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ENVIRONMENTAL DECOMMISSIONING COSTS AND FINANCIAL PERFORMANCE: A STUDY OF LISTED INDIGENOUS OIL AND GAS COMPANIES IN NIGERIA

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ABSTRACT

This paper examined the relationship between environmental decommissioning costs and financial performance of Nigerian listed indigenous oil and gas exploration and production companies. It used an ex-post facto research design. The study's population consists of three Nigeria Exchange Group-listed oil and gas companies, whereas the sample size consists of two Nigeria Exchange Group-listed oil and gas exploration and production companies. The data came from the businesses' annual reports and accounts. To test the hypotheses, the study uses E-views version 10.0 and basic linear regression of cross sectional panel data analysis. The hypotheses were developed using Hausman's findings on random and fixed effects models, co-integration, and granger causality links. The findings show that environmental dismantling costs have no positive or significant relationship with return on equity or return on assets, that environmental conventional building demolition costs have no positive or significant relationship with return on equity but do have a positive and significant relationship with return on assets, and environmental decommissioning cost have neither positive or substantial financial performance benefits. The study concludes that, in the long run, the high costs of environmental decommissioning to restore the environment of oil host and bearing communities to its near-natural state have no bearing on the financial performance of Nigeria's publicly traded oil and gas exploration and production companies.

Keywords: Environmental Decommissioning Cost, Financial Performance, Conventional Building Demolition Costs, Roe, Roa

Introduction

Profit maximization is the primary goal of business in the corporate sector. Financial performance is an assessment of a company's financial health during a certain period of time, including capital raising and allocations, and is typically assessed using capital adequacy, liquidity, leverage, solvency, and profitability as indicators. It refers to the activities (performance) carried out by businesses during a specific time period and reported in the company's financial statements (Mikial et al., 2019; Fatihudin et al., 2018). Financial performance is a measure of a company's ability to generate revenue from its assets. It is a subjective assessment of an entity's responsibility for the financial results of its policies, operations, and activities over a certain time period. The profitability ratio, solvency ratio, liquidity ratio, financial efficiency ratio, and finally the repayment capability of a business for a specific period may all be determined using ratio analysis.

It is a subjective assessment of a company's ability to generate income from its assets. Financial performance may also be used as a broad indicator of a company's overall financial performance throughout time (Alhassan & Islam, 2019; Khandelwal & Chaturvedi, n.d; Omaliko et al., 2020). It is also the technique of assessing the financial results of a firm's policies and activities in monetary terms, according to Khandelwal and Chaturvedi (n.d.). Financial performance, according to Fatihudin et al. (2018), is a company's capacity to manage and control its assets. Financial performance is the measurement of a company's profitability in terms of return on assets, return on investment, and return on equity, as well as market value and earnings per share (Abubakar et al., 2017; Solomon, 2020). Financial performance is a metric for assessing a company's level of achievement by examining the financial information it publishes, which is reflected in its financial ratios, and one of

its achievements is its financial stability, which allows it to generate profits, increase capital value, and meet short- and long-term obligations (Yuni & Mayangsari, 2020).
Financial performance is a metric that assesses a company's financial health over a lengthy period of time. It is a financial act that involves managing a corporate entity's current and non-current assets, financing, equity, revenues, and costs in order to increase sales, profitability, and value for its investors. Its goal is to offer shareholders and investors with complete financial information so that they may make informed economic decisions. It's used to compare companies in the same industry or to compare industries in aggregate (Naz et al., 2016; Khandelwal & Chaturvedi, n.d; Omaliko et al., 2020). Its application in risk management and boosting a company's profitability by adhering to corporate governance laws in order to make appropriate and informed judgments (Naz et al., 2016). Companies prepare financial reports and communicate them to users, according to Emeke et al. (2021), and the reports show costs and revenue items that are used in determining the financial position of the companies, even though improving a firm's financial performance can be hampered by external factors operating within the business environment. Because enterprises have acknowledged that external influences may affect their financial performance and position, Solomon (2020) claims that corporations' responsibility to environmental challenges as they effect society is critical for improved financial success.

Rini and Adhariani (2021) argue that a firm's financial performance can influence its environmental disclosure and performance, and that firms with high financial performance are more liberal and have no restrictions in reporting their environmental obligations, whereas firms with high profit margins are more willing to spend on environmental and social activities and may disclose such information. Salawu et al. (2021) argue that it is a resilient factor that attracts the interest of existing and prospective stockholders who are interested in how the business environment can be protected from harms, hazards, pollution, and the environment developed and maintained, rather than just profit distribution. Progress in an organization's financial performance improves the organization's image by increasing the trust of potential shareholders and creditors (Al-Dhaimesh et al., 2019). When companies have a good reputation, they are under more pressure to keep it, and they may wish to meet the demands of interested parties by articulating and carrying out their corporate social responsibility initiatives (Yu & Liang, 2020; Maryana, 2021). According to Zulfikar (2021), a high degree of profitability shows a company's ability to generate bigger profits, permit an increase in environmental and social responsibility, and publish environmental disclosures wilfully and freely in its financial report and accounts.

