

## Environmental Costs Accounting and Return on Equity of Manufacturing, Oil and Gas Firms in Southwest, Nigeria

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### ABSTRACT

This research examined the effects of environmental costs on the accounting and return on equity of manufacturing firms in Nigeria. Specifically, the study examined the effect of environmental costs (community development costs, waste management costs, expenses for employee health and safety, and research and development costs) on the return on equity of oil and gas and manufacturing firms in Nigeria. The study is quantitative in nature, and secondary data sourced from the published quoted financial reports of sampled firms for 20 years was analyzed across 10 sampled firms in the oil and gas and manufacturing sectors 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. Four models were developed. It was discovered that community development costs have a positive but insignificant effect on return on equity. It was further discovered that environmental costs have a statistical relationship with the performance of firms in the oil and gas and manufacturing sectors in Nigeria. Environmental costs should be seen as an asset that will generate more income for the organization. This will not just improve the development of the community, but it might also enhance the overall equity of the manufacturing, oil, and gas firms in Nigeria.

**Keywords:** *return on equity, environmental costs, oil and gas, manufacturing firms*

## **1.0 Introduction**

In different nations across the world, several government enactments, laws, and regulations on environmental protection have been passed. According to Nagle (2012), the United States of America, Canada, Norway, the United Kingdom, and the Netherlands have been in the forefront of environmental degradation and pollution prevention, control, and protection. Furthermore, certain developing nations, such as Nigeria, Zimbabwe, Namibia, the Philippines, and Indonesia, have taken the lead in supporting measures to meet the need for environmental cost management accounting and accountability. Various laws and regulations, such as the Environmental Impact Assessment Act of 1992 and the Department of Petroleum Resources (DPR), Environmental Guidelines and Standards for the Petroleum Industry in Nigeria, are being enacted to increase environmental protection (EGASPI, 2002).

Cross-subsidization between products arises when environmental expenses are not properly distributed. Different methods are used to make varied goods in most circumstances, and each process has a different environmental cost (Christ & Burritt, 2013). As accounting professionals today can no longer disregard the effects of natural problems on corporate management, bookkeeping, audit, and reporting, it becomes more important to include environmental conditions into all four areas. More and more accountants all around the globe are talking about environmental preservation and whether or not accountants will be called upon to take part in the fight to save the environment (Pramanik, Shil & Das, 2007). The expectations placed on accountants are that they will be proactive in environmental protection because of liberalization and the removal of barriers; thus, it's logical that costs incurred as a result of industrial activities polluting the environment should be internalized as much as feasible in business accounts, which requires accounting for ecological concerns. As a result, environmental accounting and reporting is critical to accountants (Pellegrino & Lodhia, 2016).

Worries about environmental degradation, resource shortages, and the long-term sustainability of economic activity have increased in Nigeria as a result of such issues (Adediran & Alade 2013). A company's environment is just as important as the goods or services it handles in determining whether it succeeds or fails. Understanding the impact of environmental expenditures on performance is critical of Nigerian oil and gas and manufacturing businesses, due to which it is absolutely critical to have a better awareness of the underlying costs to oil and gas and manufacturing companies in Nigeria.

## **2.0 Conceptual Review**

### **2.1.1 Accounting and Environmental Costs**

There is no question that certain organisations and industries have social and environmental consequences that may outweigh their economic consequences. Accounting plays a critical role in exposing environmental obligations for a variety of entities, whether industrial, commercial, service, or even volunteer, and at a variety of levels, including micro, meso, and macro. As a result, accounting became concerned with attaining new objectives, such as quantifying and analysing the prospective or actual environmental effect of projects and organisations. These new objectives are critical because they enable a diverse range of users to make economically and ecologically sustainable development choices.

According to Asuguo (2012), the primary reasons for accounting's interest in the environment are as follows: A properly implemented environmental accounting system is a supporting measure for achieving Sustainable Development (SD) in the sense that it serves as the primary tool for measurement, control, and decision-making; Environmental expenditures, whether capital (CAPEX) or operating (OPEX), continue to grow dramatically on a daily basis.

