Effect of Carbon Emission Disclosures on Sustainability of Oil and Gas Firms in Nigeria

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Abstract
The study examines the effect of Carbon Emission Disclosures on Sustainability of Oil and Gas Firms in Nigeria. The study is vital as it portrays the extent to which Carbon Emission Disclosures influence firms' Sustainability in Nigeria. In order to determine the relationship between Carbon Emission Disclosures and Firms Sustainability, some key proxy variables were used in the study, namely; Leverage and Firms Size as a measurement for sustainability while Carbon Emission Disclosures was measured using the GRI G4 Disclosure Index. Two hypotheses were formulated to guide the investigation and the statistical test of parameter estimates was conducted using OLS Regression Model. The research design used is Ex Post Facto design and data for the study were obtained from the NSE Factbook, Annual Reports & Accounts and Sustainability Reports of oil and gas firms in Nigeria spanning from 2015-2020. The findings of the study generally indicate that Carbon Emission Disclosures have significant and positive effect on Firms Sustainability in Nigeria at 1% level of significance. Based on the findings of the study, it was recommended that corporate organizations should be social responsible and environmental friendly since environmental friendly and social responsible firms are more sustainable. Also sustainability of a company's current life is largely determined by the company's ability to manage social and environmental performance.
Keywords: Carbon Emission Disclosure, Leverage, Firms Size, Sustainability
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1.0 Introduction

Global warming has been a major and topical issue that attracts attention and public concerns towards disasters it caused that could jeopardize the life of living creatures which remains a global burning issue. The National Aeronautics and Space Administration (NASA), observed that earth temperature has uninterruptedly increased from January to September 2016, while the earth temperature has touched the warmest level for 35 years. Definitely, global warming is a phenomenon of snowballing global temperature because of greenhouse gas effect produced by increased emissions of gases such as carbon dioxide (CO2), methane (CH4), chlorofluorocarbons (CFC) and dinitrogen oxide (N2O), which cause solar energy being trapped in the atmosphere (Riebeek 2010).

The increasing danger in global warming is driven by greenhouse gas emissions produced by human actions. However, CO2 emission released through human activities has been the most dangerous increase in greenhouse gases, such as deforestation, fossil fuel use, increased industrial quantities and natural processes including respiration and volcanic eruptions. Undesirably, our planet capability to process this waste has been greatly deteriorated by widespread of more destruction of the world's forests. Based on this, there are high carbon emissions in Nigeria which are not equivalent with the disclosure of the environment in Nigeria companies. World Bank through low-carbon development shows that Nigerian companies have low environmental disclosure with average of 20% on oil and gas companies' carbon emissions disclosure which calls for reinvestigation.

World Resources Institute (WRI) on its official website stated that Nigeria ranks 90th world largest contributing country of carbon emissions in 2019, after United States, European Union, China, India and Russia. This phenomenon caused the perceptibility of awareness of business actors towards environmental. The environmental impacts of the company's activities have been regulated by the Financial Accounting Standards. The oil and gas sector has historically been one of the main sources of greenhouse gas (GHG) emissions in Nigeria. Estimated annual emissions in 2010 were approximately 90 million metric tons carbon dioxide equivalent (Mt CO2e) per year, of which the dominant source is gas flaring. The other major sources are on-site use of gas (mainly for power generation) for operating oil and gas production, transportation, and processing facilities; fugitive emissions of gas through leaks and other losses; and venting of gas from oil reduction. Under the low-carbon scenario, GHG emissions are significantly reduced, with better utilization of Nigeria's gas resources through reduced waste of AG. The total potential abatement over the 2010–35 period is estimated to be 750 Mt CO2e (Raffaello, John & Max, 2013).

However, carbon emissions disclosure practice in Nigeria is mainly voluntary disclosure. According to Omaliko, Nwadialor and Nweze (2020), carbon emission disclosures has attracted considerable interest from a number of key stakeholders such as the United Nations Global Compact, the Global Reporting Initiative (GRI), the International Integrated Reporting Council (IIRC), the Sustainability Accounting Standards Board (SASB), the Task Force on Climate-related Financial Disclosures (TFCD) and European Commission Guidelines.