Decommissioning aspects that are well-thought-out from the commercial and environmental perspectives, meaning costs and safety, require sophisticated resources and proper preparation (OECD, 2016). Putting aside any clear thoughtfulness on the dangerous nature of their activities and the care with which any relevant information is handled, International Organization Commissions (IOCs) and National Organization Commissions (NOCs), and, more broadly, oil and gas operators, show limited sensitivity in disclosing the extent of their obligation in minimizing the impact of their activities on the environment and human health in their decommissioning activities. This scenario can be attributed to these companies' ongoing struggle to combine their environmental responsibilities with their shareholders' desire for profit (OECD, 2016).

However, it is stated that poor decommissioning performance may pose a significant risk to the firms involved as well as the entire oil and gas industry, both in terms of direct and indirect economic losses; as listed firms' shares may experience unexpected large drops, and reputational damage may jeopardize current and future orders in their pipelines. As a result, oil and gas companies have become increasingly active in recent years in considering international law that addresses the care and protection of human rights (OECD, 2016).

Statement of the Problem

Decommissioning is unquestionable, and it poses a significant environmental danger while also being financially unprofitable. Many parties are becoming more concerned about these challenges as they realize that oil and gas exploration is changing every year. Decommissioning is frequently a lengthy procedure. A number of operators are concerned that decommissioning requires a high level of knowledge, sophisticated technology, and exposure to a high risk of worker safety, high operational costs, and environmental impact. The goal is to reduce environmental consequences while meeting decommissioning deadlines at a low cost (Yusniah, 2014). A number of big corporations have responded to increased environmental consciousness by offering "greener" products and employing "greener" procedures. Environmental performance of goods and processes has become a major concern, prompting some businesses to look at measures to reduce their environmental impact. Many businesses have found it beneficial to investigate ways to go beyond agreement, such as utilizing pollution control tactics and environmental management systems to improve their environmental performance and save costs. The Life Cycle Assessment is one of these tools. This idea considers a product's whole life cycle (Yusniah, 2014).

The product system involves models of the technical activities that are employed in the product's distinct stages, and it is termed a Life Cycle Assessment (LCA) that is built and introduced to gather and assess the inputs and outputs, as well as the possible environmental impacts. The broad scope of LCA can aid decision-makers in avoiding sub-optimization, which is when parts of a system are optimized or improved at the expense of other parts of the system. The broad breadth of the LCA reduces the chance that a choice is attempting to minimize pollution while only shifting the problem from one environmental concern to another. The life-cycle perspective assists in shifting the focus of pollution management from dealing with pollutants after they have been formed to preventing pollutants from being formed so that environmental impacts can be avoided or mitigated at a lower cost during the product development and purchasing decisions processes (Yusniah, 2014).

Currently, as an oil and gas production comes to an end, the legislation demands that "decommissioned" equipment be removed, and the marine environment be maintained, cleaned up, and returned to its original state. When the platforms were erected, certain requirements were imposed on the oil and gas companies. However, the companies have been using existing legislation for some years to facilitate the abandonment of offshore platforms when production ceases. The firm's objective is to avoid paying the expenses of the previous remediation agreement. As the number of offshore platforms grows year after year, the industry of discarding, removing, or destroying them becomes increasingly important. As a result, the government and operators have been obliged to dismantle and dispose of their offshore platforms. A lot of operators are presently aware of the problems involved with decommissioning activities and are concerned about them (Yusniah, 2014). Operators must consider an efficient and effective decommissioning process to avoid incurring additional liability costs. Decommissioning activities are inherently 2risky, and LCA was created expressly to assess the environmental consequences of these procedures. An LCA provides data on product, ecological process, and system environmental performance (Yusniah, 2014).

As can be seen from the foregoing, no research has been conducted on the relationship between environmental decommissioning costs and financial performance of Nigerian oil and gas exploration and production companies as at the time of this work. To close this gap, this study examines the relationship between environmental decommissioning costs and financial success of Nigeria's publicly traded indigenous oil and gas companies. Obiora et al., 2022; Salawu, 2021; Agubosim et al., 2021; Zhang et al., 2021; Ifada et al., 2021; Badingatus and Ukhti, 2021; Nguyen et al., 2021; Wahyuningrum et al., 2021; Kaoje et al., 2020b; Using panel and pooled data (cross-sectional data),

this study aims to determine the relationship between environmental decommissioning costs and financial performance of listed indigenous oil and gas exploration and production firms in Nigeria.

