

# Effect of Environmental Costs on Financial Performance of Oil and Gas Companies Listed on Nigeria Stock Exchange

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## ABSTRACT

The main objective of this study was to ascertain the effect of environmental costs on financial performance of oil and gas companies listed on Nigeria stock exchange. The specific objectives were to: assess the effect of Employee Health and Safety Cost on Tobin's Q of Oil and Gas Companies listed on Nigeria Stock Exchange and determine the effect of Waste Management Cost on Tobin's Q of Oil and Gas Companies listed on Nigeria Stock Exchange. Ex post facto research design was adopted for the study and data collected was analysis and tested using regression analysis with aid of E-view 9.0 the result shows that employee health and safety cost has a significant positive effect on Tobin's Q of Oil and Gas Companies listed on Nigeria Stock Exchange at 5% level of significance. Another finding indicate that waste management cost has significant positive effect on Tobin's Q of Oil and Gas Companies listed on Nigeria Stock Exchange at 5% level of significance. The following recommendations were made in line with the findings and conclusion of this study: Oil and gas firms should increase their involvement in Employee Health and Safety Cost since it positively affects financial performance. Oil and gas firms should get more involved in waste management activities, since cost on waste management is more committed in improving organizational performance.

**KEYWORDS:** *Environmental cost, Waste management and Employee health and safety cost*

## 1. INTRODUCTION

Environmental cost is an issue that has captured the attention of national and international, political and business leaders across the globe and the developed world. The creation of wealth has led to various environmental impacts such as depletion of non-renewable resources, global warming, diminution of land resources, acidification, and reduction of water resources and potential threats to health and safety of employees (Singh, Murty, Gupta & Dikshit, 2007). The issues of environmental abuses and degradation have led various sectors, governments and non-governmental organizations (NGOs) to engage in environmental sustainability debates and initiate strategies for responding to the challenges of sustainable development. It is also in response to this that the academic world has dedicated various groups to the issues of environment and sustainable development, including Brunel Research in Enterprise, Innovation Sustainability and Ethics (BRESE), Royal Holloway's Centre for Research into Sustainability and the International Centre for Corporate Social Responsibility at Nottingham University in the United Kingdom.

Okafor (2018) citing Environmental Accounting Guidelines issued by Ministry of Environment (2002) noted that environmental accounting aims at achieving sustainable development, maintaining a favorable relationship with the community, and pursuing effective and efficient environmental conservation activities. This type of accounting enables a company to ascertain the cost of

conserving the environment while carrying out her normal business activities, discover benefits and gains from such activities, and provide the best means possible for quantitative measurement and encourage the communication of the results. Proper disclosure of accounting information relating to the environment is a very important aspect of accountability (Okafor, 2018).

In such a context, it becomes pertinent to empirically find out if negative or positive corporate environmental behaviour impact on firm financial performance. Some studies purport to find a positive relationship (Simerly 2018, Schaltegger & Wagner, 2014; Coleman, 2011). Similar studies found a negative relationship (Crane, Matten & Moon, 2018; Bromley, 2016; Thornton, Kagan, & Gunningham, 2013). While others showed either inconclusive results or no (neutral) effect (Klassen & McLaughlin, 2016; Makni, Francoeur & Bellavance, 2009), thereby creating a gap in knowledge.

It is expected that a company with poor environmental credentials is punished in the form of dwindling financial fortune by strategic stakeholders like consumers, potential investors to mention a few. But this may not be the same always judging from previous research evidences that have shown inconsistent results when the relationship between corporate environmental cost and financial performance is investigated. The typical conclusion, based on narrative

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reviews of literature is that the empirical evidence is too mixed to allow for any firm conclusion. In most of the previous reviews, poor measures, methodological shortcomings, difficulties in obtaining data and weak theory construction are often mentioned as causes of this apparent variability in findings (Coleman, 2011; Kline, 2010)

In view of the inconclusiveness in study outcomes in this area and paucity of studies focusing on the oil and gas sector (arguably one of the worst culprits in environmental degradation), this study investigated the effect of corporate environmental cost on the financial performance of oil and gas sector in Nigeria.

The main objective of this study was to ascertain the effect of environmental costs on financial performance of oil and gas companies listed on Nigeria stock exchange.

The specific objectives were to:

1. Assess the effect of Employee Health and Safety Cost on Tobin's Q of Oil and Gas Companies listed on Nigeria Stock Exchange.
2. Determine the effect of Waste Management Cost on Tobin's Q of Oil and Gas Companies listed on Nigeria Stock Exchange.