Previous research on carbon emission disclosures in both developed and developing nations showed inconsistent and mixed results. Thus, researchers are interested to elaborate more on the subject matter especially in the developing nations were little or no study had concentrated on. For instance, Bae, Lee and Psaros (2013) reported that leverage and profitability are not affected by carbon emissions disclosure, while firm size, industry type, carbon emission level, and quality of corporate governance have significant relation with carbon emission disclosure. Similar result was gotten from the work of Jannah and Muid (2014) who analyzed factors that influence carbon emission disclosure in Indonesian companies. The study found that carbon emission disclosure has negative impact on firms leverage. Moreover, environmental performance in their study demonstrated no significant association with carbon emissions disclosure.

Akhiroh and Kiswanto (2016) on the same note executed a research on determinant of carbon emission disclosure. Results indicated that profitability, organizational visibility, managerial ownership and audit committee have significant and positive association with carbon emission disclosures, while environmental performance, financial distress, institutional ownership, and independent commissioners have no association with carbon emission disclosure. Also, Omaliko and Okpala (2020) reported that environmental friendly firms are more sustainable and also pay higher dividend than non environmental friendly firms. Thus, conflicting and mixed results were found on the impact of carbon emission disclosures on firms' characteristics which calls for further clarity.

Also some corporations in developing countries are becoming conscious of their international market and are creating appreciable effort especially as regards to environmental practices. The result of sampled industries in Nigeria shows that few companies are becoming social responsible and environmental friendly (Omaliko Nweze and Nwadialor, 2020). However a large number of firms are still apathetic about their environmental and social responsibility as they are unaware of the connection between carbon emission disclosures and their performance.

Based on this observation, this study considered it imperative to examine the relationship between carbon emission disclosures and firms sustainability. Thus, the study examined the effect of carbon emission disclosure on sustainability of oil and gas firms in Nigeria with data spanning from 2015-2020 which no recent study had focused on.

1.1 Objective of the Study

The aim of this study is to examine the effect of carbon emission disclosures on sustainability of oil and gas firms in Nigeria. The specific objectives include; to

1. determine the effect of Carbon Emission Disclosures on Leverage of oil and gas Firms in Nigeria.
2. ascertain the effect of Carbon Emission Disclosures on Size of oil and gas Firms in Nigeria.

1.2 Research Questions

Three research questions established for the study is as follows:

1. To what extent does Carbon Emissions Disclosures affect the Leverage of oil and gas firm in Nigeria?
2. What is the effect of Carbon Emission Disclosures on Size of oil and gas firms in Nigeria?

1.3 Research Hypothesis

In order to direct the direct flow of this study, the following hypothesis were formulated in line with objectives of the study

H_{01}: Carbon Emission Disclosures has no significant effect on Leverage of oil and gas firm in Nigeria.
H_{02}: Carbon Emission Disclosures has no significant effect on the Size of oil and gas firm in Nigeria.

2.0 Review of Related Literature

2.1.1 Carbon Emission Disclosure

According to Carbon Emissions and Greenhouse Gases Based on the United States Environmental Protection Agency (EPA), is a disclosure on greenhouse gas which is a gas that may be trapping heat in the earth's atmosphere so that the heat of the sun reflected by the earth's surface is caught by the gas and cannot get out of the atmosphere. The buildup of these gases makes the rising rays infrared reflected earth and lead to a rise in temperature of the earth's surface. These gases include carbon dioxide (CO2), methane (CH4), dinitrogen oxide (N2O), hydrofluorocarbon (HFC), perfluorocarbon (PFC), and sulfur hexafluoride (SF6). Carbon emissions are distinguished into two, namely the natural carbon gas and the carbon gas, which comes from human activities, or may also be referred to as the carbon gas industry (Gayo & Vera, 2020).

