental protection index dissemination and information signaling in the capital market was very important as capital market participants do not benefit much in the mist of information asymmetry.

2.3. Corporate Governance and Environmental Sustainability Protection

Similarly, Jain and Winner (2016) investigated the corporate social responsibility and sustainability reporting practices in top sized companies in India. The study employed corporate social responsibility and sustainability reporting practices in 200 biggest state-owned and privates companies in India, specifically, a case study was based on Danish Carpet manufacturing company. The study infers the case from the perspective of rational constructivism focused on for magnitudes: possibilities, facts, values and communication. The study found that corporate social responsibility had a negative significant effect on sustainability reporting among the companies investigated and such did not comply as expected in the compliance with the sustainability reporting practices in India. The study recommended that the regulating bodies should increase monitoring guidelines to ensure a batter compliance. Apparently, the study of Jain and Winner (2016) was consistent with the result found by the study of Mahmudi, Biswas and Islam (2017) and at the same time the result as obtained by Jain and Winner was found to be inconsistent by the study carried out by Susanto and Meiryani (2019). Both studies showed that the level of environmental compliance in Bangladesh and in India was far below expectation, poor and companies did not comply, reflecting the weaknesses of the corporate governance in both countries.

Furthermore, the study of Amran and Ooi (2014) studied sustainability reporting in meeting stakeholders demand and illustrated the emerging trend and significance of sustainability reporting. The study employed qualitative research design to analysis data obtained through content analysis and review. The study found that there were pressure from stakeholder forces business to ascertain their competence in governance, efficiency, accountability and transparency through corporate to ensure sustainability disclosure and as such that sustainability reporting had a positive significant effect on shareholders demand. The study suggested that to satisfy diverse stakeholders' expectations, and attain sustainability reporting practice, it was expedient that business try to comply with sustainability reporting performance and reporting processes. The result of Amran and Ooi (2014) was similar to the result obtained in the study of Masu, Nurunnabi and Seong (2018), but not in consistent with the result obtained in the study carried out by Amarjit and Obradovich (2015), who studied the effect of corporate governance and oil and gas leverage on value of selected American firms and found that corporate board size had a negative effect on value of American firms in the manufacturing sector, while CEO duality and audit committee, corporate oil and gas leverage, firm size and insider holders had a negative significant effect on value of American service firms. This further validates the variable chosen to measure the dependent and independent variable of our study.

Adolfo, Ignacio and Pasten (2018) conducted an examination to determine sustainable development planning: master's based on a project-based learning approach. It analyzed a joint project-based learning strategy for training sustainable development planning in postgraduate programs, using Universidad Politecnica de Madrid in Spain. The study project-based learning programs strategy was applied to an international postgraduate program for sustainable rural development in Erasmus Mundus, Master of Science with the participation of five European Union universities that formed the Agric Mundus Alliance for sustainability Development, using a mixed methods approach. The found study that the sustainability development planning had a positive influence on performance, and were categorized into perspective

(holistic thinking and intellectual coherent, practice (experiential learning by reconnecting to real-life situations and people (personal and interpersonal skills required to succeed in sustainable projects, programs and portfolios. The result found by Adolfo, Ignacio and Pasten (2018) was consistent with the result found in the study of Laskar, Chakraborty and Maji (2017), on the not consistent with the result obtained by Jain and Winner (2016) who found that corporate social responsibility had a negative significant effect on sustainability reporting among the companies investigated and such did not comply as expected in the compliance with the sustainability reporting practices in India and that of Mahmudi, Biswas and Islam (2017), Adolfo *et al.*, (2018) was not specific on the effect of corporate governance on environmental sustainability reporting.

