

Implication Of Environmental Related Cost On Performance Of Oil And Gas Companies In Nigeria

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Abstract

The study examined the implication of environmental cost on performance of oil and gas companies in Nigeria. The objectives of the study are to examine whether environmental cost affects return on capital employed and market value added of oil and gas companies in Nigeria. Data for this study were retrieved from reports of the companies from 2013-2017 financial years and values for the qualitative data such as environmental regulatory cost (ERC) and environmental health and safety cost (EHSC) were measured using dichotomy procedures. Values were assigned from 0-5 based on the level of disclosure using global reporting index (GRI). Having examine the content of the financial report of the companies, the analytical technique used for this study was the panel regression method. The research results indicate that there exists a relationship between environmental cost and profitability of oil and gas companies in Nigeria. The study therefore recommended amongst others that Oil and gas companies should focus reasonable attention to addressing relevant environmental issues and cost involvement disclosed in their financial report for the purpose of profit measurement.

Keywords: *Environmental, cost, performance, oil and gas.*

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I. Introduction

The movement of economic activity from agriculture to manufacturing since after the industrial revolution of late 18th century has resulted to the development of many societies. This uprising in industrial changes is often accompanied with related cost through the industrialization and use of natural resources that brought about emission of green gasses, pollutant and land use which affect natural environment around the world. Environmental Accounting is aim at attaining sustainable development, keeping a satisfactory relationship with the community, and tracking effective and efficient environmental safeguard. The system aids company to establish the cost of safeguarding the environment while carrying out her ordinary business activities, ensure profit maximization and encourage the communication of the results. Proper disclosure of relevant information relating to the environment is a very important aspect of accountability. Environmental cost accounting enables companies to intensify their public confidence and carry out internal assessment on their social contract. These costs include; costs of complying with environmental laws, remediation costs, pollution control cost and cost incurred to enhance by environmental data that is more relevant for strategic decision making.

Institutional environmental protection agency such as the USA through policy formulation and sanction attached thereof, now motivate most corporate institutions to report in the annual financial statement environmental performance (Hart, 1997). Davis and Okoriee (2007) observed that environmental guidelines and procedures have also resulted to corporate decision on environmental mapping. Given the competitive nature of business and the quest to comply with the Bruntland report of 1985, managers of various oil companies invest more on the environment so as to reduce threat and external factor that may injured it existence. The symbiotic relationship between business and the environment has also increase the awareness and urgent attention by companies operating in this sector of the economy, to struggle for wealth maximization as well as providing a safeguard to sustain the environment through remediation measures by using accounting tool in the ascertainment of expenditure relevant to its activities and those incurred to prevent harm on the environment. Doorasamy (2015), in his study believes that managers may not easily invest large amounts of money unless they are made to understand the amount of money they could save by adopting cleaner production techniques and technologies.

Environmental cost is often hard to define from a business perspective but given their concern, they are cost related with direct and indirect costs information about possible environmental, social and economic sustainability. Environmental cost eliminates or at least reduce the arbitrary allocation of environmental overhead, so that the true cost of products or service may be ascertained. Such cost includes environmental remediation costs, pollution control equipment costs and non-compliance penalty. Based on the meaning of environmental degradation, environmental cost could also cover the cost incurred to prevent degradation, cost of re-stating the environment to its original state, cost of restoring depleted environment to its normal position. Vasanth, Selvam, Lingaraja, Karpagam and Gaya (2012), maintain that environmental cost accounting information is relevant for decision making such that it performs essential roles in internal decision making in the area of product related decision making, investment projects decision making and correct product costing. The rapid exploitation of crude products and natural gas poses a significant environmental and ecological danger to the immediate environment owing to oil spills, effluent discharge and gas flaring. Furthermore, Hunter (2015) affirm that petroleum exploration and production activities present legal, political, economic, financial, technical and environmental problems. Oil spillage has become a global menace that has been occurring since the discovery, exploration and exploitation of crude oil, which was part of the industrial revolution (Kadafa, 2012).

To enable organization, evaluate its performance over time and account for its activity, it is expedient to use measurement tool such as balance score card which consider both qualitative and quantitative performance information. As a result, they track activities and ensure that desire goal is achieved within the scope of performance measurement (Crane, 2007). McMahon (1998) defined financial performance as a subjective measure of how well a firm can use assets from its primary mode of business and generate revenues. Chukwuma and Efeeloo (2017) in their own way, opines that financial statement measure overall financial health of a firm over a given period of time, and such statement can be used to compare performance between industries. Proper disclosure of environmental cost information relating to the environment is an important aspect of company accountability architecture which stand in long run to provide a veritable environment for business growth and profit maximization.

Statement Of the Problem.

