Effect of Environmental Cost on Performance of Manufacturing Firms in Nigeria

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Abstract
The study examined the effect of environmental cost on the performance of some selected manufacturing firms in Nigeria using return on asset as a proxy for performance. Environmental training cost, donations and charitable cost, waste management cost and corporate social responsibility cost were used as proxy for environmental cost. Data were collected from the annual financial statement of the selected firms and the ex-post facto research design was adopted. The dependent and independent variables were observed over the period, 2011 to 2020. Stationarity of the data were tested using the Augmented Dickey-Fuller unit root test statistic and the data were analyzed using the Panel Least Square. The signs and significance of the regression coefficients were relied upon in explaining the nature and influence of the independent variable on the dependent variable as to determine both magnitude and direction of impact. Findings from the study showed that, environmental training cost, donations and charitable cost, waste management cost and corporate social responsibility cost had positive and significant impact on return on asset of manufacturing firms in Nigeria. The study therefore, concluded that environmental cost had positive and significant effect on the performance of manufacturing firms in Nigeria. The study therefore recommended that manufacturing firms should invest in environmental training, donations and charity, waste management and remain socially responsible to the host communities to ensure smooth and uninterrupted operations.

Keywords: *Environmental Cost, Performance, Manufacturing Firms, Nigeria*

1.0 INTRODUCTION

Businesses around the world are realizing that environmental cost needs to be accommodated in their business models. Quinn & Dalton (2009) have argued that business practices are destroying life on earth and there is no polite way to say that business is destroying the world. Businesses as part of modern society and part of the problem must also be part of the solution (Dunphy, Benveniste, Griffiths & Sutton, 2000). The organizations role as the solution provider is important because organizations are the primary players in economic development and have the financial backing, technological know-how, and the institutional capacity to implement sustainable solutions. If they do not proactively incorporate environmental aspects into their business models, they are bound to experience a negative reaction through the media, public perception, brand reputation, government regulation, customer satisfaction, employees, shareholders revolts, communities or organization trying to protect the environment. Today's, unfavourable environmental effect on economic development has become worrisome. The collective ecological footprint of the planets population is unsustainable and the current trends of growth and environmental degradation suggest we are going to encounter more problems in the future.

Measuring environmental performance and setting targets is a critical component for organizations to become more productive, more profitable, and more sustainable. The disclosure requirements of environmental cost information in corporate annual reports and their determinants have attracted considerable research attention in developed countries rather than developing ones (Akhtaruddin, 2005; Barako, 2007). Also, the limited awareness of environmental costing principles and methodology has become an important issue to be addressed. If environmental issues and activities that are vital are not disclosed, financial statement cannot be said to present a true and fair view of affairs.

According to Bassey, Effiok & Okon (2013), environmental cost accounting helps the firm to record all environmental costs incurred by the business thereby finding a way of reducing the cost (environmental expenses) so that the business can increase profit. Also environmental cost accounting helps to disclose to the outside world the ability of the organization to be environmental friendly.

Ugochukwu & Ertel (2012) posited that environmental pollution arising from oil prospecting and exploration in the Niger Delta area of Nigeria has impacted negatively on the biodiversity of the affected areas. The main stresses arise from leakages of crude oil, gas flaring and the escape of other chemicals used in production processes. Effects on the flora and fauna of freshwater ecosystems in this part of Nigeria have been noticed. This is not far from the havoc air pollution from other manufacturing companies are causing at their various locations. In some occasions, the host communities have protested both peacefully and violently leading to loss of revenue.

Consequently, various studies have been undertaken on environmental cost accounting and how it affects organizational performance. Agbo, Ohaegbu & Akubuilo (2017) examined the effect of environmental cost on financial performance of Nigerian Brewery from 2011-2015. This study is an expansion on the scope of the work of Agbo, Ohaegbu & Akubuilo (2017) to include five different firms in manufacturing sectors of the Nigerian economy from 2011 to 2020 in a panel data analysis.

