

Effects of Environmental Costs on Earning Per Share of Selected Oil and Gas and Manufacturing Firms in Nigeria

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Abstract

The study examined the impact of environmental costs on earnings per share of oil and gas and manufacturing firms in Nigeria. Specifically, the study evaluated the influence of environmental costs on the earnings per share of oil and gas and manufacturing firms in Nigeria. It was a quantitative study, and secondary data sourced from the published financial reports of the sampled firms for 20 years and across 10 firms in the oil and gas and manufacturing sectors were analyzed using descriptive statistics, Pearson correlation, unit root test, panel regression with regards to pooled ordinary least square (OLS) estimation, fixed effect estimation, two-ways fixed effect estimation, random effect estimation, and other position estimation tests, which include the restricted F-test, Hausman test, Wald test of heterogeneity, Pearson test of cross-sectional dependence, and Wooldridge test. The finding revealed that environmental costs exerted negative and insignificant effects on earnings per share to the tune of -5.0121 ($p = 0.844 > 0.05$). The paper concluded that environmental costs have a statistical relationship with the performance of firms in the oil and gas and manufacturing sectors in Nigeria.

Key works: Earning per share, Environmental Costs, Oil and Gas Manufacturing Firms, Green Accounting.

Introduction

Generally, the paramount importance for environmental costs management in both oil and gas and the manufacturing sectors has become the concern and focus of nations and most corporate management strategies. It has become one of the foremost issues on the agenda of nations and businesses since the 1990s and the reasons for this were varied, emanating from both within and outside of the firm, and, particularly, at the global level (Okoye and Ngwakwe, 2013). A lot of government enactments, laws and regulations on environmental protection have been made in several nations of the world. According to Nagle (2012), the United States of America, Canada, Norway, the United Kingdom and the Netherlands have led in the pursuit of degradation and

pollution prevention, control and the need for environmental safety. Besides, some developing countries like Nigeria, Zimbabwe, Namibia, Philippines and Indonesia have led in championing policies to address the need for accounting and accountability for environmental costs management. Various laws and regulations are awakening to strengthen environmental protection such as the Environmental Impact Assessment Act, 1992 and the Department of Petroleum Resources (DPR), Environmental Guidelines and Standards for the Petroleum Industry in Nigeria (EGASPI, 2002).

Internal and external stakeholders are increasingly interested in the financial as well as the physical impacts that a company has on the environment. On this Schaltegger and Burrit (2000), Staniskis & Stasiskiene (2006) and International Federation of Accountants Committee (IFAC) (2005) opined that as a consequence, environmental costs and reporting have become a significant tool for organizations' to answer stakeholder' expectations considering environment. Furthermore, it has been identified that environment-related costs are increasing in many countries in different sectors. With specific emphasis on an efficient resource use and non-product output costs in environmental management accounting, organizations can identify potential savings considering the environmental costs (IFAC 2005).

The increasing concern about environmental degradation, resources depletion and the sustainability of economic activity have made the development of environmental accounting and reporting an area of significant interest in Nigeria (Adediran & Alade 2013) . The success or failure of a company may be determined, not only by the products or services it deals with, but also by the complexity of its environment. Therefore, there is need to know the impact of environmental costs on performance of oil and gas and manufacturing firms in Nigeria.

Environmental Performance Indicators

The Global Reporting Initiative (GRI) (2016) has suggested that oil and gas industry recognizes that its operations have potential impacts on the environment, hence, some impact assessment is vital. Some of the environmental impacts may have social and/or economic implications. Although, companies in the industry have made many commitments to manage and minimize negative environmental impacts, in the developing nations such as Nigeria, more of commitment needs to be made. Whilst in the developed nations, these commitments go beyond regulatory obligations (Campbell & Slack, 2018), it is usually not the case with developing nations. Just as it is globally advocated, the environmental performance indicators described in this section, as suggested by American Petroleum Institute (API) (2005), may be useful in describing the performance of company operations of which must be upheld regardless of where operations are carried out.