Aim and objectives of the study

The overall aim of the study was to determine the relationship between environmental decommissioning costs and financial performance of Nigeria's publicly traded indigenous oil and gas exploration and production companies from 2011 to 2020. The specific objectives are to:

1. assess the relationship between environmental dismantling cost and return on equity of listed indigenous oil and gas exploration and production firms in Nigeria;
2. establish the relationship between environmental dismantling cost and return on assets of listed indigenous oil and gas exploration and production firms in Nigeria; and
3. establish the relationship between environmental conventional building demolition cost and return on assets of listed indigenous oil and gas exploration and production firms in Nigeria.
4. determine the relationship between environmental conventional building demolition and return on assets of listed indigenous oil and gas exploration and production firms in Nigeria

Research Questions

1. What is the relationship between environmental dismantling cost and return on equity of listed indigenous oil and gas exploration and production firms in Nigeria?
2. What is the relationship between environmental dismantling cost and return on assets of listed indigenous oil and gas exploration and production firms in Nigeria?
3. What is the relationship between environmental conventional building demolition cost and return on assets of listed indigenous oil and gas exploration and production firms in Nigeria?
4. What is the relationship between environmental conventional building demolition and return on assets of listed indigenous oil and gas exploration and production firms in Nigeria?

Research Hypotheses

1. There is no relationship between the cost of environmental decommissioning and the return on equity of Nigerian listed indigenous oil and gas exploration and production enterprises;
2. There is no relationship between the cost of environmental decommissioning and the return on assets of Nigeria's listed indigenous oil and gas exploration and production enterprises;
3. There is no relationship between the cost of environmental conventional building destruction and the return on equity of Nigeria's publicly traded indigenous oil and gas exploration and production enterprises;
4. There is no relationship between the cost of environmental conventional building destruction and the return on assets of Nigeria's publicly traded indigenous oil and gas exploration and production enterprises.

REVIEW OF RELATED LITERATURE

Conceptual Review

Decommissioning, also known as asset retirement duty or environmental liability provisions, has a significant impact on the financial performance of companies. A number of academics and researchers believe that increasing costs of decommissioning and environmental management activities have an impact on financial performance, while others cite questionable evidence that financial performance has improved. This study's conceptual review is broken down into the following subheadings:

Environmental Decommissioning Cost

Environmental decommissioning is the final step of an oil and gas project. The infrastructure must be decommissioned and the surrounding land restored to its natural form after a field production cycle approaches the end of its useful life and all viable oil and gas has been processed. This

stipulation is spelled forth in the Petroleum Act of 1998. Aside from drilling and filling the well, the procedure includes removing the infrastructure and platform. Occasionally, conductor pipes can be kept in place to create artificial ridges during the course of their deep-sea lifespan, although this is the exception rather than the rule. They can be reused or recycled for other projects, or they can be discarded once they return to land. As the number of offshore oil and gas fields has grown, the number of oil platforms nearing the end of their useful lifespan has also increased. Global revenue and employment are likely to soar to billions of dollars as the decommissioning and abandonment business grows fast (BP Plc., 2019). Decommissioning, according to Hallak (2017), is the process of removing structures, equipment, and facilities from a facility location once they have been dismantled, decontaminated, and removed. Decommissioning is described as "the process of plugging and abandoning wells, removing wellhead, production, and transport infrastructure, and restoring producing areas in line with licensing requirements and applicable legislation" in the Statement of Recommended Practice (OIAC., 2001).

Environmental Dismantling Cost

Decommissioning costs include the cost of dismantling and removing an oil rig, a processing plant, or a platform, as well as pipe installations, when the assets of property, plant, and equipment have reached the end of their useful life and are no longer productive, and their continued existence does not provide future economic benefit to the businesses. According to Jeroh and Okoro (2016), the expenses of disassembly are really repair and maintenance expenditures. By building long-term assets such as an oil drilling platform or processing facility, companies commit to deconstructing and rebuilding the site at the end of their asset's useful life, according to Javaid (2021). In the vast majority of cases, the company is legally required to do so. Where there is no environmental regulation governing site rehabilitation, companies may take this obligation as a goodwill gesture to the community. A constructive responsibility is created when the necessity to destroy and rebuild the place arises. First, an estimate of the long-term asset's dismantling costs is created.

Environmental Conventional Building Demolition Cost

There is a traditional form of construction known as "wet building" (in-situ) that uses reinforced concrete and is passed down from generation to generation (Amjad et al., 2017). Conventional or traditional construction materials employ non-recycled resources that are hazardous to the environment. Uses environmentally destructive materials such as concrete, cement, and other building items. There aren't any stated environmental objectives in this plan at all. The walls are built using steel-reinforced bricks. When we say "traditional building materials," we're talking about those that have traditionally been used in the construction of historical structures. The term "conventional" is used to describe them since they are the materials that most people use and have used for a long time. A significant drawback of using these conventional building materials is that they are not an eco-friendly choice. For this reason, waste and contamination from chemical production processes are involved.