## 2. REVIEW OF RELATED LITERATURE

### 2.1. Conceptual Review

#### Environmental Costs

Environmental costs can be analyzed as relating to prevention, appraisal, internal failure and external failure activities (Eltaib, 2012). Prevention activities are activities that solve environmental problems before they occur or convert problems into opportunities. Cost of prevention activities are investment costs as they minimize future cost outlays and provide long-lasting benefits. Appraisal activities are activities that monitor the levels of environmental impact, for instance, auditing supplier performance, inspecting processes and products and measuring damage. Internal failure activities are activities that correct mishaps/breakdowns noticed in appraisal activities. These costs include, cost of cleaning the plant after spillage, occupational health and safety claims of employees. External failure activities are activities which occur when resolution and remediation efforts fall outside the organization management. They include costs of cleaning polluted sites, fines and penalties for environmental damage and reduction of profits as a result of reputational injury. Environmental disclosure may result in long term sustainability of the firm as there is decreased wastage and improved efficiency hence resulting into low costs (Hossain, Islam & Andrew, 2016).

Environmental costs are costs that the organization incurs to prevent, monitor and report environmental impacts (KPMG, 2012). United States of America Environmental Protection Agency (1995) defines five tiers of environmental costs namely; convectional, hidden, contingent, image and relationship and societal. These costs are broadly divided into two: private costs and societal costs. Private costs are borne by the firm whereas societal costs are borne by the society.

#### Employee Health and Safety Cost and Financial Performance

The International Labour Organization (ILO, 2003) defines occupational health and safety (OHS) as the outcome of

adequate protection of a worker from sickness, injury and disease arising from work. The ILO embraces the idea that workers' points of view need to be heeded and given equal status with those of other stakeholders in the workplace in ensuring sound business development. Health and safety in the workplace is essential for ensuring that people are not harmed during work, and that pain, suffering and loss of life are avoided. Ensuring that people are not injured can extend the productive working lives of citizens and contribute to economic growth and prosperity. The benefits of promoting occupational health and safety include enabling people to live happier and longer lives, enhancing economic activity, reducing demand on health and social services and reducing the costs associated with illness and injury on both individual and community bases (Cudjoe, 2011; Bennet, 2011). Occupational safety and health is often evaluated by the extent of injury and fatality sustained by employees in an organization. Costs associated with injury and fatality also give another way of evaluating the effectiveness of employees' safety. The costs in insurance premiums, lost wages and lost productivity create a substantial financial loss to businesses (Cudjoe, 2011). The health and safety of an employee should not be overlooked in the determination of how productive workers are, since human capital is key in firms' productivity. Therefore it must be noted that safety and health legislation, change in attitude (both employer and employee) towards safety and health issues in an organization when set as a priority will improve productivity, since "safe work means safe business" (ILO, 2003). Al-Tuwaijri, Christensen and Hughes (2014) documented a positive association between health and safety cost and financial performance. Pagell, Johnston, Veltri, Klassen and Biehl (2013) found in their study that commitment-based safety practices improved trust and organizational commitment and indirectly and directly influenced the safety climate. Another study by Cucchiella, Gastaldi and Ranieri (2014) underscored the importance of organizational commitment in improving the safety performance. Organizational interest was shown by acts in support of workplace health and safety. Workplace health and safety is expected to influence organizational commitment (Danish, Ramzan & Ahmad, 2013).). The a priori expectation of this study is that environmental cost would positively relate with tobin's q of oil and gas sector in Nigeria.

#### Waste Management Cost and Financial Performance

The production and management of waste is a strategic issue for all countries, since it has social, economic and environmental implications. Environmental management practices are those environmental friendly operations that help to protect the natural environment and to reduce damages that can be caused upon it due to human and firms activities. Environmental practices include environmental practices like recycling, eco design, clean production and reuse with the aim of minimizing expenses regarding the manufacturing, distribution, use and disposal of products (Amahalu, Ezechukwu & Obi, 2017). Business activity generates pollution and waste that can damage natural systems, causing irreversible harms, which reduce environmental resources available to society (Dominkovic, Bacekovic, Cosic, Krajacic, Pukšec, Duic, Markovska, 2016). Firms must take care of preventing and reducing their environmental impact through corporate environmental practices, which also have an impact on firms' financial

performance (Mathuva & Kiweu, 2016). The minimization of the environmental damages caused by business activity and the protection of the natural environment are signals of firms' environmental performance, and have received increasing attention from society, which require firms to reduce their negative impact on environment, contributing to sustainable development. Thereby, firms are expected to decrease and control the consumption of natural resources and energy, and to reduce or eliminate the production of waste and pollutants during and after the production process; firms can also develop new environmentally friendly products that minimize their ecological footprint (Molina-Azorín, Tarí, Pereira-Moliner, López-Gamero, Pertusa-Ortega, 2015). Richter, Bruce, Ng, Chowdhury and Vu (2017) found a positive relationship between waste management cost and financial performance. On the other hand Fosu, Danso, Ahmad and Coffie (2016) documented a significant negative relationship between waste management cost and financial performance.

