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### An Evaluation of Environmental Accounting Information and Financial Performance of Listed Manufacturing Firms in Nigeria

<sup>1</sup> Osaloni Bankole O, <sup>2</sup> Oso Oluwayomi O

<sup>1, 2</sup> Department of Accounting, Afe Babalola University, Ado-Ekiti, Ekiti State, Nigeria

Corresponding Author: **Osaloni Bankole O**

#### Abstract

Environmental accounting information plays a critical role in evaluating manufacturing firms' financial performance, particularly in environmental development, pollution control, and waste management. This study examines the relationship between environmental accounting information and the financial performance of listed manufacturing firms in Nigeria, using secondary data from annual reports between 2015 to 2022. Descriptive statistics and multiple regression analysis are employed to analyze the data. The findings of the study reveal that environmental accounting information significantly impacts the financial performance of manufacturing firms. Specifically, firms prioritizing investment in ecological development and adopting new techniques and environmental accounting practices tend to

have improved financial performance. This underscores the importance of incorporating environmental considerations into financial management practices in the manufacturing sector. The study suggests that manufacturing companies in Nigeria should prioritize investment in ecological development and adopt advanced environmental accounting practices to enhance their financial performance. This may involve the implementation of advanced software solutions to reduce costs associated with pollution management. The study contributes to the literature on environmental accounting and financial performance, providing valuable insights for policymakers and practitioners in the manufacturing sector in Nigeria and beyond.

**Keywords:** Environmental Accounting, Environmental Development, Control Environmental Pollution, Waste Management, Return on Assets, Financial Performance

**JEL Classification Code:** O13, Q53, Q52, G19, G0, Q56

#### 1. Introduction

Globally, Environmental accounting information has become increasingly important in recent years as more and more businesses recognize the importance of sustainability and environmental responsibility (Al-Waeli *et al.*, 2020) <sup>[4]</sup>. Onodi *et al.* (2021) <sup>[38]</sup> and Ezeagba *et al.* (2017) <sup>[13]</sup> opined that by incorporating environmental data into their accounting practices, businesses can better understand the impact of their operations on the environment and take steps to reduce their carbon footprint. This has led to a growing interest in the relationship between environmental accounting information and financial performance, particularly in manufacturing firms (Ironkwe & Nwaiwu, 2018) <sup>[18]</sup>.

Also, like many other developing countries, Nigeria has experienced significant environmental challenges in recent years (Igbekoyi *et al.*, 2021) <sup>[17]</sup>. These challenges have affected the country's manufacturing sector, which is a major contributor to the Nigerian economy. The increasing demand for sustainable business practices and the need to address environmental issues have led to the adoption of environmental accounting information by some Nigerian firms (Igbekoyi *et al.*, 2021) <sup>[17]</sup>. However, this information's impact on these firms' financial performance is not well understood. Therefore, there is a need for a comprehensive evaluation of the relationship between environmental accounting information and the financial performance of manufacturing firms in Nigeria.

However, evaluating the relationship between environmental accounting information and the financial performance of listed manufacturing firms has been researched by several scholars. For instance, Woo *et al.*, (2016) <sup>[52]</sup> explored suppliers' communication capability and external green integration for green and financial performance in the Korean construction industry. Similarly, Ahmad *et al.* (2018) <sup>[2]</sup> studied the relationship between environmental accounting and nonfinancial firms' performance: an empirical analysis of selected firms listed on the Pakistan stock exchange. Other studies have also investigated this relationship in different contexts and using various methodologies, including case studies (Jaradat and bin Abdul Rahman

2022)<sup>[19]</sup>, regression analysis (Susanto & Meiryani 2019)<sup>[47]</sup>, and meta-analysis (Oduro *et al.*, 2022)<sup>[36]</sup>. Overall, the findings suggest that environmental accounting information positively affects the financial performance of manufacturing firms, indicating that the adoption of environmentally sustainable practices can contribute to their economic success. However, some studies have reported mixed or inconclusive results, suggesting that the relationship between environmental accounting and financial performance may not always be straightforward (M. T. Lee & Suh, 2022)<sup>[25]</sup>.

The objective of this study is varying in its entirety from past studies, as this intends to examine the relationship between environmental accounting information and the financial performance of manufacturing firms in Nigeria. Specifically, the study aims to investigate whether the adoption of environmentally sustainable practices and reporting of environmental accounting information can lead to improved financial performance for Nigerian manufacturing firms. The study also seeks to identify the key environmental accounting practices that are most strongly associated with financial performance, using environmental development, waste management, and control of environmental pollution as well as to explore any potential moderating factors that may affect this relationship such as return on asset to provide insights into the potential benefits of environmental accounting and sustainability practices for Nigerian manufacturing firms and to inform policy and practice in this area. The remainder of this research paper is structured as follows: Review of extant literature highlighting several concepts about environmental accounting, environmental development, waste management, control of environmental pollution and appropriate theoretical considerations, methodology of the study, data analysis, and discussion of the results and conclusion.