The environmental protection agency based in USA and other domestic regulatory agencies of government in Nigeria such as the Nigeria extractive industry and transparency initiative, and the national environmental standards and regulation enforcement agency have provided guidelines that assist companies carrying out manufacturing and extraction of natural resources to comply with relevant environmental laws. These guidelines ensure that company's direct interaction with physical environment do not result to harm the biological structure in the ecosystem. In spite of these laws and enforcement, there is increasing concern about environmental degradation, resources reduction in area where oil is deposit, poor waste and emission are of the increase and negative attitude towards prevention of the ecosystem. This incidence results to people living in these areas being exposed to more dangerous diseases such as respiratory disorders as a result of long-term exposure to gas flaring which in the future will affect population growth. This unfavorable environmental effect on human and ecosystem poses reasonable threat to businesses, youth restiveness from non-compliance with laws could lead to hostility in the environment, threat to company's employee's life and off course low-productivity.

The nature of the global environment resulting from ecological dislodgement have increase public attention and investigation on the activities and performance of companies. In this light, Companies are now expected to prove that they are responsive and ensure that the impression created through their operations on the environment is addressed by rehabilitation which are capital intensive. Despite effort recorded so far, there exist a general concern that the conventional accounting policies and regulatory framework do not make better provision covering management and disclosure of environmental accounting information, but internal management policy and procedure has made it inclusion in advisory form. Therefore, the need for comprehensive environmental costs information system that would meet current intensified environmental pressure, manage wastages and maximize profit in a critical industry such as oil and gas companies is a burning issue in Nigeria. Extant literature has documented studies on environmental cost accounting but they have been scanty research on the implication of environmental cost on oil and gas companies which this study intends to address.

Objectives Of the Study.

The main objective of the study is to investigate whether there exists any significant relationship between environmental costs and financial performance of oil and gas companies in Nigeria. In arriving at the main objective, the following specific objectives were considered to;

- i. examine the effect of environmental cost on return on capital employed of oil and gas companies in Nigeria.

ii. investigate effect of environmental cost on market value added of oil and gas companies in Nigeria.

II. Theoretical Framework

Sustainability theory, Solow Robert M. (1993).

Sustainability is the process of maintaining change in a balanced fashion, in which the exploitation of resources, the direction of investments, the orientation of technological development and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations. This theory assume that the corporation is a member of the moral community, and this gives its social responsibilities that enhance future benefit. The emphases are more on sustainability, and requires that company weigh its actions on three independents scale economic, social and environmental sustainability. Brundtland Report for the World Commission on Environment and Development (1987) introduced the term of sustainable development and further provide a ground for the development of the theory. The theory postulates that organization must account for economic, social and environmental performance in its process. Thereby increasing firm's consciousness on activities that aim at embracing life-cycle technology, give room to social common groups and restructure company authority, modify products and services to be more environmentally friendly and also ensure compliance with environmental rules and guidelines. Hart (1997) opine that the achievement of environmental sustainability needs products and services accountability, pollution prevention and green technology. Triple bottom down suggests a special recognition of businesses to the sustainable development of environmental performance matrix. Higgins (2001), posit that quantifying and recording an organization's triple bottom down (TBD) has emerge as a critical organizational procedure for organizations to prove that their contributing to the society is appropriate in line with regulations. It could therefore be deduced from the general assumption of this theory that oil and gas production, process, purifying of raw material and marketing if reformed with consideration to social, economic and environmental sustainability will help advanced pollution control, reduces environmental costs and maximize long term reward of the Companies.

The Stake-Holders Theory by Freeman (1984).

Stakeholder theory explains specific cooperative actions and activities using a stakeholder agency approach. It is concerned with the relationships between stakeholders and manager of a companies in terms of the acknowledgement of accountability. According to Freeman (1984) stakeholders comprise any group or individual who can affect or be affected by the achievement of the organization's objectives. These groups or individuals may include employees, local communities, customers, suppliers, competitors, banks, investors, governments, non-governmental organizations (NGOs) etc. Some scholars have agreed with his positions on the responsibility of the firm to a broader set of stakeholders other than shareholders while Friedman (2002) have opposed the idea. The concern of the stake-holder's theory is to ascertain which stakeholders are more relevant to the organization, and this is very vital to the management of the organization because it is believed that the success of the organization in terms of performance is dependent on the support of the stakeholders (Arowoshegbe and Uniamikogbo, 2016). Ballou, Heitger and Landes (2006) maintained that companies have recognized that ascertaining stakeholders need is crucial in maximizing the general strategic business objectives. They went further to assert that if achieving shareholders worth continue to be dominant anxiety, companies would not be fragile in meeting other key stakeholder's welfares. Post, Preston and Sachs (2002) submitted that firm market value is increase when critical stakeholder's needs are meet. However, this theory proposed an increased level of environmental awareness which creates the need for companies to extend corporate planning to include the non-traditional stakeholders in order to adapt to changing social demands. As stakeholders influence become crucial for corporate image and comparative advantage, companies manage their stakeholder relationship by providing information often in the form of voluntary disclosures in the annual reports or on their websites. On the contrary, ethical aspect of the stakeholder's theory opine that all stakeholders have to obtain adequate and equal treatment by the organization and that the issue of higher influence of some stakeholders on the organization is irrelevant. It has been argued that the impact of the organization on the stakeholder is what should be paramount in this circumstance rather than the economic importance of a stakeholders to the organization. In summary, stakeholder theory views corporations as part of a social system while focusing on the various stakeholder group. Shareholder theory does not give primacy to one stakeholder group over the others. However, management must keep their relationship among stakeholders in balance, when this relationship become skewed the survival of firm is in jeopardy. Hence the study is anchored on stakeholders' theory given it relevance to the study.