Naturally, any entity produces primary and secondary outputs that are primarily polluting, and if the entity does not incur costs to mitigate or prevent it, a third party in society must bear the cost (the concept of externality); Environmental risks can result in enormous environmental liabilities, and the organization/entity may be required to make large payments, which may have a significant impact on the organization's/financial entity's position.

As a result, suitable billing and allocation are required. Separating environmental expenses from other costs allows for more exact cost allocation and, as a result, pricing, as well as the establishment of sustainability indicators. Accounting for environmental costs and performance enables an organisation to develop and operate an overall Environmental Management System (EMS) and ISO 14000 accreditation. (ISO 14000 is an international collection of environmental management standards created and published by the same agency for other organizations. The ISO 14000 standards provide as a guideline or framework for businesses seeking to organise and enhance their environmental management activities).

For the reasons stated above, the researcher argues that accounting should be responsible for monitoring, analysing, and disclosing environmental performance in financial statements and their accompanying exhibits. Without a doubt, monitoring environmental performance requires accounting systems but also other data, such as pollution ratios. While monetizing environmental challenges is not always precise, economists and accountants must make the best estimations possible given the present state of information and tools available.

### **2.1.2 Green Accounting**

The reform and transformation of conservative accounting, or conventional accounting, which is primarily concerned with financial accounting, to Green Accounting, which is concerned with reporting environmental accounting data, social accounting data, and financial accounting data in a single integrated accounting reporting package, is becoming increasingly critical and urgent. There are numerous critical reasons for this.

To begin, Nigeria, like other countries, is undergoing a severe and terrifying ecological or environmental crisis. The crisis has triggered a slew of ecological and environmental disasters. The crisis has resulted in a slew of ecological and social disasters that are extremely damaging and jeopardise the sustainability of human life. Natural disasters, societal upheavals, and severe economic downturns have all been exacerbated by climate change, global warming, and environmental degradation. Additionally, these calamities have resulted in an energy crisis and resource shortages, poverty, social inequality, and escalating levels of human misery.

In general, a variety of literatures assert that the primary reason of the crisis is the state's, companies', and general public's greed in developing the economy and promoting the country's growth. The crisis was precipitated and fuelled by the government's and economic players' aim to boost economic growth and maximise profits (profit maximize). Additionally, the incentive

has motivated governmental officials and economic players to be excessively greedy. They deplete natural and social resources and wreak havoc on the ecosystem (Elkington, 2018). At the micro level, it refers to the whole field of environmental accounting, which includes financial accounting, reporting and auditing, as well as environmental management accounting. Environmental accounting must therefore be designed in such a way that it provides information that enables users to assess a company's environmental behaviour and its economic impact, with components of the system consisting of both monetary information (financial information) and physical information (physical information) (non-financial information). Additionally, it is vital to meet the diverse information demands of many interested parties. Additionally, environmental accounting is based on the fundamental recognition that influenced the development of accounting systems in the twentieth century: the method of reflecting business processes should be differentiated according to the users of accounting information and the decision-making tasks for which accounting information is used (Kral, 2015).

As a result, the company's conventional accounting system is divided into three basic subsystems (Kral, 2015): Management Accounting – Its primary objective is to reflect the business process from the perspective of the information needs of the management, specifically of all staff members at various levels of the company management – the information provided serves to assist management in managing the business process. In financial and tax accounting, users advocate for term and process standardisation to ensure that information supplied in particular circumstances is similar. On the contrary, management is defined by the absence of virtually any external regulation. This accounting subsystem is not universally specified and is even not utilised (Kral, 2015).

### **2.1.3 Accounting for Natural Resources**

The term "natural resource accounting" refers to the incorporation of environmental considerations into the national accounting system, which is concerned with the stocks and changes in natural assets, which include biota (produced or wild), subsoil assets (proved reserves), water, and land with their aquatic and terrestrial ecosystems (Deegan, 2012).

## **2.3 Costs Associated with the Environment**

### **(i) Waste Management Costs**

Waste management entails recognising what is present, sorting, separating, changing, and reusing what is usable, as well as appropriately disposing of what remains (Rose, 2002). Ghush (2009) asserts that wastes are an unavoidable by-product of human activity. They are either a by-product of the primary manufacturing process or result from the discarding of things or materials after they have been utilised.