## 2. Literature Review and Hypotheses Development

### 2.1 Conceptual Review

#### 2.1.1 Environmental Accounting information

Al-Mawali *et al.* (2018)<sup>[3]</sup> conceptualized environmental accounting information (EAI) in Traditional environmental accounting as the identification and measurement of environmental costs and benefits in financial terms, and their integration into a firm's accounting system. and, the firm may quantify the costs of pollution control measures or the savings from energy efficiency improvements and report these in its financial statements. However, Environmental management accounting (EMA) is concerned with the use of accounting information to support environmental management decision-making, such as identifying opportunities for waste reduction or assessing the costs and benefits of alternative environmental strategies (Resta *et al.*, 2016)<sup>[42]</sup>. EMA goes beyond traditional environmental accounting by considering non-financial indicators and incorporating environmental information into decision-making processes. The Sustainability accounting concept involves the integration of environmental, social, and economic performance measures into a firm's reporting and management systems (Fernando *et al.*, 2019)<sup>[14]</sup>. Sustainability accounting extends beyond the firm's boundaries and considers its activities' impacts on stakeholders and the wider society. Rounaghi, (2019)<sup>[43]</sup> Submitted that the green accounting concept focuses on the valuation of natural resources and environmental assets, and

the incorporation of these values into a firm's accounting system.

Environmental accounting information is vital in promoting sustainability, waste management, and controlling environmental pollution (Das *et al.*, 2019)<sup>[12]</sup>. This information enables organizations to measure and report on their environmental impacts, helping them identify areas where they can reduce their negative impact on the environment (Teh *et al.*, 2020). Environmental accounting helps track an organization's energy and water usage, emissions, waste generation, and other environmental factors contributing to its ecological footprint (Das *et al.*, 2019)<sup>[12]</sup>. This data can then be used to set goals, develop strategies, and track progress toward environmental sustainability.

Moreover, environmental accounting information can provide insights into the economic benefits of sustainable practices (Teh *et al.*, 2020). By measuring the costs and benefits of environmental initiatives, organizations can make informed decisions that balance environmental and economic considerations (Scoones, 2023)<sup>[44]</sup>. This helps to improve resource efficiency, reduce waste, and lower operating costs (Li *et al.*, 2019)<sup>[26]</sup>. Furthermore, environmental accounting information can demonstrate an organization's commitment to sustainability and transparency, leading to improved reputation and stakeholder engagement (Scoones, 2023)<sup>[44]</sup>. Incorporating environmental accounting into organizational decision-making can lead to more sustainable practices, better waste management, and greater control of environmental pollution (Li *et al.*, 2019)<sup>[26]</sup>.

#### 2.1.2 Environmental Development

Koval *et al.* (2021)<sup>[21]</sup> conceptualized environmental development (ED) according to the Brundtland Commission, as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987). This approach emphasizes the importance of balancing economic growth with environmental protection and social equity. However (Van *et al.*, 2019)<sup>[51]</sup>, opined that Ecological Modernization was introduced by Spaargaren and Mol, (1992)<sup>[46]</sup> in their book "Ecological Modernization and the Policy Process" (2000). Ecological modernization refers to "a process of societal transformation whereby environmental concerns become integral to the innovation process and economic development more broadly conceived". This approach focuses on promoting environmentally friendly technologies and practices within existing economic systems.

In addition Anand, (2017)<sup>[6]</sup> emphasizes environmental justice as the importance of addressing environmental issues in a way that is equitable and just for all members of society. As Pellow, (2016)<sup>[41]</sup> affirm that environmental justice is the sacredness of Mother Earth, ecological unity and the interdependence of all species, and the right to be free from ecological destruction and to live in a clean and healthful environment". This approach emphasizes the need to address environmental issues in a way that is inclusive of marginalized communities who may bear a disproportionate burden of environmental harm when an organization is making its profit and to achieve consistency of revenue generation and the goals of going concern of the organization with the expansion of update and related useful

information and discoveries.

Environmental development is a critical aspect of ensuring sustainable growth and the preservation of natural resources. Environmental accounting, on the other hand, provides information that can aid in effective environmental management decision-making. The relationship between these two concepts has been explored by several researchers such as Liu and Bai, (2022) <sup>[28]</sup> and (La Soa Nguyen *et al.* 2017) <sup>[22]</sup>, who argue that environmental development can enhance the quality of environmental accounting information. They suggest that improved environmental performance can lead to better data collection and analysis, which can ultimately result in more accurate and useful environmental accounting information. Similarly, Anand, (2017) <sup>[6]</sup> posits that environmental development initiatives can help organizations identify new environmental costs and benefits, leading to more comprehensive and informative environmental accounting. Finally, Igbekoyi *et al.* (2021) <sup>[17]</sup> highlight the importance of stakeholder engagement in environmental development, as it can help to improve transparency and accountability in environmental reporting. Overall, these studies demonstrate the significant role that environmental development can play in enhancing the quality and usefulness of environmental accounting information.

