

## Assessment of the Relationship between Environmental Cost and Profitability among Selected Extractive Firm Listed on the Nigeria Exchange Group

Abiola, Idowu\*<sup>1</sup>, Agboola Olugbengba , O.\*<sup>2</sup>

\*<sup>1,2</sup> Department of Management and Accounting

Faculty of Management Sciences,

Ladoke Akintola University of Technology, Ogbomosho, Oyo State, Nigeria

\* *E-mail of Correspondence Author:* [fodio123@gmail.com](mailto:fodio123@gmail.com)

### Abstract

Balancing the mix between environmental conservation and profit maximization has left many extractive firms causing serious damage to the ecosystem. As a result, this study examined the relationship between environmental costs and the profitability of Nigerian extractive firms. The audited financial reports of eighteen (18) extractive firms listed on the Nigerian Exchange Group (NGX) were used to obtain secondary data. Time series data for eleven (11) years spanning 2010–2020 were extracted and the data were analyzed using Pearson's pairwise correlation matrix. Results showed that there is a positive and significant relationship between ROCE and ERC ( $p = 0.001$ ) and SC ( $p = 0.001$ ). EPS has a positive and significant relationship with R&DC ( $p = 0.001$ ), while Tobin's Q has a positive and significant relationship with BAC ( $p = 0.001$ ), SC ( $p = 0.001$ ), and ERC ( $p = 0.001$ ). The study concluded that environmental cost variables such as administrative costs, business area costs, and environmental remediation significantly influence the profitability of the extractive industry in Nigeria. It is therefore recommended that management of firms within the extractive industry channel efforts towards engaging in adequate environmental spending as a way of increasing stakeholders' trust. This will in turn lead to greater profitability.

**Keywords:** *Environmental Cost; Profitability; Extractive Firm; Nigeria Exchange Group*

### Introduction

Management of the environment has taken a strategic position among business organisations in recent years as companies strive to survive in a highly regulated and competitive market while improving on their investment into environmental conservation and yet remaining profit oriented. The investment, cost or expenses in monetary value allocated for the prevention, reduction or avoidance of environmental impact, removal of such impact and restoration following the occurrence of a disaster is referred to as environmental cost (United Nations Conference on Trade and Development, 2002).

Environmental cost is described by Al-Mawali (2021); Onyekachi, Ihendinihu, and Azubike (2020); and Mieseigha and Ihenyen (2014) as the impact incurred by society, an organization, or an individual resulting from activities that affect the quality of the environment. They are the costs, direct or indirect, tangible or intangible, with short- or long-term financial impacts on an enterprise. These include the cost of handling, treatment, and disposal of waste and emissions as well as remediation and compensation costs, such as equipment depreciation, operational materials, water, and energy, internal personnel, external services, fees, taxes, and

permits, fines, and insurance (Shehu, 2018). It is also thought to include the cost of adhering to environmental laws and regulations. Additionally, Adagye and Abubakar (2018) stated that, based on what is known about environmental degradation, environmental cost comprises the amount spent on prevention of environmental degradation as well as the amount spent restoring the environment to its original state before damage, or a combination of both. Navarro & Vincenzo (2019); Nwaiwu & Oluka (2018) posited that environmental costs include clean-up costs, recycling materials costs, closure costs, capital expenditures, and development expenditures. These expenses are incurred in the prevention, reduction, or repair of environmental damage and the conservation of natural resources. They further held that environmental losses are costs that bring no benefits to the business, which include fines, penalties, compensation, and disposal losses relating to assets that have to be scrapped or abandoned due to their harmfulness to the environment.

Environmental problems are considered to be related to business production activities by the United Nations Conference on Trade and Development (2002), Oraka & Egbunike (2016), and Hasan & Hakan (2012) because of their negative effect on the natural environment, which leads to damages not only to the environment but also to human society. Firms portend a lot of danger to the environment because of profit maximization, unlimited stakeholder needs, advancement in technology, and continued exploration of natural resources in the course of their business operations. Hence, applying business management to environmental costs so as to enhance a firm's long-term financial performance and develop a pathway that can both improve profitability and environmental performance is key among developing nations, to which Nigeria belongs. The extent to which this can be achieved in Nigerian extractive firms is a gap in this study.

