Effect of Environmental Cost Disclosure on Earnings Per Share of Listed Manufacturing Firms in Nigeria

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Abstract
The study investigated the effect of environmental cost disclosure on the financial performance of 12 listed manufacturing firms in Nigeria from 2013 to 2022. Expost facto research design was adopted and secondary data were sourced from their annual reports of the sampled manufacturing firms listed on the Nigerian Exchange Group as at 31st December, 2022. Results on the assessment of the effect of independent variables (Pollution control cost (PCC), Waste management cost (WMC) and Employee health and safety cost (EHSC) on dependent variable (Earnings per share (EPS) were analyzed with the use of the statistics, correlation analysis, Panel Generalized Method of Moments as well as Arellono-Bond Serial Correlation test. The outcome of the analysis revealed that Pollution control cost effect on earnings per share of listed manufacturing firms in Nigeria is negative but significant. However, the effect of Waste management cost and Employee health and safety cost on earnings per share of listed manufacturing firms in Nigeria is positive and significant. The study concluded that environmental cost disclosure has significant effect on the financial performance of listed manufacturing firms in Nigeria. The study 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: Earnings per Share, Environmental Cost, Environmental Cost Disclosure, Financial Performance & Waste Management.

Introduction

In order to develop procedures and goods that can simultaneously improve competitive and environmental performance, Environmental Management Systems (EMS) have emerged as a way to methodically apply business management to environmental costs and improve a firm's long-term financial performance. Over the past 20 years, firms' environmental disclosure has progressively increased in size and complexity (Smith, 2013). Globally, most corporate management strategies and governments are focusing on how important it is for corporate enterprises to control their environmental costs. Thus, the requirement for environmentally responsible cost management in the industrial sectors has grown to be a global business management obligation as well as a worry for the majority of nations (Nwaiwu & Oluka, 2018). Global industry is using more natural resources and emitting more greenhouse gases on a constant basis. Factory spaces replaced the customary homes and thatched workshops as the sites of production. For the majority of individuals in the industrialized world, the industrial revolutions brought about economic progress (Okoye & Ngwakwe, 2013). There are costs associated with these economic advances. The natural environment was affected by industrialization, which necessitated the use of natural resources like energy and resulted in manufacturing pollution and increased land use. This is demonstrated by the widespread environmental damage and air pollution that the globe, and Nigeria in particular, are currently experiencing. According to the Ministry of the Environment (2005) Environmental Accounting Guidelines, environmental accounting is an accounting strategy that aims to achieve

sustainable development, uphold positive community relations, and pursue successful and efficient environmental conservation initiatives.

According to Okoye and Ezejiofor (2013), this kind of accounting gives a business the ability to determine the costs associated with environmental conservation while conducting regular business operations, identify the advantages and profits from such efforts, offer the most effective tools for quantitative measurement, and promote the sharing of the outcomes. An essential part of accountability is the accurate disclosure of accounting data pertaining to the environment. The dual goals of Environmental Cost Disclosure (ECD) systems are to manage and enhance a business firm's financial and environmental performance. Burritt, Hahn and Schaltergger (2001) claim that ECD can produce data regarding resource usage that has an impact on the financial standing and performance of businesses. It can also help businesses and other organizations gain the public's trust and confidence, which will ultimately result in an accurate evaluation of the businesses. Environmental expenses include the cost of adhering to environmental legislation, according to a US-based environmental protection agency (Rockness, Schlachter & Rockness, 2016). The organization made it clear that the charges cover non-compliance penalties, pollution control equipment expenditures, and environmental remediation expenses. Furthermore, Nwaiwu and Oluka (2018) stated that the impact of environmental variables on corporate organizations might lead to future capital expenditure and cash flow issues that could compromise their ability to continue as a going concern. For example, once all of its land values are impacted by environmental factors, secured loans on balance sheets might not be secured. Businesses have been ignoring how their actions affect the social and environmental environments in which they operate for many years, unless those actions directly affect the financial performance report. According to Rodriguez and Cruz (2017), consumers are progressively shifting their views towards purchase in favour of actions that are more considerate of the social and natural environments. Thus, there's a chance that those businesses will come seen as unconcerned with environmental issues. There have been differing opinions about the nature of the relationship between corporate environmental cost disclosure and performance, notwithstanding the growing interest in environmental issues. In light of this, the goal of this study is to determine the effect that environmental cost disclosure - which is determined by the costs associated with waste management, pollution control, and employee health and safety - has had on the earnings per share of Nigerian listed manufacturing companies.

