Environmental Appraisal Costs And Profitability Of Oil And Gas Companies In Niger Delta Region Of Nigeria

Nelly Raphael Imong[1], Udemeobong Bahakongfe Umagu[2], Timothy Oluwatominiyi Oni[3], Mary Eyong Nkang[4] 1, 2, 3, & 4 Department of Accounting, Faculty of Management Sciences, University of Calabar, Calabar, Cross River State, Nigeria.
Correspondent Author's phone number 08067931063 & email: neriventure@yahoo.com

Abstract
This study examined the effect of environmental costs on profitability of oil and gas companies in the Niger Delta region of Nigeria. To achieve the above objectives, the researcher used primary data to collect information from the respondents through the use of questionnaire. A survey research design was adopted for this study. A well-structured questionnaire was issued to 398 staff of oil and gas firms whose operations involve the exploration and exploitation of oil and gas and two hundred and seventy (270) were retrieved from the respondents. A Confirmatory factor analysis was conducted to ascertain the validity and reliability of the research instrument. The study model estimated with the aid of qualitative regression models (ordered regression). The results showed that environmental pollution appraisal costs has significant effect on the probability of oil and gas firms in Niger Delta Region of Nigeria. The study concluded that environmental pollution appraisal costs affect profitability of oil and gas firms in Niger Delta Region of Nigeria. The study therefore recommended amongst others that oil and gas firms should monitor their operations effectively to prevent environmental internal failure and reduce the cost of rework and pollution.

Keywords: *Environmental costs, profitability and stakeholder's theory*

I. INTRODUCTION

The purpose of every business is to achieve successful performance such as customer satisfaction, increased returns on investment as well as improved profitability amongst others. A business that tends to achieve these objectives must make available goods and services for the target market through the transformation of inputs into output. During the transformation process and in the costs of operations, the society and the business stakeholders such as employees and customers may adversely be affected as a result of pollution, oil spillage, gas flaring and other externalities, thereby reducing the quality of life of the people. In order to compensate the people for reducing their quality of life, businesses are becoming socially and environmentally responsible thus incurring social costs (Okoye & Ngwakwe 2013).

As a result of the very reckless operations of oil and gas companies like Shell, Chevron, Agip, Total etc., all stages of oil activity including exploration, drilling, transportation result in the destruction of the natural environment and the livelihood of local people who depend on the land for survival. Forests and mangroves are cleared, community farmlands are destroyed, and wet-lands, creeks and community fishponds are polluted, while the air and rainwater is contaminated with dangerous gasses flared indiscriminately by oil and gas producing companies. In 2000 the Niger Delta Development Commission (NDDC) was established to replace the OMPADEC (Oil Mineral Producing Areas Development Community) to offer a lasting solution to the socio-economic difficulties of the Niger Delta region by offering rapid, even and sustainable development of the Niger Delta into a region that is economically prosperous,

socially stable, ecologically regenerative and politically peaceful (Oti, Effiong & Tapang, 2012).

The impact of company's activities on the environment and the findings of environmental practitioners as well as accounting practitioners have necessitated the need to link environmental data to the accounting system. This has generated environmental accounting as a part of accounting. There is growing demand by stakeholders on company's environmental effect. Stakeholders not limited to consumers but includes industrial customers, financial institution and the government. This has resulted to companies reporting environmental information, but which is of low data content. This reduced financial statement credibility (Mamman 2004).

Environmental issues for purpose of economic and cost accounting have also been controversial even though the topic has been identified for discussions for the past four decades. This is because common criteria for value measurement of non-marketed, resources and impact on externalities have not been agreed (Okafor, 2018).Recent studies have shown that, corporate organizations have ranked business considerations based on profitability. Companies have also recognized all indirect expenditures as overheads without paying attention to the environment. Conventional accounting practice has not recognized environmental accounting for materials, water, energy and other natural resource usage. Besides, conventional accounting has not provided for such practice and particularly for accounting for impact on externalities. (Feenstra, 2002) observed that little has been recognized of the environmental depletion and degradation to the environment until a few well -meaning people in the developed countries realized that it was not good having great corporate profits and material well-being if they come at the cost of large scale of the ecosystem by which we are nourished. It became clear that degradation, pollution and accelerated destruction of the ecosystem and the depletion of non-renewable environment biodiversity would soon become very dangerous to human existence. The authors conclude that what once were localized environmental impacts, easily rectified, have now become widespread effects that may very well turn out to be irreversible.

Globally, it is needful to evaluate and investigate accounting reporting for raw materials, energy consumption and use of natural resources which have systematically depleted the environment. Besides, the adverse effect on the biodiversity through human and industrial activities and the nations need to protect the environment, have made for global regulations. These regulatory environmental laws however require only voluntary disclosure in financial statements of environmental information on industrial emissions, degradations, industrial wastages and all activities which impact negatively on the environment. As a result of the great impact on the ecology of oil and gas producing environment of the Niger Delta in Nigeria, which has caused political unrest in the area, Owolabi (2007) submitted that the political unrest in the Niger Delta cannot be wished away until there is a policy to incorporate environmental concerns into the nation's oil and gas industry planning, management and decision making. On environmental costs, he concludes that Costs and benefits need to be properly attributed, a clear distinction made between the

generation of income and the drawing down of capital assets through resource depletion or degradation (Eradiri 2019)

Based on the fact that there is increasing environmental attention, and the fact that the oil and gas sector, the mineral extractive and indeed the manufacturing sectors have profound production impact on the environment, this study will focus on assessing the impact of environmental cost on the profitability of oil and gas companies.