Novick (2009) outlined the following accounting principles for waste management in any village, town, or city: Associating costs with the decrease of sanitation-related diseases, the prevalence of non-communicable illnesses, and the decrease of environmental pollution (land, water, and air degradation), etc. All enterprises are required to provide a report detailing the costs connected with trash management.

This is because stakeholders wanted this information to assess the organization's environmental stewardship and the efforts necessary to avoid environmental damage. While the costs paid by the organisation lower the company's performance, they are costs that should be avoided in order to achieve the organization's goal of delighting consumers through the production of goods and services and environmental stewardship.

## **(ii) Safety and Health of Employees**

This is what it means to be in a condition of well-being. If health encompasses not only physical but also mental and emotional well-being, it is the employer's job to establish a healthy work environment for her employees. If he takes care of their health, the expense of disability payments and replacement of wounded or deceased staff may be avoided. The corporation may improve its employees' mental and physical well-being through employee safety and health initiatives.

Employees' ability to meet security needs is likely to be jeopardized by poor safety and health conditions, stressing the importance of regulatory measures implemented by various organizations in various industries. Safety risks are those features of a work environment that can cause an employee immediate and occasionally violent injury. Such losses include hearing loss, loss of vision or body parts, sprains and broken bones, as well as burns and electric shocks.

## **2.4 Theoretical Framework**

### **2.4.1 Organizational Theory**

This study is anchored by organizational theory that attracted considerable attention from organizational and management scholars, owing to their widespread adoption in most industry sectors . Organizational theory was first developed and defined by

Taylor (1947), Weber (1947), and Fayol (1947). The hypothesis looks at how hierarchical design and exercises are melded by friendly, political, and social powers that include the establishments through which the association ought to cooperate with its environmental factors and its numerous foundations to look after soundness. As per this hypothesis, authoritative exercises are obliged by an assortment of outside pressing factors, and associations should react to outer solicitations and cultural assumptions as per the hypothesis' suspicions (Ali khani 2014). This theory have attracted considerable attention from organizational and management scholars, owing to their widespread adoption in most industry sectors. Management is the function that coordinate the efforts of people to accomplish goals and objectives using available resources efficiently and effectively.

## **2.5 Empirical Review**

A research study by Rufelawaty and Budi (2010) indicated that green data collected via accounting practices may assist in company development (Shaltegger, Martin, and Jasch, 2018). When such information is lacking, managers must do more bookkeeping and cutting

costs. Larrinaga and Babbington (2018) found that companies may be able to reduce costs and improve their overall performance by making use of environmental accounting. The findings of Elewa's (2007) research demonstrated that manufacturing cost reductions provide higher profits because of environmental accounting. Environmental accounting offers additional advantages, as well as cost reductions, according to De Beer and Friend (2018). Furthermore, it may be used to show how investment that avoids environmental responsibilities may result in large financial returns. The goal of this study is to determine not just whether long-term planning is a smart strategy for businesses to increase profitability, but also how effective it is. This research looked at several financial measures, such as return on equity (ROE), return on sales, and other measures (Hagel, Brown, and Davision 2010).

Firms that are concerned about the environment are likely to incorporate considerable environmental data in their annual reports and some other reports, according to research published in Basse, Effiok, and Eton (2018). The authors of this study (Azar, Shahbazi, Abad, and Moasavi, 2018) found that businesses listed on the Tehran Stock Exchange that have improved their management performance have also started to provide environmental financial data. Sutrisno, Mohammad, Prihat, and Rosidi (2018) have investigated the relationship between environmental performance and environmental disclosure and company value as a mediator. The researchers looked into it as part of their investigation, found 59 Indonesian companies that adoption of green accounting had little impact on company value by way of environmental disclosure.

### 3.0 Methodology

This research looked at the Nigerian economy's oil and gas and manufacturing sectors. It focused its attention on ten (10) different industry sectors, such as upstream oil and gas, downstream oil and gas, and indigenous oil and gas. In this case, both the oil and gas and industrial companies were found to have a detrimental effect on the environment via emissions and industrial effluent. Additionally, due of the environmental and social impact their businesses have on the environment; they adopt more environmentally friendly practices. As a result, the research was used to corroborate secondary data from public firms on the Nigerian Stock Exchange.