Conceptual Clarification

Environmental Cost Disclosure

The expenses an organization bears to avoid, track, and document environmental effects are known as environmental costs. According to KPMG (2012), they can be examined in relation to actions related to internal and external failure, assessment, and prevention. Activities aimed at preventing environmental issues are those that find solutions before they arise or turn issues into opportunities. Preventive measures are investments because they reduce future expenses and yield long-term advantages. Monitoring environmental impact levels is done by appraisal activities, which include assessing damage, reviewing supplier performance, and examining items and procedures. Correcting errors or malfunctions found during assessment activities is known as an internal failure activity. These expenses consist of employee claims for occupational health and safety as well as the cost of cleaning the plant following a spill. Activities that arise from external failures are those that take place when organization management is not involved in resolution and remediation efforts. These consist of the price of cleaning up contaminated areas, fines and penalties for harming the environment, and lost earnings due to damage to one's reputation (KPMG, 2012). Long-term sustainability of the

business may arise from environmental disclosure since it will reduce waste and increase efficiency, which will cut expenses. The creation and evaluation of financial and non-financial data to assist internal environmental management procedures is known as environmental cost disclosure, or ECD (Shehu, 2014). It is intended to create suitable mechanisms that support the identification and allocation of expenses connected to the environment. It is a supplementary method to the conversional financial management accounting approach (Bennett & James, 1998). The assessment of annual environmental costs and expenditures, product pricing, budgeting, investment appraisal, calculating costs and savings of environmental initiatives, or defining quantifiable performance targets are the main areas where ECD is applied. The ECD has an internal function and focus at the firm level in addition to serving as a tool for reporting environmental costs to external stakeholders (Jasch, 2003; Lange, Hassan & Alferi, 2004).

Waste Management Cost Disclosure

Unwanted or useless items are considered waste (or wastes). Waste is defined as any material that is thrown away after its intended use or that is worthless, broken, or useless. Examples include radioactive waste, wastewater (such as sewage, which comprises bodily wastes like faeces and urine) and surface runoff, hazardous waste, municipal solid waste (home trash/refuse), and others. According to the UNSD Glossary of Environment Statistics (2013), wastes are substances or things that must be disposed of either because they are intended to be disposed of or because they are mandated by national law. To determine the most cost-effective trash collection system, accurate cost estimation and monitoring are crucial (Dijkgraaf & Gradus, 2017).

Employee Health and Safety Cost Disclosure

Employees can learn new skills and information and promote quality work practices by paying for it, which will transform their behaviour at work. Effective staff training can prevent and replace workplace mishaps while also boosting productivity, knowledge, and morale. The goal of health and safety is to safeguard and promote the physical and mental well-being of those who work for the company (Amahalu, Agbionu & Obi, 2017). This entails creating and implementing health and safety plans, monitoring and reporting performance concerns to internal and external stakeholders, and doing most other management functions as well.

Pollution Prevention Cost

Pollution prevention is the reduction or elimination of pollution at the source (source reduction) instead of at the end-of-the-pipe or stack. Pollution prevention occurs when raw materials, water, energy, and other resources are used more efficiently; when less harmful substances are substituted for hazardous ones; and when toxic substances are eliminated from the production process (Nzekwe, 2022). Pollution prevention is any action (large or small) that reduces the amount of contaminants released into the environment. By implementing pollution prevention processes, fewer hazards will be posed to both public health and natural wellbeing. We safeguard human health, bolster our economic security, and maintain the environment by lowering the use and manufacturing of dangerous materials and by running our operations more effectively (Amahalu, Okoye & Obi, 2018). Industry frequently gains from the adoption of pollution prevention strategies and practices since it reduces operating and environmental compliance expenses for businesses.