Over the past decades, the effect of industrial activities on natural environment has become uncontrollable and has created ecological concerns among stakeholders. It is observed that, companies only report corporate social responsibility like donations and other contributions excluding environmental cost on prevention, appraisal. As a result, insufficient environmental accounting information disclosed made users not to make meaningful investment decision and assess the true profitability of the company. In other words, where the information that is provided is less than user's requirements, an expectation gap arises creating low organizational performance.

The refusal of oil and gas companies to take into cognizance environmental costs disclosure make organizations to operate below expectation, though they reported higher profit but the real financial position has not been disclosed. There has been a reduction in barrels' production per day of crude oil in Nigeria and a fall in reported profit by oil and gas companies as a result of oil pipeline vandalization and theft.

The failure to include environmental costs in financial statements have the effect of sending wrong signals to shareholders, other stakeholders are making process improvement, product mix, pricing, capital budgeting, and other routine decisions complicated.

In summary, some oil and gas companies do not have an environmental policy document that will be used as a guide in their operations. There is also no department to handle the overall issues relating to environmental costs. Information on actions taken, including details of the nature and amount of expenditure incurred in pursuit of the identified environmental objective not disclosed. It is based on the backdrop, that the study is undertaken to examine the effect of environmental cost on the profitability of oil and gas companies in the Niger Delta region of the country using empirical analysis.

The main objective of the study is to examine the impact of environmental pollution appraisal cost and profitability of oil and gas companies in Nigeria.

With respect to the above objective, the researcher formulated the following research question.

Does environmental pollution appraisal cost affect the profitability of oil and gas firms?

From the research questions, the following null hypothesis was formulated:

Ho Environmental pollution appraisal cost has no significant effect on profitability of oil and gas

To enhance understanding, the following theory underpin this study.

II. LITERATURE REVIEW

In this section, a review of literature on the subject matter is carried out covering theoretical review, conceptual issues, and empirical studies.

The prevention, appraisal failure model (PAF) The PAF (Prevention, Appraisal, Failure) model the oldest of cost of quality models was developed by Feigenbaum (1956) and Masser (1957). It is one of the most well-known quality cost model among quality practitioners and has found applications in both manufacturing and service industries and it is based on classifying quality cost into three main categories: prevention, appraisal and failure cost. In addition to these three categories, Abed and Dale (1987) proposed that failure cost can be divided into two sub-classes as internal and external failure cost.

According Schiffauerova and Thomson (2006) prevention cost are associated with actions taken to ensure that a process provide quality product or service and prevention of future losses. Appraisal cost are associated with measuring the level of quality attained by the process failure cost are incurred to correct quality products and service before (internal) or after (external) delivery to the customer. The PAF approach help to examine company or service industry operating procedures, accounting system and monthly departmental reports to identify various cost element associated with four cost categories.

Basic on the supposition of the P-A-F model, investment in prevention and appraisal activities will reduce failure costs and further investment in prevention activities that minimizes total cost of quality management. To further facilitate the understanding of cost of quality relationship. The cost of quality models (P-A-F model) are analyzed and presented by Scheiffauerova and Thomason, (2006).

Environmental pollution appraisal cost

An appraisal cost is the expenditures made by a company to monitor its activities as it relates to the environment where it operates. Careful investigations have shown that the activities of companies' especially manufacturing industries have an effect on the ecological system.Due to regulatory pressures to reduce air, land and water emission appraisal has become critical. Appraisal costs include:

i. Charges for the depreciation of test equipment
ii. Costs of supplies used in test and inspections
iii. Costs of obtaining outside laboratory endorsements

Much of the appraisal effort focuses on inspecting the inputs and production processes. For environmental effects, efforts focus on monitoring the production processes and by-products. By engaging in monitoring activities companies will be able to discover problems early and corrective actions can be taken quickly and economically. The oil and gas industries are not left out of these industrial effects as its activities affect the environment negatively if not properly regulated (Falope, Offor & Ofurum 2019).

Major oil spills and industrial waste disposal heavily contaminates marine shorelines, causing severe localized ecological damage to the near-shore communities. The harmful effects of these on the environment are numerous. These spillages and disposals destroy plants and animals in the estuarine zone. It settles on beaches and kills organisms and marine animals like fishes, crabs, and other crustaceans. It endangers fish hatcheries in coastal waters and as well contaminates the flesh of commercially valuable fish. Oil spillages poison algae,

disrupts major food chains and decreases the yield of edible crustaceans. Oil on water surface also interferes with gaseous interchange at the sea surface and the oxygen levels will thereby be lowered. This no doubt reduces the life span of marine animals (Worgu, 2000). Environmental Detection Costs i.e. Environmental Pollution Detection Expenditure/ Costs Responsiveness (PODET) which include costs for:

i. auditing environmental activities
ii. inspecting products and processes
iii. developing environmental performance measures
iv. testing contamination and measuring contamination level

ECAPEX = Other Environmental Capital Expenditure/Costs Responsiveness

COTEC = Environmental Technology Content for production Responsiveness

Empirical review

This section will review previous and relevant studies on the effect of environmental cost accounting and profitability (performance).