The extractive firms in Nigeria are one sector of the economy that has seen a lot of public outcry over environmental issues. However, going by the fact that lots of the country's accrued revenue comes from the sector; there have not been many efforts to ameliorate the situation. The extractive industry is made up of firms that are involved in the extraction of raw materials from the earth to be used by consumers. The industry consists of any operations that remove metals, minerals, and aggregates from the earth; this includes oil and gas extraction, mining, dredging, and quarrying. Perdeli, Smith, Duzgun, and Waclawski (2021) saw the extractive industry as having unacceptable environmental impacts and that, by definition, this industry uses energy and disturbs the land in order to extract the resource being developed. Sustainable development of an extracted resource is a paradoxical concept. They further held that there appears to be an inherent, economically based conflict between the extraction of virgin materials and the reduction in the amount of use, reuse, or recycling of these same materials. Indeed, reduction, reuse, and recycling can be viewed as competitors to the extractive industry.

Globally, the extractive industry is known for having a significant financial, socio-cultural, and environmental impact on the population (Frunza, 2010). The United Nations Conference on Trade and Development (2012) defines the extractive industry as a process that involves different activities that lead to the extraction of raw materials from the earth (such as oil,

metals, minerals, and aggregates), processing, and utilization by consumers. Nwaiwu & Oluka (2018) opined that Nigeria, being a developing nation, has massive degradation and destruction of environmental systems and natural resources, which continually threaten sustainable development. The current global corporate examination of the movement towards environmental protection makes it necessary for Nigerian companies to join the cause. However, should these companies in such a challenging business environment continue to invest in environmental conservation when there might not be a favourable economic return? It is key to consider if environmental accounting practices generate benefits to sustain the business entity. That is to say, whether investing in environmental conservation improves profitability, which Jensen (2002) considers the core objective of every firm? The extent to which environmental costs affect the profitability of a selected Nigerian extractive firm calls for empirical investigation, which is the aim of this present study.

### **Research Hypotheses**

Ho<sup>1</sup>: Environmental cost does not have significant relationship with return on capital employed in the extractive firm of Nigeria

Ho<sup>2</sup>: Environmental cost does not have significant relationship with earning per share of extractive firm in Nigeria

### **Literature Review**

As evident from prior studies, based on relevant theories of environmental accounting, there has been mixed results on the relationship between environmental cost and profitability. Researchers such as Boaventura, Silva & Bandeira-De-Mello (2012), adduced of a positive relationship between environmental cost and profitability. They upheld that, firms engaged in environmental initiatives will incur lower explicit costs arising from their environmental responsibility as against those companies that are environmentally irresponsible (Vincent, 2012; Idowu & Agboola, 2021). The implication of which is the existence of a good relationship with the relevant stakeholders' which is critical to the survival of the company; owing to the positive signal such involvement will send to the external stakeholders', which will in turn yield positive returns to the reporting company in the long-run (Durnev, Li, & Magnan, 2015).

On the contrary, Boaventura, Silva and Bandeira-De-Mello (2012) further held of a negatively inclined school of thought where a negative relationship tends to occur when business organisations get involved in environmental issues. This is due to the belief that few economic benefits arise from environmentally responsible behaviour with many costs associated with it; thus, resulting in a decline in the profitability of the company. The status of the relationship between environmental cost and profitability is of interest, particularly to business managers in order to justify their involvement or non-involvement in environmental initiatives given its voluntary nature. As asserted by Arowoshegbe and Emmanuel (2011), that the direction and existence of a relationship are important to corporate managers because the reporting of certain environmentally responsible actions tend to correlate with the

financial performance of firms negatively. In which case, managers may be advised to take caution; if otherwise, then Management might be encouraged to pursue such activities.

Environmental cost consists of environmental measures and environmental losses. They include clean-up cost, cost of recycling materials or conserving energy, closure cost, capital expenditure and development expenditure. These costs are incurred in preventing, reducing or repairing damage to the environment and conserving resources. However, environmental losses are costs, which bring no benefits to the business. Example of these includes fines, penalties, and compensation and disposal losses relating to assets which have to be scrapped because they impact negatively on the environment. It is the investment and expenses related to the prevention, reduction and avoidance of environmental impact, removal of such impact, restoration following the occurrence of disaster and other activities measured in monetary value.