Earnings Per Share (EPS): The earnings per share (EPS) measures the portion of a company's profit that can be ascribed to each common share. It evaluates an organization's annual performance as well as its potential for growth in the near future. It is defined as the portion of

a company's distributable profit that is allocated to each outstanding common share or equity share. (Xuan & Hong, 2016),

EPS = Net profit or loss attributable to ordinary shareholders

Weighted average number of ordinary share outstanding during the period

Theoretical framework

This study is anchored on environmental quality cost theories. Hansen and Mowen introduced the Environmental Quality Cost Theory, sometimes referred to as the Environmental Cost Reduction Model, in 2005. It implies that the point of zero environmental damage will be where the lowest environmental costs are reached. It is believed that environmental costs need to be specified before environmental cost information may be given. Comparable to Environmental Quality Management (EQM), which is a zero-defect state of overall quality management, the environmental quality model represents the ideal state of zero environmental damage. This is undoubtedly consistent with the idea of eco-efficiency. Ideal cost measurements are recommended by the Environmental Quality Cost Model and are considered pertinent in contemporary cost and management accounting. However, the Environmental Quality Cost Model indicates a potential route for environmental cost and management accounting thinking trends. It is anticipated that EQCM concepts will improve environmental accounting, which is already better than existing conventional cost accounting (Hansen & Mowen, 2005).

Empirical review

A study by Enekwe, Ugwudioha, and Uyagu (2023) examined the effect of environmental costs on the financial performance of listed oil and gas companies for a ten-year period from 2010 to 2019 in Nigeria. Data collected on staff development cost, community development costs and employee health and safety costs were analyzed using panel Ordinary Least Square. The findings revealed that staff development costs have a negative but insignificant effect on listed Nigerian oil and gas companies' return on assets, while community development costs and employee health and safety costs have a positive but insignificant effect.

Similarly, Lawrence and Bernard (2023) investigated the relationship between environmental costs and financial performance in Nigeria. The main objective of the study is to empirically determine if waste management costs and communities' development costs lead to better performance or not. The study covers the period between 2011 and 2020 and uses the Panel Estimated Generalized Least Squares (Panel EGLS) regression. Results show that waste management cost and communities development costs (CDC) as well as firm size are positively significant while the moderated waste management costs and moderated communities development costs are negatively significant with NPM.

The effect of environmental reporting on financial performance of eleven (11) listed Nigerian industrial and consumer goods firms was examined by Ibrahim, Ibrahim and Hussain (2023) for the period of ten (10) years from 2012 to 2021. Data was collected on Return on Asset (ROA) which is considered as proxy of financial performance as well as environmental information, employee health and safety, and product safety. The regression result revealed that environmental information has significant positive effect on return on asset (ROA); employee health and safety have negative significant effect on ROA; product safety has negative significant effect on ROA.

Another study by Madawa and Ebiaghan (2022), examined the effect of environmental cost disclosure (ECD) on corporate profitability in listed oil and gas firms in Nigeria, adopting ex-post facto research design, 10 firms were sampled from a population of fifty listed oil and gas

firms. Data on Return on equity(ROE), Net Profit Margin(NPM) and Earning per share(EPS) were gleaned from the annual reports of the sampled firms from 2010-2020, the research findings, indicates that ROE have negative and significant effect on environmental cost disclosure of firms, net profit margin (NPM) has a positive relationship with environmental cost disclosure among listed firms and earnings per share (EPS) have no significant effect on environmental cost disclosure among listed oil and gas firms in Nigeria.

Nzekwe (2022) evaluated the effect of environmental cost on financial performance of selected oil and gas firms in Nigeria. Specifically, the study examined the effect of environmental pollution prevention cost, environmental protection cost, environmental remediation cost, and environmental recycling cost for the ten years period (2009 – 2018) using multiple regression analysis. The findings reveal that pollution prevention cost, environmental protection cost, environmental remediation cost, and environmental recycling cost have positive effect on firm's financial performance.