Deegan (1994) conducted a study on the incentives of Australian firms to provide environmental information within their annual reports voluntarily in Australia. Using a political cost framework, hypotheses were developed which link the extent of environmental disclosures with a measure of the firm's perceived effects on the environment. A sample of 197 firms was obtained from Australian Graduate School of Management annual reports file for the year 1991. The results using linear regression statistical tool indicate that firms which operate in industries which are perceived as environmental damaging are significantly more likely to provide positive environmental information within their annual reports than are other firms.

Bennett and James (1998) also viewed environmental accounting as the generation, analysis and use of financial and non financial information in order to optimize corporate environmental and economic performance and to achieve sustainable business.

Adediran and Alade (2013) carried out a research on the impact of environmental and social Accounting on corporate performance in Nigeria used fourteen (14) randomly selected quoted companies in Nigeria. Data were collected from annual report analyzed using Regression Analysis. The authors discovered that there is negative relationship between Environmental Accounting and Return on Capital Employed and Earning per Share and a significant relationship between Environmental Accounting and Net Profit Margin cum Dividend per Share.

Jash (2003) viewed environmental management accounting as a combined approach which provides for the transition of data from financial accounting, cost accounting and material flow balances to increase material efficiency, reduce environmental impact risk and reduce cost of environmental protection and this has a financial as well as physical component.

Asuquo (2012) carried out an empirical study in Nigeria on the topic:" Environmental friendly policies and their financial effect on corporate performance". Data were received from both primary and secondary sources and afterwards, the data were analyzed using simple ordinary least square regression method. It was then revealed that the cost of the ensuring environment friendly policies as well as firm competitiveness have significant relationship with the firm's corporate

performance. The study then recommended that firms should formulate and implement environmental friendly policies to enhance their competitiveness, acceptability and stability, which would eventually result in high performance.

Bessong & Kankpang(2012) carried out a study in Nigeria on Social Responsibility cost and it influence on the profitability of Nigerian Banks, the study made use of explanatory design and data were sourced secondarily from five Nigerian Banks and analyzed using the ordinary least square (OLS) method. The study revealed that there is a negative influence of social cost and pollution cost on profitability. The study therefore recommended that the Financial Reporting Council (FRC) of Nigeria should collaborate with other professional bodies to produce a standard on social responsibility accounting and ensure transparency and good compliance in the process.

Agbigwu, Ihendinihu and Okafor (2016) carried out a study in Federal College of Education Imo State, Nigeria on the topic: "Impact of Environmental and Social costs on performance of Nigerian manufacturing companies". The study made use of secondary data obtained from ten (10) randomly selected firms (Flour mill plc, Unilever plc, Cadbury plc, Nestle plc, Dangote Plc, UAC foods, Honey well plc, national salt Nigeria plc, Presco Nigeria plc and Union Dicon Plc) annual reports and financial statement for the year2014. The obtained data were analyzed using t-test of SPSS version 20. Findings of the study revealed that the companies environmental and social cost significantly affect Net Profit Margin, Earning per share and return on capital employed of manufacturing companies. The researchers then suggested that government should ensure complete adherence of environmental laws by manufacturing companies in Nigeria.

Blessing (2015) studied the role of environmental cost accounting in environmental sustainability in Nigeria. Data for study were sourced primarily with aid of questionnaire; Administered to 200 randomly selected respondents from the agricultural/Allied, Breweries, Chemical and Paints, Health care, Pharmaceutical and oil marketing companies in Nigeria. Tested the hypotheses using Frequency distribution, Mean rank and Kruskal-Wallis test and Chi-square statistical tool, findings revealed that majority of the respondents agreed that business organization in Nigeria have not been aware of environmental policies. It was found that there exists no significant difference on business organization in Nigeria not being aware of environmental policies. The result also revealed that majority of the respondents believes that environmental sustainability practice is an important concept for organization. The findings further revealed that majority of the respondents have not agreed that business organization in Nigeria have not adopted the use of environmental cost accounting techniques cost management. It was revealed that significant difference on the adoption of environmental cost accounting techniques cost management in the light of the findings of the study, the researcher recommended that a detailed and well spelt out environmental disclosure themes and evidence must be established to provide foundation for improving corporate social environmental disclosure among companies. Also environmental regulatory agencies should mandate organizations to adopt environmental practices in its operations so

as to enhance environmental sustainability consciousness within Nigeria organization.

Homan(2016) researched on the topic "environmental accounting roles in improving the environmental performance and financial performance of the company" in Indonesia; using secondary data obtained from the Ministry Environment of Indonesia, and statistically analyzing the data obtained, using Linear regression, the findings revealed that disclosure of the environment has been done by most of the public companies in Indonesia less is implementing reporting environmental costs in the annual report 2015, especially in sub-sectors of tourism, hotels and restaurants.

