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## DETERMINANTS OF CORPORATE ENVIRONMENTAL PERFORMANCE OF OIL AND GAS FIRMS LISTED ON NIGERIAN STOCK EXCHANGE

**Onyali, Chidiebele Innocent**

**Uchegbu, Callista Ukamaka**

Department of Accountancy, Faculty of Management Sciences, Nnamdi Azikiwe University  
Awka, Anambra State, Nigeria

### **Abstract**

*The study examined the determinants of environmental performance of Oil and Gas firms listed on Nigerian Stock Exchange. Specifically, the study examined the effect of firm size, firm profitability, firm leverage and firm liquidity on waste management expenditure of the oil and gas firms over a ten year period that covered 2010-2019 accounting years. The study applied an ex-post facto research design using a population of eleven (11) oil and gas firms that are listed on the Nigerian Stock Exchange (NSE). Seven (7) companies were sampled and the data collected for a ten year period were analyzed using Ordinary Least Square regression. The findings of the study indicated that firm size, firm profitability, firm leverage and firm liquidity significantly influenced annual waste management expenditure of listed oil and gas firms in Nigeria. The study therefore recommended that Government should make environmental performance disclosure mandatory rather than voluntary since it has become important for firms to incorporate governance, social and environmental issues in their business strategies.*

**Keywords:** Environment; Environmental Performance; Costs; Performance

## Introduction

There has been a rise in environmental consciousness as is shown by the increased clarion call by stakeholders for firms to account for the environmental impact of their activities (Atang & Eyisi, 2020). The global attention paid to environmental consciousness and man's ability to destroy the environment while exploiting natural resources began in the 19th century. This anxiety was promulgated in the increased successive international conferences and also in agreements that date back to the sixties (Lamidi, Adesola & Tariro, 2020). According to Atang and Eyisi (2020), the concern for environmental issues such as waste management and disposal, gas emissions, safety of the ozone layer and climate change is now an evolving task in present-day business operation and activities that has made firms seek to re-structure their overall performance indicators in such a way as to incorporate environmental issues as cognate part of their standard strategic objective.

The attention that is now paid to firms' consciousness for the natural environment is not just about a particular country or region but a global campaign for environmental sustainability which stresses that there is a need to protect and preserve the environment for future generation. Thus, stakeholders, nowadays, are not only concerned about the economic profitability of firms but are also increasingly interested in the social, environmental and human capital resources issues of the firm (Usman, 2019). Though corporate performance of firms is influenced by its economic achievements, firm efficiency in the discharge of its responsibilities towards the natural environment and social dimension is a significant area of concern in today's business world. This is because profiteering is only a part of total corporate performance; and developments such as the replacement of the concept of shareholders with stakeholders, coupled with the increase in societal awareness regarding the relevance of natural and environmental resources, have altogether mounted some level of pressure on firms to disclosure information about the impact of their activities on natural and environmental resources. In response to this societal pressure for sustainability reporting, firms all over the world have for long begun to seek for veritable ways by which they can reduce the negative impacts of their operational activities on the environment vis-à-vis corporate environmental management (Kiswanto, Woro & Ulupui, 2020; Abdulsalam & Auwal, 2020; Shaibu, 2020).

Environmental performance refers to the extent to which a firm contributes to the global match of protecting and preserving the environment. It reports the impacts of the firm's activities on natural environment which could be waste management, carbon management, recycling, emission control, wetland conservation, pollution, and wildlife conservation (Ahmed & Moses, 2020; Gatimbu & Wabwire, 2016). Firms vehemently exploit natural resources in their operations which, by extension, create some environmental problems that cut across erosion of natural resources, pollution problems and host of other environmental hazards.

In as much as firms seek to satisfy the demands of shareholders, the needs of future generations must not be compromised. In Nigeria for instance, it is a necessity that Oil and Gas firms should be mindful of the environmental impacts of their operational engagements in order not to cause huge environmental damages and hazards. Oil and Gas firms in Nigeria, just like every other business, are situated, and carry-out their business operations within the society and in the environment. In line with the stakeholder theory, it is the society that provides employees, suppliers, customers, and the environment which is conducive for the firms to carry-on their business (Etale, Ikechukwu & Ayaundu, 2021). This is why it is ideal that these Oil and Gas firms meet the needs of the society through various sustainability

practices including imbibing practices that reduce environmental damages, pollution and hazards.