Objective of the study

The broad objective of this study is to determine the effect of environmental cost on financial performance of manufacturing from 2011 to 2020. The specific objectives were

- **i.** To determine effect of environmental training on return on asset of manufacturing firms in Nigeria.
- **ii.** To ascertain the effect of donations and charitable cost on return on asset of manufacturing firms in Nigeria.
- **iii.** To determine effect of waste management cost contribution on return on asset of manufacturing firms in Nigeria.
- **iv.** To ascertain effect of corporate social responsibility on return on asset of manufacturing firms in Nigeria.

Research Hypotheses

In line with the objectives of the study, the following hypotheses were stated:

- **i.** Environmental training has no positive and significant effect on return on asset of manufacturing firm in Nigeria.
- **ii.** Donations and Charitable cost has no positive and significant influence on return on asset of manufacturing firms in Nigeria.
- **iii.** Waste management cost has no positive and significant effect on return on asset of manufacturing firms in Nigeria.
- **iv.** Corporate Social Responsibility has no effect on return on asset of manufacturing firms in Nigeria.

Scope of the Study

The study focused on the effect of environmental cost on performance of manufacturing firms in Nigeria. The independent variables used for this study are: Environmental training, Donation/charitable cost, Waste management cost and corporate social responsibility. The dependent variable used for the study is return on asset. The study is an expansion on the scope of the work of Agbo, Ohaegbu & Akubuilo (2017) to include five different firms in manufacturing sectors of the Nigerian economy from 2011 to 2020 in a panel data analysis. The work of Agbo, Ohaegbu & Akubuilo (2017) examined the effect of environmental cost on financial performance of Nigerian Brewery Plc from 2011 to 2015 using Ordinary Least Square Method. However, this work looked at the effect of environmental cost on performance of manufacturing firms. It employed the Panel Least Square on the data of five different manufacturing firms in Nigeria, namely: Shell Petroleum Development Company of Nigeria (SPDC), Presco Plc, FTN Cocoa Processors Plc, UAC of Nigeria Plc and Livestock Feeds Plc.

2.0 REVIEW OF RELATED LITERATURE

2.1 Conceptual framework

Environmental costs

Environmental costs consist of environmental measures and environmental losses. They include cleanup costs, costs of recycling materials or conserving energy, closure costs, 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. Such as, fines, penalties, compensation, and disposal losses relating to assets which have to be scrapped or abandoned because they damage the environment (Noe, Hollenbeck, Gerhart & Wright, 2006). Environmental costs are the environmental damage, an entity costs to the environment and its users as a result of its operations. There is also the general concern that environmental cost reduces operating flexibility, slow productivity of companies.

Hansen and Mowen (2000) defined environmental costs as costs associated with the creation, detection, remediation and prevention of environmental degradation. According to the US Environmental Protection Agency - EPA (1995), Green Accounting or Environmental Accounting is defined as identifying and measuring the costs of environmental materials and activities and using this information for environmental management decisions. The purpose is to recognize and seek to mitigate the negative environmental effects of activities and system. Howes (2002) defines Environmental Accounting as: The generation, analysis and use of miniaturized environmentally related information in order to improve corporate Environmental and economic performance. In the opinion of the author, Environmental Accounting does not only focus on internal and external environmental accounting but links environmental and financial performance more visibly. Environmental accounting assists in getting environmental sustainability embedded within an organization's culture and operations. The aim is to provide decision makers with the information that enable the organization to reduce costs and business risks and to add value (Ibemgbor, 2011).

Environmental costs form a part of waste. Waste is anything that cannot be turned into a marketable product and is therefore indicative of production inefficiency (United Nations Division for Sustainable Development - UNDFSD, 2001). Put another way, what has not left the organisation as a product is a sign of inefficient production and is therefore waste (Jasch, 2006). Knowing the cost of wastage due to environmental costs can help management make more relevant decisions so as to reduce such inefficiencies. Environmental costs are defined

by the UNDFSD as 'the internal and external costs incurred in relation to environmental damage and protection (UNDFSD, 2001).