Environmental management accounting

Accounting has an instrumental role in disclosing environmental responsibility for different entities whether industrial, commercial service and at all levels whether micro or macro. Thus, accounting became concerned with achieving new goals such as measuring and evaluating potential or actual environmental

impacts of projects and organizations. Environmental Management Systems (EMS) have emerged as a means to systematically apply business management to environmental costs to enhance a firm's long-run financial performance by developing processes and products that simultaneously improve competitive and environmental performance (Stead and Stead, 1992). Environmental accounting therefore referred to as Green Accounting has different meanings and can be used in varied contexts. It is an inclusive field of accounting that provides reports for both internal uses, generate environmental information to help make management decisions on pricing, controlling overhead and capital budgeting, and external use; disclosing environmental information of interest to the public and to the financial community. According to Steel and Powell (2002) environmental accounting is an aspect of accounting which has to do with the identification, allocation and analysis, of material streams and their related money flows by using environmental accounting systems to provide insight in environmental impacts and associated financial effects. In his contribution, Peskin (1998) viewed environmental accounting as a tool that can be employed to determine less tangible and external costs for projects and activities, such as biodiversity, human health and aesthetic values. It is also aimed at broader issues such as implementing sustainable business practice to conserve natural resources for future generations. 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. An important function of environmental accounting is to bring environmental cost to the attention of corporate stakeholders who may be able and motivated to identify ways of reducing or avoiding those costs while at the same time improving environmental quality (United State Environmental Protection Agency, 1995). According to International federation of accountant (1998) environmental accounting is the management of environmental and economic performance through the development and implementation of appropriate environmental-related accounting systems and practices. While this may include reporting and auditing in some companies, environmental accounting typically involves life cycle costing, full-cost accounting, benefits assessment, and strategic planning for environmental management. Jasch (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.

Environmental reporting in oil and gas companies.

Environmental information provided by companies by their nature is distinguish into financial and non-financial environmental information. The financial information is found in the balance sheet, the income statement and the cash flow statement. Cunha (2017) observed that the financial information is prone to quantification problem and valuation of certain facts concerning environmental factors. He further stressed that, they could be great possibilities of value subjectivity of the models to measure environmental costs and benefits and the challenges of ascertaining the extent of the environmental impact in the company. Non-financial environmental information is qualitative in nature. It provides data describe certain environmental indicators such as in physical terms, emissions of pollutants into the atmosphere, as well as the amounts of waste discharged into the water or soil, energy and raw material consumption, noise reduction, among others. On the other side, the narrative data address the policies and actions undertaken in environmental matters, the description of the environmental impact and the activities carried out in research and development (Larrinaga, Carrasco, Correa, Llena & Moneva 2002).

Environmental reporting usually included in non-financial information is a broad term applicable to all information for shareholders and other stakeholders that is not defined by an accounting standard or a calculation of a measure based on an accounting standard (AECA, 2012). AECA (2012) emphasizes that the development of non-financial information is more recent and less structured, because it is information that is voluntarily prepared and published by companies and institutions. In general, this information is included in the sustainability report. This have emerged to increase the transparency of organizations, although their main limitation is the necessary creation of information tools measurable, comparable and reliable. At the moment, there is no legal framework in most countries to determine the content of sustainability report of companies. In general, in the sustainability report, companies report their activities and performance, using a series of economic, social and environmental indicators. In particular, oil industry companies use standards such as the GRI Global Reporting Initiative (GRI), and models provided by the International Petroleum Industry Environmental Conservation Association (IPIECA) and the American Petroleum Institute (API) to disseminate sustainability information. In this regard all companies involved in oil and gas exploration, development and production activities must indicate in their financial statements the policy for accounting for costs incurred and the manner of costs capitalization in respect of oil and gas activities (Davies, Nangil & Egbai 2014). The policy could be disclosed through full-cost and successful effort. The successful effort allows all operating expenses relating to locating new oil and gas reserves regardless of the outcome to be capitalized while successful effort

method depreciation, depletion and amortization (DD&A), production expenses and exploration costs incurred from unsuccessful efforts at discovering new reserves are recorded on the income statement.

Environmental management cost and firm performance.

Environmental Protection Agency (EPA, 1995) declared that environmental cost information can be applied in internal management decisions. Environmental cost information generated through accounting for environment can help in company growth. The absence of such information increases the stress of accounting for costs and struggles to reduce costs to managers. The term Environmental accounting belongs to the area of accounting -related activity, method and system for recording and analysis (Shaltegger, Bennet, Burritt & Jasch 2008). The study by Larrinaga and Babbington (2001) revealed that companies can achieve cost savings that can improve their performance by implementing environmental accounting. Elewa's study in (2007) discovered that implementing environmental accounting leads to profit growth resulting from cost reduction of yearly production. According to De Beer & Friend (2006), Environmental accounting has other advantage order than cost reduction. It can also be used to indicate potential for environmentally beneficial investment to yield significant financial benefits by avoiding environmental liability. Financial Performance as a way of definition is a subjective measure of how well a firm can use assets from its primary mode of business and generate revenues. It is a process of measuring the results of a firm's policies and operations in monetary form. This study focuses on determining whether sustainability accounting will help to improve company's financial performance. Return on assets being a better metric of financial performance than other measures like return on equity (ROE), return on sales etc (Hagel, Brown & Davision, 2010) was used as a metric for financial performance in this study.