According to Ecolife.com, carbon emissions are carbon release to the atmosphere. It is associated with greenhouse gas emissions, the main contributor to climate change. CO2 emissions from time to time continue to increase both at the global, regional, national to a state or local to an area. This happens because of the growing use of energy from organic materials (fossil), land use change and forest fires, as well as the increase in anthropogenic (Diah & Efita, 2016). The study also noted that one contributor to the carbon footprint is the operational activities of the company. Companies in the face of climate change are expected to disclose their activities that contribute to the improvement of climate change. Such disclosures are referred to as carbon emission disclosure.

According to Mohammad, Aisa and Indah (2020), companies' carbon emission disclosures include community environment, business environment, and government pressuring the companies to respond to the threats of environmental sustainability resulting from the effects of extreme climate changes. Companies can respond to this demand by disclosing the carbon emissions produced from their operational activities. The stakeholders may consider that carbon emission disclosure is a form of corporate responsibility in responding to the demand for reducing the impacts of environmental damage.

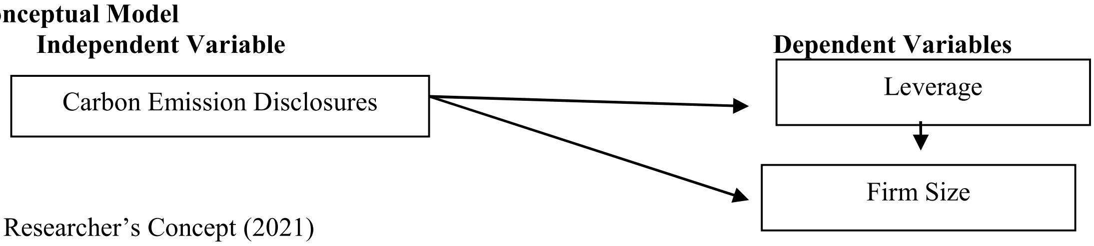
2.1.2 Leverage

Financial leverage can be described as the extent to which a business or investor is using borrowed money. Leverage is a measure of how much firm uses equity and debt to finance its assets. As debt increases, financial leverage also increases. It has also been seen in different studies that financial leverage has relationship with financial performance (Sayed, 2013).

2.1.3 Firm Size

The nature of the relationship between firm size and financial performance has received considerable attention in the literature and has motivated strong debate. Several arguments favor larger firm size in attaining higher performance. Large firms are more likely to exploit economies of scale and enjoy higher negotiation power over their clients and suppliers (Serrasqueiro & Nunes).

2.1.4 Conceptual Model



Source: Researcher's Concept (2021)

2.2 Theoretical Framework

2.2.1 The Legitimacy Theory

This study employs legitimacy theory as a theoretical framework. This theory was propounded by Donavan in the year 1984. The legitimacy theory presents two basic ideas whereby corporate organizations need to legitimize their activities and this legitimacy process provides benefits to the organization. Disclosing Quality Non Financial Information is a way for companies to legitimize their activities which in this regard is carbon emission disclosures. The benefit from the legitimacy process is represented on firm's sustainability. Legitimacy theory presumed that a corporation will act to ensure that its activities and actions were congruent with whom it believed has the necessary attributes to affect the corporation's image and ultimately, existence (Donavan, 1984).

Suchman (1995) described legitimacy theory as a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs and definitions. Using the legitimacy perspective, firms voluntarily disclose carbon emission disclosures to show that they are conforming to the expectations and values of the society within which they operate. According to Guthrie and Parker (2009), they argue that if the legitimacy explanation holds true, the corporate disclosure policies will react to major social and environmental events.

On the other hand, the theory suggests that social expectations no longer rests upon mere generation of profit but has broadened to include local communities as well as concern for the natural environment. Therefore, firms need to provide voluntary information to meet the broad expectations of society relating to the treatment of the natural environment. Hence the study is anchored on Legitimacy theory.

Also Information asymmetry occurred when management has information on a company that is not owned by an outsider. Therefore, companies are expected to make voluntary disclosures about company information, such as environmental issues which in this case is carbon emissions disclosure. By doing this, it is expected to minimize information asymmetry between agents and principals.