Environmental protection costs include costs for prevention, disposal, shifting actions, planning, control, and damage repair. Environmental damage costs are the costs of waste and emissions. Waste is a material that has been purchased but that has not been utilized in a product. In this context waste indicates production inefficiency. In addition to the costs of wasted materials, all other costs related to their processing are included in environmental damage costs - the costs of energy, transportation, labor, investment, etc. (Jasch, 2003)

Environmental cost accounting as a prevalent subject in the international community is not yet a priority in Nigeria. Field and Field (2002), explain pertinent aspect of environmental degradation and costs as those including emissions into the air, water and land. Also, aspects of untreated domestic waste outflows into rivers and coastal oceans, quantities of solid waste that must then be disposed of, perhaps through land spreading or incineration. Pollution include Airborne sulfur dioxide (SO2) emissions from power plants by stack-gas scrubbing which leaves a highly concentrated sludge and degradation. This incorporates illegal midnight dumping along the sides of roads or in remote areas (Ibemgbor, 2011). In Nigeria, some of the sampled companies were seen to seriously pollute the environment in their production process. It was observed that some firms discharge waste into public highways, streams and rivers. Some oil companies and chemical companies in Lagos and Port Harcourt still flare gas into the air. It was also discovered that some of the streams were already contaminated in those areas (Ibemgbor, 2011).

Categories of Environmental Costs

Environmental costs can be categorized into costs that directly impact on a company's bottom-line, which are referred to as private costs and costs to individuals, society, and the environment for which a company is not accountable, which are called societal cost. Private costs can further be classified into; conventional costs, potentially hidden costs, contingent costs and image and relationship costs. This classification creates both a decision-oriented information base for the environmental management system and for the planning, control and supervision of material and energy flows (Lethmate and Doost, 2000).

- **Conventional Costs:** The costs of using raw materials, utilities, capital goods, and supplies are usually addressed in cost accounting and capital budgeting. However, the environmental portion of these costs is not usually considered as environmental costs. It is important to factor these costs into business decisions, whether or not they are seen as environmental costs.
- **Potentially Hidden Costs:** These are environmental costs that may be potentially hidden from managers because of their infrequent nature and/or because of their collection in company overhead accounts (EPA 742-R-95-003, 1995). Different types of environmental costs that may be potentially hidden from managers are; upfront environmental costs, regulatory and voluntary environmental costs and back-end environmental costs.
- **Contingent Costs:** These are costs that may or may not be incurred at some point in the future. Examples include the costs of remedying and compensating for future accidental releases of contaminant into the environment (example, oil spills), fines and penalties for future regulatory infractions. Because these costs may not currently need to be recognized for other purposes, they may not receive adequate attention in internal management accounting systems and forward-looking decisions.

- **Image and Relationship Costs:** These costs are incurred to affect subjective (though measurable) perceptions of management, customers, employees, communities and regulators. These costs have also been termed "corporate image" and "relationship" costs. This category can include the costs of annual environmental reports and community relations activities, costs incurred voluntarily for environmental activities (example, tree planting), and costs incurred for recognition programs. These costs themselves are not intangible, but the direct benefits that result from relationship or corporate image expenses that often incurred.
- **Societal Costs or External Costs:** These are the costs a business impacts on the environment and society for which business is not legally accountable. They include environmental degradation and adverse impacts on human beings, their property and their welfare which cannot be compensated through the legal system.

At present, valuing societal costs is both difficult and controversial. Nevertheless, it is essential for any environmentally friendly organization to determine external impacts and to the extent possible, value societal costs in order to integrate them into its planning and decision-making

2.2 Theoretical Review

- **Stakeholder theory:** Stakeholder theory views corporations as part of a social system while focusing on the various stakeholder groups within society (Ratanajongkol, Davey, & Low, 2006). According to Gray, Owen & Adams (1996), stakeholders are identified by companies to ascertain which groups need to be managed in order to further the interest of the corporation. Stakeholder theory suggests that companies will manage these relationships based on different factors such as the nature of the task environment, the salience of stakeholder groups and the values of decision makers who determine the shareholder ranking process (Donaldson & Preston, 1995). This study however anchored the stakeholders theory which states that "those whose relations to the enterprise cannot be completely contracted for, but upon whose cooperation and creativity it depends for its survival and prosperity" (Slinger & Deakin, 1999). Stakeholder theory explains specific corporate actions and activities using a stakeholder-agency approach, and is concerned with how relationships with stakeholders are managed by companies in terms of the acknowledgement of the society where they operates.