Economic Performance Indicators

The economic performance indicators that companies may find useful for sustainability reporting are examined here in addition, they are essential as they help companies ascertain their viability and, otherwise, sustainability of operations. In other words, companies are encouraged to use these economic indicators and to choose other financial indicators that they already use in various public financial reports, to give an overall picture of their sustainability performance in general terms of income and expenses (or economic inflow and outflow).

The economic dimension of sustainability reporting may not only address the financial performance of the reporting company but also the company's effects on the economic circumstances of its stakeholders and on the local, national and global economic systems in which it operates (Campbell & Slack, 2018). Economic performance, therefore, covers aspects of the company's economic interactions. These include the following Economic Performance Indicators that describe key economic interactions.(Campbell & Black, 2018). Return on Asset (ROA), Earning per Share (EPS), Return on Equity (RON) and Earnings per Share (EPS).

Earnings per Share

The proportion of a company's profitability. Farah, Farruk and Faizan (2016) conclude that Earnings per share are indicators of profitability. EPS is useful for estimating the amount of room a company has for increasing existing divided amount. If the Earnings per share have a positive trend, it means that the company is generating an increase amount of earnings

Literature Review

Environmental Costs

Hansen and Mowen (2000) defined environmental costs as costs associated with the creation, detection, remediation and prevention of environmental degradation. According to the United State (US) Environmental Protection Agency (EPA) (2017), Green Accounting or Environmental Accounting is defined as: identifying and measuring the costs of environmental materials and activities and using this information for environmental management decisions. The purpose is to recognize and seek to mitigate the negative environmental effects of activities and system. Okafor (2010) stated that environmental accounting is a general term which may mean the integration of environmental dimension into the macro or micro level despite the fact that it is more applicable to the latter level. Environmental Accounting which calls for introducing a system that supports Sustainable Development (SD), has many meanings and uses. Environmental Accounting can support national income accounting, ecological accounting at local administration level and, at micro level, related to financial accounting, cost accounting or internal business managerial accounting (Ahamid, 2017).

Accounting and Environmental Costs

There is no doubt that different organizations and sectors, have social and environmental impacts which may carry bigger weight than its economic impacts. Accounting has an instrumental role in disclosing about environmental responsibilities for different entities whether industrial, commercial, service or even voluntary and at all levels whether micro, meso and macro. Thus, accounting became concerned with achieving new goals such as measuring and evaluating potential or actual environmental impacts of projects and organizations. These new goals are of great importance as they enable many users to take different development decisions which are economically and environmentally sound.

Environmental (Green) Accounting

The focus of traditional (conventional) accounting practices is on the economic aspects only. Taking into consideration the environmental dimensions, in the accounting system, especially natural resources/assets, depletion can be termed as “green accounting”. The term "greening" has been used a lot in the past thirty years in relation to different environmental issues. In many cases, the term is also used to name organizations such as Green Belt Movement, operations such as Green Contracting etc. ‘Green Accounting’ is a general term where it may mean Environmental, Ecological or Natural Resource Accounting. Needless to say that Environmental Accounting is also a general term which may mean the integration of environmental dimensions into the macro or micro level despite the fact that it is more applicable to the latter level. However, the four main terms mentioned overlap with each other. Environmental Accounting, which calls to introduce a system that supports Sustainable Development (SD) that is gaining more interest, especially from multinational energy companies, has many meanings and uses. Environmental Accounting can support national income accounting, ecological accounting at local administration level and at micro level related to financial accounting, cost accounting or internal business managerial accounting.(Azar, Robab, Salehh & Seyed,2018).

Reform and transformation of conservative accounting or conventional accounting that focuses on financial accounting to Green Accounting that focuses on reporting environmental accounting information, social accounting and financial accounting in an integrated accounting reporting package is felt increasingly important and urgent. There are several underlying crucial reasons.