Empirical Studies

Healy and Palepu (2001) claimed that voluntary disclosure by companies can improve their financial statements quality; therefore, potential investors are willing to invest. When a company discloses its carbon emissions, then it can be considered responsible for its environment. As such, the company is able to increase its stakeholders' confidence, which will also increase its business profit that ensures sustainability. This study explains that the more companies in Indonesia disclose their carbon emissions, the more they will be considered capable to utilise their energy resources efficiently, by reducing greenhouse gas emissions and protecting ecological balance.

In Indonesia, study conducted by Siregar and Deswanto (2018) found that environmental disclosures do not affect the firm value. Saka and Oshika (2014) examined the interaction between GHG emissions disclosure and environmental performance on firm value. The study found that the greater the volume of GHG emissions (environmental performance), the stronger the positive effect of GHG emissions disclosure on firm value.

According to Ennis, Kottwitz, Lin and Markusson (2012), companies that disclose their carbon emissions should enable the stakeholders to make decisions regarding the companies' condition of carbon emissions performance, encourage companies to reduce their carbon emissions, give contribution to public debates of policies, as well as regulations on climate change. Anggraeni (2015) showed that environmental performance does not affect the relationship between GHG emissions disclosure and firm value. Based on the explanation, this study assumes that the PROPER rating can moderate the effect between GHG information disclosure and firm value.

Cucchiella, Gastaldi, and Miliacca (2017) argue that good environmental management activities (waste management, water consumption, controlling GHG emissions, refining waste and so on) can lead to saving firms' resources, increasing productivity and income, and ultimately the value of the firm. The sample of research by Bae, Lee and Psaros (2013), on carbon emissions disclosure in Australian companies showed that leverage and profitability are not affected by carbon emission disclosures, while firm size, industry type, carbon emission level, and quality of corporate governance have significant association with carbon emission disclosure.

Similar result was gotten from the work of Jannah and Muid (2014) who analyzed factors that influence carbon emission disclosure in Indonesian companies. The study found that leverage has significant and negative effect on carbon emission disclosure, whereas firm size, profitability, media exposure and industry type have significant and positive impact. Additionally, environmental performance in their study demonstrated no significant effect on carbon emissions disclosure.

Akhiroh and Kiswanto (2016) executed a research on determinant of carbon emission disclosure. Results indicated that profitability, organizational visibility, managerial ownership and audit committee have significant and positive association with carbon emission disclosures, while environmental performance, financial distress, institutional ownership, and independent commissioners have no association with carbon emission disclosures.

Lee and Min (2015) evaluated the effect of green research and development investment on environmental and financial performance using Japanese manufacturing companies (from 2001 to 2010). The study reported a negative relationship between green research and development investment and carbon emissions. The study concluded that companies must control emissions to acquire high financial performance.

Gallego-Álvarez, Segura, Martínez-Ferrero (2015) examined the influence of carbon emissions on corporate financial performance of 89 companies for the period 2006–2009 and posited that a reduction of carbon emissions increased corporate financial returns.

Omaliko and Okpala (2020) examined the effect of environmental disclosures on dividend payout of firms in Nigeria. Using regression model, the study found that environmental friendly firms are more sustainable and also pay higher dividend than non environmental friendly firms.

3.0 Methodology

The research design used in this study is Ex Post Facto Design. Ex Post Facto Design was used in order to examine the effect of carbon emission disclosures on sustainability of oil and gas Firms quoted on Nigerian Stock Exchange (NSE). Oil and gas firms quoted on Nigerian Stock Exchange (NSE) which engaged on downstream activities and as well disclose carbon emission during 2015-2020 is 12 in number as at 2021 business list. It ranges from Ardova Plc, Conoil Plc, Oando Plc, Japaul Oil Plc, Seplat Oil Plc, Mrs Oil Plc, Total Oil Nig Plc, Amino International Plc, Rak Unity Pet Plc, Capital Oil Plc, 11 Plc to Eternal Plc.