- **Legitimacy Theory:** Legitimacy is a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values and definitions (Suchman, 1995). According to Tilling (2004), legitimacy theory offers a powerful mechanism for understanding voluntary social and environmental disclosure made by corporations, and that this understanding would provide a vehicle for engaging in critical public debate. The problem for legitimacy theory in contributing to the understanding of accounting disclosures specifically and as a theory in general is that the term has an occasion been fairly loosely. This is not a problem of the theory itself, and the observation could be equally applied to a range of theories in a range of disciplines.

- **Positive Accounting Theory:** This theory suggests and explains why firms make voluntary social disclosures. Based on the original work of Watts and Zimmerman 1986), the positive accounting theory has directly sought to establish evidence for the political cost hypothesis as an explanation for firms' social disclosures. Along with

numerous others, Gray et al (1996) dismiss the positive accounting arguments on the grounds of the underlying assumptions of the theoretical framework. As they suggest positive theories are not about what (social)reporting should be, but rather about what it is on the face of it, and on the basis for explaining why firms are making social disclosures, positive accounting explanations are less easily dismissed. Casual observations, for example reveals that positives accounting explanation rely on empirical evidence largely identical to that used in support of other explanation (most notably, legitimacy theory) of social disclosure, explanations which, incidentally Gray et al(1996) seem to find more acceptable.

- **The Systems Theory:** The General systems theory or the "General systems research and systems inquiry" as introduced by Ludwig von Bertalanffy in 1968 is an influential theoretical framework. It provides a shared philosophical platform for a dialogue between social and natural sciences. The theory offers a framework for eco-system and eco-social relationship modeling where a large number of variables are involved in solving real life problems that require qualitative common sense reasoning approach for which the mechanistic mathematical-quantitative tactics are not appropriate (Bertalanffy 1969).

- **Luhmann's Theory of Ecological Communication:** The theory of ecological communication developed by Niklas Luhmann, as a societal, communication and evolution conception examines how modern societies can adjust themselves to the exposures of ecological dangers in the light of contemporary modernity and rationality (Luhmann 1989). Grounded in the General systems theory, Lehmann's theory or ecological communication ontologically reasons that a society is defined by its communication, and whatever is not communication is more appropriately viewed as an aspect of its environment than as part of the society self.

2.3 Empirical Review

Agbo, Ohaegbu and Akubuilo (2017) carried out study on the effect of environmental cost on organizational performance of Nigerian brewery Plc. Data used for the study were obtained from the annual report of Nigerian brewery Plc on Donations (DN), Medical Expenses (ME) and on the Return on Asset (ROA) within a period of five for the years 2011 to 2015. Hypotheses were formulated and multiple regressions were used for the analysis. It was found that both donation and medical expenses have a negative relationship (r = -0.068 and r =- 0.072) respectively with return on assets (ROA). Trainings, Recruitment and Canteen Expenses (TRC) and the return on assets (ROA) have a positive relationship (r = 0.068).

Ezejiofor, John-Akamelu & Chigbo (2016) did a study on effect of sustainability environmental cost accounting on financial performance of Nigerian Corporate Organizations. Ex post facto research design and time series data were adopted. Data for study were collected from annual reports and accounts of the company in Nigeria. Formulated hypotheses were tested using Regression Analysis. Based on the analysis, the study found that environmental cost does not impact positively on revenue of corporate organizations in Nigeria. Again also environmental cost impact positively on profit generation of corporate organizations in Nigeria. Based on this the researcher recommends that Indigenous and multi-national firms should ensure that strict policies as regards environmental accounting are adhered to, in order to enable stable organizational performance.

Bassey, Oba and Onyah (2013) critically analyzed the extent of implementation of environmental cost management and its impact on output of oil and gas companies in Nigeria from 2001 to 2010. The study used multiple regression analytical technique. Findings revealed that there were a significant relationship between the parameters that influence environmental cost management and output of oil and gas produced in Nigeria. Also, it was discovered that there are no established standards in Nigeria guiding environmental cost management in the oil and gas industries.

Tochukwu (2018) studied the Environmental Costs Accounting and Reporting on Firm Financial Performance: A Survey of Quoted Nigerian Oil Companies. The study aimed at ascertaining the effect of environmental costs on firm performance. The results of the statistical analysis indicated that better environmental performance positively impact business value of an organization. Moreover, environmental accounting provides the organization an opportunity to reduce environmental and social costs and improve their performance.