The process of crude oil exploration and drilling produces numerous environmental consequences that have been a source of disturbing concern to various stakeholders such as environmentalists, farmers, regulatory agencies, activists, and green investors. There are highly hazardous environmental consequences of Oil and Gas operation in Nigeria which include land degradation, air pollution, depletion of the ozone layer, oil spillage, deforestation, loss of biodiversity, and water pollution from effluent discharge. Particularly, the Niger Delta environs have been greatly hampered by this environmentally hazardous process of crude oil prospecting and exploration (Adegbe & Olubunmi, 2020).

According to Abdulsalam and Auwal (2020), the question of whether Oil and Gas firms in Nigeria perform excellently well in terms of their environmental responsibility or not can be influenced by firm attributes such as firm leverage, firm size, firm sales growth, firm profitability, firm industry type, etc. Extant literature posits that firm-intrinsic attributes have the potential of influencing the environmental performance of corporate entities who utilize the resources available to them to integrate practices that help protect and preserve the environment against hazardous corporate activities (Abdulsalam & Auwal, 2020; Shaibu, 2020; Oluwamayowa, 2020). Thus, only firms that have adequate structural attributes are able to minimize the extent of such damages triggered by environmental irresponsibility. Therefore, this study in the light of the above, investigates the effect of firm size, firm profitability, firm leverage and firm liquidity on environmental performance of oil and gas firms in Nigeria.

### **Objectives of the Study**

The broad objective of the study is to examine the determinants of environmental performance of Oil and Gas firms that are listed on the Nigerian Stock Exchange. The study specifically seeks to:

1. Ascertain the effect of firm leverage on waste management expenditure of Oil and Gas firms listed on Nigerian Stock Exchange.
2. Determine the effect of firm liquidity on waste management expenditure of Oil and Gas firms listed on Nigerian Stock Exchange.
3. Examine the effect of firm size on waste management expenditure of Oil and Gas firms listed on Nigerian Stock Exchange.
4. Determine the effect of firm profitability on waste management expenditure of Oil and Gas firms listed on Nigerian Stock Exchange.

### **Research Hypotheses**

The following null hypotheses were formulated to guide the study:

1. Firm leverage has no significant effect on waste management expenditure of Oil and Gas firms listed on Nigerian Stock Exchange.
2. Firm liquidity does not significantly affect waste management expenditure of Oil and Gas firms listed on Nigerian Stock Exchange.
3. Firm size does not significantly influence waste management expenditure of Oil and Gas firms listed on Nigerian Stock Exchange.

4. Firm profitability has no significant effect on the waste management expenditure of Oil and Gas firms that are quoted on the Nigerian Stock Exchange.

### Methodology

Ex-post facto research design was used for this study. This design was considered appropriate based on the fact that already existing secondary data were applied in the study to examine the determinants of corporate environmental performance of listed Oil and Gas firm on the Nigerian Stock Exchange. This design was also utilized considering the fact that the study used a historical data since the event under investigation has already taken place.

The Population of this study consists of all the eleven (11) oil and gas firms that are listed on the Nigerian Stock Exchange (NSE) as at 31st March 2021. The listed firms are as follows: Ardova Plc., 11 Plc., Capital Oil Plc., Conoil Plc., Eterna Plc., Japaul Oil & Maritime Services Plc., MRS Oil Nigeria Plc., Oando Plc., Rak Unity Pet. Company Plc., Seplat Petroleum Development Company Plc., and Total Nigeria Plc.

Using purposive sampling technique based on the condition that the firms must have (a) been listed for a 10 year period of interest spanning from 2010-2019 and (b) must have uploaded its 10 year annual reports on NSE website, five (5) firms were used as the sample size of the study. Hence, the following firms met the criteria for the sample selection: Conoil Plc., Ardova Plc., MRS Oil Nigeria Plc., Oando Plc., and Total Nigeria Plc.