Financial Performance

Financial performance is defined as a series of financial transactions over a period of time that is disclosed in the financial statements, which include the statement of other comprehensive income and the statement of financial position. The market's performance and the firm's key performance can be used to assess the firm's financial performance (Homan, 2016). The profitability ratio is the difference between the profit on sale and the profit on investment. Every business is striving to achieve a high degree of profitability (Van et al., 2005). Stakeholders examine a company's financial performance to determine its ability to produce money and meet its objectives. Accounting or stock market performance can be used to measure financial performance.

Return on Equity

Ordinary shareholders are entitled to a portion of an organization's residual profits. The dividend rate is not set in stone; earnings may be distributed among shareholders or reinvested in the company. Nonetheless, net gains after taxes represent a return. To determine the profitability of an owner's investment, a return on shareholders' equity is determined. Paid-up share capital, share premium, reserves, and surplus, less accumulated losses, make up the shareholders' equity or net worth. Subtracting total liabilities from total assets will yield a net loss. Return on equity measures how effectively a company has used its owners' resources.

Return on Assets

Ross et al. (1995) see return on assets as a measure of profit per naira of assets. Ho and Zhu (2004) explain that return on assets is obtained from the competence and efficiency of management in applying the assets to productive usage. The ability of the managers to control waste products and pollution while also putting assets to good use will have an impact on the profitability and returns of the establishments (Tsolas & Charles, 2015). As a result, return on assets is a well-balanced indicator that reflects both the effectiveness and efficiency of a company's asset usage operations (Ogunode & Adegbie, 2020). Cohen and Fenn (1997); and Cohen et al. (2014) observe that return on assets (ROA) is a metric that assesses how effectively assets are used to generate income and commonly used to evaluate company performance. Return on assets is calculated by dividing net income, which is the end result of a firm's performance, by total assets to get total income per dollar or naira of asset. On the other hand, regardless of whether debt or equity financing was employed, it can be determined by adding interest expenditure to net income to calculate total income (Malarvizhi & Ranjani, 2016).

Theoretical Review

Environmental Economic Theory

This work is anchored on Environmental economic theory. This viewed economy's role as a subsystem of the ecosystem, with a focus on natural capital preservation (Mol & Sonnenfeld, 2014). Environmental economics is a field of economics and environmental science (Turner et al., 2000). The environment is being threatened and destroyed at a rate never seen before as the industrialization process continues to speed up. As a result, there has been a rise in environmental consciousness. Environmental economics theory aims to help businesses strike a balance between growth and environmental protection. That is, to reduce the environmental impact of economic activity while yet ensuring long-term growth (Fondevila et al., 2019; Taplin & Winterton, 2019). Various researches on environmental accounting and reporting depend on different theories which include stakeholders' theory, economic agency theory, institutional theory, triple bottom line theory, legitimacy theory, and the theory that suggests a negative relationship, which is the trade-off theory. However, this study hinges on institutional and social contract theories.

Empirical Review

Chukwu et al. (2020a) studied environmental liability estimates and equity value of oil firms in Nigeria. The study examines whether decommissioning and environmental restoration estimates affect market value of oil firms in Nigeria, and how changes in environmental liability estimates affect the equity values of listed firms in the oil industry in Nigeria. The study adopts the *ex-post facto* research design and makes use of four listed oil firms that estimate and report decommissioning liabilities in their annual reports for the period 2012-2018. The study employs regression analysis to analyze the data with the aid of STATA version 12. The finding of the study shows that investors in Nigeria's oil and gas firms negatively value environmental liability estimates. The authors state that the finding is perhaps because Nigerian investors view these estimates as representing the extent to which the firms damage the environment. Given the adverse effect of environmental degradation in Nigeria, they assert that investors are wary of any indication of

environmental violation, though changes in decommissioning and restoration estimates are not associated with variations in the market value of oil firms in Nigeria, maybe due to lack of investors' sophistication in appreciating the basis for these changes. Additionally, the study observed that a number of listed oil firms did not provide for environmental liability in their annual reports for the seven years investigated, perhaps because there is no legal obligation to restore the environment.

Mydin et al. (2014) conducted a study on investigation of industrialized building system performance in comparison to conventional construction method. The study aims at making comparisons between the two (2) construction approaches. The study made used of case studies and interview. The case studies and the interview sessions were conducted at four constructions sites in the state of Penang, Malaysia. 2 projects were industrialized building system (IBS) based while the other 2 deployed the conventional method of construction. The finding reveals that, the IBS approach has more to offer compared to the conventional method. Among these advantages, there were shorter construction periods, reduced overall costs, less labour needs, better site conditions and the production of higher quality components.