Agbiogwu, Ihendinihu and Okafor (2016) studied the impact of environmental and social costs on performance of Nigerian manufacturing companies. Findings from the analysis showed that the sample companies environmental and social cost significantly affect Net profit margin, Earnings per share and Return on capital employed of manufacturing companies. The researchers recommended that government should ensure complete adherence of environmental laws by manufacturing companies in Nigeria.

Obara, Ohaka, Nangih & Odinakachukwu (2017) examined the effect of accounting for waste management expenditure on the profitability of oil and gas companies in Nigeria. Three companies were used for the study namely; the Nigeria Agip Oil Company Ltd, Schlumberger Nig. Ltd and Total E&P Nig. Ltd. The study investigated four operational variables which were: Waste management, Return on Assets, Return on Equity and Operating Profit. The results of the study, tested at 0.05 level of significance, showed that Waste management has high positive and significant influence on the Return on Assets, Return on Equity and Operating Profit Level of the oil and gas companies in Nigeria. It was recommended that companies should be socially responsible to their host communities while the government on their part should ensure compliance with relevant laws regulating waste management and environmental pollution in Nigeria.

3.0 METHODOLOGY

The research design adopted for this research is the *ex-post facto* research design. A total of five manufacturing firms in Nigeria were selected using the judgmental sampling technique. The selected firms were Shell Petroleum Development Company of Nigeria (SPDC), Presco Plc, FTN Cocoa Processors Plc, UAC of Nigeria Plc and Livestock Feeds Plc. The study employed secondary data and relevant data were obtained from the financial statement of the selected manufacturing firms from 2011-2020.

To empirically analyze the relationship between environmental cost and financial performance, the study adopted the model developed and adopted by Mohammed (2013), Ifurueze, Etale and Bingilar (2013), Malarvizhi and Matta (2016) which is:

$$ENVI_{it} = f\,(ROCE_{it}, ATOV_{it})$$

When presented in an econometric form, it becomes:

$$ENVI_{it} = \beta_0 + \beta_1 ROCE_{it} + \beta_2 ATOV_{it} + U_{it} \quad \text{- - - - - - 1}$$

Where:

ENVI = Environmental Responsibility Reporting Index. The authors argued that, in assessing the amount of environmental and social responsibility reporting in annual financial reports,

the Global Reporting Initiative (GRI) Reporting Guidelines (2002) had to be adopted in the study. These disclosure procedures included sixty items to determine the magnitude of responsibility reporting relating to economic, social, and environmental perspectives (twenty items for each perspective). The index uses a binary coding system which assigns 1 if item is disclosed and 0 if it is not disclosed (Hossain & Hammami, 2009). As such, a sampled company could score sixty points highest and zero score at the lowest. GRI having representation in 77 countries provides a comprehensive sustainability reporting framework that is widely used around the world to achieve greater transparency (GRI, 2018). The framework and sustainability reporting guidelines, sets out the principles and indicators any organization that is seeking to develop transparency can use to report the environmental, social and economic impact of its operations.

ROCE = Return on capital employed indicates firms profitability and is calculated as the net profit after taxes plus interest on long term liabilities scaled by total capital employed (shareholders' equity plus long term liabilities) as at the end of the financial year under investigation. After all, equity owners and providers of long term liability combined have claims on the assets of the firm. This measure of financial performance is considered the best as it shows the earnings power of a firms taking into account the interest of all stakeholders;

ATOV = Assets turnover. This is calculated as sales revenue as a ratio of total assets. This financial performance measure considers the revenue generating capacity of the firm's assets, as well as a measure of the efficiency in the management and utilization of the assets. Besides total assets, is also used as a measure of a firm's size. Therefore, assets turnover which includes in its calculation the total assets of a firm, combined with return of capital employed as defined in this study are adjudged the best measures of financial performance.

U describes stochastic error term, while t is the time dimension of the variables, β0 represents constant and β1, *β2,* and *β3* are coefficients of the independent variables to be estimated.