### 2.1.3 Control of Environmental Pollutions

Long *et al.* (2021) <sup>[29]</sup> defined control of environmental pollution (CEP) as the measures taken to minimize or eliminate the release of pollutants into the environment to protect public health and the natural world. Also in liberal terms, the control of environmental pollution involves a range of strategies aimed at reducing the impact of human activities on the environment. This includes regulations and policies to limit emissions and waste, as well as the development of cleaner technologies and practices (Igbekoyi *et al.*, 2021) <sup>[17]</sup>.

This may involve a combination of regulatory, technological, and behavioral interventions. Environmental accounting information can play a vital role in controlling environmental pollution by providing relevant data and information that can aid in decision-making processes related to environmental management (Ma *et al.*, 2019) <sup>[30]</sup>. By incorporating information on pollution prevention and reduction measures into their accounting systems, businesses can identify opportunities to improve their environmental performance while simultaneously reducing costs (Long *et al.*, 2021) <sup>[29]</sup>. Overall, effective environmental accounting practices can facilitate the integration of environmental considerations into organizational decision-making processes, helping to promote more sustainable business practices (Yin *et al.*, 2020) <sup>[53]</sup>.

### 2.1.4 Waste Management

According to the United Nations Environment Program (UNEP), waste management (WM) is "the collection, transport, processing, recycling or disposal of waste materials, usually produced by human activity, in an environmentally responsible manner (Kameri-Mbote *et al.*, 2023) <sup>[20]</sup> and (Mattos & Calmon, 2023) <sup>[32]</sup>. This definition emphasizes the importance of managing waste in a way that minimizes harm to the environment. Consequently, the American Society of Civil Engineers (ASCE) defines waste

management as "the planning, design, construction, operation, and maintenance of facilities and systems for the collection, treatment, storage, and disposal of solid, liquid, and gaseous wastes (J. Lee, 2023) <sup>[24]</sup>. Finally, the International Solid Waste Association (ISWA) defines waste management as "the generation, prevention, characterization, monitoring, treatment, handling, reuse and residual disposition of solid wastes (Bockreis & Ragossnig, 2023) <sup>[9]</sup>. This definition takes a more holistic approach to waste management, including not only the physical management of waste but also efforts to reduce waste generation and promote reuse and recycling. Also, this definition highlights the engineering and technical aspects of waste management, including the development of infrastructure to manage waste.

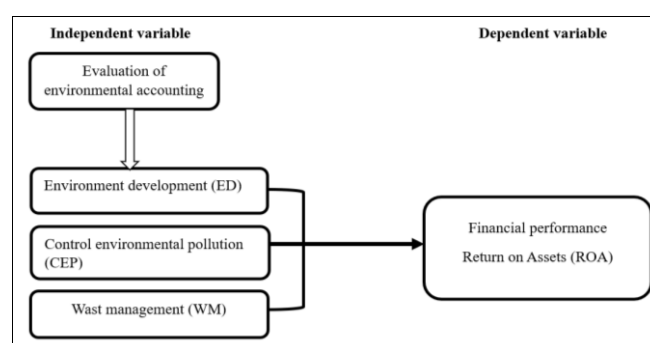
### 2.1.5 Financial Performance

Financial performance (FP) is conceptualized as how well a firm uses its resources to generate revenues and profits (Alexopoulos *et al.*, 2018) <sup>[5]</sup>. On the hand, Centobelli *et al.* (2019) <sup>[10]</sup> defined financial performance as the achievement of a company in terms of profitability, efficiency, liquidity, and solvency. In addition, financial performance refers to the ability of a business to effectively manage its financial resources to achieve its objectives and create value for its stakeholders (Liu, 2020) <sup>[53]</sup> and (Gonenc & Scholtens, 2017) <sup>[15]</sup>. Similarly, firm performance was measured using the return on assets (ROA) of an organization and is widely used by market analysts as a measure of firm performance, as it measures the efficiency of assets in producing income.

### Conceptual framework

This study's conceptual framework was to establish the link between the independent variable and the dependent variable. The independent variable is an evaluation of environmental accounting information (EEAI), proxied with Environment Development (ED), Control Environmental Pollution (CEP), and Waste Management (WM). While the Financial Performance of manufacturing firms (FP) is the dependent variable.

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Source: Author's Conceptualization (2023)

Fig 1: Conceptual Framework

### 2.2 Theoretical Review

This study is anchored on the Resource-based view theory (RBV), which was propounded by Jay Barney in 1991. RBV theory asserted that a firm's resources and capabilities are the primary sources of its competitive advantage. In the context of environmental accounting information and

financial performance, RBV theory might suggest that manufacturing firms in Nigeria should focus on developing and leveraging environmentally sustainable resources and capabilities to improve their financial performance. Madhani, (2010)<sup>[31]</sup> posits that the RBV theory has had a significant impact on Human Resource Management. This theory serves to rationalize the significance of resourcing activities, particularly in talent management and can be leveraged to elevate the value of HR's contribution towards attaining a competitive edge.