Empirical review

Those competing thoughts intuitively produce contradictory empirical findings. It is because prior studies on this topic posit either a positive relationship or a negative relationship. For instance. Esira, Ikechukwu & Ikechukwu (2014) examined the impact of environmental cost management on the profitability of the oil and gas sector in Nigeria from 2004 to 2013. The study revealed that there exists a significant relationship between the influence of environmental cost management and profitability of firms in the Nigerian oil and gas sector. It was also revealed that there are no established standards guiding environmental cost management in the oil and gas sector in Nigeria. In their study, Bessong & Tapang (2012) examined the influence of social responsibility costs on profitability of Nigerian banks. Their study revealed that there exists a negative influence between social cost and pollution cost on the profitability of Nigerian banks. Ijeoma (2015) employed survey method to investigate the role of environmental cost accounting towards environmental sustainability in Nigeria. The results showed that there exists no significant difference on the adoption of environmental cost accounting techniques cost management by business organizations in Nigeria which implies strong evidence that business organizations in Nigeria have not adopted the use of environmental cost accounting techniques cost management. In a similar way, Acti, Lyndon and Bingilar (2013) also used survey method to study the impact of environmental cost on corporate performance of oil and gas in Niger Delta states of Nigeria. The study showed that sustainable business practice as a tool for corporate conflict resolution and corporate performance are significantly related.

Asuquo (2012) studied the financial effect of environmentally friendly policies such as environmental protection and cost of determining environmental degradation on the corporate performance of manufacturing companies. He found out from the study that the cost of ensuring environmentally friendly policies as well as firm's competitiveness have significant relationship with the corporate performance of the firms. In their study, Uwuigbe & Egbide (2012) investigated the relationship between firms' corporate financial performance and the level of social responsibility disclosure among selected companies in Nigeria. They also looked at the relationship between the firm's financial leverage and the level of corporate social responsibility disclosure among those firms using the annual reports of the firms for the year 2008. The study revealed that firm's corporate financial performance and the size of audit firm has a significant positive relationship with the level of social responsibility disclosure whilst there exists a negative relationship between firm's financial leverage and the level of corporate social responsibility disclosure.

Bassey, Effiok & Eton (2013), in their work whose objective is to examine the impact of environmental accounting and reporting on organizational performance of selected oil and gas companies in Niger Delta region of Nigeria, found that firms which are environmentally friendly will significantly publish environmental related information in their financial statements and other reports of the business. Obara and Onangih (2017) examine the extent to which accounting practices 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 relationship with performance of Oil and Gas Companies, particularly, the Return on Assets and Return on Capital Employed.

Cunha (2017) used exploratory and descriptive method to investigate environmental indicator of oil companies in Brazil. The result showed that moderate disclosure in aspect of emission, effluents, waste and biodiversity are responsible for green house emission. Clarkson, Li and Richardson (2008), study the relationship between environmental performance and environmental disclosure. The result of the study found that there is a positive and significant relationship between environmental performance as measured by ratio of waste recycled or toxic releases index (TRI) and level of environmental disclosure index as measured by Global Reporting Initiative (GRI). Mohammad, Sutrisno, Prihat and Rosidi (2013) used partial least square to investigate stakeholder theory and legitimacy as well as eco-efficient related to effect of environmental accounting implementation and environmental performance and environmental disclosure as mediation on company value. The results found that environmental accounting implementation is able to affect company value and level of information disclosed. Arafat, Warokka and Dewis (2012), examine whether environmental performance really matter among Indonesian companies. The empirical results reveal that environmental performance has significantly influenced financial performance of the Indonesian manufacturing firm.

III. Research Methodology

The study adopts ex-post facto research design to examine the environmental cost incur by oil and gas companies as contained in the annual report of the study firm and its effect on their financial performance. The choice of using ex-post facto was informed by the fact that variables of the study cannot be manipulated. This is because the events had already taken place and therefore the research has been conducted after the fact. To show the relationship existing between variables of the study, the sample size consisted of Ten (10) quoted oil and gas companies consistently traded on Nigeria Stock Exchange. The reason for selection was based on their reporting pattern and disclosure of appropriate financial and non-financial information which were used for the determination of the dependent and independent variables for the study. The study covered ten years consolidated financial statement of these companies from 2012 to 2021 financial years.