First, just like other countries, Nigeria is also facing a serious and frightening ecological or environmental crisis. The crisis has caused a variety of ecological or environmental crisis. The crisis has caused a variety of ecological disasters and social disasters that are very detrimental and threaten the sustainability of human life. Climate change and global warming and environmental degradation have caused many natural disasters, social disaster and serious economic disasters. These disasters have also caused an energy crisis and scarcity of resources, poverty, social inequality and increasingly serious human suffering.

In general, a number of literatures say that the main cause of the crisis is due to the behaviour of greed and greed of the state, corporations and the public at large in building the economy and encouraging the progress of the country. The crisis is triggered and driven by the desire of the government and economic actors to increase economic growth and profit maximize (profit maximize). The motive has also encouraged state leaders and economic actors to behave greedy and greedy. They exploit natural resources and social resources, and damage the environment (Elkington, 2018).

Environmental Accounting

At micro level, it means the entire domain of accounting for the environment including: financial accounting, reporting and auditing, and environmental management accounting. Environmental accounting must therefore be designed so that it provides information enabling users to assess environmental behaviour of the company and its economic consequence where parts of the system are both information in monetary units (financial information) and information in physical units (non-financial information). Furthermore, it is necessary to ensure that different information needs of various interested parties are filled. It also means that the conception of environmental accounting is based on the basic recognition influencing development of accounting system in the 20th century method of reflecting the business process should be differentiated according to the users of the accounting information and according to decision making tasks for support of which the accounting information is used (Kral, 2015).

Consequently, the conventional accounting system of the company is divided into three basic subsystems (Kral, 2015): Management Accounting- Its main aim is to reflect the business process from the point of view of information needs of the management, namely of all staff members of various levels of the company management – the provided information serves to support management of the business process; Financial Accounting- Its main aims is to fill information needs of external users (primary owners, creditors, business partners, employees, entities participating in financial and capital market), which, although, stay out of the assessed entity, are connected with its development by both future benefits and future risks and Tax Accounting- The aim of this accounting subsystem is to reflect the same business process with the purpose to correctly determine the income basis, as well as other tax lien and liabilities of the company. In the case of the financial and tax accounting, the users press on unification of terms and processes so that the information submitted in individual cases are comparable. To the contrary, the management is characterized by the fact that practically no regulation from outside of the company exists. This accounting subsystem is not uniformly defined and even not being used for this subsystem (Kral, 2015). Aim to the true disclosure in the financial statements in the end of period. That is, include environmental dimension in the published sheets of operations.

Ecological Accounting

In many cases, the term Ecological Accounting is used to refer to the preparation of accounts according to physical data only. In addition, Ecological accounting is a type of Environmental Accounting (a dedicated type for Natural Resource Accounting at local administration level). In this respect, Ecological accounting is mainly used to prepare an asset management plans at local administration level. Such plans provide a tool to evaluate the condition and life cycle of any particular physical asset.(Barkerel, 2018).

Natural Resource Accounting

The term natural resource accounting is called after the inclusion of environmental aspects into the system of national accounts that deals with stocks and stock changes of natural assets, comprising biota (produced or wild), subsoil assets (proved reserves), water and land with their aquatic and terrestrial ecosystems.(Deegan, 2012). However, the factors considered in environmental accounting reporting are: Incoming harms to environment; The responsibilities of companies towards these harms; The revision of the relationship between industries and environment and the use of natural sources; The evaluation of environmental impacts harms and The necessity of reporting environmental costs.

Theoretical Review

Stakeholder Theory

Stakeholder theory was propounded by Gray, Kouhy & Lavers as cited in Sternder, (2007). The basic proposition of the stakeholder theory is that the firm's success is dependent upon the successful management of all the relationships that a firm has with its stakeholders, the theory was originally introduced by Stanford Research Institute (SRI), to refer to those groups without whose support the organization would cease to exist. This theory maintains that there is need for an organization to engage in active social role in the society where it is operating since it depends on the society for sustenance (Ojo, 2012). Investors, shareholders, employees, customers, suppliers, government and the communities are the stakeholders capable of influencing organizational performance of which managers must ensure that their demands are satisfied according to this theory. The stakeholder theory therefore takes into consideration the need to satisfy those interested parties capable of influencing organizational performance, if an organization is to survive in its environment.