Similarly, Junaidu and Kabiru (2022) studied the influence of environmental disclosure (ED) on financial performance of seventy-six (76) listed non-financial companies in Nigeria from 2013-2020. Data collected on Environmental Disclosure measured using environmental prevention expenditure disclosure, Waste disposal, emission treatment and remediation cost disclosure, Prevention and environmental management cost disclosure as well as on financial performances' accounting and market-based measures proxied by earnings per share and Tobin's Q was analyzed using descriptive statistics and multiple regressions. The study revealed that there is positive significant relationship between EPED, WDCD, PMCD and EPS while negative with TQ of listed Nigerian non-financial companies.

Equally, Okore (2021), 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 and analyzed using the Panel Least Square. 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.

Nwambeke, Udama and Oko (2019) also carried out a study to determine the impact of environmental accounting disclosure on financial performance in cement companies in Nigeria over the period 2006-2017. Data collected on employee safety costs, charitable contribution costs and community development costs on the financial performance measured using return on assets were analyzed using panel data regression model. The study found that employee safety costs have negative and significant impact on the financial performance of cement companies in Nigeria; the level of charitable contribution costs has positive and significant impact on the financial performance of cement companies in Nigeria while the level of community development costs has positive and significant impact on the financial performance of cement companies in Nigeria.

Also, Falope and Udeh (2019) carried out a study to determine the effect of environmental cost disclosure on corporate performance of quoted Nigerian construction firms. Environmental cost disclosure was measured using environmental restoration costs and pollution control cost while corporate performance was measured using return on assets. Data collected on these variables were analyzed using linear regression analysis. The study found out that

environmental restoration cost and pollution control cost have effect on corporate performance of quoted Nigerian construction firm and recommended among others that regular and continuous environmental evaluation will improve organizations sales, income and ensure that environmental situational needs are met.

Likewise, Nwaiwu and Oluka (2018) studied the financial performance of Nigerian oil and gas corporations and environmental cost transparency. Their study used secondary data and employed causal comparative research design in its methodology. The study also made use of time series data. Waste management costs (WMC), pollution abatement costs (PAC), and rules and regulations (LR) were used as independent variables in the environmental cost disclosure, while earnings per share (EPS) was used as a proxy for financial performance. The Pearson Product Moment Correlation Coefficient and multiple regression analysis was used to analyze the data and the findings showed that environmental cost disclosure policies have a positive and noteworthy impact on the financial performance of Nigerian oil and gas businesses.

Methodology

This study adopts expost facto research design using panel data for 10 years (2013 - 2022). Secondary sources of data were collected from the audited annual reports of the selected firms to assess the effect of environmental cost disclosure on financial performance of the listed manufacturing firms in Nigeria. The population of the study was made up of all the fifty-nine (59) manufacturing companies listed in the Nigerian Exchange Group (NGX) in 2022. A sample size of 12 listed firms were selected from the population based on purposive sampling technique which covered a representation of all the 6 sectors that engages in manufacturing and 20% of the population size. The firms selected for the study were chosen based on the criteria that they were listed on the Nigerian stock exchange for the period under study, have audited financial statement for the period and the selected dependent and independent variables were specified in the financial statements of firms. The study employed the use of descriptive and inferential (correlation, panel data Generalized Method of Moments as well as Arellono-Bond Serial Correlation test) techniques to analyse the data collected. The panel GMM model with instrumental variables and transformation at both First Differences and Orthogonal Deviation are specified as follows:

$$EPS_{it} = \beta_1 EPS(-1)_{it} + \beta_2 PCC_{it} + \beta_3 WMC_{it} + \beta_4 EHS_{it} + \mu_{it} \quad ..$$

Instrument Specification = @DYN (EPS (-2) PCC (-1) WMC (-1) EHS (-1)

Where;

β_1 to β_4= the coefficients (rate of change) in the predictor or exogenous variables.

EPS = earnings per share

PCC = pollution control cost

WMC = waste management cost

EHS = Employee health and safety cost

u = error term

Result of the Findings

Descriptive Statistics

A descriptive statistic is a summary statistic that gives relevant information about sample statistics such as mean, median, minimum, maximum value, skewness, kurtosis and Jarque-Bera statistics. The result of the descriptive statistics shown in Table 1.