Hence the model for this study shall be specified as follows:

For hypothesis one, which states that environmental training has no positive and significant effect on the return on asset was represented by the equation.

$$ROA = a + b\,ETC + ATOV + \mu \quad - - - - \quad 2$$

For hypothesis two, which states that Donations and Charitable cost has no a positive and significant influence on the return on asset was represented by the equation

$$ROA = a + b\,DCC + ATOV + \mu \quad - - - - \quad 3$$

For hypothesis three, which states that Waste management cost has no a positive and significant effect on the return on asset, was represented by the equation,

$$ROA = a + b\,WMC + ATOV + \mu \quad - - - - \quad 4$$

For hypothesis four, which states that Corporate Social Responsibility has no positive and significant effect on return on asset was represented by;

$$ROA = a + bCSR + ATOV + \mu \quad - - - - \quad 5$$

Where;

ETC = Environmental Training
ROA = Return on Asset
CSR = Corporate Social Responsibility
DCC = Donation/Charity Contribution
WMC = Waste Management
ATOV = Asset Turnover
a = Regression equation intercept

b = Regression equation coefficient
μ = error term

The hypotheses were tested using the Panel Least Square model with E-View statistical software. The signs and significance of the regression coefficients were relied upon in explaining the nature and influence of the independent and dependent variables as to determine both magnitude and direction of impact. In the study, the following statistical signs were relied upon; the Correlation Coefficient (R), Coefficient of Determination (R^2), Durbin Watson (d) test and the Student (t) test.

4.0 DATA ANALYSIS AND DISCUSSION OF FINDINGS

Unit Root Test

The unit root test was carried out on each of the variables to ensure the stationarity of the model variables. The unit root test for return on asset (ROA) shows that the ROA data were not stationary at level and first difference, however, it was stationary at second difference. The unit root test for environmental training cost (ETC) shows that the ETC data were not stationary at level difference, but stationary at first difference. The unit root test for donations and charitable cost shows that the DCC data were stationary at first difference. The unit root test for donations and charitable cost (DCC) shows that the DCC data were stationary at first difference. The unit root test for corporate social responsibility (CSR) shows that the CSR data were stationary at level difference.

Test of Hypothesis

The hypotheses of the study as stated in chapter one are tested in this section. According to Onwumere (2005), to test a hypothesis, it has to be stated in both Null and Alternative forms. The rejection of the null means the acceptance of the alternative form. The null hypothesis represents the conclusion that we would draw if the process is operating properly. It is analogous to the presumption of innocence until guilt is proven in the Nigeria legal system. The alternative hypothesis, which is usually the opposite of the null hypothesis, represents the conclusion that would be drawn if evidence of guilt is found.

Test of Hypothesis one

Step One: Statement of the Hypothesis in both null and alternative forms.

The hypothesis is restated in both Null and Alternative forms as follows:

H_0: Environmental training has no positive and significant effect on return on asset of manufacturing firms in Nigeria.

H_a: Environmental training has positive and significant effect on return on asset of manufacturing firms in Nigeria.

STEP TWO: Analysis of Regression Result of the effect of Environmental training on return on asset of manufacturing firms in Nigeria.

TABLE 4.1 Regression Result of the effect of Environmental training on return on asset of manufacturing firms in Nigeria.

Dependent Variable: ROA
Method: Least Squares
Date: 08/10/21 Time: 10:45
Sample (adjusted): 2011 2020
Included observations: 10

Variable	Coefficient	Std. Error	t-Statistic	Prob.

ETC	0.390905	0.093151	4.196462	0.0247
C	0.971214	0.307237	-3.161121	0.0508

R-squared	0.973580	Mean dependent var	-1.166667
Adjusted R-squared	0.955967	S.D. dependent var	3.544949
S.E. of regression	0.743877	Akaike info criterion	2.552970
Sum squared resid	1.660058	Schwarz criterion	2.448850
Log likelihood	-4.658911	Hannan-Quinn criter.	2.136168
F-statistic	55.27512	Durbin-Watson stat	2.356795
Prob(F-statistic)	0.004294		

Source: Researchers E-View Results

Model Equation ROA = 0.9712 + 0.3909ETC + μ

(t-value = 4.1964)

As revealed from the table 4.3 above, environmental training has positive and significant effect on return on asset (coefficient of ETC = 0.3909, t-value = 4.1964). The probability value of 0.024 < 0.05 further indicates that, this is significant. On the whole the coefficient of determination which measures goodness of fit as revealed by R-square (R^2) indicates that 97.4% of the variations observed in the dependent variable (return on asset) were explained by variations in the independent variable (environmental training). The test of goodness of fit of the model as indicated by R^2 was properly adjusted by the Adjusted R-Square of 95.6%.