Obara and Onangih (2017) examine the extent to which Accounting practice affect the profitability of Oil and Gas companies in Nigeria, particularly those in the upstream sector using descriptive statistical tool. The result of the study showed that accounting practices had a significant tool. The result of the study showed that accounting practices has a significant relationship with performance of Oil and Gas Companies, particularly, the Return on Assets and Return on Capital Employed.

Akhaiyea (2009) researched on the topic Design and Bases of Environmental Accounting in oil and gas and manufacturing sectors in Nigeria. For this study, primary data survey and secondary data elucidation were the instruments utilized; sampling 199 companies comprising of 93 oil and gas companies and 106 manufacturing companies in Nigeria. Data was sourced through annual report of companies as sourced from the Nigerian stock exchange, manufacturing association of Nigeria and corporate annual reports starting from Kyoto protocol 1997 to 2006.The t-test statistic Pearson product-moment correlation tests, ANOVA, and multivariate linear regression analysis were statistics applied. Findings are that environmental operating standards which should focus on minimizing impact on environment. Also suggested was that standard cost accounting definition should be agreed for environmental spending, expenditure and management accounting in the oil and gas and manufacturing sectors operating in Nigeria.

Pandey and Kumar (2016) carried out a research on the topic exploring the Association between environmental cost and corporate financial performance: a study of selected NIFTY companies. The research which was carried out in India. Relying on secondary data collected from different well source and companies annual reports covering a five year period, that is from 2010-2011 and to 2012- 2015.The data had been collected the dependent variables that is environmental cost (EC)and independent variables that is EPS, ROCE and P/E ratio environmental cost(EC) was sourced from annual reports of the selected companies whereas the independent variables and control variables were obtained from the companies and data base websites. Sampling the data obtained using regression analysis, the findings were that there is no significant relationship between environment expenditure of the company and its financial performance. It was found that companies with higher market capitalization are spending more 0n environmental issues.

Ammad Osazuwa and Mgbame (2015) carried out a study in Nigeria on environmental accounting and firm profitability in Nigeria. Do firm-specific effects matter? Utilizing a cross sectional research design and sampling 50 companies

from Nigerian Stock exchange. The regression analysis was conducted using E-views 7.0 econometric software and adopting the ordinary least square (OLS) technique for the data estimation, data obtained from only audited financial statement and foot notes of the sampled companies. Findings of the study revealed that there exists a significant relationship between environmental accounting disclosure and firm's profitability when environmental accounting is moderated by firms. Specific variables like size, industry type and big four auditors. Though the result appears mixed with industry type and big four auditors, positive correlation shows between big four auditors while size exhibit negative relationship. The study recommends companies where the only concern was striving to be profitable to ensuring that they consider the impact of their activities on the society, as the study has shown that environmental accounting disclosure could have a positive take on the profitability of the firm.

Rakiv, Islam and Rahman (2016) carried out a study on environmental accounting reporting disclosure and company profitability: a study of listed manufacturing companies in Bangladesh. The study developed an environmental accounting reporting disclosure index (EARDI) consisting of 21 major environmental accounting disclosure. Return on asset was used as variable for profitability. To obtain the EARDI score, content analysis is being used and statistical technique such as frequency, mean, standard deviation, ANOVA, Bi-variant regression model analysis as conducted to acquire research findings. Sampling 166 companies from Dhaka stock exchange and analyzing their annual financial reports from 2014 to 2015, the study discloses that only 41 companies out of 166 companies are proving some sort of environmental disclosures in their annual reports and there is a significant relationship between company's profitability and EARDI.

Okafor (2018) examined environmental costs accounting and reporting on firm financial performance: A survey of quoted Nigerian oil companies. The findings indicate that better environmental performance positively impact business value of an organization. Moreover, environmental accounting provides the organization an opportunity to reduce environmental and social costs and improve their performance.

Falope, Offor, and Ofurum (2019) environmental cost disclosure and corporate performance of quoted construction firms in Nigeria. Ex-post was adopted for the study. The findings showed that environmental pollution prevention cost, environmental protection cost and environmental recycling disclosure have effects on return on assets of quoted construction firms in Nigeria. The study recommended among others that regular and continuous environmental evaluation will improve organizations sales, income and ensure that environmental situational needs are met.

Ikpor, Enuma, and Okezie (2019) studied environmental accounting and sustainable financial performance: evidence from the Nigerian petroleum industry. The study used expost-facto research design. The finding suggested that environmental operating costs and environmental prevention costs have significant and negative effect on the performance of petroleum firms in Nigeria. However, we found important differences in the correlates of firm's capital expenditure on sustainable financial performance. The

finding of this study therefore have important implications for policy.

Victor, Adiga, Shaki and Bassey (2020) study focused on environmental reporting and corporate performance with particular reference to listed oil and gas companies in Nigeria. The study adopted the ex-post facto design and data was sourced from the published financial reports of 6 listed oil and gas companies out of the 12 quoted oil and gas companies. Ordinary least square was used in analyzing the data using Minitab 17. The findings revealed that environmental protection, development and safety cost has a negative but significant relationship with ROA. More also, environmental protection, development and safety cost showed a negative and insignificant relation with EPS. The study recommends that oil firms should provide comprehensive reports of their environmental involvement and also government and stakeholders should be concern and mandate compliance to standards regulating and mandating firms to report environmental accounting satisfactorily.