Table 1: Descriptive analysis of transformed EPS, LNPCC, LNWMC and LNEHS

	EPS	LNPCC	LNWMC	LNEHS
Mean	12.14853	4.336912	6.129426	4.468174
Median	2.080000	4.544874	6.198247	4.407255
Maximum	213.0000	5.866287	8.660420	5.911690
Minimum	-1.130000	2.060698	3.207634	2.086360
Std. Dev.	32.03371	0.745523	1.001629	0.664795
Skewness	4.079650	-0.462820	-0.128453	-0.530174
Kurtosis	21.24944	2.628567	3.257904	4.310588
Jarque-Bera	1814.924	4.517928	0.601842	12.90732
Probability	0.000000	0.104459	0.740136	0.001575
Sum	1324.190	472.7234	668.1074	487.0309
Sum Sq. Dev.	110825.1	60.02683	108.3522	47.73090
Observations	109	109	109	109

` *Source: Author's Computation 2024*

Table 1 reveals that the mean values of Earnings per share (EPS) is 12.14853 for the period covered by the study, indicating that the average value of EPS of the series is 12.1%. The standard deviation (Std. Dev.) indicates the dispersion from or spread of the series from their mean values. Earnings per share has the highest dispersion of 32.03371, followed by Waste Management Cost (WMC) with 1.001629. However, Pollution control cost (PCC) and Employee health and safety cost (EHS) have low dispersion from their means of 0.745523 and 0.664795 respectively. Skewness which depicts the asymmetry of the distribution around the mean reveals that EPS have a long right tail (positive Skewness) while PCC, WMC and EHS have long left tails (negative skewness). The peakness or flatness of the distribution of the series is indicated by Kurtosis reveal that EPS and EHS are not normally distributed as their values exceed the acceptable value of 3 while PCC and WMC with values less than 3 are presumed to be flat (playtykurtic) relative to the normal. The statistical significance for the Jarque-Bera statistics (JB) of all the variables as reported are less than 0.05, hence we reject the null hypothesis that the series are normally distributed and were accordingly transformed. All the series except PCC and WMC, failed to meet the assumption of normality, even after transformation processes were carried out. This is an indication of uncertainty in trend of the distribution of the data set collected for the study. Again, the panel data is a short panel with the time period (10 years from 2013 to 2022) less than the number of cross-sessions (12 listed manufacturing companies) which call for the use of an appropriate dynamic model/estimation technique (the GMM Panel Data technique).

Correlation Analysis

The correlation analysis is a method used to measure the strength of the linear relationship between two variables. The results of the correlation analysis of the variables of this study are shown in Table 2 below.

Table 2: Correlation Analysis Results of Environmental Cost Disclosure and Earning per share

		EPS	LNPCC	LNWMC	LNEHS
EPS	Pearson Correlation	1	.170	-.295**	-.201*
	Sig. (2-tailed)		.063	.001	.028
	N	120	120	120	120
LNPCC	Pearson Correlation	.170	1	.400**	.073
	Sig. (2-tailed)	.063		.000	.430
	N	120	120	120	120
LNWMC	Pearson Correlation	-.295**	.400**	1	.381**
	Sig. (2-tailed)	.001	.000		.000
	N	120	120	120	120
LNEHS	Pearson Correlation	-.201*	.073	.381**	1
	Sig. (2-tailed)	.028	.430	.000	
	N	120	120	120	120

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Author's Computation 2024

Data in Table 2 indicate the strength and direction of the association between pairs of the variables in this work as indicated under the remark's column of the table. EPS has significant but negative association with both LNWMC and LNEHS, respectively reporting coefficients and probabilities of -.295 (PV = .001 < 0.05) and -.201 (PV = .028 < 0.05). However, the relationship between EPS and LNPCC is positive but insignificant, with a coefficient of .170 and PV = .063 > 0.05. It is therefore observable that the strength of the associations among pairs of the independent variables of the study are not strong enough to suspect the existence of multi-collinearity problem among the series, hence the study concluded that the estimated parameters are unlikely to be affected by multi-collinearity issues.

Generalized Method of Moments (GMM) Estimates of the Effects of Environmental Cost Disclosure Components on the Earnings per share

To select the most appropriate approach, three regressions estimates were estimated – the Pooled OLS, the Fixed Effect OLS and the First Differences transformation. The choice is based on the comparative value of the coefficients of the lag of the dependent variable in the three estimates. The results obtained from the EPS regression models is shown in Table 3.