While Adolfo *et al.*, (2016) was not emphatic in validating positive or negative effect of corporate governance on environmental sustainability reporting, making more specific findings, Oti and Mbu-Ogar (2018) examined the effect of environmental and social disclosure on the oil and gas performance of some selected oil and gas quoted in Nigeria. The study sourced a time series data from Central Bank of Nigeria for the study, covering a period of 50 years. Ordinary least square regression technique was used where the theoretical framework was underpinned on stakeholder and legitimacy theories explaining the relationship between corporations and the societal strata need for environmental disclosure and oil and gas performance. The result of the study reveal that disclosure on employee health, safety and community development had no significant effect on oil and gas performance and disclosure of waste management had a positive significant effect on firms' oil and gas performance. The study recommended that oil and gas companies sampled in this study should regularly review their waste management strategy and employee bespoke technology in waste management in order alleviate the effect on the environment. The result obtained by Oti and Mbu-Ogar (2018) was in tandem with the finding of Otuya, Akporien and Ofeimum (2019), however the result was not in tandem with the result found in the result of Adediran and Alade (2013), who found that there was a negative significant relationship between environmental accounting and return on capital employed, earnings per share.

Brown and Dillard (2014) investigated integrated reporting and the need for broadening out and opening out and opening up. The study was actually aimed to analytically evaluate integrated reporting as to burden out and open up dialogue and debate about accounting and level of disclosure practices that might support or hinder efforts to nature sustainability business reporting practices. Though the study expected a responsive integrated reporting and adequate sustainability reporting practices, but the review revealed a weak response. Also that though the business cased enclosing on support in spreading the range of phenomena accounted for in companies report, the leftovers ideological bolted approach were more likely to emphasize rather than boost serious consideration o-n -business - as - usual practices and the study identified that integrated reporting had a negative effect on disclosure level of reporting and that the sense and design of integrated reporting were below expectations. The result reported in this study of Brown and Dillard (2014) was similar to the result obtained in the study of Meca and Palacio (2018) who equally found that outside directors, independent directors and business specialists had positive and compelling effect on decisions of the board during board meetings. However, the result of Brown and Dillard (2014) was not similar to the result found in the study of Eneh and Amakor (2019), who revealed that profitability exhibited negative significant effect on sustainability reporting in Nigeria.

Furthermore, Mahmood, Kouser, Ali, Ahmad and Salman (2018) investigated the effect of corporate governance affect sustainability disclosure on economic, social and environmental sustainability disclosures. The study in carrying out the investigation, adopted an explanatory sequential mixed methods approach of qualitative and quantitative methods. The data for the study were sourced from both primary and secondary sources, from selected top 100 companies listed on the Pakistan Stock Exchange for a period of 4 years 2012-215. In addition, the primary data were obtained from personal interviews with five board members of different companies. The study after the analysis, found that board diversity consisting female directors and corporate social responsibility committee was a better checks and control on management decisions on sustainability issues of economic, environment and social. Mahmood, Kouser, Ali, Ahmad and Salman (2018) finding affirm the gender coloration and the effect of female directors in the board on the responsiveness to environmental reporting. This finding was consistent with the finding of Del' Atti *et al* (2017); and that of Saona, Muro, Martin and Baier-Fuentes (2019). This equally affirm that one of this study's variable women on board (WBBD) has the ability to effect environmental sustainability reporting.

Omoloso, Wise, Mortimer and Jraisat (2020) studied the identification and comparison a of the key social, economic and environmental sustainability practices in the leather industry. The study employed content analysis by reviewing exiting literature on social, economic and environmental sustainability, the study analyzed sustainability information data extracted from either the website, annual report, sustainability report or corporate social responsibility report of six leather related companies. The study revealed that sustainability reporting practice had weak but positive significant effect on social, economic and performance of the leather industry and that the sampled companies observed good practice of sustainability practices in their annual reports. The study also revealed that energy efficiency, waste management and reduction of greenhouse gases emission were the most occurring environmental sustainability practices among the companies sampled in the study. Health and safety occurred as the dominated social sustainability practice, while economic sustainability was well understood by the companies. The study suggested that the managers and companies in the leather supply chain to lean from brands that have been embarking on sustainability efforts that have been embarking on sustainability efforts and assist the companies in readiness for strategy formulation, implementation and reporting. The result obtained by Omoloso, Wise, Mortimer and Jraisat (2020) found that coercive pressure exercise had a positive effect on green information system and that information system analysis had a weak positive significant on environmental performance. On the contrary, the result found by Omoloso *et al.*, (2020) was not similar to the one found in the study of Birindelli, Dell-Atti and Iannuzzi (2018), who found that there was a negative significant with share of independent directors.