This research was conducted using secondary data obtained from annual reports of the sampled companies over the period of interest which spanned from 2010-2019.

The ordinary Least Squares (OLS) technique was used to estimate the model and test the null hypotheses developed with the aid of STATA 14 software. The model for this study is stated thus:

$$CEP = f(FSiz + FProf + FLev + FLiq) \dots\dots\dots (i)$$

Econometrically, the above equation becomes:

$$CEP_{it} = \alpha_0 + \beta_1 FLev_{it} + \mu_{it} \dots\dots\dots eq ii$$

$$CEP_{it} = \alpha_0 + \beta_1 FLiq_{it} + \mu_{it} \dots\dots\dots eq iii$$

$$CEP_{it} = \alpha_0 + \beta_1 FSiz_{it} + \mu_{it} \dots\dots\dots eq iv$$

$$CEP_{it} = \alpha_0 + \beta_1 FProf_{it} + \mu_{it} \dots\dots\dots eq v$$

Where,

$\alpha$  = constant

$\beta$  = coefficient of the independent variable

$CEP_{it}$  = Corporate Environmental Performance of firm  $i$  in year  $t$

$FLev_{it}$  = Leverage of firm  $i$  in year  $t$

$FLiq$  = Liquidity of firm  $i$  in year  $t$

FSiz = Size of firm  $i$  in year  $t$

FProf = Profitability of firm  $i$  in year  $t$

$\mu$  = Stochastic term

The operational description of the research variables are given as follows:

Name Variable	Acronym	Type of Variable	Description
1. Firm Leverage	FLev	Independent	$\frac{\text{Total Debt}}{\text{Total Equity}}$
2. Firm Liquidity	FLiq	Independent	$\frac{\text{Current Assets}}{\text{Current Liabilities}}$
3. Firm Size	FSiz	Independent	Natural Log of firm's total assets
4. Firm Profitability	FProf	Independent	$\frac{\text{Earnings After Tax}}{\text{Total Revenue}}$
5. Corporate Environmental Performance	CEP	Dependent	Natural Log of Waste Management Cost of the Firm

**Source: Researcher's Compilation, 2021**

The test of hypotheses was carried out at 5% level of significance. Thus, null hypothesis is rejected when the p-value is less than 5%; otherwise, we accept the null hypotheses and reject the alternate hypotheses.

### Data Analysis

In order to undertake the statistical analysis on the quantitative data gathered, STATA Version 14 was used to generate the descriptive statistics of the variables. The firm size, firm profitability, firm leverage, firm liquidity and waste management cost are summarily presented below.

### Descriptive Statistics of Data

Variable	Obs	Mean	Std. Dev.	Min	Max
CEP	50	218329.7	283834.6	0	1784245
FLev	50	3.543741	3.49274	-4.881254	21.35047
FLiq	50	1.109212	.2603793	.6698222	1.982707
FSiz	50	7.934851	.2506674	7.573614	8.462122
FProf	50	-.0509942	1.262044	-3.978709	6.294989

**Source: Stata Output, 2021**

From the descriptive statistics above, for all the 50 observation, the average of Corporate Environmental Performance (proxy by waste management cost) was ₦218,329.7 with a minimum value of 0, maximum 1784245, with a standard deviation of 283834.6. This shows that on the average, the listed oil and gas firms had an appreciable rate of environmental performance since majority of the firms are in the right distribution of CEP. Similarly the Firm Leverage (FLev) with a mean value of 3.54, minimum of -4.88 and maximum of 21.35 with a standard deviation of 3.49. Also the average of Firm Liquidity (FLiq) is approximately 1.11 with a minimum value of 0.6698, maximum value of 1.98 with a standard deviation of 0.260. This shows that on the average, the listed firms had a normally distributed current ratio since the small standard deviation indicates there is some homogeneity in the Firm Liquidity of the sampled firms.