According to Gupta *et al.* (2018)<sup>[16]</sup> who asserted that (RBV) on information systems as Internal resources assets owned and controlled by the firm, such as financial, human, physical, and technological resources; whereas external resources are assets that may be earned and controlled, to a certain extent depending on various factors like industry attractiveness and structural autonomy, but not necessarily owned by the firm, such as customers, competitors, and suppliers, among others. strategic management suggests that RBV is a firm's resources, capabilities, and competencies that determine its competitive advantage and performance. In other words, a company's unique internal resources and abilities are more important than its industry or external environment in achieving sustained competitive advantage (Beamish & Chakravarty, 2021)<sup>[8]</sup>.

Consequently, Bag *et al.* (2020)<sup>[7]</sup> pursued that operations management emphasizes the importance of (RBV) on resource allocation and efficiency in achieving operational excellence. It suggests that a company's resources, including tangible assets such as machinery and intangible assets such as knowledge and expertise, should be optimized to improve productivity and reduce costs. In addition, Collins, (2021)<sup>[11]</sup> noted that human resource management also focuses on the (RBV) role of employees in creating organizational capabilities and competitive advantage. It suggests that a company's human capital, including skills, knowledge, and motivation, can be a valuable resource that contributes to the success of the organization.

One potential criticism of the Resource-based view (RBV) theory is that it tends to overlook the importance of external factors in shaping a firm's competitive advantage. This is where the Industrial Organization theory (IO) propounded by Landy, (1992)<sup>[23]</sup> comes into play, which suggests that a firm's industry and market environment are the primary drivers of its profitability and success. According to IO, a firm's competitive advantage is largely determined by the characteristics of its industry, including factors like the number and strength of competitors, barriers to entry, and the bargaining power of suppliers and buyers. While RBV emphasizes the significance of internal resources, IO stresses the importance of external market conditions in shaping a firm's strategy and ultimate success.

### 2.3 Empirical Review

Over the years, environmental accounting and reporting have garnered significant attention from academic researchers. Oraka and Egbunike, (2016)<sup>[39]</sup> appraise environmental accounting information in the financial statements of consumer goods manufacturing companies in Nigeria. The study made use of a descriptive research design. The study finds that there is a significant difference in the environmental disclosure themes of consumer goods manufacturing firms. Also, there is a significant effect of environmental disclosure on total asset turnover and returns

on equity, however, no significant effect was found for the cash flow ratio, current ratio, and returns on assets of the manufacturing companies. The finding of this study justifies the result of the survey by Ofoegbu and Megbuluba, (2016)<sup>[37]</sup> on the impact of an accounting information system on financial performance, while considering the mediating role of internal control. The study collected data through 90 questionnaires distributed among employees of 18 industrial companies. The findings revealed that Timeliness, Accuracy, and Verifiability significantly affected financial performance.

Nguyen and Tran (2019)<sup>[33]</sup> assessed the relationship between disclosure levels of environmental accounting information and financial performance. Based on data collected from firms listed in Vietnam between 2013 and 2017, it has been found that there is a significant correlation between the level of disclosure of environmental accounting information and financial performance. Furthermore, the study indicates that firms that disclose their ecological accounting information tend to have better financial performance compared to those that do not disclose such information. This also supported the study of Ezeagba *et al.* (2017)<sup>[13]</sup> which investigated the relationship between environmental accounting disclosures and the financial performance of food and beverage companies in Nigeria. Data for the study were collected through secondary sources. The study revealed that there is a significant relationship between environmental accounting disclosures and the return on equity of selected companies. It also revealed a negative relationship between environmental accounting disclosures and return on capital employed and the net profit margin of selected companies.

Osemene *et al.* (2016)<sup>[40]</sup> examine the relevance of environmental accounting practices to sustainable development and performance of listed manufacturing companies in Nigeria. Data was collected from annual reports and accounts of thirty-six randomly selected quoted companies in Nigeria. Results revealed that there is a significant positive relationship between sustainable development and return on equity (ROE) and return on assets (ROA); a significant positive relationship between environmental accounting and return on equity (ROE). However, The findings of this study were not in support by Nkwoji, (2021)<sup>[35]</sup> on the relationship between environmental accounting and the Profitability of selected quoted oil and gas companies in Nigeria in recent years 2012-2017. The result shows that there is no significant relationship between environmental expenditure and the net profit of the oil and gas companies in Nigeria. Furthermore, this study is in correlation with the study of Umoren *et al.* (2018)<sup>[50]</sup> on Oil Companies Performance and Environmental Accounting Reporting in Nigeria. The result reviews no significant correlations between environmental accounting reporting and performance measures such as return on capital employed ( $P = 0.175$ ), net profit margin ( $P = 0.95$ ), earnings per share ( $P = 0.423$ ), and dividend per share ( $P = 0.542$ ).

T. D. Nguyen, (2020)<sup>[34]</sup> evaluated the factors that affect the degree of environmental accounting information disclosure. Data are collected from 87 industry companies listed on the Vietnamese stock market from 2009 to 2019. The results show that the extent of environmental accounting information disclosure is influenced by factors: firm size, uptime, and independent audit. These factors positively



affect the level of environmental accounting information disclosure; independent audit has the greatest influence. The study conducted in Nigeria by Shabbir and Wisdom (2020) [45] ascertain the relationship between corporate social responsibility, environmental investments, and financial performance in Nigerian manufacturing firms. The results indicate a positive and significant relationship exists between internal environmental investments and the firm's financial performance.