3. Methodology

The research design adopted for the study was *expostfacto* and the population is the entire twelve (12) firms making up oil and gas sectors listed on the Nigeria Stock Exchange market as at 31/12/2020. Judgemental sampling technique was employed to select eight companies. Data was collected from the financial statement of the selected companies while, environmental indicators as per Global Reporting Initiative (GRI) check list was obtained from these financial statements for the period 2006 -2020 which is equivalent to fifteen (15) years. The environmental protection index of sustainability reporting was determined through content analysis of the sampled firms for the 15 years of study.

Validity of the data was premised on the assurance provided by statutory auditing. The data was analysed through the use of multiple regression as well as the inferential statistics. Panel data regression approach which involved the use of Random or Fixed Effect estimators was employed as it allowed the researcher to combine both the time series and cross-sectional data.

3.1. Functional Relationship

The functional relationship in the study is as shown below:

Y = Environmental Protection Index (ENVPT),

X = (BDSIZE, BDINDP, WMBD, FRBDM, INSH)

BDSIZE = Board Size

BDINDP = Proportion of Board Independent,

WMBD = Women on Board,

FRBDM = Frequency of Board Meeting,

INSH= Institutional Holding

Z = Moderating Variables (Firm Size (FSIZ), Firm Leverage (FLEV))

4.4. Models of the Study

Model 1

$$ENVPT_{it} = \alpha + \beta_1 BDSIZE_{it} + \beta_2 BDINDP_{it} + \beta_3 WMBD_{it} + \beta_4 FRBDM_{it} + \beta_5 INSH_{it} + \varepsilon_{it} \quad (1)$$

Model 2

$$ENVPT_{it} = \alpha + \beta_1 BDSIZE_{it} + \beta_2 BDINDP_{it} + \beta_3 WMBD_{it} + \beta_4 FRBDM_{it} + \beta_5 INSH_{it} + \beta_6 FSIZ_{it} + \beta_7 FLEV_{it} + \varepsilon_{it} \quad (2)$$

5. Results and Discussion of Findings

5.1. Test of Hypotheses

5.1.1. Hypothesis One

- Objective One: Evaluate the effect of corporate governance on environmental protection index of sustainability reporting in oil and gas companies quoted in Nigeria;
- Research Question One: To what extent does corporate governance affect environmental protection index of sustainability reporting in oil and gas companies quoted in Nigeria?
- Research Hypothesis One (H_{01}): There was no significant effect of corporate governance on environmental protection index of sustainability reporting in oil and gas companies quoted in Nigeria.

Variables	Coefficient	Cluster Standard Error	Z-test	Prob.
Constant	0.340***	0.110	3.098	0.002
BDINDP	0.619**	0.256	2.418	0.013
BDSIZE	0.476***	0.115	4.139	0.000
WMBD	0.190	0.226	0.841	0.403
FRBDM	0.383**	0.157	2.439	0.011
INSH	-0.038	0.227	-0.166	0.868
Adjusted R ²	0.123			
Wald-Test	39.29 (0.000)			
Hausman Test	1.07 (0.956)			
Bresuch-Pagan RE Test	7.52 (0.003)			
Heteroscedasticity Test	97.35 (0.000)			
Serial Correlation Test	19.95 (0.002)			
Pesaran CSI	0.97 (0.332)			
Observations	120			

Table 1: Corporate Governance on Environmental Protection Index of Sustainability Reporting
Dependent Variable: ENVPT

Source: Researcher's Computation (2021)

Notes: Table 4.5 reports the cluster random effect model that corrects for autocorrelation and heteroscedasticity panel regression results of the effects of corporate governance on environmental protection index of sustainability reporting of selected oil and gas companies Nigeria. The dependent variable was Environmental Protection Index of Sustainability Reporting (ENVPT). The independent variables were Board Independence (BDINDP), Board Size (BDSIZ), Institutional Holding (INSH), Women on Board (WMBD), and Frequency of Board Meeting (FRBDM).