III. METHODOLOGY

For the purpose of the study, the survey design was adopted by using primary data to test effectiveness of the independent variable on the dependent variable. Survey design best suits a study that adopts the questionnaire instrument in data gathering. This choice was made because the survey method is effective when it comes to getting opinions, attitudes and descriptions as well as getting cause and effect relationship. The study was carried out in Nigeria, Niger Delta to be precise. This is because oil and gas exploration and exploitation is carried out in this locations which comprises of Abia, Akwa Ibom, Bayelsa, Cross River, Delta, Edo, Imo, Ondo, *and* Rivers states. The companies selected for this study included all the upstream oil and gas companies with Nigerian Stock Exchange (NSE). The choice of the companies is informed by the fact that they are involved in upstream activities which include exploration, drilling, and extraction in Nigeria with a significant financial reporting quality. The population for the study comprised of all 27 upstream oil and gas companies that are quoted in the Nigerian stock exchange (NSE). The population also covered the total number of staff in the 27 upstream companies which is 82,310.The study was conducted using the oil and gas in the Niger Delta region of Nigeria Questionnaires were distributed to the total number of staff of the selected companies. A total number of 398 questionnaires were served and only 270 were retrieved. Using the Tara Yamane formula below the sample size for the study was determined.

$$\underline{n=N}$$
$$1+N(e)^2$$

$$\underline{n = 82{,}310}$$
$$1+82{,}310(0.05)^2$$

$$\underline{n = 82{,}310}$$
$$1+82{,}310(0.0025)$$

$$\underline{n = 82{,}310}$$
$$1+205.775$$

$$\underline{\underline{n = 398}}$$

Where: n = Sample size
N = Population Size
e = Tolerable error (5%)

Primary source: The primary data was sourced using the questionnaire instrument. The questionnaire was well structured to capture five point Likert scale; strongly agree (SA), Agree (A), Disagree (D), Strongly disagree (SD) and Undecided (U).

The questionnaire instrument was used in gathering data from the selected oil and gas companies. A well-structured open ended and close ended questionnaire was issued to the 398 staff of the firms.

Validation and reliability of instrument and test of instrument

The research instrument was subjected to content validity by the researcher and other experts. In order to establish the validity and reliability of the research instrument, a confirmatory factor analysis was conducted. Generally, factor loadings and communality of 0.500 and above is adequate for establishing the validity of test items measuring a construct (Hair, Black, Babin &Anderson, 2014; Avwokeni, 2016).The Cronbach's Alpha coefficient stipulates a theoretical standard score 0.40 and above for test of reliability.

Qualitative response regression models (Ordered regression) were employed for the data analysis. This is because the dependent variable in this study is a multiple-category response variable (the responses are qualitative in nature).One of the three approaches to developing a probability model for a discreet response variable are the logit model and the probit model. The ordered regression model is applicable to a response variable that has more than two outcomes like study whose responses are on the Likert-type scale of "strongly agree", "agree", "undecided", "disagree" and "strongly disagree". Residual diagnostic tests such as normality test, multicollinearity test, and heteroscadasticity test were carried out to clean up the study data.

Normality Test

Normality describes a condition in which a variable follow the standard normal distribution. The Jargue-Bera test shall be used to test whether the series is normally distributed by measuring the difference of skewness and kurtosis of the series with those from the normal distribution. If the residuals are normally distributed, histogram should be bell-shaped and the Jargue-Bera (JB) statistics insignificant. It therefore, implies that a series with probability of the JB statistics greater than 0.05 is deemed to be normally distributed.

Multi-collinearity Test

Multicollinearity among the independent variables implies that they are perfectly correlated. In a multivariate regression analysis of this nature, there is the possibility that one or more explanatory variables could correlate among themselves thus undermining the regression result.

The variance inflation factor (VIF) statistics shall be used to ascertain the presence or absence of multicollinearity among the independent variables.

The rule is that if each of the explanatory variables has a VIF of less than ten (10), they do not correlate with other independent variables. Any variable with VIF greater than 10 shall be dropped as it correlate with other independent variable.

HeteroscedasticityTest

The problem of heteroscedasticity exists when the residuals of a regression fail to follow regular pattern and are not normally distributed. Linear regression analysis

assumes that there is homoscedasticity or constant variance. Heteroscedasticity describes a situation where the variance of the error terms is not equal, and in which the error terms may be larger for some observations or periods of the data than for others. Breusch-Pagan/Godfrey test was employed to test for the problem of heteroscedasticity. When the probability value of the observed R-squared (R^2) is greater than 5% or if the F-statistic is greater than the critical value at 5% in the Breusch-Pagan/Godfrey test, the assumption of the presence of homoscedasticity is upheld.

The study model is specified as follows:

$P = f$ (EPAC)

……1

Where,

EPAC = environmental pollution appraisal cost

P = profitability

The econometric form of the model is specified as:

$P = \beta_0 + \beta_1 EPAC + \varepsilon$ ……2

EPAC = environmental pollution appraisal cost

P = profitability

ε = stochastic error term

The 'a priori' expectations are:

$B_1 > 0$; implying that the higher the EPAC, the higher the P.