As at when the study was carried out, there were sixteen (16) oil and gas companies listed on the Nigerian Stock Exchange. Six (6) out of the sixteen (16) companies do not publish their financials online while the remaining ten (10) companies published their financials online for easy retrieval. These constitute the simple size of the study. Besides, the study companies involved in refining, process, purifying of raw material, marketing and distribution of petroleum products. To ascertain the statistical validity of the relationship between variables in the study, panel regression model was adopted for the analysis of the data. Moreover, the variables used for this study were reviewed from the study oil company's annual reports 2013-2017. The environmental (IV) independent variable such as pollution mitigation cost (PMC), environmental regulatory cost (ERC) and employee health and safety cost (EHSC) were all measured by dichotomy procedure with score 0 if disclosure item is not applicable and score range from 1-5 based on full and partial disclosure applying global reporting index (GRI) where expenditure on pollution control and certificated to ISO 14001.

Model Specification

The model used in this study is the Multiple Regression Models and is given as thus:

$$ROCE = \beta_0 + \beta_1 t_1 + \mu_t \dots \dots \dots (1)$$

$$MVA = \beta_0 + \beta_1 t_1 + \mu_t \dots \dots \dots (2)$$

Thus, the model is specified as follows.

$$FP = f(EC)$$

$$FP = \beta_0 + \beta_1 PMC_{t_1} + \beta_2 ERC_{t_2} + \beta_3 EHSC_{t_3} + \mu_t \dots \dots \dots (3)$$

$$ROCE = f[PMC, ERC, EHS]$$

$$ROCE = \beta_0 + \beta_1 PMC_{t_1} + \beta_2 ERC_{t_2} + \beta_3 EHSC_{t_3} + \mu_t \dots \dots \dots (4)$$

$$MVA = f[PMC, ERC, EHS]$$

$$MVA = \beta_0 + \beta_1 PMC_{t_1} + \beta_2 ERC_{t_2} + \beta_3 EHSC_{t_3} + \mu_t \dots \dots \dots (5)$$

Where:

FP = Firm performance

EC = Environmental cost

ROCE = Return on capital employed

MVA = Market value added.

PMC = Pollution mitigation cost

ERC = Environmental regulatory cost

EHS = Employee health and safety

μ_t = error term

β_0 = Constant

β_1, β_2 & β_3 = regression coefficient.

IV. Results Presentation And Discussion Of Findings.

Table 1 Descriptive Statistics

	MVA	ROCE	EHSC	ERC	PMC
Mean	3629139.	0.302911	3.285714	2.561071	2.623571
Median	891710.0	0.050000	4.000000	2.000000	3.000000
Maximum	74360642	6.340000	5.000000	5.000000	5.000000
Minimum	13261.28	0.010000	1.000000	0.420000	0.320000
Std. Dev.	9977681.	1.034006	1.637229	1.278263	1.107883
Skewness	6.528140	4.979740	0.341431	0.315329	0.078916
Kurtosis	46.76433	27.14444	1.527222	1.992644	2.333990
Jarque-Bera	4866.826	1591.672	6.149208	3.295823	1.093119
Probability	0.000000	0.000000	0.046208	0.192451	0.578938
Sum	2.03E+08	16.96300	184.0000	143.4200	146.9200
Sum Sq. Dev.	5.48E+15	58.80425	147.4286	89.86754	67.50729
Observations	56	56	56	56	56

Source: E-view compilation (output), 2024.

Descriptive statistics show the summary of data and other basic characteristics within the series. The summary statistics for annual changes the main variables in the study are presented for the sampled oil and gas companies are reported in Table 1 above. The descriptive are reported in this manner because, the values for the general variables are large and may not present much information about the characteristics of the datasets. From the Table, average annual changes in market value added (MVA), return on capital employed (ROCE), environmental health and safety cost (EHSC), environmental regulatory cost (ERC) and pollution mitigation cost (PMC) for the oil and gas companies are 36 per cent, .30 per cent, 3.2 per cent, 2.5 per cent and 2.6 per cent respectively. Although the maximum value of 74, 6.3, 5.0, 5.0 and 5.0 suggests that there were companies with terrific changes in market value added over the period of the study. This is also confirmed by the standard deviation value of 9.9, 1.03, 1.63, 1.27 and 1.10 are much higher and lesser than the mean value, suggesting that market value added, return on capital employed, environmental health and safety cost, environmental regulatory cost and pollution mitigation cost of oil and gas companies are not evenly spread across the reported mean value. Indeed, the skewness value of 6.5, 4.97, 0.34, 0.31 and 0.07 suggests that most of the actual changes in environmental cost incurred by oil and gas companies are higher and lesser than that of the reported mean value. There are large outliers that are pushing up the mean value. The Jarque-Bera statistics for all the variables are all significant at the 5 per cent level, which shows the absence of normality in their respective data distributions. This outcome is to be expected since different banks was adopted for the datasets. Hence, the result shows that deposit money banks characteristics may be exerting strong heterogenous influences for the datasets.