Thabit and Jasim (2016) [49] evaluated the role of environmental accounting disclosure to reduce harmful emissions from oil refining factories through review the annual financial statements of some oil refining companies in the Kurdistan Region (KGR), and distributing 50 questionnaires. The research suggests that oil refining Kurdistan (KGR) companies have insufficient environmental accounting disclosure practices, with annual financial statements providing limited or no information on environmental accounting. However, the study conducted by Simsek and Öztürk, (2021) [1] evaluates the impact of environmental accounting approaches of businesses on the overall performance of businesses. The data was obtained by random sampling method. the result shows a mutually significant relationship between environmental accounting, and performance.

### 3. Methodology

To ensure the achievement of the objective, this study adopted an ex-post facto research design with a census sampling technique. The population for the study consisted of 177 listed manufacturing firms in Nigeria, and data were collected from their annual reports between 2015 to 2022. To produce statistically significant results, the study considered the sample size of all 177 firms. In analyzing the gathered data, descriptive statistics and multiple regressions were utilized.

#### 3.1 Model Specification

The model for this study was developed in line with the research work done in Nigeria by Osemene *et al.* (2016) [40] on the effects of environmental accounting practices and sustainable development on the performance of Nigerian-listed manufacturing companies.

$$ROE_{it} = \beta_0 + \beta_1 EA_{it} + \beta_2 SD_{it} + \epsilon_{it} \quad (i)$$

However, this particular study adopted the above model by including Environment Development (ED), Control Environmental Pollution (CEP), and Waste Management (WM) as a function of the dependent variable. Thus, below is the study model:

$$EEAI = f(ED, CEP, WM,) \quad (1)$$

$$EEAI = \beta_0 + \beta_1 ED + \beta_2 CEP + \beta_3 WM + \mu \quad (2)$$

Where,

ED = Environment Development.

CEP = Control Environmental Pollution.

WM = Waste Management.

$\beta_0$  = constant of the equation.

$\beta_1, \beta_2, \beta_3$  = unknown coefficient of the variable.

$\mu$  = error term.

A-priori expectation =  $\beta_1, \beta_2, \beta_3, > 0$

## 4. Data Analysis and Discussion of Findings

### 4.1 Descriptive Statistics

Table 1 below presented the descriptive statistics for the study to determine the degree to which the distribution of sample data corresponds to a normal distribution and to access the series characteristics of the variables. In listed manufacturing companies, just 0.004 percent of sales was spent on environmental development, with a coefficient of variation of more than 200 percent, according to the average value of environmental development (ED), which is 0.0048567 with a standard deviation of 0.0097878. As the minimum value is 0 and the maximum value is 0.028 2223 percent, there exist companies with no environmental development commitment. The variable's data are positively skewed, having a kurtosis value of 1.523313, and are regularly distributed with a kurtosis value of 4.969314. However, Control of Environmental Pollution (CEP), on the other hand, has a mean value of 0.4583333 and a standard deviation of 0.5089774, indicating that there is significant variation in the reporting of CEP, with a coefficient of variation of more than 100%. The data is positively skewed with a 0.1672484 value and normally distributed with a kurtosis value of 1.027972. The minimum and maximum values are 0 and 1, respectively. Furthermore, waste management has an average value of 0.17038 with a standard deviation of 0.2631128, indicating there is high variability in the waste management responsibility of the listed manufacturing companies. The minimum value is 0, while the maximum is 0.8805401. the data is positively skewed having a value of 1.409692 and a kurtosis value of 3.681439. The average Return on Assets (ROA) for listed manufacturing companies is -3.5968, which shows that these companies significantly perform poorly in terms of how they use the resources under their control. The coefficient of variation for ROA is 31 percent, and the standard deviation at 14.0981 suggests that ROA is significantly and consistently high across all manufacturing companies. The value of the company with the lowest return on assets is -41.51794, and the value of the company with the highest return on assets is 7.53158. Therefore, the variable's data has an irregular distribution with a kurtosis value over 3 and a value of 4.969314, and it is negatively skewed (-1.81446).

**Table 1:** Descriptive Statistics

Variables	ED	CEP	WM	ROA
Mean	0.0048567	0.4583333	0.1703838	-3.596822
Maximum	0.0282223	1	0.8805401	7.53158
C.V	2.015336	1.110496	1.544236	1-3.919606
Minimum	0.0	0.0	0.0	-41.51794
Std. Dev	0.0097878	0.5089774	0.2631128	14.09812
Skewness	1.523313	0.1672484	1.409692	-1.81446
Kurtosis	3.458045	1.027972	3.681439	4.969314
Observations	24	24	24	24

Source: Researcher's Computation (2022)

### 4.2 Test of Variables

#### 4.2.1 Normality Test

From Table 2 below, the results significances show that variables that describe how environmental accounting information is evaluated have P-Values greater than the 0.05 level, which was stated in the table at the 5% significance level. This meant that the independent samples' sample means were regularly distributed.