### Tobin's Q

The Tobin's Q ratio is a ratio devised by James Tobin of Yale University, Nobel laureate in economics, who hypothesized that the combined market value of all the companies on the stock market should be about equal to their replacement costs (Bond & Cummins, 2004). Replacement value (or replacement cost) refers to the cost of replacing an existing asset based on its current market price. For example, the replacement value of a one-terabyte hard drive might be just N50 today, even if we paid N500 for the same storage space a few years ago (Amahalu, Okoye & Obi, 2018). Tobin's q (also known as q ratio) is the ratio between a physical asset's market value and its replacement value (Hayes, 2019). The Q Ratio expresses the relationship between market valuation and intrinsic value. In other words, it is a means of estimating whether a given business or market is overvalued or undervalued (Hayes, 2019). The Q ratio is calculated as the market value of a company divided by the replacement value of the firm's assets.

$$Q \text{ Ratio} = \frac{\text{Total Market Value of Firm}}{\text{Total Asset value}}$$

For example, a low Q (between 0 and 1) means that the cost to replace a firm's assets is greater than the value of its stock. This implies that the stock is undervalued. Conversely, a high Q (greater than 1) implies that a firm's stock is more expensive than the replacement cost of its assets, which implies that the stock is overvalued. This measure of stock valuation is the driving factor behind investment decisions in Tobin's model (Maverick, 2018). The formula for Tobin's Q ratio takes the total market value of the firm and divides it by the total asset value of the firm. For example, assume that a company has \$35 million in assets. It also has 10 million shares outstanding that are trading for \$4 a share. In this example, the Tobin's Q ratio would be:

$$\text{Tobin's Q ratio} = \frac{\text{total market value of firm}}{\text{total asset value of firm}} = \frac{\$40,000,000}{\$35,000,000} = 1.14$$

### 2.2. Empirical Review

Earnhart and Lizal (2011) analyzed the effect of corporate environmental performance on financial performance in a transition economy of Czech. In particular, the study assessed whether good environmental performance affects profits, and if so, in which direction. Using multiple

regression analysis. The empirical results indicated strongly and robustly that better environmental performance improves profitability by driving down costs more than it drives down revenues. The strong reduction in costs is consistent with the substantial regulatory scrutiny exerted by environmental agencies during the sample period in the forms of prevalent monitoring (i.e., inspections) and enforcement and escalating emission charge rates. Cortez and Cudia (2011) explored the impact of environmental innovations on financial performance of Japanese electronics companies following the growing literature linking corporate social performance with profitability. Using sample electronics companies listed in the Tokyo Stock Exchange, the industry case study focused on the global manufacturing leaders as they play a significant role in advancing environmental reporting due to their supplier networks and subsidiaries. The findings pointed to risk minimization efforts of electronics companies in spite of declining profitability. Arafat, Warokka and Dewi (2012) studied the effect of environmental performance on financial performance. The study analyzed 33 Indonesian manufacturing firms that were listed in Indonesian Stock Exchange (IDX) from 2005-2010 and reported their environmental performance assessment to the Ministry of Environment Indonesia. Statistic methods used for testing the hypothesis were T-test and multivariate regression model. The empirical results reveal that environmental performance has significantly influenced financial performance of the Indonesian manufacturing firm. These results explicitly show how firms in emerging countries are going to be more concerned with environmental sustainability and long-run profitability. Akabom (2012) carried out a study on the environmental friendly policies and their financial effects on corporate performance of selected oil and gas companies in Niger Delta Region of Nigeria. Data were collected from both primary and secondary sources. Thereafter, the data were analyzed using simple ordinary least square regression method and the study hypothesis was also validated. It was revealed that the cost of ensuring environmental friendly policies as well as firm competitiveness have significant relationship with the firms' profitability (Corporate performance). Olusegun (2012) explored the impact of corporate environmental responsibility on the financial performance in the extractive sector using a pooled secondary data of 101 multinational extractive companies for the period of 2008-2010 and primary data from a survey of 275 extractive sector managers. The results of this study showed that there is no relationship between corporate environmental responsibility and financial performance while the environmental attitude of managers is positively related to the perceived corporate reputation of their companies. Ifurueze, Lyndon and Bingilar (2013) examined the impact of environmental cost on corporate performance in oil companies in the Niger Delta States of Nigeria. The field survey methodology was utilized involving a selected sample of twelve oil companies. The multiple regression analysis was explored to test the hypothesis. The study revealed that sustainable business practices and corporate performance is significantly related. And sustainability may be a possible tool for corporate conflict resolution as evidenced in the reduction of fines, penalties and compensations paid to host communities of oil companies. Okoye and Ezejiofor (2013) assessed the appraisal of Sustainability environmental accounting in enhancing corporate performance and