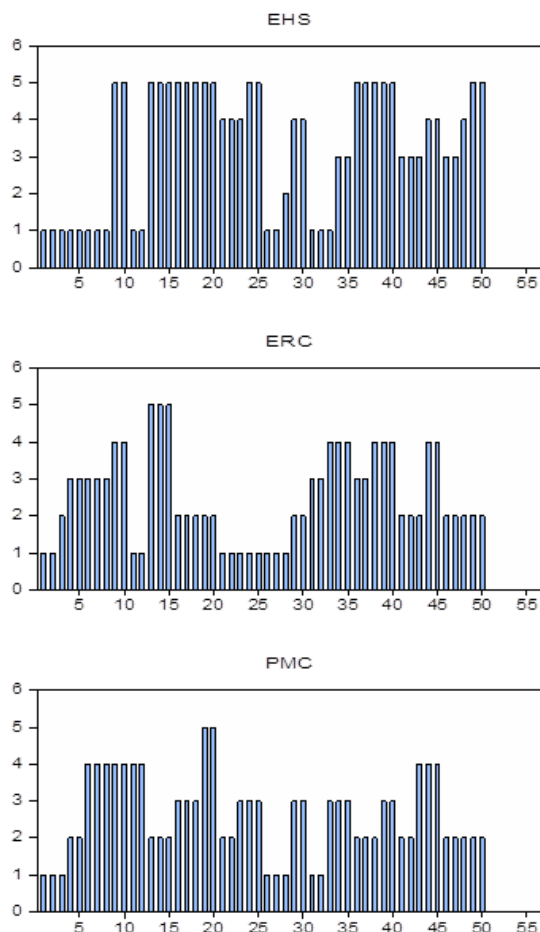


Fig 1 Histograms of Probability Distributions Of The Datasets.

We further test for the distribution patterns of the density functions of the datasets for the study since the aim of the study is to investigate the interactive relationships. First, the concentration of the distribution of the datasets are demonstrated by the functions of the density distribution of the variables. The plot of the density functions in histograms (shown in Figure 1 above) presents the results of degree of normality amongst the variables. The distribution of environmental cost is quite unstable and indicates that it is non-normally distributed. Similar outcomes are reported for the other variables, given that they are not quite bell-shaped.

Table 2 Correlation

	EHSC	ERC	MVA	PMC	ROCE
EHSC	1				
ERC	0.2087	1			
MVA	0.1253	0.1366	1		
PMC	0.2548	0.2216	-0.1066	1	
ROCE	0.0066	0.0329	0.0829	0.2228	1

Source: E-view compilation (output), 2024.

The patterns of relationships among the dependent and independent variables in the study are evaluated with the correlation analysis shown on Table 2 above. The result showed a positive and negative correlations among all the variables, although not all correlations are strong. The correlation between environmental health and safety cost (EHSC) and environmental regulatory cost (ERC) exerted positive relationship with market value added of oil and gas companies while pollution mitigation cost (PMC) showed negative relationship with market value added (MVA) of oil and gas companies. This means that environmental health and safety cost and environmental regulatory cost incurred by the study companies influences their market value while pollution mitigation cost reduces market value of the study companies respectively. However, the correlation between environmental health and safety cost (EHSC) and environmental regulatory cost (ERC) exerted positive and significant relationship on return on capital employed while the relationship between pollution mitigation cost and return on capital employed exerted positive but not significant.

Table 3 Panel least square estimation results showing the relationship between environmental accounting and return on capital employed of oil and gas companies.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.153372	0.449795	-0.340982	0.7345
EHS	-0.032968	0.089337	-0.369029	0.7136
ERC	-0.007216	0.113469	-0.063595	0.9495
PMC	0.222250	0.132408	1.678521	0.0992
R-squared	0.052427	Mean dependent var		0.302911
Adjusted R-squared	-0.022641	S.D. dependent var		1.034006
S.E. of regression	1.035164	Akaike info criterion		2.975745
Sum squared resid	55.72131	Schwarz criterion		3.120413
Log likelihood	-79.32087	Hannan-Quinn criter.		3.031833
F-statistic	2.807016	Durbin-Watson stat		1.150871
Prob(F-statistic)	0.419096			

Source: E-view compilation (output), 2024.

Model summarized in table 3, showed the panel least square result of the study. The table test the implication of the environmental cost as identified in this study on return on capital employed. The model R square of 0.52 and Adjusted R square of 0.22 showed the variation in the independent variables which explain 58% deviation in the dependent variable leaving only 22% variability in environmental cost to other factors not considered in the model. The durbin-watson statistics value indicated a positive auto-correlation between the variables, meaning that the relationship between the dependent and independent variables are strong and significant to the study. The unstandardized coefficient revealed actual result of the regression analysis. The result shows that, an increase in pollution mitigation cost (PMC) by 22% during the period will stimulate 1% increase in ROCE. The result further revealed that, a decrease in environmental regulation cost (ERC) and employed health and safety cost (EHSC) by 32% and 7% will result to a positive 1% increase in the companies returns (ROCE) respectively. The probability value (p-value) for PMC, EHSC and ERC showed a positive value above 5% of the 95% confidence level. This imply that there is a positive strong relationship between the independent and dependent variables but the relationship was not significant to the model. The p-value for EHSC showed a value below 5% of the 95% confidence level, meaning that there is a positive strong relationship between ROCE and EHSC and is consider significant to the model.