**Table 2:** Sphero-Wilk W Test for Data Normality

Variable	Obs	W	V	Z	Prob>Z
Residuals	24	0.94766	1.412	0.703	0.24092
Skewness/kurtosis Tests for Normality					
Variable	Obs	Pr (Skewness)	Pr(kurtosis)	Adj chi2(2)	Prob>chi2
Residual	24	0.0792	0.1570	5.01	0.0816

Source: Researchers Computation (2022)

#### 4.2.2 Linearity Test

Table 3 shows the relationship between return on assets (ROA) and environmental development (ED) is positive, with a coefficient of 0.2053, which means that if manufacturing companies consider their impact on environmental development, the performance will of the firms will also increase by 20.53% similarly the relationship on the environmental development is not significant at 0.05% with the probability value of (0.3358). Also, the relationship between returns on assets (ROA) and control of environmental pollution (CEP) is positive with a coefficient of 0.3782, which means the improvement in reporting, consequently, their performance will improve with 0.3782% however the relationship is not significant at 5% reviewing P-value at (0.0684).

Moreover, in Table 3 the relationship between returns on assets (ROS) and waste management (WM) on the manufacturing companies is negatively significant, with a value of -0.4444, which means that with little commitment by manufacturing companies to waste management will reduce by -0.4444% and with 5% level of significance on the probability value of (0.0296). in addition, the relationship between the explanatory variables does not have multicollinearity as it is not in the expected threshold of 0.7. Therefore, the relationship observed between the control of environmental pollution and waste management is low with a coefficient value of 0.0307. However, the relationship between environmental development (ED) and waste management is negatively significant, while the order variable has a positive relationship.

**Table 3:** Correlation Analysis of Study Variables

	ROA	ED	CEP	WM
ROA	1.0000			
ED	0.2053 (0.3358)	1.0000		
CEP	0.3782 (0.0684)	0.5510* (0.0053)	1.0000	
WM	-0.4444* (0.0296)	-0.3064 (0.1454)	0.0307 (0.8868)	1.0000

Source: Researchers Computation (2022)

#### 4.2.3 Panel Unit Root Test of the Variables

Unit root test results displayed in Table 4, shows the integrated order of variable to be zero, (0).

**Table 4:** Panel Unit Root Test

Variable	Levine, Lin & Chu t*		Harris-Travails	
	Test-statistics	P-value	Z-statistics	P-value
ROA	-17.6896	0.0000	-1.2985	0.0097
ED	-3.5315	0.0001	-4.4344	0.0000
CEP	-4.0020	0.0000	-3.4982	0.0002
WM	-6.1729	0.0000	-2.8673	0.0021

Source: Authors Computation (2022)

#### 4.2.4 Multicollinearity Test of the Variables

The multicollinearity outcome using the variance inflation factors, having analyzed the degree of correlation between independent variables, will be reported in Table 5. The result is insignificant as the tolerance value is comparatively above the established rule of thumb. Consequently, based on the result presented, it can be said that with no multicollinearity problems, the VIF values of variables reviewed in the table are less than 10, while the tolerance values in the rule of thumb are greater than 0.10. Also, the Heteroscedasticity test shows the probability value to be 0.0152 which implies the presence of heteroscedasticity problems. The data used for the study was also tested for auto-correlation using the Wooldridge test for autocorrelation in panel data, however, the result for the probability is 0.0236 which implies the significance present of Auto-correlation problems.

**Table 5a:** Post-Estimation Test Results

Shapiro-Wilk Test		
Null Hypothesis	Statistics	Probability
Distribution of the residuals is normal (P>0.05)	0.703	0.24092
Tolerance and VIF Value		
Null Hypothesis	VIF	1/VIF
The variables have no evidence of multicollinearity. (1/VIF)	1.81>	0.10)
Breusch-Pagan/cook-Weisberg test for Heteroscedasticity		
Null Hypothesis	Statistics	Probability
Residuals with a constant across the variables (P>0.05)	5.90	0.0152
Wooldridge test for autocorrelation		
Null Hypothesis	Statistics	Probability
No first-order autocorrelation (P>0.05)	18.233	0.0236
Hausman Specification Test		
Null Hypothesis	Statistics	Probability
The coefficient of variation is not systematic.	12.53	0.0138

Source: Researchers Computation (2022)

**Table 5b:** Tolerances and VIF Value

Variable	VIF	1/VIF
ED	2.20	0.453762
CEP	1.74	0.576003
WM	1.19	0.841803
Mean VIF	1.81	

Source: Researchers Computation (2022)

#### 4.3 Evaluation of Environmental Accounting Information and Financial Performance

The result of regressed the evaluation of environmental accounting information such as environmental development (ED), control of environmental pollution (CEP), and waste management (WM) on the financial performance which was stated in the model after meeting the level of significance for the Best Linear Un-bias estimate (BLUE) as a review in table 6. This shows that there is the presence of heteroskedasticity problems and serial correlation which was corrected in the panel's regression.