economic growth. This paper analyzed and tested two hypotheses with Pearson Product Movement Correlation Coefficient. Based on this, the study discovered that sustainable environmental accounting has significant impact on corporate productivity in order to enhance corporate growth. Makori and Jagongo (2013) established whether there is any significant relationship between environmental accounting and profitability of selected firms listed in India. The data for the study were collected from annual reports and accounts of 14 randomly selected quoted companies in Bombay Stock Exchange in India from 2006-2011. The data were analyzed using multiple regression models. The key findings of the study shows that there is significant negative relationship between Environmental Accounting and Return on Capital Employed (ROCE) and Earnings per Share (EPS) and a significant positive relationship between Environmental Accounting and Net Profit Margin and Dividend per Share. Tze, Boon and Yee (2014) analyzed the relationship between environmental improvement and the financial performance of firms on a sample of 78 leading companies listed in Bursa Malaysia. The study covered a period of 5 years, from 2008 to 2012. The study used content analysis to verify the extent of information disclosed and reported by companies. The results indicated there is a positive correlation between efficiency used towards natural resources and financial performance (both ROA and ROE). On the other hand, (Materials, Energy and Water were found to be negative predictor for ROA and ROE. This is a result of compliances that are required by environmental laws and regulations, which increase the cost of companies, and thus decrease their profit. Bai, Pingli and Zhuang (2014) investigated the effect of multi-dimensional corporate environmental performance (CEP) on firm's financial performance and risk in Pakistan from 2005-2012. Considering two dimensions of CEP as environmental management performance (EMP) and environmental operational performance (EOP), the study found an inverted U-shaped relationship between carbon performance and Tobin's Q, and a positive relationship between EMP and Tobin's Q. The findings also provided evidences for the moderation effect of EMP on the EOP-Tobin's Q relationship. The study also found a significant positive relationship between the carbon performance and firm risk within manufacturing industries and an inverse relationship within service industries. Magara, Aming'a and Momanyi (2015) focused on the impact of environmental accounting (EA) on financial performance of corporate organizations in Kisii County, Kenya. The study adopted a stratified sampling design where simple random sampling technique was used to identify a sample size of 49 employees drawn from all the 16 corporations. Both qualitative and quantitative data were collected using questionnaire, and secondary data and descriptive statistics were used to analyze the responses. Findings revealed that the perceived financial performance of the corporate organization in general was in good status as perceived by the employees. Vinayagamoorthi, Murugesan and Kasilingam (2015) analyzed the impact of environmental performance on profitability on of firms in India. The analysis made use of descriptive statistics, correlation, and regression analysis. The results found that the profitability variables like ROA, ROE, and ROS create the positive impact on energy intensity (proxy of environmental performance) of the sample firms. At the same time, one profitability variable such as ROCE recorded negative impact on environmental information. Ezejiofor, John-Akamelu and

Chigbo (2016) ascertained the effect of sustainability accounting measure on the performance of corporate organizations in Nigeria. Ex post facto research design and time series data were adopted. Data for study was collected from annual reports and accounts of the company in Nigeria. Formulated hypotheses were tested using Regression Analysis with aid of SPSS Version 20.0. Based on the analysis, the study found that environmental cost does not impact positively on revenue of corporate organizations in Nigeria, also that environmental cost impact positively on profit generation of corporate organizations in Nigeria. Azomahou, Van & Wagner (2017) examined the relationship between the environmental and economic performance of firms in the European paper manufacturing industry from 2011-2015. Based on panel data, it investigated the relationship separately, with the analysis based on four hypotheses formulated with regard to country influence, process influence and firm size influence on environmental and economic performance. Hypotheses were tested using pooled regression and a panel regression framework with random firm and temporal effects. Subsequent to analyzing the relationship separately, the study estimated the determinants of the relationship between environmental and economic performance using three simultaneous equations systems. It was found that for the system with return on sales as economic performance variable, and an environmental performance index as environmental performance variable, a significant and positive regression coefficient was estimated for the asset-turnover ratio, as well as significant and negative coefficients for the dummy variables representing the industrial and mixed sub-sector. Hai, Foo, Tan & Yap (2018) investigated the relationship between environmental disclosures and financial performance using a sample of potentially polluting publicly-listed companies in Singapore from 2012-2015. Results showed that a positive link existed although the evidence was less strong for the impact of environmental disclosures on subsequent financial performance. All null hypotheses were rejected. This finding should encourage Singapore companies to increase the content of their environmental reporting in annual reports. This is important in order to expose pollution-prone companies to a wider spectrum of stakeholders on their role to achieve a cleaner and greener environment.

Conceptually, environmental costs can be seen as the costs of those aspects of industrial activities that affects environmental quality. It is the costs associated with air, and water pollution and land ecosystem degradation and destruction as borne by the society. This study encompasses some theories which are stakeholders' theory and legitimacy theory. These theories as propounded are intended to establish congruence between the organization and the social values associated with or implied by their activities and the norms of acceptable behavior in the larger system. These theories further imply that the organization should be aware of socially constructed standards of quality and desirability as well as perform in accordance with accepted standards and professionalism. The main concern of these theories in environmental accounting is to address the environmental costs elements and valuation and its inclusion in the financial statements.

### 3. METHODOLOGY

The research design employed in this study is the *ex-post facto* research design, in order to establish a relationship

between environmental cost and financial performance. This study was treated as ex-post facto research since it relied on historical data. This is appropriate because ex-post facto research aims at measuring and establishing the relationship between one variable and another or the effect of one variable on another, in which the variables involved are not manipulated by the researcher (Kothari & Garg, 2014).