Accountability Theory

Accountability theory was propounded by Lerner & Tetlock (1999) and is concerned with the relationship between groups, individuals, organizations and the rights to information that such relationships bring about. Accountability is an act of being responsible or answerable for one's

own decisions or actions with the expectation of explaining and justifying them, when asked to do so. Simply stated, accountability is the duty to provide an account of the actions for which one is held responsible (Gray, Owen & Adams, 2006). The natures of the relationships and the attendant rights to information are contextually determined by the society in which the relationship occurs. It is absolutely true that some sort of relationship will exist between an organization and each of its stakeholders. Part of this relationship may be economic in nature and the terms determined by the parties as reflecting their relative powers in the relationship. The information flowing through the relationship will be determined by the power of the parties to demand it (a power which, where it exists, could arise from either the intrinsic abilities and power of the groups concerned or from the legislative processes of the society) and/or the willingness/desire of the organization to provide it (Gray, Dey, Owen, Evans, & Zadek, 2007). Society, as a whole, stands expressing a concern that all such relationships and their attendant information rights should not be left entirely to the parties and particularly to the organization. The most noticeable manifestation of this societal concern is statute law and standards established by statutory bodies such as environmental protection agency and health and safety at work inspectorate (Gray et al., 2007).

Political Economy Theory (PET)

Political economy theory was propounded by William Stanley in (1871). The theory explicitly recognizes the power conflicts that exist within society and the various struggles that occur between various groups within the society. The political economy is defined as the social, political and economic framework within which human life takes place (Gray et al., 2006). The political economy perspective perceives accounting disclosures as social, political and economic documents (Guthrie & Parker, 2016). They serve as a tool for constructing, sustaining and legitimizing economic and political arrangements, institutions and ideological themes which contribute to the corporation's private interests. Disclosures have the capacity to transmit social, political and economic meanings for a pluralistic set of report recipients. Political economy theory and legitimacy theory seem to be more appropriate for analysis of existing practices than as normative bases from which to deduce proper accountability relationships.

Empirical Review

According to Shaltegger, Martin & Jasch (2018) a study carried out by Rufelawaty and Budi (2010) discovered that 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 study by Larrinaga and Babbington (2018) revealed that companies can achieve cost savings that can improve their performance by implementing environmental accounting. Elewa's study (2007) discovered that implementing environmental accounting leads to profit growth resulting from cost reduction of yearly production.

According to De Beer and Friend (2018), environmental accounting has other advantage other than cost reduction. It can also be used to indicate potential for environmentally beneficial investment to yield significant financial benefits by avoiding environmental liability. 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 and Davision 2010) was used as a metric for financial performance in this study. Bassey, Effiok and Eton (2018), in their work whose objective was 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. In a work aimed at evaluating the relationship between provision of environmental accounting information and improving management performance of companies of pharmaceutical industry accepted in the Tehran stock exchange, Azar, Shahbazi, Abad and Moasavi (2018), concluded that a relationship exists between improving management performance and environmental accounting information disclosure of the companies accepted in Tehran stock exchange.