IV. RESULT AND DISCUSSION

TABLE 4.1: ***Descriptive Statistics and Normality tests***

	PFTB	**EPAC**
Mean	4.37	4.03
Median	4	4
Maximum	5	5
Minimum	3	2.5
SD	0.57	0.52
Skewness	-0.23	-0.15
Kurtosis	2.26	2.41
JB	*8.54*	***4.91***
p-value	*0.01*	***0.08***
N	270	270

Source: Researchers' compilation (2021)

TABLE 4.2: Multicollinearity test

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.174	187.9	NA
EPAC	0.004	62.7	1.03

Source: Researchers' computation (2021)

The result of the multicollinearity test, {the centered variance inflation factors (VIF)} for the variables are low, indeed, the value for the variable is less than 10, which shows that there is no form of multicollinearity in the study variable. Thus, the estimates from the regression results are deemed good for drawing valid conclusions

The Glejser and the Breusch-Pagan-Godfrey tests were used to check for the presence of heteroscadascticity. The results are reported in Table 4.9 below shows the chi-square statistics for both Glejser and

Breusch-Pagan-Godfrey tests were highly not significant at the 5 per cent level, indicating the presence of homoscedasticity in data set. Therefore, the null hypothesis of homoscedasticity is not rejected. These results imply that the ordinary least square technique can be used to estimation the study's model. However, because the dependent variable in the model is a multi-ranked variable, ordered regression was adopted for the estimation of the model (Green & Hensher, 2010).

In order to provide a robust analysis to show the direction of movements among the explanatory variable, the researcher examined the unconditional correlation of the variable. Table 4.10 below shows that firms' profitability has positive and significant correlation with environmental pollution appraisal cost at less than 1 per cent but no significant correlation with the other explanatory variable. In fact, the result of the regression analysis confirms this relationship.

To enable the researcher test the hypotheses of the study, the specified model is estimated and analysed. The main statistics of interest for the ordered regression used in this study are the coefficient of the estimates and their respective probabilities. The Lagrangian ratio (LR) statistic provides valuable information on the efficiency of the estimates. The probit, logit and extreme value approaches are used for the estimation of the ordered model. The one with the least LR probability value or higher LR coefficient performs better and is preferred for interpretation purposes.

TABLE 4.3: Heteroscadasticity test

Heteroskedasticity Test: Glejser

F-statistic	1.40	Pro. F (4,265)		0.24
Obs*R-squared	5.60	Prob. Chi-Square (4)		0.23

Heteroskedasticity Test: Breuschi-Pagan-Godfrey

F-statistic	1.38	Prob. F (4,265)		0.24
Obs*R-squared	5.52	Prob. Chi-Square (4)		0.24
Scaled explained SS	4.59	Prob. Chi-Square (4)		0.33
Scaled explained SS	4.61	Prob. Chi-Square (4)		0.33

Source: Researchers' computation (2021)

TABLE 4.4: Estimation Results

	Probit			**Logit**			**Extreme value**		
Variable	Coef	z-Stat	Prob.	Coef	z-Stat.	Prob.	Coef	z-Stat.	Prob.
EPAC	0.29	1.98	0.04	0.53	2.05	0.04	0.25	1.47	0.14
Psuedo R^2	0.17			0.17			0.16		
LR statistic	77.11	0.000		***77.70***	***0.000***		74.08	0.000	

Source: Researchers' computation (2021)

Table 4.4 above, reveals that the LR values are high at over 74 for each of the estimates implying that the estimated model has impressive explanatory power. The LR value for the logit model has the highest value at 77.70; the researcher therefore focused on the logit result for inference and interpretation. Table 4.4, shows that the coefficients of Environmental appraisal cost (EPAC) is significant at the 5 percent level as the z-values have probabilities that are less than 0.05.

The model estimation result shows that EPAC has a significant positive impact on the profitability of oil and gas firms. This implies that appraisal of the environment to trouble shoot spillages can reduce the incidence of pollution and the consequences thereof.

The hypotheses of the study are tested using the coefficients of the variable and the

significance of the z-values. Table 4.4 exhibits the results of the association between environmental pollution appraisal cost and profitability of oil and gas firms. The LR value for the logit model has the highest value at 77.70; therefore, the study adopts this result for interpretation and conclusions

Hypothesis 1

Environmental pollution appraisal cost has no significant effect on profitability of oil and gas firms.

This hypothesis is tested based on the coefficient of the environmental pollution appraisal cost (EPAC) in Table 4.4. The coefficient of EPAC is 0.53 and the z-statistic is 2.05 with probability of 0.04. This is less than the probability of 0.05, implying that the coefficient passed the significance test at the 5 percent level. Consequently, the null hypothesis is rejected, implying environmental pollution appraisal cost has significant and positive effect on oil and gas firms' profitability.