### **Theoretical perspective**

The construct of this study was based on stakeholder theory, which is based on the view that business organizations should focus on profit maximization. Freeman propounded the stakeholder theory, which held that organizations will respond to the demands of the stakeholder groups that control the resources required for their operations and will tend to ignore the concerns of the groups without power (Belal & Owen 2007). Deegan (2002), among others, discussed the importance of applying well-known and proven conceptual pillars for the purpose of understanding, explaining, and predicting the process of gathering social and environmental information by firms, such as the stakeholder theory. The theory argues that a firm should create value for all stakeholders, not just the shareholders. The basic proposition of the "stakeholders' 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 further asserts that managers must satisfy a variety of constituents ranging from employees, customers, suppliers, the host community, etc. who can influence the firm's outcomes. According to this view, it is not sufficient for managers to focus exclusively on the needs of stakeholders or the owners of the business. This implies that it can be beneficial for the firm to engage in certain environmental activities that non-financial stakeholders perceive as important, because without this, these groups might withdraw their support from the business. They held the persuasive view that attending to the management system according to the interests of stakeholders is crucial for an organization's sustainability.

Thus, if the stakeholder has a strong influence on the environmental impacts caused by the organization, then the organization will invest more in environmental conservation. Stakeholder theory recognizes the complex and flexible relationships between organizations and stakeholders, including accountability and environmental management practices (Idowu & Agboola, 2021). They further opined that when the internal accounting system in a firm affects the interests of external stakeholders, for example by ignoring the environmental impacts of the firm's operations, they pay attention to improving and even changing its internal operations.

Stakeholder theory can be adopted to promote environmental management accounting practices. Environmental management accounting practices appear to manage environmental conservation in order to respond to the pressure of stakeholders with strong influence. Therefore, stakeholder theory is an important theory used by environmental accounting researchers to explain the relationship between an organization and its environment.

### **Empirical Review**

Several studies on the relationship between environmental cost and profitability from both local and international authors were reviewed. Oluwafemi *et al* (2018) in their study titled the nexus between environmental cost and financial performance: a trend analysis approach sampled 14 manufacturing firms in the period from 2008 to 2016. Findings eliminated the bias that investment in environmental cost is detrimental to the performance of companies in Nigeria. Additionally, Kihamba (2017) in his thesis titled the relationship between environmental accounting and reporting practices and profitability of manufacturing firms listed on the Nairobi securities exchange established that there exist a positive relationship between profitability measured by return on asset and environmental accounting. Also, Nkwoji (2021) investigated the relationship between environmental accounting and profitability of selected quoted oil and gas companies in Nigeria in years 2012-2017. The result of the study shows that there is no significant relationship between environmental expenditure and net profit of the oil and gas companies in Nigeria. Ojiakor *et al* (2018), in their study on the topic of environmental cost disclosure in the financial statements of motor vehicle manufacturing firms in south-east Nigeria, held that the degree of environmental cost disclosure in the financial statements of these companies is dependent on the profitability of the firm. Furthermore, Ngozi and Ike (2019) examined the effect of environmental and social costs on the performance of manufacturing companies in Nigeria. Data were analyzed using multiple regression models, and the findings of the study showed that there is a significant negative relationship between environmental and social costs and return on capital employed (ROCE) and earnings per share (EPS) and a significant positive relationship between environmental and social costs and net profit margin (NPM) and dividend per share (DPS).

### **Methodology**

This study adopted the causal comparative research design because it reveals a cause/effect of relationship between variables and at the same time it determines the nature of the relationship between the antecedent (independent) variable and the consequent (dependent) variable; thereby taking care of both variables (Creswell & Clerk 2007). 18 quoted extractive companies were samples and secondary data sourced from annual financial report from 2010-2020 was collected and analysed using Pearson's Pairwise Correlation Matrix. Profitability is the dependent variable and measured based on Return on Capital Employed/ Earnings per Share of the selected firm. The independent variable were measured based on environmental cost variables such as environmental cost variables such as business area costs (BAC), administrative costs (AC), social costs (SC), research and development costs (RDC), environmental remediation costs (ERC). The model adduced is based on the ideal that

environmental costs correlate with profitability of corporate organisation as observed in the study of Karambu and Joseph (2016).