Meanwhile, Firm Size (FSiz) average statistic value is 7.93 with a minimum value of 7.57, maximum value of 8.46 and a standard deviation of 0.25. This shows that the size of the sampled oil and gas firms are not heterogeneous. Finally, Firm Profitability (FProf) average statistics is -0.051, with a minimum value of -3.98, maximum value of 6.29 with a standard deviation of 1.26. This shows that on the average, the listed oil and gas firms had a negative NPM.

## Test of Hypotheses

### Hypothesis One

**H<sub>01</sub>:** Firm leverage has no significant effect on waste management expenditure of Oil and Gas firms listed on Nigerian Stock Exchange.

**H<sub>A1</sub>:** Firm leverage has significant effect on waste management expenditure of Oil and Gas firms listed on Nigerian Stock Exchange.

### Result of Test of Hypothesis I

Source	SS	df	MS	Number of obs=	50
-----+-----				F(1, 48)	= 4.38
Model	.127153614	1	.127153614	Prob> F	= 0.0380
Residual	15.5246464	48	.330311625	R-squared	= 0.1981
-----+-----				Adj R-squared	= -0.0630
Total	15.6518	49	.326079167	Root MSE	= .57473

CEP	Coef.	Std. Err.	t	P> t	Beta
-----+-----					
FLev	.0146151	.0235559	2.62	0.038	.445084
_cons	5.049172	.1176218	42.93	0.000	.

Source: Stata Output, 2021

### Result Interpretation

From the above result of test of hypothesis 1, the Prob> F in the model is 0.038, which suggest strong overall fitness of the model. Also, R<sup>2</sup> which shows the amount of variance in the dependent variables that is explained by the explanatory variables is 19.81%. The regression table shows that the effect of firm leverage on environmental performance is positive and significant ( $\beta_1 = 0.4451$ , t-value = 2.62, p-value = 0.038). Meanwhile, the t-value tests the hypothesis that the coefficient is different from 0. The constant (alpha) in the model means that if the independent variable, Firm Leverage, is zero, Environmental Performance of the firm will be 5.0492.

The test of hypothesis was carried out at 5% level of significance. Thus, the null hypothesis is rejected when the p-value is less than 5%. Since the p-value (0.038) is less than 0.05, the alternate hypothesis; Firm leverage has significant effect on waste management expenditure of Oil and Gas firms listed on Nigerian Stock Exchange is accepted.

### Hypothesis Two

**H<sub>02</sub>:** Firm liquidity does not significantly affect waste management expenditure of Oil and Gas firms listed on Nigerian Stock Exchange.

**HA<sub>2</sub>:** Firm liquidity significantly affects waste management expenditure of Oil and Gas firms listed on Nigerian Stock Exchange.

**Result of Test of Hypothesis II**

Source	SS	df	MS	Number of obs=	50		
-----+-----				F(1, 48)	=	4.48	
Model	1.36313475	1	1.36313475	Prob> F	=	0.0395	
Residual	14.2886653	48	.304014154	R-squared	=	0.0871	
-----+-----				Adj R-squared	=	0.0677	
Total	15.6518	49	.326079167	Root MSE	=	.55137	

CEP	Coef.	Std. Err.	t	P> t	Beta
-----+-----					
FLiq	.6907402	.3262062	2.12	0.040	.2951123
_cons	5.858089	.3659159	16.01	0.000	.

**Source: Stata Output, 2021**

**Result Interpretation**

The regression result for the model above shows that the Prob> F in the model is 0.0395, which suggest strong overall fitness of the model. Also, R<sup>2</sup> which shows the amount of variance in the dependent variables that is explained by the explanatory variables is 8.71%. The regression table shows that the effect of firm liquidity on environmental performance is positive and significant ( $\beta_1 = 0.2951$ , t-value = 2.12, p-value = 0.0395). Meanwhile, the t-value tests the hypothesis that the coefficient is different from 0. The constant (alpha) in the model means that if the independent variable, Firm Liquidity, is zero, Environmental Performance of the firm will be 5.8581.