METHODOLOGY

The philosophy of the study

The philosophical assumption of this study is epistemology, which deals with the science of knowing something and is all about the theory of knowledge and how knowledge is attained; the amount of individual's knowledge, and the standards or criteria by which people can judge the dependability of their assertions (Popkin & Stroll, 1993). Ahiauzu and Asawo (2016) posit that it is centered on how individuals can comprehend the world and communicate it to other individuals. Also, it is predicated on the opinion about the nature of knowledge, and whether it is probable to recognize and communicate the nature of knowledge, being difficult, tangible and capable of being communicated in real form, or whether knowledge is of easier, more personal and of mystical kind, based on individual's experience, perception of an exceptional and one's own nature. Epistemology is a derivative from the Greek word *episteme* meaning knowledge and *logos* meaning reason. Its concentration is on knowledge collecting process and its subject is about the question of what is considered satisfactory by philosophers in the view of knowledge in a discipline (Bryman & Bell, 2003).

Research Design

The *ex-post facto* research design was used in this study, because the data for the study is already available, and the researcher has no plans to change or control the variables.

Population of the Study

The population comprises the three (3) indigenous oil and gas exploration and production firms listed on the Nigeria Exchange Group. The firms include Seplat Energy Plc., Oando Plc., and Conoil Plc.

Sample Size and Sampling Techniques

A sample size of two (2) listed indigenous oil and gas exploration and production firms on the Nigeria Exchange Group was selected because the firms report decommissioning cost on their annual report and accounts with respect to the exploration and production activities. However, one of the firm Conoil Plc does not report decommissioning cost on its annual report and accounts with respect to the exploration and production activities, but on dealer owned service stations which is based on dismantlement and removal of signage's and fuel pumps.

Sources of Data

The study made use of secondary sources of data obtained from the annual financial report and accounts of Seplat Energy Plc., and Oando Plc., for the period of ten (10) years (2011-2020). The annual financial report and accounts of the firms were sourced from the firms' financial statement.

Method of Data Analysis

Following the lead of similar studies, the study employs a single econometric model to achieve the empirical results. The econometric model determines the Panel Regression, followed by the stationarity of the variables by applying unit root test using the Augmented Dickey-Fuller (ADF) test in line with Dickey and Fuller (1979, 1981), Multi-collinearity/Variance Inflation Factors test, Serial and Autocorrelation test, Ramsey Reset test, Normality test, Heteroskedasticity test, Common Effect Model, Fixed Effect Model, Random Effect Model, Hausman test, etc. Also, to ascertain the existence of long-run and causal relationship between variables, and also effect of the independent and moderating variables on the dependent variable, the co-integration and the Granger Causality tests which are the Diagnostic or Pre-Estimation and Post-Estimation tests was applied to achieve the results of this study.

Models Specification

In the light of the aim of this research, the models of Olugbenga (2016) were adopted and modified to suit the peculiarity of this study. Each model represented a given hypothesis respectively. The analysis was based on multiple linear regression models. Therefore, the models used for the purpose of this study are stated below:

$ROE_{it} = f(LogEDMC_{it}, LogECBC_{it},$ ..... (1)

$ROA_{it} = f(LogEDMC_{it}, LogECBC_{it}, LogEWDC_{it},$ ..... (2)

These are further stated in econometric forms below:

$ROE_{it} = b_0 + b_1LogEDMC_{it} + b_2LogECBC_{it}$ ..... (1)

$ROA_{it} = b_0 + b_1LogEDMC_{it} + b_2LogECBC_{it}$ ..... (2)

Where:

EDMC = Environmental Dismantling Cost
ECBC = Environmental Conventional Building Demoliion Cost
ROE = Return on Equity
ROA = Return on Assets
FP = Financial Performance
EDC = Environmental Decommissioning Cost
B_0 = Intercept of the Regression
B_1 = Coefficient of the Regression

DATA PRESENTATION, ANALYSIS, RESULTS AND DISCUSSION

Data Presentation

Table 4.1: Data used for Analysis

YEAR	EDMC	ECBC	EDC	ROE	ROA	FP
2011	11.67451665	13.54431012	19.71602	0.1091	0.0426	0.1517
2012	12.66770201	14.53749548	15.20896	0.274	0.1918	0.4658

2013	12.9849641	14.85475757	15.67488	0.7602	0.4213	1.1815
2014	13.62759484	13.18388735	13.5005	0.0156	0.0912	0.1068
2015	14.74222696	16.61202043	17.43214	0.0462	0.0238	0.07
2016	14.67495494	16.54474841	17.364871	0.1388	0.0718	0.2106
2017	16.66719963	16.83903774	17.933614	0.2516	0.1204	0.372
2018	12.751077	16.92365599	18.665303	0.1952	0.0846	0.2798
2019	17.07787969	9.737332786	17.079252	0.1535	0.0847	0.2382
2020	8.175607403	10.04540087	10.865523	0.0486	0.0234	0.072

Source: Researcher's computation of Firm's Annual Financial Reports, 2011 - 2020.