### 3.1. Population and Sampling Method

The population of this study consist of all the of eleven (11) oil and gas companies listed on the Nigerian Stock Exchange as at 31<sup>st</sup> December, 2018. They include; Japaul Oil & Maritime Services Plc, Oando Plc, Beco Petroleum Products Plc, Capital Oil Plc, Conoil Plc, Rak Unity Petroleum Plc, Eterna Plc, Forte Oil Plc, Mobil Oil Plc, MRS Oil Nigeria Plc and Total Nigeria Plc.

The entire eleven (11) Oil and Gas companies were selected as the sample size of this study with the utilization of purposive sampling method. Data were gathered from the published financial statements of the eleven (11) Oil and Gas companies for eleven (11) years period spanning from 2008-2018, using Purposive sampling method (that is all the Oil and Gas firms that filed their annual financial statements with NSE from 2008-2018 without missing any year were selected for this study). The reason for the choice of this time frame is availability of published annual report and accounts of the selected organizations and to have a fairly, reasonably, reliably and up-to-date available financial data.

## 4. DATA ANALYSIS AND INTERPRETATION

**Table 1: Pearson Correlation Matrix**

	TQ	EHSC	WMC	FSZ	LEV
TQ	1.000	0.031	0.356	0.011	-0.036
EHSC	0.031	1.000	-0.107	-0.394	-0.454
WMC	0.356	-0.107	1.000	-0.741	-0.605
FSZ	0.011	-0.394	-0.741	1.000	0.934
LEV	-0.036	-0.454	-0.605	0.934	1.000

Source: E-Views 9.0 Correlation Output, 2019

### Interpretation of Pearson Correlation Matrix

The result of the Pearson correlation result in table 4.1 reports that there is a positive correlation between EHSC, WMC, FSZ and TQ as indicated by the coefficient factors of 0.031, 0.356, 0.011 respectively, while LEV negatively correlate with TQ.

### 4.1. Test of Hypotheses

#### Test of Hypothesis I

**H<sub>01</sub>** : Employee Health and Safety Cost has no significant effect on Tobin’s Q of Oil and Gas Companies listed on Nigeria Stock Exchange.

**H<sub>1</sub>** : Employee Health and Safety Cost has significant effect on Tobin’s Q of Oil and Gas Companies listed on Nigeria Stock Exchange.

**Table 2: Panel Least Square Regression Analysis between Employee Health and Safety Cost and Tobin’s Q of listed Oil and Gas Companies**

Dependent Variable: TQ
Method: Panel Least Squares
Date: 09/03/19 Time: 17:06
Sample: 2008 2018
Periods included: 11
Cross-sections included: 11
Total panel (balanced) observations: 121

### 3.2. Method of Data Analysis

The data analysis for the study took the form of descriptive statistics and inferential statistics. This research work adopted the panel least square (PLS) regression analysis with longitudinal (panel) regression using E-Views 9.0 statistical software. The reason for adopting panel data regression is because of the number of Oil and Gas firms and the period of time involved (Koutsoyiannis, 2001).

### 3.3. Model Specification

The following research models were formulated in line with the research hypotheses in order to empirically determine the effect of environmental cost on financial performance.

$$TQ_{it} = \beta_0 + \beta_1EHSC_{it} + \beta_2FSZ_{it} + \beta_3LEV_{it} + \mu_{it} - \text{Model 1}$$

$$TQ_{it} = \beta_0 + \beta_1WMC_{it} + \beta_2FSZ_{it} + \beta_3LEV_{it} + \mu_{it} - \text{Model 2}$$

#### Legend:

TQ<sub>it</sub> = Tobin’s Q of firm *i* in period *t*

EHSC<sub>it</sub> = Employee Health and Safety Cost of firm *i* in period *t*

WMC<sub>it</sub> = Waste Management Cost of firm *i* in period *t*

μ<sub>it</sub> = component of unobserved error term of firm *i* in period *t*

β<sub>0</sub> = constant term

β<sub>1</sub>, β<sub>2</sub> and β<sub>3</sub> = are slopes to be estimated of firm *i* in period *t*.

*i* = firm identifier (11 firms)

*t* = time variable (2008, 2009, .....2018) – (Eleven Years)

#### Decision Rule:

Accept H<sub>0</sub>, if the P-value of the test is greater than 0.05, otherwise reject.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.049746	0.798633	6.062288	0.0000
EHSC	0.138062	0.612667	8.041450	0.0000
FSZ	0.089238	0.169294	5.527120	0.0000
LEV	-0.070513	0.160459	-0.439446	0.6611
R-squared	0.731051	Mean dependent var		0.493763
Adjusted R-squared	0.714307	S.D. dependent var		0.845262
S.E. of regression	0.851287	Akaike info criterion		2.548364
Sum squared resid	84.78863	Schwarz criterion		2.640787
Log likelihood	-15.01760	Hannan-Quinn criter.		2.585900
F-statistic	24.35799	Durbin-Watson stat		1.014733
Prob(F-statistic)	0.000000			