The test of hypotheses was carried out at 5% level of significance. Thus, the null hypothesis is rejected when the p-value is less than 5%. Since the p-value (0.0395) is less than 0.05, the alternate hypothesis which states that Firm liquidity significantly affects waste management expenditure of Oil and Gas firms listed on Nigerian Stock Exchange is accepted.

**Hypothesis Three**

**H<sub>03</sub>:** Firm size does not significantly influence waste management expenditure of Oil and Gas firms listed on Nigerian Stock Exchange.

**HA<sub>3</sub>:** Firm size significantly influences waste management expenditure of Oil and Gas firms listed on Nigerian Stock Exchange.

**Result of Test of Hypothesis III**

Source	SS	df	MS	Number of obs=	50
Model	1.3320312	1	1.3320312	F(1, 48)	= 4.37
Residual	14.3197688	48	.304675932	Prob> F	= 0.0420
				R-squared	= 0.0951
				Adj R-squared	= 0.0656
Total	15.6518	49	.326079167	Root MSE	= .55197

CEP	Coef.	Std. Err.	t	P> t	Beta
FSiz	.6653784	.3182223	2.09	0.042	.3083829
_cons	-.1746883	2.524575	-0.07	0.945	.

Source: Stata Output, 2021

**Result Interpretation**

The Prob> F in the model result above is 0.0420, which suggest strong overall fitness of the model. Also, R<sup>2</sup> which shows the amount of variance in the dependent variables that is explained by the explanatory variables is 8.71%. The regression table shows that the effect of firm size on environmental performance is positive and significant ( $\beta_1 = 0.3084$ , t-value = 2.09, p-value = 0.0420). Meanwhile, the t-value tests the hypothesis that the coefficient is different from 0. The constant (alpha) in the model means that if the independent variable, Firm Size, is zero, Environmental Performance of the firm will be -0.1747.

The test of hypotheses was carried out at 5% level of significance. Thus, the null hypothesis is rejected when the p-value is less than 5%. Since the p-value (0.0420) is less than 0.05, the researcher rejects the null hypothesis and accepts the alternate hypothesis that Firm size significantly influences waste management expenditure of Oil and Gas firms listed on Nigerian Stock Exchange.

**Hypothesis Four**

**H<sub>04</sub>:** Firm profitability has no significant effect on the waste management expenditure of Oil and Gas firms that are listed on Nigerian Stock Exchange.

**H<sub>A4</sub>:** Firm profitability has significant effect on the waste management expenditure of Oil and Gas firms that are listed on Nigerian Stock Exchange.

**Result of Test of Hypothesis IV**

Source	SS	df	MS	Number of obs=		
				50	F(1, 48)	= 1.09
Model	.353707316	1	.353707316		Prob> F	= 0.0200
Residual	15.2640243	48	.324766475		R-squared	= 0.026
					Adj R-squared	= 0.0019
Total	15.6177317	49	.325369409		Root MSE	= .56988

CEP	Coef.	Std. Err.	t	P> t	Beta
FProf	.0685561	.0656916	1.04	0.020	.1504919
_cons	5.106562	.0815494	62.62	0.000	.

Source: Stata Output, 2021

**Result Interpretation**

The regression result show that the Prob> F in the model is 0.0200, which suggest strong overall fitness of the model. Also, R<sup>2</sup> which shows that the amount of variance in the dependent variables which is explained by the explanatory variables is 2.6%. The regression table shows that the effect of firm profitability on environmental performance is positive and significant ( $\beta_1 = 0.1505$ , t-value = 1.04, p-value = 0.020). Meanwhile, the t-value tests the hypothesis that the coefficient is different from 0. The constant (alpha) in the model means that if the independent variable, Firm Profitability, is zero, Environmental Performance of the firm will be 5.1066.

The test of hypotheses was carried out at 5% level of significance. Thus, the null hypothesis is rejected when the p-value is less than 5%. Since the p-value (0.0200) is less than 0.05, the null hypothesis is rejected and the alternate hypothesis which states that Firm profitability has significant effect on the waste management expenditure of Oil and Gas firms that are listed on Nigerian Stock Exchange is accepted.