The table above shows the changes in the environmental dismantling cost, environmental conventional building demolition cost, and environmental decommissioning cost, return on equity, net profit margin, and financial performance. From the table, it could be seen that the amount of EDMC, ECBC and EDC increased in the year 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018 and 2019, while ECBC, EWDC, EDC dropped in the year 2019, and all the variables later dropped in the years 2020, in the firms under study. The analysis reveals that the percentage of ROE is in increased and decreased, and fluctuated over time between the year 2011, 2012, 2013, 2016, 2017, 2018 and 2019, then dropped in the year 2014, 2015 and 2020. While the ROA fluctuated over time with increased in the year 2011, 2012 and 2017, and dropped in the year 2013, 2014, 2015, 2016, 2018, 2019 and 2020. The FP fluctuated over time with increased in the year 2011, 2012, 2013, 2014, 2015, and 2016, 2017, 2018, 2019 and decreased in the year 2020.

Test of Hypotheses

Having conducted the Hausman tests to be able to choose between fixed and random effects for an appropriate fit model for the analysis and discussion of the results, the tests show a mixed results of appropriate fit of the models. Following the test results, Random Effect models are the appropriate fit for models Ia, Id and IIf, while Fixed Effect models are the appropriate model fit for models IIa, Ib, IIb, Ic, IIc, IId, Ie, IIe and If. Therefore, the analyses were based on the random and effect models, cointegration (long run relationship or no long run relationship), and granger causality or relationship (bi-directional or uni-directional relationship) among the variables.

(i) There is no positive and significant relationship between environmental dismantling cost and return on equity of the listed indigenous oil and gas exploration and production firms in Nigeria. In model Ia, the result shows that the coefficient of determination, (R^2) 0%, of the changes in the dependent variable is explained by the changes in the independent variable. This means that 100% is explained by the disturbance error term which is unobservable in the model. The adjusted R-squared explains the true behaviour of the R^2 and moderates it by 6%. Thus, the model did not show a good fit. The F-statistics show 0% and the overall model is not statistically significant at 5% level, while the Durbin-Watson statistical value is 2.0, showing the absence of serial and auto correlation. As the EDMC decreases by a unit percentage, the ROE remains static at 0.00 vice versa. Since the coefficient estimate of EDMC and ROE has a negative value and the probability is greater than 0.05 (5%), the null hypothesis is accepted and the alternate hypothesis rejected. The cointegration shows that there is no long run relationship because the Panel v-Statistics probability value is 0.7201 greater than 0.05, while granger causality indicates bi-directional

relationship with F-statistics of 0.005807. We concludes, therefore, that EDMC does not have a positive and significant relationship, and no long run relationship, although it has a bi-directional relationship with ROE of the listed indigenous oil and gas exploration and production firms in Nigeria.

(ii) There is no positive and significant relationship between environmental dismantling cost and return on assets of the listed indigenous oil and gas exploration and production firms in Nigeria. In model IIa, the result shows that the coefficient of determination, (R^2) 34%, of the changes in the dependent variable is explained by the changes in the independent variable. This means that 66% is explained by the disturbance error term which is unobservable in the model. The adjusted R-squared explains the true behaviour of the R^2 and moderates it by 25%. Thus, the model did not show a good fit. The F-statistics shows 391% and the overall model is not statistically significant at 5% level, while the Durbin-Watson statistical value is 1.8, which show the absence of serial and auto correlation. As the EDMC increases by a unit percentage, the ROA remain static at 0.00 unit and vice versa. Since the coefficient estimate of EDMC and ROA has a positive value and its probability is greater than 0.05, the null hypothesis is accepted and the alternate hypothesis rejected. The cointegration shows that there is no long run relationship because the Panel v-Statistics probability value is 0.6558, greater than 0.05, while the granger causality indicates bi-directional relationship wth F-statistical value of 2.31497. We therefore conclude, that EDMC does not have positive and significant relationship, and no long run relationship, but has a bi-directional relationship with ROA of the listed oil and gas exploration and production firms in Nigeria.

(iii) There is no positive and significant relationship between environmental conventional building demolition cost and return on equity of the listed indigenous oil and gas exploration and production firms in Nigeria. In model Ib, the result shows that the coefficient of determination, (R^2) 22%, of the changes in the dependent variable is explained by the changes in the independent variable. This means that 78% is explained by the disturbance error term which is unobservable in the model. The adjusted R-squared explains the true behaviour of the R^2 and moderates it by 12%. Thus, the model did not show a good fit. The F-statistics show 223% and the overall model is not statistically significant at 5% level, while the Durbin-Watson statistical value is 2.7, which shows the absence of serial correlation and autocorrelation. As the ECBC increases by a unit percentage, the ROE increases by 0.02 unit and vice versa. Since the coefficient estimate of ECBC and ROE has a positive value and the probability is greater than 0.05, the null hypothesis is accepted and the alternate hypothesis rejected. The cointegration shows that there is no long run relationship because the Panel v-Statistics probability value is 0.6903, greater than 0.05, while its granger causality reveals bi-directional relationship with F-statistical value of 2.239374. We therefore conclude, that ECBC does not have positive and significant relationship, and no long run relationship, although it has a bi-directional relationship with ROE of the listed indigenous oil and gas exploration and production firms in Nigeria.