Source: E-Views 9.0, Regression Output 2019

### Interpretation of Regression Results

From the analyzed regression result in table 4.3; the regression equation signifies that:

$$TQ = 0.049746 + 0.138062EHSC + 0.089238FSZ - 0.070513LEV$$

From the result presented in table 4.3, the surrogate for environmental cost (EHSC) is in line with the apriori expectation. It could also be seen that EHSC and FSZ have a positive relationship with Tobin's Q while a negative relationship exist between LEV and Tobin's Q in the period under study. Using the coefficient of variation from the model presented table 4.3, it is observed that TQ is positive at 0.049746 when all other variables are held constant. Consequently, a unit change in EHSC will lead to a positive change of about 0.138062 units in TQ provided all other variables are held constant. Also, a unit change in FSZ, provided all other variables are held constant will have a positive change of about 0.089238 units in TQ. Furthermore, a unit change in LEV will lead to a negative change of about 0.070513 units in TQ. From the adjusted R- squared of 0.714307, the regression co-efficient indicates that about 71.4% of the changes in the dependent variable (TQ) is explained by the changes in the independent variables (EHSC, FSZ, LEV). The Durbin-Watson statistic of 1.014733 indicates the absence of auto - correlation since it is not more than the rule of Thumb of 2. The tool of F-statistic helps in determining the overall joint significant of the explanatory (independent) variables on the dependent or explained variable. At 5% level of significance, the probability of F-statistic = 0.000000 is less than the critical p-value at 0.05.

### Decision.

The null hypothesis is rejected since Prob(F-statistic) at 0.000000 is less than the critical value of 5% (0.05). This implies that Employee Health and Safety Cost has a significant positive effect on Tobin's Q of Oil and Gas Companies listed on Nigeria Stock Exchange at 5% level of significance.

**Table 3: Fixed Effect Model between EHSC, FSZ, LEV and TQ**

Dependent Variable: TQ				
Method: Panel Least Squares				
Date: 09/03/19 Time: 17:07				
Sample: 2008 2018				
Periods included: 11				
Cross-sections included: 11				
Total panel (balanced) observations: 121				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.319859	0.982680	5.343122	0.0000
EHSC	0.337973	0.619356	7.545684	0.0000
FSZ	0.003869	0.179780	4.021522	0.0001
LEV	-0.099514	0.165747	-0.600395	0.5495
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.784262	Mean dependent var		0.493763
Adjusted R-squared	0.765154	S.D. dependent var		0.845262
S.E. of regression	0.808472	Akaike info criterion		2.521103
Sum squared resid	69.93816	Schwarz criterion		2.844583
Log likelihood	-13.85267	Hannan-Quinn criter.		2.652480
F-statistic	21.59201	Durbin-Watson stat		1.175403
Prob(F-statistic)	0.000000			

E-Views 9.0 output, 2019

**Table 4: Random Effect Model between EHSC, FSZ, LEV and TQ**

Dependent Variable: TQ				
Method: Panel EGLS (Cross-section random effects)				
Date: 09/03/19 Time: 17:07				
Sample: 2008 2018				
Periods included: 11				
Cross-sections included: 11				
Total panel (balanced) observations: 121				
Swamy and Arora estimator of component variances				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.633104	0.873652	4.924664	0.0000
EHSC	0.479089	0.603093	3.794387	0.0003
FSZ	0.051604	0.171001	4.301775	0.0001
LEV	-0.085252	0.159934	-0.533042	0.5950
Effects Specification				
		S.D.	Rho	
Cross-section random		0.299862	0.1209	
Idiosyncratic random		0.808472	0.8791	
Weighted Statistics				
R-squared	0.612065	Mean dependent var	0.311460	
Adjusted R-squared	0.583266	S.D. dependent var	0.801985	
S.E. of regression	0.807287	Sum squared resid	76.25033	
F-statistic	11.76294	Durbin-Watson stat	1.100695	
Prob(F-statistic)	0.000000			
Unweighted Statistics				
R-squared	0.285635	Mean dependent var	0.493763	
Sum squared resid	85.25299	Durbin-Watson stat	0.984463	

E-Views 9.0 output, 2019

**Table 5: Hausman Specification Test**

Correlated Random Effects - Hausman Test			
Equation: Untitled			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	8.657137	3	0.0414

E-Views 9.0 output, 2019

Hausman specification test states that:

- If the *p value* >  $\alpha = 0.05$  then the variable does not have a significant effect (Accept  $H_0$ ).
- If the *p value* <  $\alpha = 0.05$  then the variable has a significant effect (Accept  $H_1$ ).

**Interpretation of Post Regression Analysis**

From the Hausman test result in table 4.6, the p-value is 0.0414, this is statistically significant at the conventional level of 0.05. Thus, the Fixed Effect Model (FEM) is more appropriate than the Random Effect Model (REM) in analysing the effect of Employee Health and Safety Cost on Tobin’s Q of Oil and Gas Companies listed on Nigeria Stock Exchange at 5% level of significance.