Mohammad, Sutrisno, Prihat and Rosidi (2018) also researched on the effects of environmental performance and environmental information disclosure as mediation on company value. The researchers selected 59 companies in Indonesia, their major findings was that environmental accounting implementation has not been able to affect company value through environmental information disclosure. Lubomir and Dietrich (2018) carried out a research on whether better environmental performance affects revenues, costs or both: evidence from transition economy. The work used unbalanced panel data of Czech firms from 1996-1998. The analytical results indicate strongly that better environmental performance improves profitability by driving down costs more than it drives down revenue. In a work on the effects of environmental disclosure on financial performance in Malaysia, Norhasimah, Norhabibi, Nor, Sheh & Inaliah (2018), aimed to find out whether environmental disclosure practice exists among top 100 companies of market capitalization in Malaysia for the year 2011, and its relationship with financial performance, the analysis shows mixed results between the existence of environmental disclosure practices in Malaysia and company financial performance. Hartikayanti, Trisyardi and Saptono (2016) studied the effects of corporate characteristics on environmental disclosure on seventeen companies selected by purposive sampling technique. The measurement of the disclosure was using corporate Social Responsibility Rating System from Global Reporting Initiatives (GRI) G4. The multiple linear regression method was employed for analysis. The result indicates that firm size, profitability and foreign ownership have no significant effect, whereas, the type of industry has a significant effect on environmental disclosure. Malarvizhi and Ranjanni (2016) conducted a research to examine whether there is any significant relationship between Corporate Environmental Disclosure (CED) and firm performance of selected companies listed in Bombay Stock Exchange (BSE), India. They used content analysis methodology by developing an

environmental disclosure index (EDI) and formulating hypotheses to test the association between firm performance and level of environmental disclosure. Primary data was collected using questionnaire instrument. A regression model with EDI as dependent variable and return on capital employed (ROCE), return on assets (ROA), net profit margin (NPM) and earnings per share (EPS) as independent variables were used to analyze data for this research. Results show that there is no significant relationship between the level .

Methodology

This study focused on the selected oil and gas and Manufacturing sectors of the Nigerian economy. It spared across ten (10) sub-sectors of the economy, such as the oil and gas sector (upstream, downstream and indigenous oil and gas sub-sector), consumer goods, healthcare and agricultural sector.

This study adapted the model used by Onyinyechi and Ihendinihu (2016) who worked on the Impact of Environmental and Corporate Social Responsibility Accounting on Organization Financial Performance. This is given below:

$$PAT = f(CRS, EMC, PBC) \dots \dots \dots (3.1)$$

Where:

CSR = Corporate Social Responsibility

EMC = Environmental Maintenance Cost

PBC = Personnel Benefit Cost

However, both dependent and independent variables in the above model was re-modified in order to capture the proxies used for both outcome and predictor variables of this study. The model was modified by specifying the profitability of the sampled firms measured in terms of Earning per Share (EPS) as a function of environmental costs. The modification was predicted on the fact that the financial performance of firms could be best captured when all the major profitability proxies are used. In the same vein, the models are controlled by total assets (firm size) and leverage ratio. The controlled variables were introduced because they are germane to the profitability of companies.

$$EPS = f(EOC, TOA, LER) \dots \dots \dots (3.2)$$

Mode 1: This shows the relationship between Earning Per Share and proxies for environmental costs

Where:

EPS = Earnings Per Share

EOC = Environmental Operating Cost

TOA = Total Assets

LER = Leverage Ratio

The econometric equations are presented below:

$$EPS_{it} = \beta_0 + \beta_1 EOC_{it} + \beta_2 TOA_{it} + \beta_3 LEV_{it} + \epsilon_2 \dots \dots \dots (3.3)$$

Where:

$\beta_0 - \beta_3$ = the slope parameter

i = firms sampled in this study

t = the period covered

$\epsilon_1, \dots, \epsilon_4$ = error terms for each of the models specified

The work made used of secondary data (cross sectional) sources from Nigeria Stock Exchange (NSE). Also, the financial statements and annual reports of the selected oil and gas (OANDO, CONOIL, TOTAL and FORTEL) and manufacturing firms (PRESCO, GUINNESS, MAY and BAK, PZ, II PLC and OKOMU) selected from the Nigeria Stock Exchange (NSE) were used. The data collected covered a period of twenty (20) years spanning from 1999 to 2018.

Results and Discussion of Finding

Model one: The relationship between earnings per share, environmental cost and the control variables.