The model utilized by Nwaiwu and Oluka (2018), who researched on environmental cost disclosure and financial performance of oil and gas in Nigeria, was adopted for this study. This is given below:

$$EPS = f(WMC, PAC, LAR) \dots \dots \dots (3.1)$$

Where:

EPS = Earnings per Share

WMC = Waste Management Cost

PAC = Pollution Abatement

LAR = Law and Regulation

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 is modified by specifying the profitability of the of the sampled firms measured in terms of Return on Equity (ROE) was a function of environmental cost that will be measured with community development cost, waste management cost, expenses for employee health and safety and cost for research and development. The modification is 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.

Model 1: this shows the relationship between Return on Equity and proxies for environmental cost

$$ROE = f(CDC, WMC, EHS, CRD, TOA, LEV) \dots \dots \dots (3.2)$$

Where:

ROE = Return on Equity

CDC = Community Development Cost

WMC = Waste Management Cost

EHS = Expenses on Employees' Health and Safety

CRD = Cost of Research and Development

TOA = Total Assets

LER = Leverage Ratio

The econometric equations are present below:

$$ROE_{it} = \beta_0 + \beta_1 CDC_{it} + \beta_2 WMC_{it} + \beta_3 EHS_{it} + \beta_4 CRD_{it} + \beta_5 TOA_{it} + \beta_6 LER_{it} + \mu_1 \dots \dots (3.3)$$

Where:

$\beta_0 - \beta_6$  = the slope parameter

i = firms sampled in this study

t = the period covered

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

Primary data sources used included data from the Nigerian Stock Exchange (NSE). These companies, which were all from the NSE, included financial statements and annual reports from oil and gas businesses, such as OANDO, CONOIL, TOTAL and FORTEL as well as manufacturing companies such as PRESCO, GUINNESS, MAY AND BAKER, PZ, II PLC and OKOMU. The data used in this analysis spans the years 2000 to 2019, covering twenty (20) years.

#### 4.0 Results and Discussion

**Model One:** this shows the relationship between environmental costs (community development cost, waste management cost, expenses for employee health and safety and cost for research and development) and return on equity and the control variables.

**Table 4.1: Pooled OLS Estimation Result**

Variables	Coefficient	Std Error	T-Test	Probability
C	-230.3222	107.2491	-2.15	0.033
LCDC	31.23088	11.6147	2.69	0.008
LWMC	-13.4688	13.72586	-0.98	0.328
LEHS	6.2716	13.73576	0.46	0.648
LCRD	.7354201	13.08318	0.06	0.955
LTOA	-7.611924	2.111651	-3.60	0.000
LEV	1.848679	6.522694	0.28	0.777

*R-square=0.1230, Adjusted R-square=0.0958, F-statistics=4.51, Prob (F-stat) =0.0003*

*Source: Data Analysis (2021)*

Table 4.1 revealed that when the diversity of the firms is not considered, LWMC and LTOA exert a negative effect on returns on equity of firms in the oil and gas and manufacturing sector in Nigeria for the years covered by this study to the tune of -13.4688 for LWMC and -7.611924 for LTOA. However, while the negative effect was significant for total asset with the probability value of  $0.000 < 0.05$ , the negative effect of LWMC was not significant with the probability of  $0.328 > 0.05$ . Also, it was revealed that LCDC, LEHS, LCRD and LEV exact a positive effect on return on equity to the tune of 31.23088 for community development cost, 6.2716 for LEHS, 0.7354201 for LCRD and 1.848679 for LEV. However, the positive effect was only significant for LCDC with the probability value of  $0.008 < 0.05$  as against the insignificant positive effect of LEHS, LCRD and LEV given to be  $0.648 > 0.05$ ,  $0.955 > 0.05$  and  $0.777 > 0.05$  respectively. The adjusted R-square of 0.1230 revealed that about 12% of the systematic variation in return on equity can be explained by all the predictor variables while the remaining 88% could be accounted for by other variables not covered by this study. The F-statistics of 4.51 along the probability value of 0.0003 revealed that the model is fit.