* Significant at 10%, ** Significant at 5%, *** Significant at 1%.

5.2. Interpretation of Diagnostic Test

From Table 4.1, the diagnostic test reported were the Hausman test, the Bresuch-Pagan RE Test for random effect 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 was that there was no correlation between the random effect and fixed effect model, thus the random effect estimates were efficient and consistent, and that the fixed effect estimates were inefficient and the alternative hypothesis that the fixed effect model was consistent and efficient. The Hausman statistic of 1.07 with a probability value of 0.956 was greater than the 5% level of significance hence, the non-rejection of the null hypothesis and the rejection of the alternative hypothesis. This implies that the random effect model was efficient and appropriate. To determine the appropriateness of the random effect model, the Bresuch-Pagan RE Test for random effect model was conducted; the result showed that the statistic of 7.52 with a probability value of 0.000 was less than the 5% level of significance. Thus, the random effect model was appropriate.

To determine the cross-sectional dependence between the selected oil and gas companies in Nigeria, the Pesaran CD test was used. The statistic of 0.97 and with a probability value of 0.332 was not statistically significant at 5% level of significance. This implies that the selected oil and gas companies were cross sectional independence. The Breusch-Pagan/Cook-Weisberg test for heteroscedasticity was carried out to determine if the variance of the residual was constant. The null hypothesis of homoscedasticity was rejected and the alternative hypothesis of heteroscedasticity was accepted. This was because the test statistic of 97.35 was 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 were not correlated was rejected in favour of the alternative hypothesis that the successive error terms were serial correlated because the statistic of 19.95 with a probability value of 0.000 which was less than the 5% level of significance. However, with the presence of autocorrelation and heteroscedasticity, the study used the cluster option for the random effect model.

Model 1:

$$\text{ENVPT}_{it} = \alpha_1 + \beta_1 \text{BDIND}_{it} + \beta_2 \text{BDSIZE}_{it} + \beta_3 \text{WMBD}_{it} + \beta_4 \text{FRBDM}_{it} + \beta_5 \text{INSH}_{it} + \mu_1$$

$$\text{ENVPT}_{it} = 0.340 + 0.619 \text{BDIND}_{it} + 0.476 \text{BDSIZE}_{it} + 0.190 \text{WMBD}_{it} + 0.383 \text{FRBDM}_{it} - 0.038 \text{INSH}_{it}$$

T-test	3.098	2.418	4.139	0.841	2.439	-0.166
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5.3. Interpretation of Results

Table 4.5 showed the results of regression analysis of the effects of corporate governance on environmental protection index of sustainability reporting of oil and gas companies in Nigeria. The results show that board independence, board size, women on the board and frequency of board meetings have positive relationship with environmental protection index of sustainability reporting of oil and gas companies in Nigeria while institutional holding has negative relationship with environmental protection index of sustainability reporting of oil and gas companies in Nigeria.

In addition, there was evidence that board independence, board size and frequency of board meeting have significant relationship with the environmental protection index of sustainability reporting of oil and gas companies in Nigeria (BDINDP = 0.619, t-test= 2.418, $p < 0.05$; BDSIZE = 0.476, t-test= 4.139, $p < 0.05$ and FRBDM = 0.383, t-test= 2.439, $p < 0.05$), respectively. This implies that board independence, board size and frequency of board meeting were significant factors influencing changes in the environmental protection index of sustainability reporting of oil and gas companies in Nigeria.

Conversely, there was evidence that women on board and institutional holding do not have significant relationship with the environmental protection index of sustainability reporting of oil and gas companies in Nigeria (WMBD= 0.190, t-test= 0.841, $p > 0.05$ and INSH= -0.038, t-test= -0.166, $p > 0.05$). This also implies that women on the board and institutional holding were not a significant factor influencing changes in the environmental protection index of sustainability reporting of oil and gas companies in Nigeria.