Environmental pollution appraisal cost and profitability of oil and gas firms

From test of this hypothesis in the estimated result in Table 4.10 the result is positive and significant at 5% level. This result implies that environmental pollution appraisal cost has a significant and positive relationship with the profitability of firms. The plausible reason is that environmental pollution appraisal can help reduce environmental pollutions such as land, water and air pollutions, improve the relationship between oil firms and the community and thereby enhance profitability.

This result agrees with the findings of Makori and Jangogo (2013) in Kenya whose study result shows thatenvironmental accounting has positive significant effect on firms' profitability; Gatinbu and Wabwire (2016) in Nairobi who finds that environmental accounting disclosure has a positive and significant effect on corporate profitability. However, the result negates the findings of Adediran and Alade whose study show that environmental and social cost has negative relationship with performance of firms in Nigeria.

V. CONCLUSION AND RECOMMENDATION

This study shows that environmental pollution appraisal have significant effect on the profitability of oil and gas firms in Nigeria.

The harmful effects of pollution on the environment are numerous. Oil spillages destroy plants, animals and aquatic life in the estuarine zone, while gas flaring pollutes the air and destroy the ozone layer. Activities of firms in the oil and gas sector have profound impact on the environment hence the necessity to examine the impact of environmental pollution appraisal cost on the profitability of oil and gas companies. Oil and gas firms incur appraisal cost in a bid to monitor their activities and inspect the environment to assess the effect of their activities on the environment where they operate. Moreover, regulatory requirements dictate that firms must take necessary steps to reduce air, land and water emission, thus necessitating regular appraisal of the environment.

Environmental pollution appraisal cost affects profitability of oil and gas firms especially if they fail to take proactive step to prevent oil spillage. Moreover, failure to include environmental costs in financial reports can present a firm in bad light before stakeholders. The findings of this study show

that environment pollution appraisal affect profitability positively. This is because such expenditure assist to reduce oil spillage, gas flaring and the effect on the environment. This creates a conducive atmosphere for the oil firms to carry out their operations without interference from the host community.

Based on the findings of this study, the following recommendations are made:

Oil and gas firms in Nigeria should constantly appraise the environment and monitor oil facilities to obviate spillage and the associated consequences.

REFERENCES

Adediran, S.A.& Alade, S.O. (2013) 'The impact of environmental accounting on corporate performance in Nigeria: *European Journal of Business and Management*, 5. (23): 141-151.

Agbiogwu, A.A., Ihendinihu, J.U., & Okafor, M.C. (2016).Impact of environmental and social cost on performance of Nigerian manufacturing companies.*International Journal of Economics and Finance*: 18 (9):

Ahmed, K. and Nicholls, D. (1994). The impact of non-financial company characteristics on mandatory disclosure compliance in developing countries: The Case of Bangladesh. *The International Journal of Accounting*, 29(1): 62-77.

Akinyemi, O. O. Nwaokocha, C. N. &Adesanya, A. O. (2012). Evaluation of corrosion cost of crude oil processing industry. *Journal of Engineering Science and Technology:*

Asuquo, A. I. (2012). Environmental friendly policies and their financial effects on corporate performance of selected oil and gas companies in Niger Delta region of Nigeria, *American International Journal of Contemporary Research,* 2 (1): 168-173.

Bassey, B. E., Usang, O. U. E. & Edom, O. G. (2013). An analysis of the extent of implementation of environmental cost management and its impacts on output of oil and gas companies in Nigerian 2001-2010.*uropean Journal of Business and Management. 5* (1):

Bassey, E. B., Sunday, O. E. & Okon, E. E. (2013).The impact of environmental accounting and reporting on organizational performance on selected oil and gas companies in the Niger Delta Region of Nigeria. *Research Journal of Finance and Accounting;* 4(3): 57-73.

Bennett, M. & James, P. (1998). The green bottom line, In Bennett, M & James, P. (Eds.), Environmental Accounting for Management: Current Practice and Future Trends, Sheffield: Greenleaf Publishers Ltd.

Blessing, I. N. (2015).The role of environmental cost accounting in environmental sustainability in Nigeria, *American Journal of*

Business, Economics and Management, 3

Chowdhury, A.A. & Hamid, K. (2013) 'Present Status of Corporate Environmental Accounting (CEA) in Bangladesh: A Study Based on Some Selected Textile Companies', *Research Journal of Finance and Accounting,* 4, (17): 122-129.

Cunha, D (2017). Environmental indicators of oil companies. *European Journal of Scientific Research.* 145(4), 386-394.

Deegan, C. (1994). An Analysis of the Incentives of Australian Firms to provide Environmental Information within their Annual Report, Accounting Group Seminar in Church land campus, New South Wales.

Department of petroleum Resources (DPR), Environmental Guideline and Standards for the Petroleum Industry in Nigeria (EGASPIN: 2002)

Ditz, D., Janet, R. & Banks, R. D. (1995) Green Ledgers: Case Studies in Corporate Environmental Accounting. Washington: World Resources Institute. (eds.).

Enahoro, J. A. (2009). Design and bases of environmental accounting in oil and gas and manufacturing sectors in Nigeria.Ogun: Department of accounting, College of Business and Social Sciences. Covenant University Ota.