**Test of Hypothesis II**

- H<sub>02</sub>:** Waste Management Cost has no significant effect on Tobin’s Q of Oil and Gas Companies listed on Nigeria Stock Exchange.
- H<sub>2</sub>:** Waste Management Cost has significant effect on Tobin’s Q of Oil and Gas Companies listed on Nigeria Stock Exchange.

**Table 6: Panel Least Square Regression Analysis between Waste Management Cost and Tobin’s Q of listed Oil and Gas Companies**

Dependent Variable: TQ
Method: Panel Least Squares
Date: 09/03/19 Time: 17:16
Sample: 2008 2018
Periods included: 11
Cross-sections included: 11
Total panel (balanced) observations: 121



Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.071754	0.714315	0.100452	0.9202
WMC	0.017450	0.378892	2.685333	0.0083
FSZ	0.028587	0.165101	0.173148	0.8628
LEV	-0.009593	0.158299	-3.060603	0.0008
R-squared	0.459828	Mean dependent var		0.493763
Adjusted R-squared	0.435721	S.D. dependent var		0.845262
S.E. of regression	0.830028	Akaike info criterion		2.497783
Sum squared resid	80.60664	Schwarz criterion		2.590206
Log likelihood	-147.1159	Hannan-Quinn criter.		2.535320
F-statistic	12.81784	Durbin-Watson stat		1.012088
Prob(F-statistic)	0.000000			

E-Views 9.0 output, 2019

**Interpretation of Regression Result**

The results in Table 4.7 indicate that there is a significant association between WMC, LEV and TQ as indicated by the t-statistic and p-value value of 2.685333 and 0.0083; -3.060603 and 0.0008 respectively, while a non-significant relationship exist between FSZ and TQ with a t-statistic value of 0.173148 and p-value of 0.8628. However, the Beta coefficient value shows that WMC ( $\beta_1=1.017450$ ); FSZ ( $\beta_2=0.028587$ ) and LEV ( $\beta_3= -0.009593$ ). The implication is that there is a positive relationship WMC, FSZ and TQ, while, on the other hand, a negative relationship exist between LEV and TQ. The adjusted R-squared of 0.435721 of the estimated model revealed that the independent (WMC) and control variables (FSZ, LEV) explain the variability in the dependent variable (TQ) up to 44% approximately. The Durbin-Watson value of 1.012088 shows that the model is free from serial correlation since it not more than 2 approximately. The F- value of 12.81784 indicates that the parameter estimate cannot be dismissed at 5% level of significance. This is due to the fact that the associated P-value = 0.000000 is less than the critical P-value of 5% (0.05).

The regression equation is:  $TQ = 0.071754 + 0.017450WMC + \mu$

The implication is that, for there to be a unit/one naira increase in TQ there will be 0.017450 increase in WMC.

**Decision**

The alternative hypothesis ( $H_1$ ) is accepted since the Prob(F-statistic) = 0.000000 is less than the critical P-value at 5% (0.05). It indicates that the explanatory variables are jointly significant at explaining or causing variation in the dependent variable (Tobin's Q), which means that Waste Management Cost has significant positive effect on Tobin's Q of Oil and Gas Companies listed on Nigeria Stock Exchange at 5% level of significance.

**Table 7: Fixed Effect Model between WMC, FSZ, LEV and TQ**

Dependent Variable: TQ				
Method: Panel Least Squares				
Date: 09/03/19 Time: 17:16				
Sample: 2008 2018				
Periods included: 11				
Cross-sections included: 11				
Total panel (balanced) observations: 121				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.163820	0.899222	1.294251	0.1984
WMC	0.783854	0.388894	2.015598	0.0463
FSZ	-0.032714	0.174680	-0.187280	0.8518
LEV	-0.049188	0.164638	-0.298765	0.7657
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.211915	Mean dependent var		0.493763
Adjusted R-squared	0.116166	S.D. dependent var		0.845262
S.E. of regression	0.794651	Akaike info criterion		2.486616
Sum squared resid	67.56736	Schwarz criterion		2.810096
Log likelihood	-136.4403	Hannan-Quinn criter.		2.617994
F-statistic	2.213238	Durbin-Watson stat		1.161420
Prob(F-statistic)	0.013454			

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**Table 8: Random Effect Model between WMC, FSZ, LEV and TQ**

Dependent Variable: TQ				
Method: Panel EGLS (Cross-section random effects)				
Date: 09/03/19 Time: 17:18				
Sample: 2008 2018				
Periods included: 11				
Cross-sections included: 11				
Total panel (balanced) observations: 121				
Swamy and Arora estimator of component variances				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.516617	0.783794	0.659124	0.5111
WMC	0.904991	0.376370	2.404526	0.0178
FSZ	0.005323	0.166359	0.031995	0.9745
LEV	-0.027371	0.158381	-0.172817	0.8631
Effects Specification				
		S.D.	Rho	
Cross-section random		0.268779	0.1027	
Idiosyncratic random		0.794651	0.8973	
Weighted Statistics				
R-squared	0.052860	Mean dependent var	0.328560	
Adjusted R-squared	0.028574	S.D. dependent var	0.805292	
S.E. of regression	0.793703	Sum squared resid	73.70584	
F-statistic	2.176574	Durbin-Watson stat	1.085644	
Prob(F-statistic)	0.094478			
Unweighted Statistics				
R-squared	0.055840	Mean dependent var	0.493763	
Sum squared resid	80.94856	Durbin-Watson stat	0.988508	