Table 3: Selection Criteria between First Differences and System Panel GMM Regression for EPS Model

Regression Approach	***EPS(-1) Coefficient***	***Remarks***	***Decision***
Pooled OLS	0.451555	Upper bound	1st Differences GMM is preferred since -0.106342 ***is not lower than*** -0.085592
Fixed Effect OLS	-0.085592	Lower bound	
1st Differences GMM	0.106342	System GMM is preferred if EPS (-1) Coefficient from 1st Diff. GMM < lower bound coefficient, otherwise 1st Differences GMM is used.	

Source: Author's Computation 2024

Since 0.106342 (1st Differences Coefficient of the lag of the Dependent Variable - EPS (-1) is higher than -0.085592 (Fixed Effect Coefficient of the lag of the dependent variable), First Differences GMM is preferred as the result shows that this dynamic transformation of GMM is not downward bias.

Effect of Environmental Cost Disclosure Components on the Earnings per Share

Table 4 provides the summary of the GMM test results of the effect of environmental cost disclosure on EPS based on 1st differences GMM transformation.

Table 4: Test result of the effect of PCC, WMC, and EHS on the Earnings per Share (EPS) of listed manufacturing firms in Nigeria.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EPS(-1)	0.106342	0.000627	169.7194	0.0000
LNPCC	-1.546012	0.197404	-7.831721	0.0000
LNWMC	25.08804	0.301402	83.23769	0.0000
LNEHS	8.862221	0.325746	27.20593	0.0000
	Effects Specification			
Cross-section fixed (first differences)				
Mean dependent var	-0.083229	S.D. dependent var		21.46728
S.E. of regression	21.74048	Sum squared resid		43483.66
J-statistic	10.02304	Instrument rank		13
Prob(J-statistic)	0.348623			

Source: Author's Computation 2024

Table 4 provides results to evaluate the validity of EPS model using the J-statistic of 10.02304. The probability of the J-statistic is reported as 0.348623, further indicating that the model is valid and can be relied upon in predicting the effect of environmental cost disclosure on earnings per share. The results obtained also show that all the environmental cost disclosure variables (LNPCC, LNWMC and LNEHS) have significant effect on earnings per share at 5% level, with LNWMC and LNEHS exacting positive influence while LNPCC negatively correlated with EPS. The value of the beta coefficient for LNPCC of -0.106342 implies that a unit increase in the number of pollution control cost will lead to about 0.11% decrease in the earnings per share of the listed manufacturing firms in Nigeria if other factors are held constant. On the contrary, a unit increase in waste management cost (LNWMC) and employee health and safety cost (LNEHS) respectively result to increases of 25% and 8.86% in earnings per share of the manufacturing firms investigated.

Post estimation test

Post estimation test to check for possible existence of autocorrelation problem in the model was conducted using the Arellano Bond Serial Correlation test and the result shown below.

Table 5: Arellano-Bond Serial Correlation Test on EPS Model

Test order	m-Statistic	rho	SE(rho)	Prob.
AR(1)	-1.384482	-1.540542	1.112721	0.1662
AR(2)	-1.111503	-0.137921	0.124085	0.2664

Source: Author's Computation 2024

The values of m-statistic for both AR (1) and AR (2) of -1.384482 and -1.111503 are found to be insignificant at 5% level (as the p-values of 0.1662 and 0.2664 are both > 0.05). Accordingly, the null hypothesis that proposes absence of serial correlation is not rejected and we conclude that there is no serial correlation in the series. The Orthogonal Deviations transformation option of GMM was also executed and the results are shown in Table 6.