**Table 4.2: Fixed Effects Estimates (Cross-sectional and Period specific)**

Cross-sectional specific effect	Time-specific effect
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Variables	Coefficients	Prob	Variables	Coefficients	Prob
C	31.60013	0.907	C	-228.6159	0.035
LCDC	17.673	0.207	LCDC	28.4608	0.015
LWMC	-3.099521	0.814	LWMC	-15.22852	0.274
LEHS	2.217124	0.875	LEHS	12.56053	0.392
LCRD	-9.874859	0.477	LCRD	-0.9139441	0.947
LTOA	-7.634616	0.001	LTOA	-8.48712	0.009
LEV	-4.332077	0.491	LEV	7.422509	0.282
Effects			Effects		
PRESCO	-1.948328	0.893	2001	-8.730935	0.666
GUINNESS	22.60415	0.148	2002	1.759281	0.931
PZ	7.087497	0.666	2003	-6.669424	0.743
MAY & BAKER	-8.697036	0.609	2004	17.03252	0.422
II PLC	59.9703	0.011	2005	23.56675	0.272
FORTE	40.26483	0.106	2006	18.55506	0.389
OANDO	-21.14828	0.401	2007	11.70989	0.594
CONOIL	7.337958	0.772	2008	12.08419	0.586
TOTAL	37.46357	0.146	2009	20.10379	0.373
			2010	19.62407	0.391
			2011	32.3507	0.158
			2012	55.20545	0.018
			2013	9.586558	0.680
			2014	13.44235	0.569
			2015	12.70713	0.598
			2016	-6.820449	0.775
			2017	1.346562	0.954
			2018	-23.39869	0.323
			2019	-6.34412	0.790

Adjusted R-square= 0.3678	Adjusted R-square= 0.3298
F-statistics=5.85	F-statistics=2.19
Prob(F-stat)=0.0000	Prob(F-stat)=0.0000

*Source: Author’s Compilation (2021)*

Table 4.2 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, LWMC, LCRD, LTOA and LEV have a negative effect on return on equity of the sampled firms in the oil and gas and manufacturing sector in Nigeria. However, the negative effect was insignificant for LWMC, LCRD and LEV to the tune of -3.099521( $p=0.814 > 0.05$ ) for LWMC, -9.874616( $P=0.477 > 0.05$ ) for LCRD and -4.332077( $p=0.491 > 0.05$ ) for LEV as against the negative significant of LTOA with the coefficient and probability values of -7.634616 and 0.001 respectively. Also, LCDC and LEHS were found to have positive but insignificant effect on return on equity to the tune of 17.673 ( $p=0.207 > 0.05$ ) and 2.217124 ( $p=0.875 > 0.05$ ) respectively. The adjusted R-square of 0.3678 revealed that about 37% of the systematic variation in return on equity can be explained by all the predictor variables while the remaining 63% could be accounted for by other variables not covered by this study. The F-statistics of 5.85 along the probability value of 0.000 revealed that the model is fit.

Concerning the result of the time-specific estimation, table 4.2 showed that when the time covered by this study are put into consideration, LCDC, LEHS and LEV have a positive effect on return on equity of the sampled firms in the oil and gas and manufacturing sector in Nigeria. However, the positive effect was significant for LCDC to the tune of 28.4608 ( $p=0.015 < 0.05$ ) as against the positive insignificant effect of LEHS and LEV with the coefficient and probability values of 12.56053( $p=0.392 > 0.05$ ) for LEHS and 7.422509 ( $P=0.282 > 0.05$ ) for LEV. In the same vein, LWMC and LCRD exert a negative insignificant effect on return on equity of sampled firms in Nigeria with to the tune of -15.22852( $p=0.274 > 0.05$ ) and -0.9139441( $0.947 > 0.05$ ) respectively. Also, LTOA was found to have a negative but significant effect on return on equity to the tune of -7.422509( $0.009 < 0.05$ ). The adjusted R-square of 0.3298 revealed that about 33% of the systematic variation in return on equity can be jointly explained by all the explanatory variables while the remaining 67% could be accounted for by other variables not covered by this study. The F-statistics of 2.19 along the probability value of 0.000 revealed that the model is 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 -1.948328 for PRESCO, 22.60415 for GUINNESS, 7.087497 for PZ, -8.697036 for MAY and BAKER, 59.9703 for II Plc, 40.26483 for FORTE, -21.14828 for OANDO, 7.337958 for CONOIL and 37.46357 for TOTAL. Also, deviation from the intercept term of the reference period stood at -8.730935, 1.759281, -6.669424, 17.03252, 23.56675, 18.55506, 11.70989, 12.08419, 20.10379, 19.62407, 32.3507, 55.20545, 9.586558, 13.44235, 12.70713, -6.820449, 1.346562, -23.39869 and -6.34412 for 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018 and 2019 respectively.