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**Table 4.10: Hausman Specification Test**

Correlated Random Effects - Hausman Test			
Equation: Untitled			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	2.720927	3	0.0411

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**Interpretation of Post Regression Analysis**

From the Hausman test result in table 4.10, the p-value is 0.0411, which is statistically significant at the conventional level of 0.05. Thus, the Fixed Effect Model (FEM) is more appropriate than the Random Effect Model (REM) in analysing the effect of Waste Management Cost on Tobin’s Q of Oil and Gas Companies listed on Nigeria Stock Exchange at 5% level of significance.

**4.2. Discussion of Findings**

This study ascertained the affect of environmental cost on financial performance of listed oil and gas firms in Nigeria during the period 2008-2018. The independent variable (environmental cost) was proxied by Employee Health and Safety Cost, Waste Management Cost, Community Development Cost, Environmental Remediation Cost and Compliance Cost while financial performance was measured with Tobin’s Q as the dependent variable of this study. Moreover, this study adopted the Global Reporting Initiative (GRI) framework disclosures according to the G4 guidelines for the purpose of developing the Environmental cost disclosure index.

The regression result of hypothesis 1 reveals that EHSC and FSZ have a positive relationship with Tobin’s Q while a negative relationship exist between LEV and Tobin’s Q in the period under study. Using the coefficient of variation from the model presented table 4.3, it is observed that TQ is positive at 0.049746 when all other variables are held constant. Consequently, a unit change in EHSC will lead to a positive change of about 0.138062 units in TQ provided all

other variables are held constant. Also, a unit change in FSZ, provided all other variables are held constant will have a positive change of about 0.089238 units in TQ. Furthermore, a unit change in LEV will lead to a negative change of about 0.070513 units in TQ. From the adjusted R- squared of 0.714307, the regression co-efficient indicates that about 71.4% of the changes in the dependent variable (TQ) is explained by the changes in the independent variables (EHSC, FSZ, LEV). The Durbin-Watson statistic of 1.014733 indicates the absence of auto – correlation since it is not more than the rule of Thumb of 2. The tool of F-statistic helps in determining the overall joint significant of the explanatory (independent) variables on the dependent or explained variable. At 5% level of significance, the probability of F-statistic = 0.000000 is less than the critical p-value at 0.0

The regression results for hypothesis II indicate that there is a significant association between WMC, LEV and TQ as indicated by the t-statistic and p-value value of 2.685333 and 0.0083; -3.060603 and 0.0008 respectively, while a non-significant relationship exist between FSZ and TQ with a t-statistic value of 0.173148 and p-value of 0.8628. However,

the Beta coefficient value shows that WMC ( $\beta_1=1.017450$ ); FSZ ( $\beta_2=0.028587$ ) and LEV ( $\beta_3= -0.009593$ ). The implication is that there is a positive relationship WMC, FSZ and TQ, while, on the other hand, a negative relationship exist between LEV and TQ. The adjusted R-squared of 0.435721 of the estimated model revealed that the independent (WMC) and control variables (FSZ, LEV) explain the variability in the dependent variable (TQ) up to 44% approximately. The Durbin-Watson value of 1.012088 shows that the model is free from serial correlation since it not more than 2 approximately. The F- value of 12.81784 indicates that the parameter estimate cannot be dismissed at 5% level of significance. This is due to the fact that the associated P-value = 0.000000 is less than the critical P-value of 5% (0.05).

## 5. CONCLUSION and RECOMMENDATIONS

This study examined the effect of environmental costs on financial performance of oil and gas companies listed on Nigeria stock exchange from 2008-2018 periods. Panel data were sourced from the annual reports and accounts of the sampled oil and gas firms. Descriptive statistics were adopted to describe the mean, standard deviation, kurtosis and skewness of the study variables, while inferential statistics using correlation analysis, panel least square regression, and hausman test were employed via E-Views 9.0 statistical software. Data analysis revealed that a significant relationship exists between environmental costs and financial performance of listed oils and gas firms in Nigeria. As disaggregated components, Employee Health and Safety Cost, Waste Management Cost. The study further concludes that the components of environmental costs considered in this study are important variables in explaining financial performance of listed oil and gas firms in Nigeria.

The following recommendations were made in line with the findings and conclusion of this study:

- A. Oil and gas firms should increase their involvement in Employee Health and Safety Cost since it positively affects financial performance.
- B. Oil and gas firms should get more involved in waste management activities, since cost on waste management is more committed in improving organizational performance.

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