Table 1: Pooled OLS Estimation Result

Variables	Coefficient	Std Error	T-Test	Probability
C	-309.584	221.514	1.40	0.164
LEOC	66.697	23.542	2.83	0.005
LTOA	-34.250	19.600	1.75	0.082
LEV	36.270	38.280	0.95	0.345

R-square=0.0482, Adjusted R-square=0.0337, F-statistics=43.31, Prob (F-stat) =0.0212

Source: Authors computation 2021

Table 1 revealed that when the heterogeneity of the firms is not considered, environmental costs and financial leverage exert a positive effect on earnings per share of firms in the oil and gas and manufacturing sectors in Nigeria for the years covered by this study to the tune of 66.697 for environmental costs and 36.270 for financial leverage. However, the positive effect was only significant for environmental cost with the probability value of $0.005 < 0.05$ as against the insignificant positive effect of financial leverage given to be $0.345 > 0.05$. Also, it was revealed that total assets have negative and significant effect on earnings per share with the coefficient and probability values -34.250 ($p=0.082$). The adjusted R-square of 0.337 revealed that about 34% of the systematic variation in earnings per share can be explained by all the predictor variables while the remaining 66% could be accounted for by other variables not covered by this study. The F-statistics of 43.31 along the probability value of 0.0212 revealed that the model is fit.

Table 2: Fixed Effects Estimates (Cross-sectional and Period specific)

Cross-sectional specific effect			Time-specific effect		
Variables	Coefficients	Prob	Variables	Coefficients	Prob
C	395.982	0.138	C	-644.564	0.018
LEOC	-22.336	0.399	LEOC	70.2278	0.010
LTOA	-5.965	0.745	LTOA	-17.687	0.533
LEV	37.603	0.295	LEV	49.8610	0.231
Effects			Effects		
PRESCO	48.6426	0.513	2000	143.106	0.253
GUINNESS	612.950	0.000	2001	-45.019	0.720
PZ	80.170	0.315	2002	106.986	0.399
MAY & BAK	-11.512	0.884	2003	26.5603	0.847
II PLC	142.849	0.080	2004	-13.310	0.922
FORTE	51.7764	0.518	2005	35.8105	0.791
OANDO	102.157	0.222	2006	20.2096	0.884
CONOIL	306.644	0.000	2007	78.8130	0.580
TOTAL	50.2450	0.532	2008	40.3370	0.778
			2009	15.3518	0.915
			2010	24.6729	0.864
			2011	107.549	0.452
			2012	27.8473	0.847
			2013	35.2798	0.812
			2014	11.9756	0.937
			2015	-271.94	0.072
			2016	-51.294	0.732
			2017	-154.60	0.289
			2018	-112.25	0.446
Adjusted R-square= 0.3132			Adjusted R-square= 0.1381		
F-statistics= 8.56			F-statistics= 4.36		
Prob(F-stat)=0.0000			Prob(F-stat)=0.1412		

Source: Authors computation 2021

Table 2 presented the fixed effect estimation results and this included the cross-sectional and time effect. The results indicated that when the diversity of the operational activities and managerial skills across firms are considered, environmental cost and total assets have negative effect on earnings per share of the sampled firms in the oil and gas and manufacturing sector in Nigeria. However, the negative effect was insignificant for both environmental costs and total assets to the tune of -22.336(p=0.399) and -5.965(p=0.745) respectively. Also, financial leverage was found to have positive but insignificant effect on earnings per share to the tune of

37.603($p=0.295<0.05$). The adjusted R-square of 0.3132 revealed that about 31% of the systematic variation in earnings per share can be explained by all the predictor variables while the remaining 69% could be accounted for by other variables not covered by this study. The F-statistics of 8.56 along the probability value of 0.000 revealed that the model is fit.