**Table 4.3: Random Effect Estimation Result**

Variables	Coefficient	Std Error	T-Test	Probability
C	110.211	203.3221	3.54	0.008
LCDC	1.39333	6.17175	1.62	0.104
LWMC	-6.179383	1.85991	2.95	0.005
LEHS	3.774604	13.38912	0.36	0.721
LCRD	-5.919883	2.91176	2.46	0.042
LTOA	-7.566477	2.20786	-3.43	0.001
LEV	3.408078	6.185457	-0.55	0.582

$R\text{-square}=0.4595$ ,  $Wald\ Chi=19.59$ ,  $Prob (F\text{-stat}) =0.0007$

**Source: Data Analysis (2021)**

Table 4.3 showed that when heterogeneity effect across firms and over time is incorporated into the model via the error term, LWMC, LCRD and LTOA exerted a negative effect on return on equity across the sampled firms in Nigeria. The negative effect was significant to the tune of -6.179383 ( $p=0.005 > 0.05$ ) for LWMC and -5.919883 ( $P=0.042 > 0.05$ ) for LCRD and -7.566477 ( $p=0.001 < 0.05$ ) for LTOA. Also, LCDC, LEHS and LEV were found to have a positive but insignificant effect on return on equity to the tune of 21.39333( $p=0.104 < 0.05$ ), 4.774604( $p=0.721 < 0.05$ ) and 3.408078( $p=0.582 < 0.05$ ) respectively. The adjusted R-square of 0.4595 revealed that about 46% of the systematic variation in return on equity can be jointly explained by all the explanatory variables while the remaining 54% could be accounted for by other variables not covered by this study. The Wald Chi of 19.59 along the probability value of 0.0037 revealed that the model is fit.

**Table 4.4: Restricted F Test of Heterogeneity (Cross-Sectional and Time Specific)**

	F-statistics	Probability
Cross-sectional	6.04	0.000
Time-specific	1.40	0.1331

**Source: Data Analysis (2021)**

F-statistics reported in table 22 stood at 6.04 and 1.40 with probability values of 0.000 and 0.1331 for cross-sectional and period-specific effects respectively. This showed that there is enough evidence to accept the null hypothesis that all differential intercept corresponding to each cross-sectional specific firm are equal to zero, but otherwise for the period-specific intercepts. This implies that there is a significant cross-sectional heterogeneity effect amidst the sampled oil and gas, and manufacturing firms.

**Table 4.5: Hausman Test for third Model**

	Chi-square stat	Probability
Difference in coefficient not systematic	1.87	0.9309

*Source: Data Analysis (2021)*

Table 4.5 reported Chi-square statistic of 1.87 and a probability value of 0.9309. 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 4.22. The results revealed that LWMC, LCRD and LTOA exerted a negative effect on return on equity across the sampled firms in Nigeria. However, the negative effect was significant for LTOA to the tune of -7.566477 ( $p=0.001 < 0.05$ ) as against the negative insignificant effect of LWMC and LCRD with the coefficient and probability values of -3.179383 ( $p=0.805 > 0.05$ ) for LWMC and -5.919883 ( $P=0.647 > 0.05$ ) for LCRD. Also, LCDC, LEHS and LEV were found to have a positive but insignificant effect on return on equity to the tune of 21.39333 ( $p=0.104 < 0.05$ ), 4.774604 ( $p=0.721 < 0.05$ ) and 3.408078 ( $p=0.582 < 0.05$ ) respectively.