A P-value of 0.0138 was determined in the Hausman specification test, which was significant at 5%.which also implies that it is thought that the diversity in distinctive qualities among companies is fixed. As a result, the panels

corrected standard errors (PCSEs) regression was interpreted, and the basic level of judgment employed is the t-statistics and probability value. The fixed effect model is not interpreted as a result of the failure in various post-estimation tests. According to the R-squared test result of 0.5283, the explanatory variable has a 52.83% influence on the dependent variable, with the error term accounting for the remaining percentage. The firms' involvement in particular businesses with little emphasis on them may be the reason for the discrepancy in explanatory power. Additionally, Wald chi2 confirms the significance of the explanatory factors, and the null hypothesis that the coefficients are not simultaneously equal to zero is disproved as shown by the result, which is 20.27 at 4 degrees of freedom. Given that the probability value for the model is 0.0004, it is significant because it is less than 0.05. The overall findings indicate that the assessment of environmental accounting information has a significant negative impact on the financial performance of manufacturing companies listed in Nigeria. Specifically, the results of regression analysis for each proxy reveal that environmental development (ED) has a statistically significant negative effect on manufacturing companies' performance, as evidenced by a Z-statistic of -2.78 and a probability value of 0.005. Additionally, control of environmental pollution positively and significantly affects returns on assets (ROA), as indicated by a Z-statistic of 2.11 and a probability value of 0.035. On the other hand, waste management (WM) has a significant negative impact on the performance of manufacturing firms, with a Z-statistic of -2.72 and a probability value of 0.007. The result of this study has several important implications. One notable finding is that the negative impact of environmental development on firm performance suggests that manufacturing firms have not fully capitalized on the potential benefits of environmental initiatives. This implies that these firms may be lacking in green innovation, which could be advantageous during times of economic challenges. This may also explain why Nigerian manufacturing companies are struggling and experiencing consistent financial losses.

The results of the study are in line with the results of Oraka and Egbunike, (2016) <sup>[39]</sup> who found that there is a significant difference in the environmental disclosure themes of consumer goods manufacturing firms in Nigeria. Also, there is a significant effect of environmental disclosure on total asset turnover and returns on equity, however, no significant effect was found for the cash flow ratio, current ratio, and returns on assets of the manufacturing companies. The finding of this study justifies the result of the survey by Ofoegbu and Megbuluba, (2016) <sup>[37]</sup> on the impact of an accounting information system on financial performance, while considering the mediating role of internal control. The findings revealed that Timeliness, Accuracy, and Verifiability significantly affected financial performance.

Furthermore, Nguyen and Tran (2019) <sup>[33]</sup> found a correlation between the level of disclosure of environmental accounting information and financial performance. assessing the relationship between disclosure levels of environmental accounting information and financial performance. Based on data collected from firms listed in Vietnam between 2013 and 2017, it has been found that there is a significant. This also supported the study of Ezeagba *et al.* (2017) <sup>[13]</sup> which

investigated the relationship between environmental accounting disclosures and financial performance in Nigeria. The study revealed that there is a significant relationship between environmental accounting disclosures and the return on equity of selected companies.

Lastly, Osemene *et al.* (2016) <sup>[40]</sup> examine the relevance of environmental accounting practices to sustainable development and performance of listed manufacturing companies in Nigeria. Results revealed that there is a significant positive relationship between sustainable development and return on equity (ROE) and return on assets (ROA); a significant positive relationship between environmental accounting and return on equity (ROE). However, The findings of this study were not in support by Nkwoji, (2021) <sup>[35]</sup> on the relationship between environmental accounting and the Profitability of selected quoted oil and gas companies in Nigeria. The result shows that there is no significant relationship between environmental expenditure and the net profit of the oil and gas companies in Nigeria. Furthermore, this study is in correlation with the study of Umoren *et al.* (2018) <sup>[50]</sup> on Oil Companies Performance and Environmental Accounting Reporting in Nigeria. The result reviews no significant correlations between environmental accounting reporting and performance measures such as return on capital employed (P = 0.175), net profit margin (P = 0.95), earnings per share (P = 0.423), and dividend per share (P = 0.542).

**Table 6:** Panel Corrected Standard Errors Regression Result

ROA	Coef.	Std. Err.	Z	P>z
ED	-751.3204	270.1177	-2.78	0.005
CEP	10.16399	4.817763	2.11	0.035
WM	-26.86596	9.875594	-2.72	0.007
Number of Obs = 24				
R-squared = 0.5283				
Wald chi2 (4) = 20.2				
Prob>F = 0.0004				

**Source:** Researchers Computation (2022)

#### 4.4 Discussion of findings

In light of the adverse impact of environmental degradation on study results, manufacturing companies should prioritize investment in ecological development, including the adoption of new techniques and environmental accounting practices, to improve their financial performance. This could involve finding and implementing advanced software solutions to reduce costs associated with pollution management. Additionally, companies should make concerted efforts to minimize expenses related to waste management, as prolonged high expenses can lead to losses. Management should explore innovative methods of waste reduction and maintenance. In line with environmental pollution control policies, further steps should be taken to mitigate the pollution effects on companies and boost profitability. Furthermore, improved accounting strategies could be developed to effectively manage company assets and generate higher revenue, which can facilitate better environmental accounting information.