Table 6: Results of Panel GMM Estimation based on Orthogonal Deviations Transformation for EPS Model.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EPS(-1)	0.103770	0.000386	268.5141	0.0000
LNPCC	-4.033540	0.192704	-20.93130	0.0000
LNWMC	18.27914	0.370198	49.37668	0.0000
LNEHS	8.506393	0.591741	14.37521	0.0000
	Effects Specification			
Cross-section fixed (orthogonal deviations)				
Mean dependent var	-0.263403	S.D. dependent var		14.17441

S.E. of regression	14.98599	Sum squared resid	20661.35
J-statistic	6.387773	Instrument rank	12
Prob(J-statistic)	0.603881		

Source: Author's Computation 2024

The probability of the J-statistic of 6.387773 is reported as 0.603881 and this affirms the validity of the model as supporting evidence to the results obtained using the 1st differences transformation. All the results on the components of environmental cost disclosure are similar with the results earlier obtained using the 1st differences transformation, and this concordance in the results from both approaches strengthens the evidence that the estimated parameters can be used in testing H_{01} to H_{03} formulated for the study.

Test of Hypotheses

Testing for the Effect of Pollution Control cost (LNPCC) on Earnings per share of Listed manufacturing Firms in Nigeria.

H_{01}: *Pollution control cost has no significant effect on the earnings per share of listed manufacturing firms in Nigeria.*

Result in Table 4 indicates that the t-statistic for pollution control cost (LNPCC) of -7.831721 is significant at 5% level (P = 0.0000 < 0.05). Accordingly, **H_{01}** is rejected, with the conclusion that the pollution control cost has significant but negative effect on earnings per share of listed manufacturing firms in Nigeria.

Testing for the Effect of Waste Management Cost on Earnings per share of Listed Manufacturing Firms in Nigeria.

H_{02}: *Waste Management Cost has no significant effect on the earnings per share of listed manufacturing firms in Nigeria.*

Table 4 result indicates that the t-statistic for Waste Management Cost of 83.23769 is significant at 5% level (P = 0.0000 < 0.05). Accordingly, the result supports the rejection of **H_{02}**, with the conclusion that the effect of waste management cost on earnings per share of listed firms in Nigeria is statistically positive and significant.

Testing for the Effect of Employee health and safety cost (LNEHS) on Earnings per share of Listed Manufacturing Firms in Nigeria.

H_{03}: *Employee health and safety cost has no significant effect on the earnings per share of listed manufacturing firms in Nigeria.*

Result also indicates that the t-statistic for Employee health and safety cost of 27.20593 is significant at 5% level (P = 0.0000 < 0.05). Accordingly, the study fails to accept **H_{03}** and concludes that, Employee health and safety cost has significant positive effect on earnings per share of listed manufacturing firms in Nigeria.

Discussion of Results

The analyses of data done in this study comprises of preliminary test conducted to determine the right estimation method for testing the hypotheses formulated in the introductory part of this study. The descriptive statistics showed that the series were not normally distributed as the Jarque-Bera statistics of all the variables have probability outcomes of less than 5% against

the decision rule which implies accepting the null hypotheses of normality of the distribution when the p-value > 0.05. The Generalized Method of Moments (GMM) analysis was used to estimate the influence of the environmental cost disclosure on the earnings per share since the panel cross-section *i* is greater than the number of year's *t*. The study finds that Pollution control cost effect on earnings per share of listed manufacturing firms in Nigeria is negative but significant. However, the effect of Waste management cost and Employee health and safety cost on earnings per share of listed manufacturing firms in Nigeria is positive and significant.

Conclusion

The study was carried out on the effect of environmental cost disclosure on earnings per share of listed manufacturing firms in Nigeria. The independent variable of environmental cost disclosure is proxy by pollution control cost, waste management cost and environmental health and safety while the dependent variable is earnings per share and were analyzed using Generalized Methods of Moments. The study concluded that environmental cost disclosure has significant effect on the earnings per share of listed manufacturing firms in Nigeria.

Recommendations

Based on the findings, the following recommendations were made:

i. To guarantee smooth and continuous operations, manufacturing companies should make investments in environmental training, donations and charity, waste management, and social responsibility to the host communities.

ii. Nigerian manufacturing companies should furnish and maintain workspaces, tools, and equipment, as well as employ labour practices that maximize return on equity while minimizing risks to health.

iii. When proper precautions are taken, manufacturing companies shall guarantee that chemical, physical, and biological substances and agents under their control do not pose a risk to human health, as far as is reasonably practicable.

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