Concerning the magnitude of the estimated parameters for the coefficients of the regression analysis, a unit increase in the change in board independence, board size, women on the board, frequency of board meetings and institutional holding will lead to 0.619, 0.476, 0.190, and 0.383 increases in the environmental protection index of sustainability reporting of oil and gas companies in Nigeria, respectively while a unit increase in institutional holding will lead to a decrease of 0.038 in the environmental protection index of sustainability reporting of oil and gas companies in Nigeria.

Adjusted R² measures the composition of corporate governance in environmental sustainability while the balance represents factors not considered in the model. In other words, the result of changes in the board independence, board size, frequency of board meetings, women on the board and institutional holding explains about 12.3 per cent changes in

the environmental protection index of sustainability reporting of oil and gas companies in Nigeria, while the remaining 87.7 per cent were other factors explaining changes in the environmental protection index of sustain

5.4. Decision

At 5% level of significance, the Wald-Test of 39.29 was statistically significant with $p < 0.05$ indicating that on the overall; the statistical significance of the model showed that the null hypothesis that corporate governance has no significant effect on environmental protection index of sustainability reporting in quoted oil and gas companies in Nigeria was rejected. Thus, the alternative hypothesis that corporate governance has significant effect on environmental protection index of sustainability reporting in quoted oil and gas companies in Nigeria was accepted.

5.4.1. Discussion of Findings

The study in model 1, examined the effect of corporate governance on environmental sustainability protection. Though the individual members revealed mixed reports of positive and negatives results. However, based on the joint result, the model recorded that corporate studies of (Nwaiwu&Oluka, 2018; Omoloso, Wise, Mortimer &Jraisat, 2020; Osemene, Kolawole&Oyelakun, 2016) that governance had a positive significant effect on environmental sustainability protection in oil and gas companies quoted in Nigeria. The result was found to be consistent with the (Laskar, Chakraborty &Maji, 2017). For instance, Omoloso, Wise, Mortimer and Jraisat (2020) studied the identification and comparison a of the key social, economic and environmental sustainability practices in the leather industry and the study revealed that sustainability reporting practice had weak but positive significant effect on social, economic and performance of the leather industry and that the sampled companies observed good practice of sustainability practices in their annual reports. On the contrary, the result obtained in this model contradicted the study carried out by Adediran and Alade (2013) who investigated the relationship between environmental accounting and corporate performance in Nigeria and found that there was a negative significant relationship between environmental accounting and return on capital employed, earnings per share.

- Hypothesis TwoResearch Objective Two: Evaluate the moderating effect of firm size and firm leverage on the effect of corporate governance on environmental protection index of sustainability reporting of oil and gas companies quoted in Nigeria;
- Research Question Two: To what extent do firm size and firm leverage moderate the effect of corporate governance on environmental protection index of sustainability reporting in oil and gas companies quoted in Nigeria?
- Research Hypothesis Two(H_{02}): There was no significant moderating effect of firm size and firm leverage on the effect of environmental protection on sustainability reporting in oil and gas companies quoted in Nigeria.

Variables	Coefficient	Cluster Standard Error	t-test	Prob.
Constant	-0.059	0.492	-0.120	0.908
BDINDP	0.461**	0.211	2.185	0.022
BDSIZE	0.427**	0.183	2.333	0.019
WMBD	0.265	0.266	0.996	0.353
FRBDM	0.086	0.093	0.925	0.387
INSH	-0.173	0.332	-0.521	0.618
FRMSZ	0.061	0.057	1.070	0.319
FRMLEV	0.100**	0.040	2.500	0.012
Adjusted R ²	0.216			
F-Test	34.58 (0.000)			
Hausman Test	27.21 (0.000)			
Testparm	11.57 (0.024)			
Heteroscedasticity Test	103.96 (0.000)			
Serial Correlation Test	19.739 (0.003)			
Pesaran CSI	0.781 (0.435)			
Observations	120			

Table 2: Corporate Governance, Firm Size and Leverage on Environmental Protection Index of Sustainability Reporting
Dependent Variable: ENVPT

Source: Researcher's Computation (2021)

Notes: Table 2 reports the cluster fixed effect model that corrects for autocorrelation and heteroscedasticitypanel regression results of the effects of corporate governance, firm size and leverage on environmental protection index of sustainability reporting of selected oil and gas companies Nigeria. The dependent variable was Environmental Protection Index of Sustainability Reporting (ENVPT). The independent variables were Board Independence (BDINDP), Board Size (BDSIZ), Institutional Holding (INSH), Women on Board (WMBD), and Frequency of Board Meeting (FRBDM). The moderating variables were Firm Size (FSIZ) and Firm Leverage (FLEV).