Table 4 Panel least square estimation results showing the relationship between environmental accounting and market value added of oil and gas companies.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2041207.	4331957.	0.471197	0.6395
EHS	849223.9	860404.1	0.987006	0.3282
ERC	1141377.	1092817.	1.044435	0.3011
PMC	-1572483.	1275215.	-1.233112	0.2231
R-squared	0.056074	Mean dependent var		3629139.
Adjusted R-squared	0.016164	S.D. dependent var		9977681.
S.E. of regression	9969614.	Akaike info criterion		35.13673
Sum squared resid	5.17E+15	Schwarz criterion		35.28140
Log likelihood	-979.8285	Hannan-Quinn criter.		35.19282
F-statistic	1.029684	Durbin-Watson stat		2.238402
Prob(F-statistic)	0.387135			

Source: E-view compilation (output), 2024.

Model summarized in table 4, showed the panel least square result of the study. The table test the implication of the environmental cost as identified in this study on market value added of oil and gas companies. The model R square of 0.56 and Adjusted R square of 0.16 showed the variation in the independent variables which explain 56% deviation in the dependent variable leaving only 16% variability in environmental cost to other factors not considered in the model. The durbin-watson statistics value indicated a positive auto-correlation between the variables, meaning that the relationship between the dependent and independent variables are strong and significant to the study. The unstandardized coefficient revealed actual result of the regression analysis. The result shows that, a decrease in pollution mitigation cost (PMC) by 15% during the period will stimulate 1% increase in market value added (MVA). The result further revealed that, an increase in environmental regulation cost (ERC) and employed health and safety cost (EHSC) by 11% and 84% will result to a positive 1% increase in the companies returns (ROCE) respectively. The probability value (p-value) for PMC, EHSC and ERC showed a positive value above 5% of the 95% confidence level. This imply that there is a positive strong relationship between the independent and dependent variables but the relationship was not significant to the model. The p-value for EHSC showed a value below 5% of the 95% confidence level,

meaning that there is a positive strong relationship between market value added (MVA) and EHSC and is consider significant to the model.

Table 5 Causality test between environmental cost and performance.

Null Hypothesis:	Obs	F-Statistic	Prob.
ERC does not Granger Cause EHSC	54	0.61241	0.5461
EHSC does not Granger Cause ERC		6.23601	0.0039
MVA does not Granger Cause EHSC	54	0.27655	0.7596
EHSC does not Granger Cause MVA		3.45183	0.0396
PMC does not Granger Cause EHSC	54	0.31953	0.7280
EHSC does not Granger Cause PMC		0.20848	0.8125
ROCE does not Granger Cause EHSC	54	0.29002	0.7495
EHSC does not Granger Cause ROCE		0.00013	0.9999

Source: E-view compilation (output), 2024.

We test causality among the environmental cost variables as well as between oil and gas performance variables. The outcome of these tests will give backing to the argument of a possible reverse causality running from performance to environment cost incurred by oil and gas companies. The result of the causality test using the Dumitrescu-Hurlin Panel Causality technique is presented in Table 5 above seen that only the F-statistics for the null hypothesis of causality running from ERC to EHSC, MVA to EHSC, PMC to EHSC, EHSC to PMC, ROCE to EHSC and EHSC to ROCE passed the significance test. This shows that the strongest reverse causality between environmental cost and performance of oil and gas companies. Thus, it is seen that EHSC and ROCE exerted strong significant relationship and could mean that the higher or lesser EHSC incurred by oil and gas companies determine its performance.

Test of hypotheses

The hypotheses earlier formulated in chapter one of this study were tested based on the panel regression results; The hypotheses in this study were tested at 0.05 per cent level of significance using the F-value.

From the result in table 3, the study proceeds to test hypothesis one.

Ho₁: There is no significant relationship between pollution mitigation cost, environmental regulatory cost and employee health and safety cost and return on capital employed in oil and gas companies in Nigeria.

The F-statistics of the estimated coefficient of environmental cost was observed to be 2.807 and the statistical table value is .998 at 0.05 per cent confidence interval. Given that the calculated value of 2.807 is greater than the tabulated value of .998 with the degree of freedom $n - 5 (50-5) = 45$ at 0.05 per cent level of significance. The null hypothesis is therefore rejected and the alternative accepted. Thus, the study therefore concludes that there exists a significant relationship between environmental cost and return on capital employed of oil and gas companies in Nigeria.

From the result in table 4, the study proceeds to test hypothesis three.

Ho₂: There is no significant relationship between employee health and safety, pollution mitigation cost and environmental regulatory cost on market value added of oil and gas companies in Nigeria

The F-statistics of the estimated coefficient of environmental cost was observed to be 1.029 and the statistical table value is .998 at 0.05 per cent confidence interval. Given that the calculated value of 1.029 is greater than the tabulated value of .998 with the degree of freedom $n - 5 (50-5) = 45$ at 0.05 per cent level of significance. The null hypothesis is therefore rejected and the alternative accepted. Thus, the study therefore concludes that there exists a significant relationship between environmental cost and market value added of oil and gas companies in Nigeria.