**Model 1:**

$$ROCE (Y) = \beta_0 + \beta_1 BAC + \beta_2 SC + \beta_3 ERC + \beta_4 AC + \beta_5 R\&DC + \varepsilon \dots (3.1)$$

Where;

ROCE = Return on Capital Employed

$\beta_0$  = Intercept

$\beta_{1-5}$  = Coefficient of independent variables

BAC = Business Area Cost

AC = Administrative Cost

SC = Social Cost

ERC = Environmental Remediation Cost

R&DC = Research and Development Cost

$\varepsilon$  = Error term (Assumed to be purely random)

The 'a priori' expectations are:

$\beta_1 > 0$ ; implying that the higher the BAC, the higher the Y.

$\beta_2 > 0$ ; implying that the higher the AC, the higher the Y.

$\beta_3 > 0$ ; implying that the higher the SC, the higher the Y.

$\beta_4 > 0$ ; implying that the higher the R&DC, the higher the Y.

$\beta_5 > 0$ ; implying that the higher the ERC, the higher the Y.

**Model 2:**

$$EPS (Y) = \beta_0 + \beta_1 BAC + \beta_2 SC + \beta_3 ERC + \beta_4 AC + \beta_5 R\&DC + \varepsilon \dots (3.1)$$

Where;

EPS = Earnings Per Share

$\beta_0$  = Intercept

$\beta_{1-5}$  = Coefficient of independent variables

BAC = Business Area Cost

AC = Administrative Cost

SC = Social Cost

ERC = Environmental Remediation Cost

R&DC = Research and Development Cost

$\varepsilon$  = Error term (Assumed to be purely random)

The 'a priori' expectations are:

$\beta_1 > 0$ ; implying that the higher the BAC, the higher the Y.

$\beta_2 > 0$ ; implying that the higher the AC, the higher the Y.

$\beta_3 > 0$ ; implying that the higher the SC, the higher the Y.

$\beta_4 > 0$ ; implying that the higher the R&DC, the higher the Y.

$\beta_5 > 0$ ; implying that the higher the ERC, the higher the Y.



## Results and Discussion

### Descriptive Statistics of Firm Variables used for the study

A descriptive analysis of this study presents a summary of the characteristics of all the variables used in the study for the dependent and independent variables of interest and shows that the estimates of mean, standard deviations, maximum, minimum, skewness, kurtosis, and Jarque-Bera statistics of the study variables adopted are in line with existing empirical researchers such as Soewarno and Tjahjadi (2020); Arumona, Lambe and Ogunmakinde (2020). The result as presented in table 1 indicates an observation of 190 with 18 companies for 11 years (2010-2020). It shows that all the variables are skewed to both the right and the left with a greater number being leptokurtic. Return on Capital Employed (ROCE) has a mean value of 22.66495 with a standard deviation of 53.25764 and the maximum and minimum values of 393.6214 and -263.3163 respectively. However, the range between the maximum and minimum is wide, which implies a stable performance as the standard deviation indicated that there is no wide dispersal of the data from the mean value. Furthermore, the mean value for Earning per Share (EPS) is 2.327982 while the standard deviation, maximum and minimum values are 4.296359, 22.83000 and -20.23000 respectively. The result implies that there were fluctuations in the EPS during the study period, as the standard deviation is large compared to the mean, together with the wide range between the minimum and maximum values. The standard deviation value shows the disparity in the dataset. The higher the value of the standard deviation, the wider the deviation of the dataset from its mean value. Equally, in the case of smaller value of the standard deviation compared to its corresponding mean value, the lesser the disparity.