* Significant at 10%, ** Significant at 5%, *** Significant at 1%.

5.5. Interpretation of Diagnostic Test

From Table 2, the diagnostic test reported were the Hausman test, the Testparm for fixed effect 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 was that there was no correlation between the random effect and fixed effect model, thus the random effect estimates were efficient and consistent, and that the fixed effect estimates were inefficient and the alternative hypothesis that the fixed effect model was consistent and efficient. The Hausman statistic of 27.21 with a probability value of 0.000 was less than the 5% level of significance hence, the rejection of the null hypothesis and the acceptance of the alternative hypothesis. This implies that the fixed effect model was efficient and appropriate. To determine the appropriateness of the fixed effect model, the testparm for fixed effect test was conducted; the result showed that the statistic of 11.57 with a probability value of 0.024 was less than the 5% level of significance. Thus, the fixed effect model was appropriate.

To determine the cross-sectional dependence between the selected oil and gas companies in Nigeria, the Pesaran CD test was used. The statistic of 0.781 and with a probability value of 0.435 was not statistically significant at 5% level of significance. This implies that the selected oil and gas companies were cross sectional independence. The Breusch-Pagan/Cook-Weisberg test for heteroscedasticity was carried out to determine if the variance of the residual was constant. The null hypothesis of homoscedasticity was rejected and the alternative hypothesis of heteroscedasticity was accepted. This was because the test statistic of 103.96 was 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 were not correlated was rejected in favour of the alternative hypothesis that the successive error terms were serial correlated because the statistic of 19.739 with a probability value of 0.003 which was less than the 5% level of significance. However, with the presence of autocorrelation and heteroscedasticity, the study used the cluster option for the fixed effect model.

Model 2:

$$ENVPT_{it} = \alpha_1 + \beta_1 BDIND_{it} + \beta_2 BDSIZE_{it} + \beta_3 WMBD_{it} + \beta_4 FRBDM_{it} + \beta_5 INSH_{it} + \beta_6 FRMSZ_{it} + \beta_7 FRMLEV_{it} + \mu_1$$

$$ENVPT_{it} = -0.059 + 0.461BDIND_{it} + 0.4271BDSIZE_{it} + 0.265WMBD_{it} + 0.086FRBDM_{it} - 0.173INSH_{it} + 0.061FRMSZ_{it} + 0.100FRMLEV_{it}$$

T-test	-0.120	2.185	2.333	0.996	0.925	-0.521	1.070
2.500							

5.6. Interpretation of Results

Table 2 showed the results of regression analysis of the effects of corporate governance, firm size and firm leverage on environmental protection index of sustainability reporting of oil and gas companies in Nigeria. The results show that board size, women on the board, frequency of board meetings, firm size and firm leverage have positive relationship with environmental protection index of sustainability reporting of oil and gas companies in Nigeria, while institutional holding has a negative relationship with environmental protection index of sustainability reporting of oil and gas companies in Nigeria.

In addition, there was evidence that board independence, board size and firm leverage have significant relationship with the environmental protection index of sustainability reporting of oil and gas companies in Nigeria (BDINDP = 0.461, t-test= 2.185, p < 0.05; BDSIZE = 0.427, t-test= 2.333, p < 0.05 and FRMLEV = 0.100, t-test= 2.500, p < 0.05), respectively. This implies that board independence, board size and firm leverage were significant factors influencing changes in the environmental protection index of sustainability reporting of oil and gas companies in Nigeria.