STEP THREE: Decision

Therefore, we reject the Null hypothesis and accept the alternative hypothesis that environmental training has positive and significant impact on return on asset of manufacturing firms in Nigeria.

Test of Hypothesis Two

Step One: Statement of the Hypothesis in both null and alternative forms.

The hypothesis is restated in both Null and Alternative forms as follows:

H_0: Donations and charitable cost has no positive and significant effect on return on asset of manufacturing firms in Nigeria.

H_a: Donations and charitable cast has positive and significant effect on return on asset of manufacturing firms in Nigeria.

STEP TWO: Analysis of Regression Result of the effect of donations and charitable cost on return on asset of manufacturing firms in Nigeria.

TABLE 4.2 Regression Result of the effect of donations and charitable cost on return on asset of manufacturing firms in Nigeria.

Dependent Variable: ROA
Method: Least Squares
Date: 08/10/21 Time: 10:37
Sample (adjusted): 2011 2020
Included observations: 10

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DCC	0.024562	0.005152	4.767595	0.0089
C	0.017362	0.001235	14.05671	0.0001

R-squared	0.998813	Mean dependent var	-0.013159

Adjusted R-squared	0.998220	S.D. dependent var	0.023850
S.E. of regression	0.001006	Akaike info criterion	-10.66763
Sum squared resid	4.05E-06	Schwarz criterion	-10.69081
Log likelihood	40.33670	Hannan-Quinn criter.	-10.95415
F-statistic	1683.311	Durbin-Watson stat	0.790500
Prob(F-statistic)	0.000001		

Source: Researcher's E-view Results

Model Equation ROA = 0.0174 + 0.0246DCC + μ

(t-value = 4.7676)

As shown in table 4.4 above, donations and charitable cost has positive and significant effect on return on asset (coefficient of DCC = 0.0246, t-value = 4.7676). The probability value of 0.0089 < 0.05 further indicates that, this is significant. On the whole the coefficient of determination which measures goodness of fit as revealed by R-square (R^2) indicates that 99.9% of the variations observed in the dependent variable (return on asset) were explained by variations in the independent variable (donations and charitable cost). The test of goodness of fit of the model as indicated by R^2 was properly adjusted by the Adjusted R-Square of 99.8%.

STEP THREE: Decision

Therefore, we reject the Null hypothesis and accept the alternative hypothesis donations and charitable cost has positive and significant impact on return on asset of manufacturing firms in Nigeria.

Test of Hypothesis Three

Step One: Statement of the Hypothesis in both null and alternative forms.

The hypothesis is restated in both Null and Alternative forms as follows:

H_0: Waste management cost has no positive and significant effect on return on asset of manufacturing firms in Nigeria.

H_a: Waste management cast has positive and significant effect on return on asset of manufacturing firms in Nigeria.

STEP TWO: Analysis of Regression Result of the effect of Waste management cost on return on asset of manufacturing firms in Nigeria.

TABLE 4.3 Regression Result of the effect of Waste management cost on return on asset of manufacturing firms in Nigeria.

Dependent Variable: ROA
Method: Least Squares
Date: 08/10/21 Time: 10:50
Sample (adjusted): 2011 2021
Included observations: 10

Variable	Coefficient	Std. Error	t-Statistic	Prob.
WMC	0.386151	0.088637	4.356562	0.0033
C	2.856821	0.647686	4.410809	0.0031

R-squared	0.730558	Mean dependent var	0.035418
Adjusted R-squared	0.692066	S.D. dependent var	0.049508
S.E. of regression	0.027473	Akaike info criterion	-4.158103
Sum squared resid	0.005283	Schwarz criterion	-4.114276

Log likelihood	20.71147	Hannan-Quinn criter.	-4.252683
F-statistic	18.97963	Durbin-Watson stat	2.575235
Prob(F-statistic)	0.003328		

Source: Researcher's E-view Results

Model Equation ROA = 2.8568 + 0.3861WMC + μ

(t-value = 4.3566)

As shown in table 4.5 above, waste management cost has positive and significant effect on return on asset (coefficient of WMC = 0.3861, t-value = 4.3566). The probability value of 0.0089 < 0.05 further indicates that, this is significant. On the whole the coefficient of determination which measures goodness of fit as revealed by R-square (R^2) indicates that 73% of the variations observed in the dependent variable (return on asset) were explained by variations in the independent variable (waste management cost). The test of goodness of fit of the model as indicated by R^2 was properly adjusted by the Adjusted R-Square of 69.2%.