**Discussion of Findings**

The study examined the determinants of environmental performance of Oil and Gas firms listed on Nigerian Stock Exchange. The regressed coefficients of firm leverage shows that there is a positive association between firm leverage and environmental performance (measured by waste management expenditure) of Oil and Gas firms, such that an increase in firm leverage by 1 unit will lead to a significant increase in environmental performance by 0.4451. This agrees with the apriori expectation that for the fact that highly-levered firms are under intense monitoring by capital providers, involvement in environmental sustainability reduces the monitoring cost of firms with high magnitude of leverage and this leads to lower costs of borrowing. By implication, firm leverage is expected to positively influence the extent of environmental performance of firms. This finding is in line with the result of Onyali and Okafor (2018); Jeroh (2020); Lamidi, Adesola and Tariro (2020); and Indah and Arum (2020). However, the finding is inconsistent with the result of Kiswanto, Woro and Ulupui (2020); Abdulsalam and Auwal (2020); and Eneh (2019).

The regressed coefficients of firm liquidity revealed that there is a significant and positive association between firm liquidity and environmental performance of firms such that increasing the current ratio of Oil and Gas firms by 1 unit will significantly increase

environmental performance by 0.2951. This result buttresses the expectation that it is easier for a more solvent firm to engage in environmental responsibility performance than it would be for less solvent firms that are still battling liquidity issues. More so, this finding contradicted the findings of Kiswanto, Woro and Ulupui (2020) that found that firm liquidity has no significant effect on environmental sustainable report disclosure..

The regressed coefficients of firm size revealed that there is a significant and positive association between firm size and environmental performance of firms such that increasing the assets of Oil and Gas firms by 1 unit will significantly increase environmental performance by 0.3084. This result buttresses the expectation that larger firms tend to receive more attention from the public and, so, they are under greater public pressure to engage in and disclose environmental responsibility. More so, this finding corresponds with those of Onyali and Okafor (2018); Shaibu (2020); Atang and Eyisi (2020); Eneh (2019); and Abdulsalam and Auwal (2020).

The regressed coefficients of firm profitability revealed that there is a significant and positive association between firm profitability and environmental performance of firms such that increasing the assets of Oil and Gas firms by 1 unit will significantly increase environmental performance by 0.1509. This result buttresses the expectation that corporate economic performance directly influences the financial capability of firms to undertake environmental responsibility activities. More so, this finding corresponds with those of Atang and Eyisi (2020); Kiswanto, Woro and Ulupui (2020) but disagreed with the findings of Eneh (2019). The reason for the disagreement between the findings of the present study and those of past studies may be attributed to the use of different sectors and methodology.

The study re-emphasized the postulations of Stakeholders theory which emphasized that those with the responsibility of formulating business objective should take into consideration the interest of other stakeholder groups, not just the economic welfare of the shareholders. Basically, the goal of the theory is to explain that sustaining the profitability and growth of a firm, it takes more than just maximizing the welfare of the shareholders but includes carrying out some initiatives that help to preserve and protect the natural environment.

### **Conclusion and Recommendation**

The thrust of this study was to examine the determinants of corporate environmental performance of oil and gas firms listed on Nigerian Stock Exchange. Specifically, some structural attributes inherent in firms such as firm size, firm profitability, firm leverage and firm liquidity were examined to ascertain their effect on environmental performance of oil and Gas firms listed on Nigerian Stock Exchange. The study established that firms' varying attitude towards environmental performance is significantly determined by firm leverage, firm size, firm liquidity and firm profitability.

The study has re-emphasized the postulations of stakeholder's theory which emphasized that those with the responsibility of formulating business objective should take into consideration the interest of other stakeholder group, not just the economic welfare of the shareholders. This implies that in sustaining the profitability and growth of a firm, it takes more than just maximizing the welfare of shareholders but includes carrying out some initiatives that help to preserve and protect the natural environment. The study therefore recommends that Government should make environmental performance disclosure mandatory rather than voluntary since it has become important for firms to incorporate governance, social and environmental issues in their business strategies.

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