Concerning the result of the time-specific estimation, table 2 showed that when the periods covered by this study is put into consideration, environmental costs and financial leverage have a positive effect on earnings per share of the sampled firms in the oil and gas and manufacturing sectors in Nigeria. However, the positive effect was significant for environmental cost to the tune of 70.2278($p=0.010<0.05$) as against the positive insignificant effect of financial leverage with the coefficient and probability value of 49.8620 and 0.231 respectively. Also, total assets was found to have a negative insignificant effect on earnings per share to the tune of -17.687($0.231>0.05$). The adjusted R-square of 0.0381 revealed that about 13.8% of the systematic variation in earnings per share can be jointly explained by all the explanatory variables while the remaining 86.2% could be accounted for by other variables not covered by this study. The F-statistics of 1.36 along the probability value of 0.1412 revealed that the model is not fit.

Divergence from the constant term (78.2291) corresponding to the reference firms (OKOMU) which was excluded from the model because of multi-collinearity stood at 48.6426 for PRESCO, 612.950 for GUINNESS, 80.170 for PZ, -11.512 for May and Baker, 142.849 for II Plc, 51.7764 for FORTE, 102.157 for OANDO, 306.644 for CONOIL and 50.2450 for TOTAL. Also, deviation from the intercept term of the reference period stood at 143.106, -45.019, 106.986, 26.5603, -13.310, 35.8105, 20.2096, 78.8130, 40.3370, 15.3518, 24.6729, 107.549, 27.8473, 35.2798, 11.9756, -271.94, -51.294, -154.60 and -112.25 for 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017 and 2018 respectively.

Table 3: Random Effect Estimation Result

Variables	Coefficient	Std Error	T-Test	Probability
C	348.795	169.048	3.30	0.035
LEOC	-5.0121	25.403	0.20	0.844
LTOA	-10.2624	18.1929	0.53	0.573
LEV	40.9913	15.4822	3.16	0.008

Source: SPSS Output (version 20).

R-square=0.2401, Wald Chi=23.57, Prob (F-stat) =0.006

Table 3 showed that when heterogeneity effect across firms and over time is incorporated into the model via the error term, environmental costs and total assets exerted negative and insignificant effect on earnings per share to the tune of -5.0121($p=0.844>0.05$) for environmental accounting and -10.2624($p=0.573>0.05$) for total assets. Also, financial leverage has a positive

and significant effect on earnings per share to the tune of 40.9913($p=0.008<0.05$). The adjusted R-square of 0.2401 revealed that about 24% of the systematic variation in earnings per share can be jointly explained by all the explanatory variables while the remaining 76% could be accounted for by other variables not covered by this study. The Wald Chi of 23.57 along the probability value of 0.006 revealed that the model is fit.

Table 4: Restricted F Test of Heterogeneity (Cross-Sectional and Time Specific)

	F-statistics	Probability
Cross-sectional	9.68	0.0000
Time-specific	1.06	0.4100

Source: SPSS Output (version 20)

F-statistics reported in table 4 stood at 9.68 and 1.06 with probability values of 0.0000 and 0.4100 for cross-sectional and period-specific effects respectively. This showed that there is enough evidence to reject the null hypothesis that all differential intercept corresponding to each cross-sectional specific firm is equal to zero, but otherwise for the period-specific intercepts. This implies that there is a significant cross-sectional heterogeneity effect amidst the sampled firms thus invalidating the restriction of pooled OLS estimation, in favour of cross-sectional fixed effect estimation.

Table 5: Hausman Test

	Chi-square stat	Probability
Difference in coefficient not systematic	5.96	0.1135

Source: SPSS Output (version 20)

Table 5 reported Chi-square statistic of 5.96 and a probability value of 0.1135. The result revealed that there is not enough evidence to reject the null hypothesis that differences in coefficients of fixed effect estimation (period effect) and random effect estimation is not significant. Hence, the difference in the coefficient is not systematic. Therefore, the most consistent and efficient estimation is given by the random effect estimation as presented in Table 3. The results revealed that environmental costs and total assets exerted negative and insignificant effect on earnings per share to the tune of -5.0121 ($p=0.844>0.05$) for environmental accounting and -10.2624 ($p=0.573>0.05$) for total assets. Also, financial leverage has a positive and significant effect on earnings per share to the tune of 40.9913($p=0.008<0.05$).