Data for the study were obtained from the NSE Factbook, Annual Reports & Accounts and Sustainability Reports of the firms. The collected data were analyzed OLS Regression Model using SPSS Statistical package V.20

3.1 Operationalization and Measurement of Variables

The dependent variable in this study is leverage and firm size and it were proxy using the variables as shown on the table below:

Table 1: Variable Measurements

S/N	VARIABLES	FORMULA
	Dependent	
1	Leverage	**LEV:** Total Debts / Total Assets
2	Firm Size	**FS:** Log of Total Assets
	Independent	
1	Carbon Emission Disclosure	Measured based on the Guideline of GRI G4 Disclosure Index.

Source: Empirical Survey (2021)

3.2 Model Specification and Justification

The study adapted and modified the model of Mohammad and Aisa (2020) as shown below;

Mohammad and Aisa (2020): $FV = \beta_0 + \beta_1 CED + \beta_2 TI + \beta_3 PRO + \beta_4 LEV + \mu$ ……….1

The modified model for the study is shown as thus:

$LEV_t = \beta_0 + \beta_1 CED_t + \mu$ …………………………………………………………… II

$FS_t = \beta_0 + \beta_1 CED_t + \mu$ ………………………………………………………………… III

Where:

FV = Firm Value
CED = Carbon Emission Disclosures
PRO = Profitability
LEV= Leverage
FS = Firm Size
μ = error term

Decision Rule:

The generally expected criterion for decisions is stated below as:
Ho (null hypothesis) will be accepted if the P-value is greater than the 5% significant adopted as a standard and to be rejected where the P-value is less than the 5% significant adopted. i.e. where P > 5% we accept null hypothesis and where P < 5%, we reject null hypothesis.

4.0: Data Presentation

The data (i.e variables) needed for the study were shown on table 2 and were used in the data analysis of the study.

Table 2: The Data Summary of the 12 Oil & Gas Firms Quoted on Nigerian Stock Exchange

S/N	Company	Average	Carbon Emission Disclosures	Leverage	Log Firms Size
1	Ardova Plc	2015-2020	0.8	0.6275	14.5300
2	Conoil Plc	2015-2020	2	0.7732	10.2485
3	Oando Plc	2015-2020	2	0.8092	14.1956
4	Japaul Oil Plc	2015-2020	0.8	1.3232	9.10848
5	Seplat Pet Plc	2015-2020	1	0.4150	13.8987
6	Total Oil PLc	2015-2020	1.3	0.7353	14.0875
7	Amino Intl Plc	2015-2020	0.9	0.1227	12.1850
8	Rak Unity Plc	2015-2020	1.1	0.6077	12.0735
9	Capital Oil Plc	2015-2020	0.9	0.6917	12.0445
10	11 Plc	2015-2020	0.9	0.6357	11.9878
11	Mrs Oil Plc	2015-2020	2	0.6665	11.8907
12	Eternal Oil Plc	2015-2020	2	0.6550	11.9465

Source: Compiled from the NSE Factbook and Annual Reports and Accounts of Oil & Gas Firms on NSE for the year ended 2015-2020.

4.1: Test of Hypotheses

OLS Statistical Test Tool was developed to test the linear relationship between the dependent and independent variables. It was operated using SPSS version 20 as shown on the tables below:

Table 3: Result on effect of Carbon Emission Disclosures on Leverage of Oil and Gas Firms in Nigeria.

Model Summary[c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	0.760[a]	0.680	0.650	1.0002	0.540	7.078	1	70	0.000	[b]2.086

a. Predictors: (Constant), CEDs
b. Dependent Variable: LEV

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.483	.409		5.083	.000		
	CEDs	-.678	.351	-.327	-4.823	.000	1.000	1.000

a. Dependent Variable: LEV

Table 4: Result on effect of Carbon Emission Disclosures on the Size of Oil and Gas Firms in Nigeria.