Discussion of findings

From the data that were analyzed and tested using the various econometric statistical indicators, the degree of correlation and significant relationship between the explanatory variables (PMC, ERC and EHSC) and dependent variables (ROCE and MVA) was measured. The adjusted R² was considered appropriate to test the level of correlation between the variables. From hypothesis one, the F-statistics was used to test the significant relationship between the dependent and independent variables. It was discovered that environmental cost (EHSC, PMC and ERC) showed a significant relationship on return on capital employed. The result of this study aligned with the research outcome of Spicer (1978) who found that firms' size is a factor that influences pollution control. According to him, larger companies had better record than smaller firms in pollution control. Though the oil and gas sector in Nigeria require intensive capital for it set up unlike other sectors. To evaluate its performance over time, returns on capital is very significant. Hence, the result imply that the identified cost (as used in the study) incurred by the companies reduced restiveness from the immediate community, employee and

government agency in form of fine from environmental default. This business stability experience throughout the period covered by this study resulted to improve in their returns on investment. The result of the study affirmed the assertion of Larrinaga and Babbington (2001) and Elewa's study in (2007) that companies can achieve cost savings and improve their performance through implementation of environmental policy. The result also agreed with the research outcome of Arafat, Warokka and Dewis (2012) whose empirical results reveal that environmental performance has significantly influenced on financial performance of the Indonesian manufacturing firm. The result is against that of Ijeoma (2015) whose empirical result found that there exists no significant difference on business organizations in Nigeria not being aware of environmental policies. The result of Ingram and Frazier (1980) who used environmental performance by a performance index devised by the Council on Economic Priorities (CEP), a non-profit organization specializing in the analysis of corporate social activities also showed that there is no association between environmental disclosure and environmental performance disclosures in annual reports

Similarly, hypothesis two was tested and it shows that there exists a significant relationship between environmental cost and market value added of oil and gas companies in Nigeria. The result has proven that market value added (MVA) actually represent the wealth generated by a company for its shareholders since the main aim of a profit-making organization is to maximize shareholders wealth. The result agrees with assertion of De wet (2005) that market value added is the best performance measure because it indicates market assessment.

V. Summary of Findings, Conclusion and Recommendations.

Summary of major findings

The study was undertaken to assess the implication of environment cost on the profitability of oil and gas companies in Nigeria. Oil sector is a non-financial sector involved in the exploration and marketing of petroleum products. The data obtained was from the reported financial statement which was statistical in nature and so relevant to providing needed information for the determination of the variables used in the study. From the result, it was found that employed health and safety cost (EHSC), pollution mitigation cost (PMC) and environmental regulatory cost (ERC) are cost that proved to be significant to the study companies. When we consider implication of environmental cost on return of capital employed of the company. It was discovered that only EHSC exerted significant effect on ROCE while PMC and ERC do not significantly affect ROCE but their respective coefficient value were positively correlated. This imply that the study companies were capital intensive and efficient enough to pay dividend and interest to both equity and debt holders. The study revealed further that only environmental regulatory cost (ERC) exerted significant effect on MVA while PMC and EHSC do not significantly affect MVA but their respective coefficient value was positively correlated except that of PMC incurred by the companies that showed a negative relationship. The result of the study means that, companies under study actually represent the wealth generated by the company for its shareholders.

Conclusion

The adverse of the activities of oil and gas companies cannot be underrated given the fact that they produce toxic chemical that causes atmospheric pollution and environmental degradation. In this end, adhering to environmental laws will reduce high crime rate and performance will increase correspondingly. Several reviews were made to compare the findings of past researchers on environmental cost accounting, environmental cost and environmental sustainability so as to establish the relationship between the dependent and independent variables. Although the result of this study provides conflicting view with previous researches while some contrast with our findings. The findings were based on the analysis of the data collected from the financial statements of ten (10) oil and gas companies involved in refining, process, purifying of raw material, marketing and distribution of petroleum products between the period in Nigeria.

Evidence from the study showed that environmental regulatory cost was significant to market value added (MVA) of the companies while employee health and safety cost of the companies showed a significant relationship with return on capital employed (ROCE). This means that the companies were efficient to generating earnings and distribute same to stakeholders. The study has proved that, oil and gas companies in Nigeria is concerned with addressing environmental challenges. This is one of the most reason while despite the challenges in global oil price, the industry is expanding more in capacity and contributing majorly in sustaining the Nigerian economy. From sustainability theory perspective, companies are required to weight their actions on three independents scale of economic, social and environmental issues. Since this constitute why they should continue in their business undertaking without being affected by external factor that would constraint profit maximization, incurring environmental cost became essential tool to oil and gas companies in Nigeria. However, many oil and gas companies apart from the one used here has failed to account and contribute to reflect economic, social and environmental performance in its process. This incidence has in many occasions result to hostility and youth restiveness in the locality which in furtherance reduce profit maximization.

However, we concluded that environmental cost significantly influences profit of oil and gas companies in Nigeria.

Recommendations

Following the discussions above, the study therefore makes the following recommendations,

1. Oil and gas companies should focus reasonable attention to addressing relevant environmental issues and cost involvement in their financial report for the purpose of profit measurement.
2. The international financial standard board should provide a framework for the inclusion of environmental cost as part of financial information not as non-financial information in the financial statement.
3. The Nigerian financial reporting council should join forces with other stakeholders, in producing an acceptable local standard for accounting for environmental cost and also ensuring full compliance in Nigeria.

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