Esica, A. F. Ikechukwu, E, C. & Ikechukwu, E. M. (2014). Environmental cost management and profitability of oil sector in Nigeria 2004-2008. *Journal of Good Governance and Sustainable Development in Africa:* 2 (2):

Falope, F. J., Offor, N. T., & Ofurum, D. I. (2019). Environmental cost disclosure and corporate performance of quoted construction firms in Nigeria. *Int. J. Adv. Acad. Res*, *5*, 17-31.

Feigenbaum AV (1956). Total quality control, Harvard Business Rev. 34: 93-10

Graff, R.G.; Reiskin, E.D. &Whitebidwell, A.L.K. (1998).Snapshots of environmental cost accounting.A report to US EPA environmental accounting project. Boston: TellusInstitute.

Hair, J. F., Black, W. C., Babin, B. J. & Anderson, R. E. (2014). Multivariate Data Analysis (7th edition), England: Pearson

Huseno, T. (2018). The environmental management accounting (EMA) perspective calculation of environmental management environment in Riau. *Jurnal of Applied Management*, *16*(4), 714-721.

Ibanichuka, E. A. & James, O. K. (2014). The relevance of environmental cost classification and financial reporting: A review of standards. *Journal of*

Economics and Sustainable development. 5

Ikpor, I. M., Ituma, E. & Okezie, B. N. (2019). Environmental accounting and sustainable financial performance: Evidence from the Nigerian petroleum industry. *International Journal of Applied Environmental Sciences, 14*(1), 85-93.

Jasch, C. (2003). The use of environmental management accounting for Identifying Environmental Costs. *Journal ofCleaner Production,* 11, 16.

Konar, S. & Cohen, M.A. (2001) 'Does the market value environmental performance', *Review of Economics and Statistics*, 83 (2): 281-289.

KPMG, United Nations Environment Programme (UNEP) (2006) Carrots and Sticks for Starters'. Current Trends and Approaches in Voluntary and Mandatory Standards for Sustainability Reporting. Parktown: KPMG (2005) KPMG *International Survey of Corporate Responsibility Reporting* 2005 7, 11 & 30.

Makori, D. M. & Jagongo, A. (2013). Environmental accounting and firms listed in Bombay stock exchange, India. *International of Journal of Humanities and Social Science.* 3 (18): 248-256.

Mamman, S. (2004). Disclosure of corporate social responsibility performance in accounting reports.*Nigerian Journal of Accounting research.* 1(1): 14-21.

Ndu, O. A. E. & Agbohifon, B. A. (2014). Corporate social responsibility in Nigeria: A study of the petroleum industry and the Niger Delta area. *International Review of Social Sciences and Humanitie*

Nwankwo, N. & Ifeadi, C. N. (1988). Case Studies of Environmental impact of oil production, in Sada, P. O. and Odemerho, F. O. (Eds) Environmental Issues and Management in Nigerian Development. Ibadan, Evans Brothers.

Odetayo, T. A., Adeyemi, A. Z., & Sajuyigbe, A. S. (2014).Impact of Corporate social responsibility on profitability of Nigerian banks.*International Journal of Academic Research in Business and Social Sciences,* 4(8), 252-263. http://dx.doi.org/10.600//ijarbss/v4-18/1094 .

Okafor, T. G. (2018). Environmental costs accounting and reporting on firm financial performance: A survey of quoted Nigerian oil companies. *International Journal of Finance and Accounting*, *7*(1), 1-6.

Okoye, A. E. & Ngwakwe, C. C. (2013). Environmental Accounting: A convergence Of antecedent divergence, Accountancy;

Management Companion, edited by Ezejelue, A. C. and Okoye, A. E. Nigeria; Nigerian Accounting Association (NAA).

Owolabi, A. (2008). Environmental disclosure kn annual reports. The Nigerian perspective. Paper presented at the 2nd Italian Conference on Social and Environmental Research. Rimini. Retrieved August 2017.

Pandey, S. N. & Kumar A. (2016).Exploring the association between environmental cost and corporate financial performance: A study of selected NIFTY companies.IMS *Management Review.* xxxii.

Rakiv, M., Islam, F. & Rahman, R. (2016). Environmental accounting reporting disclosure and company profitability: A case study on listed manufacturing companies of Bangladesh. *International Journal of Ethics in Social Scienc*es

Russo, M. V. & Fouts, P. A. (1997). A resource-based perspective on corporate environmental performance and profitability', *Academy of Management Journal*, 40(3): 534–559.

Schaltegger, S. & Burritt, R. (2000). Contemporary environmental accounting, Sheffield, UK: Greenleaf Publishing.

Shrivastava, P. (1995). The Role of Corporations in achieving Ecological Sustainability. *Academy of Management Review,* 20: 936-960.

Tapang, A.T.; Bassey, B.E. & Bessong, P.K. (2012). Environmental activities and its implications on the profitability of oil companies in Nigeria. *International Journal of Physical and Social Sciences,*2(3): 285-302.

UNDSD (2001). Environmental Management Accounting, Procedures and Principles. New York: United Nations.

Worgu, S. O. (2000). Hydrocarbon exploitation, environmental degradation and poverty in the Niger Delta Region of Nigeria. Presented in Lund University, LUMES program.