Model Summary[c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	0.670[a]	0.610	0.580	.67000	0.530	20.436	1	70	0.000	[b]2.435

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.614	.343		3.246	.002		
	CEDs	.554	.105	.475	4.521	.000	1.000	1.000

a. Dependent Variable: FS

a. Predictors: (Constant), CEDs

b. Dependent Variable: FS

4.2: Discussion of Findings

The result of the analysis of the study using OLS Regression operated with SPSS version 20 is expressed as follows:

H_{01}: Carbon Emission Disclosure has no significant effect on Leverage of Oil and Gas Firms in Nigeria.

In view of the above analysis as shown on table 3, the results indicates that the relationship between Carbon Emission Disclosures and Firms Leverage is negative and significant with a P-value (significance) of 0.000 which is less than the 1% level of significance adopted. Likewise the result of negative coefficient of -67.8% for the model is proving that an increase in firm's level of disclosure on Carbon Emission decreases firms leverage by 67.8%. Thus implies that environmental friendly firms are equity intensive (less debt intensive). By this implication, environmentally friendly firms are more sustainable.

Based on this, we rejected the null hypothesis and accepted alternate hypothesis which contends that Carbon Emission Disclosure has significant effect on Firms Leverage. This agrees with the apriori expectations of Cucchiella, Gastaldi, and Miliacca (2017) and Omaliko and Okpala (2020) who found significant and positive relationship between the variables. Bae, Lee and Psaros (2013), Jannah and Muid (2014) and Anggraeni (2015) on the other hand found insignificant and negative relationship between carbon emission disclosures and firms performance.

H_{02}: Carbon Emission Disclosure has no significant effect on the Size of Oil and Gas Firms in Nigeria.

In view of the above analysis as shown on table 4, the results indicates that the relationship between Carbon Emission Disclosures and Firms Size is positive and significant with a P-value (significance) of 0.000 which is less than the 1% level of significance adopted. This could be verified with the positive coefficient of 55.4% for the model which indicates that an increase in firm's level of disclosure on Carbon Emission as other variables are been held constant increases firms size by 55.4%. Thus implies that environmental friendly firms are more sustainable than firms that are not environmental friendly. Also, the size of a firm is determined by its sustainability. This agrees with the Stakeholders Theory which states that the purpose of every firm is to make profit but the profit could not be attained or be attainable if the environment is been neglected.

Based on this, we rejected the null hypothesis and accepted alternate hypothesis which contends that Carbon Emission Disclosure has significant effect on Firms Size. This is in consonance with the findings of Jannah and Muid (2014) and Gallego-Álvarez, Segura, Martínez-Ferrero (2015) who found that carbon emission disclosure has significant and positive impact on firm size.

5.1 Conclusion

Global warming has been a major and topical issue that attracts attention and public concerns towards disasters it caused that could jeopardize the life of living creatures which remains a global burning issue. The increasing danger in global warming is driven by greenhouse gas emissions produced by human actions. However, corporate's carbon emission disclosures include community environment, business environment, and government pressuring the companies to respond to the threats of environmental sustainability resulting from the effects of extreme climate changes. Hence, the study from the statistical analysis concludes that Carbon Emission Disclosures have significant and positive effect on sustainability of oil and gas firms in Nigeria.

5.2: Recommendation

Based on findings of the study, the following recommendations are suggested:

1. Since the study reported a significant association between carbon emission disclosures and firms leverage, it was recommended that corporate organizations should indulge on environmental practices since environmental friendly firms are more sustainable. Also, more of this information disclosure should be made available in the financial reporting of firms for financial information users' consumption. As such, the company is able to increase its stakeholders' confidence, which will also increase its business profit that ensures sustainability
2. Corporate organizations should also be social responsible since the study reported a positive and significant association between carbon emission disclosure and firms size. Also the study shows that sustainability of a company's current life is largely determined by the company's ability to manage economic performance and social performance. Hence, more of carbon emission disclosures should also be made available in financial reporting of firms since firm size is determined by its sustainability.

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