**Table 4.6: Pearson Test of Cross-sectional Dependence**

Hull Hypothesis	Chi-square stat	Probability
No cross-sectional dependence	0.401	0.6518

*Source: Data Analysis (2021)*

Table 4.6 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 4.7: Modified Wald Test for Groupwise Heteroskedasticity**

Hull Hypothesis	Chi-square stat	Probability
Static panel homoscedasticity	0.3186	0.6442

*Source: Data Analysis (2021)*

Table 4.7 revealed that there is no enough evidence to reject that assumption 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 4.8: Wooldridge Test of Panel Autocorrelation**

Hull Hypothesis	Chi-square stat	Probability
No AR(1)panel autocorrelation	0.682	0.3036

*Source: Data Analysis (2021)*

Table 4.8 revealed that there is no enough evidence to reject that 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.

### 5.0 Discussion of Findings

For the third objectives, effect of environmental costs (community development cost, waste management cost, expenses for employee health and safety and cost for research and development) on return on equity, the Chi-square stat and probability values of Hausman test were 1.19 and 0.9774 respectively. The result revealed that there is no enough evidence to reject the null hypothesis that differences in coefficients of fixed effect estimation and random effect estimation is not significant. Hence, the difference in the coefficient is not systematic.

The results revealed that waste management cost and cost of research and development exerted a negative and significant effect on return on equity across the sampled firms in Nigeria with the coefficient and probability values of -6.179383 ( $p=0.005 > 0.05$ ) and -5.919883 ( $P=0.042 > 0.05$ ) respectively. This is contrary to the expected relationship and it indicates that with a 1% increase in waste management cost and cost of research and development, return on equity will decrease by 3.2% and 5.9% respectively. This finding confirmed the tenets of political economy theory on the ground that the full disclosure of the environmental cost of firms will positively influence the overall performance level and vice versa. Full disclosure of environmental cost increases public trust and confidence, which might, in turn, improve the overall performance of the organization. The implication of this discovery is that environmental cost in terms of waste management cost and cost of research and development can significantly engender decrease in return on assets of the sampled firms. This discovery was not in agreement with the findings of Makori and Jagongo (2013), Agbiogwu, Ihendinhu and Okafor (2016), that performance of firms could be stirred up by environmental cost. However, the discovery made in this study was in tandem with the findings of Adediran and Alade (2013) and Muhammad, Wasif, Shabbir and Ume (2018) that environmental cost has a negative significant effect on firms' performance.

Also, community development cost and expenses on employee safety and health were found to have a positive but insignificant effect on return on equity to the tune of 1.39333( $p=0.104 <$

0.05) and 3.774604( $p=0.721 < 0.05$ ) respectively across the sampled firms. The positive sign is a confirmation of the a-priori expectation and it connotes that with a 1% increase in community development cost and expenses on employee safety and health, return on equity stands the chance of increasing by 1.4% and 3.8% respectively. The positive effect underscores that the association of an organization to the needs of the society tends to command more customers and thereafter, improves the overall performance level. This discovery agreed with the beliefs of the stakeholder's theory, that it is when the organization see customers and the community where it operates as indispensable parts of the organization's growth, the stated objective might be easily achieved. The insignificant positive effect might be caused by the unpatriotic acts of people saddled with the responsibility to productively utilize environmental funds for the propagation of the company interest and the interest of the stakeholders as expected. This finding was in tandem with the findings of Asquo (2012), Okoye and Ezejiofor (2013) and Ijeoma (2015) that environmental cost accounting positively influenced the level of profitability.

## 6.0 Conclusion and Recommendations

The study concluded that firms' performance in terms of return on equity might be altered in either a good or negative way, by community development cost, waste management cost, expenses for employee health and safety and cost for research and development. Therefore, the study recommended that the positive effect of environmental cost on the performance of firms in terms of return on equity could be made significant if firms can come up with a well-articulated environmental costing system capable to guarantee a conflict-free corporate atmosphere for improved performance. There is a need for accurate pricing and allocation; distinguishing between environmental and other costs will lead to more exact cost allocation and, as a result, will aid in the development of sustainability indicators.

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