Table 6: Pearson Test of Cross-sectional Dependence

Hull Hypothesis	Chi-square stat	Probability
No cross-sectional dependence	0.274	0.5011

Source: SPSS Output (version 20)

Table 6 revealed that there is not enough evidence to reject that there is no cross-sectional dependence across the firms sampled for this study. Hence, it can be established that there is no cross-sectional dependence for the estimated panel model.

Table 7: Modified Wald Test for Groupwise Heteroskedasticity

Hull Hypothesis	Chi-square stat	Probability
Static panel homoscedasticity	0.5105	0.4929

Source: SPSS Output (version 20)

Table 7 revealed that there is not enough evidence to reject the assumptions of an equal variance of residual terms across the firms sampled for this study, reflecting that the variance around the regression line is the same for the values of the predictor.

Table 8: Wooldridge Test of Panel Auto-correlation

Hull Hypothesis	Chi-square stat	Probability
No AR(1)panel autocorrelation	0.44105	0.7112

Source: SPSS Output (version 20)

Table 8 revealed that there is not enough evidence to reject the assumption that there is no serial correlation in the panel model across the firms sampled for this study, reflecting that there is no presence of auto-correlation.

Discussion of Findings

This study examined the effects of environmental costs on performance of firms in the oil and gas and manufacturing sectors in Nigeria. It was a quantitative study and it covered 20 years, spanning from 1999 to 2018, across 10 firms. It was discovered that the mean values for the performance metrics of firms in the oil and gas and manufacturing sectors was 116.529 on earnings per share. The variability of the performance level across the firms and years covered was high as seen in their standard deviations of 282.297 (earnings per share). This might be due to the operational activities and leadership of the firms. Another possible explanation is the combination of manufacturing firms and firms in the oil and gas sectors, where the nitty-gritty of the business activities is relatively different. Also, it was discovered that all the cross-sectional and time series variables were stationary at first difference I(1). The econometrics implication is that variables in the model cannot lead to spurious regression coefficient estimate.

The positive and significant effects could be attributed to the fact that customers tend to patronize more of firms that attend to their social and environmental needs. This finding gave credence to the principles of stakeholder theory which states that the higher performance of firms

is dependent on their active involvement in the environment where they operate. It is believed that there is a need to satisfy those interested parties capable of influencing organizational performance, if an organization is to survive in its environment. The corollary of this discovery is that the performance of firms in terms of earning per share could be stimulated by environmental costs. This finding corroborated the findings of Shehu (2014), Malarvizhi and Ranjanni (2016) and Tochukwu (2018), that environmental cost positively and significantly influence return on assets.

Conclusion and Recommendations

Based on the research findings, it was established that environmental costs have a statistical relationship with the performance of firms in the oil and gas and manufacturing sectors in Nigeria. Specifically, it was concluded that the performance of firms in terms of return on assets could be boosted through environmental costs, which have the potential to negatively affect firms' earnings per share insignificantly. The following recommendations were made in relation to the findings of the study: The positive effects of environmental costs on the performance of firms in terms of earnings per share could be significant if firms can come up with a well-articulated environmental costing system capable of guaranteeing a conflict-free corporate atmosphere for improved performance. There is a need for proper charging and allocation; distinguishing between environmental costs and other costs will result in proper cost allocation of these costs and thus greater precision, as well as aiding in the development of sustainability indicators and metrics. The government must work out modalities that will ensure that commensurable penalties are met out to firms that find it difficult to follow environmental protection regulations. This might help the industry be more environmentally conscious of their operational activities. Environmental regulatory authorities should be more committed to ensuring that environmental cost components are individually and separately disclosed for efficient reporting.

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