(iv) There is no positive and significant relationship between environmental conventional building demolition cost and return on assets of the listed indigenous oil and gas exploration and production firms in Nigeria. In model IIb, the result shows that the coefficient of determination, (R^2) 43%, of the changes in the dependent variable is explained by the changes in the independent variable. This means that 57% is explained by the disturbance error term which is unobservable in the model. The adjusted R-squared explains the true behaviour of the R^2 and moderates it by 35%. Thus, the model did not show a good fit. The F-statistics show 577% and the overall model is not statistically significant at 5% level, while the Durbin-Watson statistical value is 2.1, which shows the absence of serial and auto correlation. As the ECBC increases by a unit percentage, the ROA increases by 0.01 unit and vice versa. Since the coefficient estimate of ECBC and ROA has a positive value and the probability is less than 0.05, the null hypothesis is rejected and the alternate hypothesis accepted. The cointegration shows that there is no long run relationship because the Panel v-Statistics probability value is 0.5722, greater than 0.05, while its granger causality indicates bi-directional relationship with F-statistical value of 28.3136. We therefore conclude, that ECBC does have positive and significant relationship, and no long run relationship, although it has a bi-directional relationship with ROA of the listed oil and gas exploration and production firms in Nigeria.

Summary of Findings

(i) The environmental dismantling cost does not have positive and significant relationship, although it has a bi-directional relationship with return on equity of the listed indigenous oil and gas exploration and production firms in Nigeria.

(ii) The environmental dismantling cost does not have positive and significant relationship, but has a bi-directional relationship with return on assets of the listed indigenous oil and gas exploration and production firms in Nigeria.

(iii) The environmental conventional building demolition cost does not have positive and significant relationship, although it has a bi-directional relationship with return on equity of the listed indigenous oil and gas exploration and production firms in Nigeria.

(iv) The environmental conventional building demolition cost does have positive and significant relationship, although it has a bi-directional relationship with return on assets of the listed indigenous oil and gas exploration and production firms in Nigeria.

Discussion of Findings

Objective I: evaluate the relationship between environmental dismantling cost and return on equity of listed indigenous oil and gas exploration and production firms in Nigeria.

The finding shows that environmental dismantling cost does not have a positive and significant relationship, and no long run relationship, although it has a bi-directional relationship with return on equity of the listed indigenous oil and gas exploration and production firms in Nigeria. The implication is that the amount that the firms spend on environmental dismantling cost for putting the offshore platform and onshore installation facilities' environment or site to its usual or near normal condition for the

interest of society has no positive and significant relationship with the ROE, which implies that the firms' Return on Equity does not have relationship with their EDC. This finding disagrees with the findings of Jeroh and Okoro (2016) who examined whether environmental and dismantling costs affect firms or organizational performance of firms in the oil and gas sector in Nigeria for the period 2008-2015 and the finding shows that environmental and dismantling costs have positive effect on firm performance.

Objective II: ascertain the relationship between environmental dismantling cost and return on assets of listed indigenous oil and gas exploration and production firms in Nigeria.

The environmental dismantling cost does not have positive and significant relationship, and no long run relationship, but has a bi-directional relationship with return on assets of the listed indigenous oil and gas exploration and production firms in Nigeria under study**.** The implication is that the amount that the firms spend on environmental dismantling cost for putting the offshore platform and onshore installation facilities' environment or location to its normal condition for the interest of society has no positive and significant relationship with the ROA, which implies that the firms' Return on Assets does not have relationship with their EDC. This finding disagrees with the findings of Jeroh and Okoro (2016) who examined whether environmental and dismantling costs affect firms or organizational performance of firms in the oil and gas sector in Nigeria for the period 2008-2015 and the finding shows that environmental costs and firm performance tend to differ contrariwise with firm size. However, firm size has a negative and significant effect on firm performance, also environmental and dismantling costs have positive effect on firm performance.

Objective III: determine the relationship between environmental conventional building demolition cost and return on equity of listed indigenous oil and gas exploration and production firms in Nigeria.

The environmental conventional building demolition cost does not have positive and significant relationship, and no long run relationship, although it has a bi-directional relationship with return on equity of the listed indigenous oil and gas exploration and production firms in Nigeria. The implication is that the amount that the firms spend on environmental conventional building demolition cost for demolishing nuclear radioactive and non-radioactive platform or building that is harmful to life in their business environment or site to put it to its near normal or usual condition for the interest of society has no positive and significant relationship with the ROE, which implies that the firms' Return on Equity does not have relationship with their EDC.

Objective IV: assess the relationship between environmental conventional building demolition and return on assets of listed indigenous oil and gas exploration and production firms in Nigeria.