STEP THREE: Decision

Therefore, we reject the Null hypothesis and accept the alternative hypothesis waste management cost has positive and significant impact on return on asset of manufacturing firms in Nigeria.

Test of Hypothesis Four

Step One: Statement of the Hypothesis in both null and alternative forms.

The hypothesis is restated in both Null and Alternative forms as follows:

H_0: Corporate social responsibility cost has no positive and significant effect on return on asset of manufacturing firms in Nigeria.

H_a: Corporate social responsibility cost has positive and significant effect on return on asset of manufacturing firms in Nigeria.

STEP TWO: Analysis of Regression Result of the effect of corporate social responsibility cost on return on asset of manufacturing firms in Nigeria.

TABLE 4.4 Regression Result of the effect of corporate social responsibility cost on return on asset of manufacturing firms in Nigeria.

Dependent Variable: ROA
Method: Least Squares
Date: 08/10/21 Time: 10:53
Sample (adjusted): 2011 2020
Included observations: 10

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CSR	0.544457	0.035479	15.34578	0.0000
C	4.278197	0.275250	15.54298	0.0000

R-squared	0.971133	Mean dependent var	0.055023
Adjusted R-squared	0.967009	S.D. dependent var	0.085322
S.E. of regression	0.015497	Akaike info criterion	-5.303163
Sum squared resid	0.001681	Schwarz criterion	-5.259335
Log likelihood	25.86423	Hannan-Quinn criter.	-5.397743
F-statistic	235.4928	Durbin-Watson stat	2.148076
Prob(F-statistic)	0.000001		

Source: Researcher's E-view Results

Model Equation ROA = 4.2782 + 0.5444CSR + μ

(t-value = 15.3458)

As presented in table 4.6 above, corporate social responsibility cost has positive and significant effect on return on asset (coefficient of CSR = 0.5444, t-value = 15.3458). The probability value of 0.0000 < 0.05 further indicates that, this is significant. On the whole the coefficient of determination which measures goodness of fit as revealed by R-square (R^2) indicates that 97.1% of the variations observed in the dependent variable (return on asset) were explained by variations in the independent variable (corporate social responsibility). The test of goodness of fit of the model as indicated by R^2 was properly adjusted by the Adjusted R-Square of 96.7%.

STEP THREE: Decision

Therefore, we reject the Null hypothesis and accept the alternative hypothesis corporate social responsibility cost positive and significant impact on return on asset of manufacturing firms in Nigeria.

5.0 CONCLUSION AND RECOMMENDATION

Conclusion

The study examined the effect of environmental cost on the performance of manufacturing firms in Nigeria from 2011 to 2020. Environmental costs cover all cost; incurred concerning environmental protection such as emissions treatment as well as wasted material, capital and labour which so called 'non product output' as a result of inefficient production activities. In the study, the components of environmental cost were: environmental training cost, donations and charitable cost, waste management cost and corporate social responsibility cost.

The summary of the findings shows that, environmental training cost, donations and charitable cost, waste management cost and corporate social responsibility cost had positive and significant impact on return on asset of manufacturing firms in Nigeria. The study therefore, concluded that environmental cost has positive and significant effect on the performance of manufacturing firms in Nigeria. This is consistent with the works of John-Akaemelu & Chigbo (2016), Bassey, Oba & Onyah (2013), Tochukwu (2018) and Obara, Ohaka, Nangih & Odinakachukwu (2017).

Recommendation

From the forgoing, the study therefore recommends that all manufacturing companies should invest in environmental training, donations and charity, waste management and remain socially responsible to the host communities to ensure uninterrupted and smooth operations.

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