**Table 1: Descriptive Statistics of Study Variables**

	AC	BAC	EPS	ERC	FIRM_SIZ E	ROCE	SC
Mean	7786538.	4628134.	2.327982	540782.4	4.776975	22.66495	8383355.
Median	900220.0	256950.0	0.955000	17397.00	4.592500	17.42025	961.5000
Maximum	2.72E+08	2.17E+08	22.83000	34695999	6.464500	393.6214	3.12E+08
Minimum	0.000000	0.000000	-20.23000	0.000000	2.428200	-263.3163	0.000000
Std. Dev.	24078957	20248515	4.296359	3607427.	0.910882	53.25764	36533754
Skewness	7.797541	7.975705	0.673645	8.438084	0.079669	1.437736	5.643320
Kurtosis	79.63168	75.77214	9.894369	76.28424	2.110709	25.35007	39.22672
Jarque-Bera	48415.34	43939.34	390.6678	44771.80	6.461793	4020.035	11398.13
Probability	0.000000	0.000000	0.000000	0.000000	0.039522	0.000000	0.000000
Sum	1.48E+09	8.79E+08	442.3166	1.03E+08	907.6252	4306.340	1.59E+09
Sum Sq. Dev.	1.10E+17	7.75E+16	3488.694	2.46E+15	156.8144	536075.1	2.52E+17
Observations	190	190	190	190	190	190	190

Source: Researcher's Computation (2022)

**Correlation between Return on Capital Employed (ROCE) and Environmental Cost**

A Pearson's product-moment correlation was run as shown in Table 2 to assess the relationship between Return on Capital Employed (ROCE) and Environmental Cost in 198 observations of 18 companies within the extractive industry between 2010 and 2020. There was a moderate positive correlation between dependent variable and SC and ERC while it has a negative relationship with BAC, AC and R&DC at  $p > 0005$ . Therefore, the null hypothesis which states that environmental cost does not have significant relationship with ROCE of extractive industry in Nigeria is rejected.

**Table 2: Pairwise Correlation Matrix for ROCE and Environmental Cost**

	ROCE	BAC	AC	SC	ERC	R&DC
ROCE	1					
BAC	-0.182	1				
AC	-0.093	0.537	1			
SC	0.023	0.274	0.288	1		
ERC	0.123	0.079	0.108	0.458	1	
R&DC	-0.049	0.455	0.416	0.329	0.249	1

**Source: Researcher’s Computation (2022)**

**Correlation between EPS and Environmental Cost**

A Pearson's product-moment correlation was run as shown in Table 3 to assess the relationship between Earning per Share (EPS) and the variables of Environmental Cost in 198 observations of 18 companies within the extractive industry between 2010 and 2020. There was a moderate positive correlation between dependent variable and R&DC while it has a negative relationship with BAC, AC, ERC and SC at  $p > 0005$ . Therefore, the null hypothesis which states that environmental cost does not have significant relationship with EPS of extractive industry in Nigeria is rejected.



**Table 3: Correlation Matrix for Earning per Share (EPS) and Environmental Cost**

	EPS	BAC	AC	SC	ERC	R&DC
EPS	1					
BAC	-0.041	1				
AC	-0.129	0.537	1			
SC	-0.068	0.274	0.288	1		
ERC	-0.066	0.079	0.108	0.458	1	
RDC	0.056	0.455	0.416	0.329	0.249	1

Source: Researcher's Computation (2022)

### Discussion of Findings

Specifically, the findings of this research revealed that there is a relationship between environmental cost variables such as business area costs (BAC), administrative costs (AC), social costs (SC), research and development costs (RDC), environmental remediation costs (ERC), and firm profitability variables like return on capital employed (ROCE) and earnings per share (EPS). The findings were similar to those of Alam, Muhammad, and Shabir (2019) and Joshua and Chiedu (2019). Further analysis on the relationship between the variables indicates that SC and ERC have a positive and significant relationship with EPS and ROCE, while BAC, SC, RDC, as well as ERC, and possess a positive but non-significant relationship with all the dependent variables. However, a negative, significant relationship exists between BAC and ROCE and ROE, as well as between AC and EPS. This is in agreement with the studies conducted by Mwangi and Oyenje (2013); Alam, Muhammad, and Shabir (2019); and Joshua and Chiedu (2019).

### Conclusion and Recommendation

Based on the findings, the study concluded that environmental cost variables such as administrative costs, business area costs, and environmental remediation significantly influence the profitability of the extractive industry in Nigeria. It is therefore recommended that management of firms within the extractive industry channel efforts towards engaging in adequate environmental spending as a way of increasing stakeholders' trust. This will in turn lead to greater profitability.

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