The environmental conventional building demolition cost does have positive and significant relationship, and no long run relationship, although it has a bi-directional relationship with return on assets of the listed indigenous oil and gas exploration and production firms in Nigeria over the period under study. The implication is that the

amount that the firms spend on environmental conventional building demolition cost for demolishing nuclear radioactive and non-radioactive platform or building that is harmful to human health in their business environment or site to bring it to its usual or near normal condition for the interest of society has positive and significant relationship with the ROA, which implies that the firms' Return on Assets does have relationship with their EDC.

Conclusions

This study ascertains the relationship between environmental decommissioning cost and financial performance of listed indigenous oil and gas exploration and production firms in Nigeria. It adopted the *ex-post facto* research design, and the population of the study comprises the three (3) indigenous oil and gas exploration and production firms listed on the floor of the Nigeria Exchange group, and the sample size consists of two (2) indigenous oil and gas exploration and production firms listed on the Nigeria exchange group market. The simple linear regression was used to test the hypotheses, which were based on the Hausman tests in chosing between the appropriate fit model and the results of the Hausmant tests show a mixed appropriate fit of fixed effect and random effect models. Interpreting the test of hypotheses and discussing the findings, the random effect in models Ia, Id, and IIf were used, and fixed effect in models IIa, Ib, IIb, Ic, IIc, IId, Ie, IIe and If were used, as well as the Co-integration tests and Granger Causality tests to determine the relationship between the independent variable dimensions on the dependent variable measures, as well as the moderating variable and predictor variable effects on the criterion variable of the study. The finding shows that environmental dismantling cost does not have a positive and significant relationship, and no long run relationship, although it has a bi-directional relationship with ROE of the listed indigenous oil and gas exploration and production firms in Nigeria. The study also reveals that environmental dismantling cost does not have a positive and significant relationship, and no long run relationship, but has a bi-directional relationship with ROA of the firms.

It established that environmental conventional building demolition cost does not have a positive and significant relationship, and no long run relationship, although it has a bi-directional relationship with return on equity of the listed oil and gas exploration and production firms in Nigeria. The study, also, found that environmental conventional building demolition cost does have a positive and significant relationship, and no long run relationship, although it has a bi-directional relationship with return on assets of the listed indigenous oil and gas exploration and production firms in Nigeria.

The study, therefore, concludes that although the huge costs provided for environmental decommissioning to put the oil host and bearing or impacts communities in Nigeria into its near normal or usual condition, have no long run relationship with the measures of financial performance of the listed indigenous oil and gas exploration and production firms in Nigeria. The moderating variable (firm size) has no positive and significant effect on the financial performance, and also environmental decommissioning cost has no positive and significant effect on the financial performance.

Recommendations

(I) The Nigeria listed indigenous oil and gas exploration and production firms should try, as much as possible, to increase their net worth or shareholders' equity so that that their return on equity could increase, since it remains static and their environmental dismantling cost is decreasing, and also, their environmental dismantling cost does not have positive and significant relationship with the return on equity, and it is not affecting it.

(ii) The Nigeria listed indigenous oil and gas exploration and production firms should increase their profits to encourage more investors to invest with the firms so that their return on assets could be increase, since it remain static and their environmental dismantling cost is increasing, and their environmental dismantling cost does not have positive and significant relationship with their return on assets, and it is not affecting it.

(iii) The Nigeria listed indigenous oil and gas exploration and production firms should increase the amount of their environmental conventional building demolition cost, since it is increasing and the return on equity is also increasing, and it does not have positive and significant relationship with their return on equity, and it is not affecting it.

(iv) The Nigeria listed indigenous oil and gas exploration and production firms should should try as much as possible to sustain their profits to encourage more investors to invest with the firms so that their return on assets could be enhance, since it is increasing and their environmental conventional building demolition cost is increasing and it does have positive and significant relationship with their return on assets, and it is affecting it.

Contributions to Scholarship

The study has contributed to scholarship in the following dimensions.

1. The study was able to develop a unique heuristic model which revealed that EDMC and ECBC, do not have positive and significant relationship with the return on equity, and EDMC do not have positive and significant relationship with the return on assets, with the financial performance of the listed oil and gas exploration and production firms in Nigeria.
2. It employed environmental economics theory to estimate the relationship of environmental decommissioning cost with financial performance of the firms and established that environmental dismantling cost has no positive and significant relationship, and no long run relationship, although it has a bi-directional relationships with ROE and ROA of the listed indigenous oil and gas exploration and production firms in Nigeria.
3. Also, it empirically established that environmental conventional building demolition cost has no positive and significant relationship with the ROE, yet it has positive and significant relationship with the ROA, and no long run relationships, although it has a bi-directional relationships with ROE and ROA of the listed indigenous oil and gas exploration and production firms in Nigeria.
5. The study further affirmed that environmental waste disposal cost has no positive and significant relationship with the ROE, although it has positive and significant relationship with the ROA, and no long run relationship, yet it has a bi-directional

relationships with ROE and ROA of the listed indigenous oil and gas exploration and production firms in Nigeria.

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