Conversely, there was evidence that women on the board, frequency of board meetings, institutional holding, and firm size do not have significant relationship with the environmental protection index of sustainability reporting of oil and gas companies in Nigeria (WMBD= 0.265, t-test= 0.996, p > 0.05; FRBDM = 0.086, t-test= 0.925, p > 0.05; INSH= -0.173, t-test= -0.521, p > 0.05; and FRMSZ= 0.061, t-test= 1.070, p > 0.05). This also implies that women on the board, frequency of board meetings, institutional holding, and firm size were not a significant factor influencing changes in the environmental protection index of sustainability reporting of oil and gas companies in Nigeria.

Concerning the magnitude of the estimated parameters for the coefficients of the regression analysis, a unit increase in the change in board independence, board size, women on the board, frequency of board meetings, firm size, and firm leverage will lead to 0.416, 0.427, 0.265, 0.086, 0.061, and 0.100 increases in the environmental policy index of sustainability reporting of oil and gas companies in Nigeria respectively, while a unit increase in institutional holding will lead to a decrease of 0.173 in the environmental protection index of sustainability reporting of oil and gas companies in Nigeria.

Adjusted R² measures the composition of corporate governance in environmental sustainability while the balance represents factors not considered in the model. In other words, it considered measured the proportion of the changes in the environmental protection index of sustainability reporting of oil and gas companies in Nigeria as a result of changes in the board independence, board size, frequency of board meetings, women on the board, institutional holding, firm size, and firm leverage explains about 21.6 per cent changes in the environmental protection index of sustainability reporting of oil and gas companies in Nigeria, while the remaining 78.4 per cent were other factors explaining changes in the environmental protection index of sustainability reporting of oil and gas companies in Nigeria but where not captured in the model

5.7. Decision

At 5% level of significance, the *F* Test of 34.58 was statistically significant with $p < 0.05$ indicating that on the overall; the statistical significance of the model showed that the null hypothesis that corporate governance, firm size, and firm leverage have no significant effect on environmental protection index of sustainability reporting in quoted oil and gas companies in Nigeria was rejected. Thus, the alternative hypothesis that corporate governance, firm size, and firm leverage have significant effect on environmental protection index of sustainability reporting in quoted oil and gas companies in Nigeria was accepted.

6. Discussion of Findings

When the moderating effect was introduced in examining the moderating effect of firm size and firm leverage on the relationship between corporate governance and environmental sustainability protection, the results equally revealed mixed results. The *F*-statistics for the joint result revealed that while firm size exhibited positive insignificant, firm leverage showed positive significant effect. The joint result of the model revealed that moderating effect of firm size, firm leverage and corporate governance had a positive significant effect on environmental sustainability protection in oil and gas companies quoted in Nigeria. The result was similar to the findings reported in the studies of (Eze, Nweze&Enekwe, 2016; Nwaiwu, Oluka, 2018; Osemene, Kolawola&Oyelakun, 2016). However, the results contradicted that finding reported in the study of Birindelli, Dell'Atti&Iannuzzi (2018), investigated the effect of composition and activity of corporations' board of directors, board independence, board size, board frequency of meetings and corporate social responsibility committee on government performance in the oil and gas industry and found that all had negative significant effect except only gender balanced boards that positively affected companies performance for sustainability.

7. Conclusion and Recommendation

This study investigated the effect of corporate governance on environmental protection index of sustainability reporting in oil and gas companies quoted in Nigeria. In addition, the study examined the moderating effect of firm size and firm leverage on the effect of corporate governance on environmental protection index of sustainability reporting of oil and gas companies quoted in Nigeria. It was concluded from the study that corporate governance had a positive significant effect on environmental protection index of sustainability reporting in oil and gas companies quoted in Nigeria; and also, moderating the effect of firm size and firm leverage had a positive significant effect on the environmental protection index of sustainability reporting in oil and gas companies quoted in Nigeria.

The study recommends as follows:

The management should ensure strong commitments and adequate disclosure of all environmental protection policies, and set full compliance as priority since, there is likely penalties for non-compliance.

The government should provide an enabling business operating environment that will enhance effective environmental sustainability reporting such as basic infrastructures, security and political stability to augment the efforts of the corporate organization in the oil and gas.

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