#### 5. Conclusion and Recommendations

The study examined an evaluation of environmental accounting information and financial performance of listed manufacturing firms in Nigeria; with this proxy environmental development, control of environmental



pollution, and waste management on the return on assets. The research revealed that the provision of environmental accounting information has a negative significant adverse effect on financial performance. The results also indicate that environmental development and waste management have a significant negative effect. Efforts to mitigate environmental pollution positively impact the financial performance of manufacturing companies.

The study, therefore, recommends that:

1. Manufacturing companies to prioritize investment in ecological development, including the adoption of new techniques and environmental accounting practices,
2. Implementing robust measures to control environmental pollution is imperative for sustainable business operations and long-term success.
3. Adopting effective waste management practices, such as recycling, reducing, and reusing, is crucial for minimizing environmental impact and promoting sustainable waste management.

## 6. References

1. Simcsek H, Öztürk G. Evaluation of the relationship between environmental accounting and business performance: The case of Istanbul province. *Green Financ.* 2021; 3(1):46-58.
2. Ahmad M, Waseer WA, Hussain S, Ammara U. Relationship between environmental accounting and non-financial firms' performance: An empirical analysis of selected firms listed in Pakistan Stock Exchange, Pakistan. *Advances in Social Sciences Research.* 2018; 5(1).
3. Al-Mawali H, Al Sharif A, Rumman GMA, Kerzan F, Liu G. Environmental strategy, environmental management accounting and organizational performance: Evidence from The United Arab Emirates Market. *Journal of Environmental Accounting and Management.* 2018; 6(2):105-114.
4. Al-Waeli AJ, Hanoon RN, Ageeb HA, Idan HZ. Impact of accounting information system on financial performance with the moderating role of internal control in Iraqi industrial companies: An analytical study. *Jour of Adv Research in Dynamical & Control Systems.* 2020; 12(8):246-261.
5. Alexopoulos I, Kounetas K, Tzelepis D. Environmental and financial performance. Is there a win-win or a win-loss situation? Evidence from the Greek manufacturing. *Journal of Cleaner Production.* 2018; 197:1275-1283.
6. Anand R. *International environmental justice: A North-South dimension.* Routledge, 2017.
7. Bag S, Wood LC, Xu L, Dhamija P, Kayikci Y. Big data analytics as an operational excellence approach to enhance sustainable supply chain performance. *Resources, Conservation and Recycling.* 2020; 153:104559.
8. Beamish PW, Chakravarty D. Using the resource-based view in multinational enterprise research. *Journal of Management.* 2021; 47(7):1861-1877.
9. Bockreis A, Ragossnig AM. Celebrating WM & R's first 40 years. In *Waste Management & Research.* SAGE Publications Sage UK: London, England. 2023; 41(1):1-2.
10. Centobelli P, Cerchione R, Singh R, others. The impact of leanness and innovativeness on environmental and financial performance: Insights from Indian SMEs. *International Journal of Production Economics.* 2019; 212:111-124.
11. Collins CJ. Expanding the resource-based view model of strategic human resource management. *The International Journal of Human Resource Management.* 2021; 32(2):331-358.
12. Das S, Lee SH, Kumar P, Kim KH, Lee SS, Bhattacharya SS. Solid waste management: Scope and the challenge of sustainability. *Journal of Cleaner Production.* 2019; 228:658-678.
13. Ezeagba CE, John-Akamelu CR, Umeoduagu C. Environmental accounting disclosures and financial performance: A study of selected food and beverage companies in Nigeria (2006-2015). *International Journal of Academic Research in Business and Social Sciences.* 2017; 7(9):162-174.
14. Fernando Y, Jabbour CJC, Wah WX. Pursuing green growth in technology firms through the connections between environmental innovation and sustainable business performance: Does service capability matter? *Resources, Conservation and Recycling.* 2019; 141:8-20.
15. Gonenc H, Scholtens B. Environmental and financial performance of fossil fuel firms: A closer inspection of their interaction. *Ecological Economics.* 2017; 132:307-328.
16. Gupta G, Tan KTL, Ee YS, Phang CSC, *et al.* Resource-based view of information systems: Sustainable and transient competitive advantage perspectives. *Australasian Journal of Information Systems.* 2018; 22.
17. Igbekoyi OE, Ogungbade OI, Olaleye AG. Financial Performance and Environmental Sustainability Reporting Practices of Listed Manufacturing Firms in Nigeria. *Global Journal of Accounting.* 2021; 7(1):15-24.
18. Ironkwe U, Nwaiwu J. Accounting Information System on Financial and Non-Financial Measures of Companies in Nigeria. *International Journal of Advanced Academic Research| Business Development & Management.* 2018; 4(2):39-55.
19. Jaradat AAR, bin Abdul Rahman SA. Barriers of Implementing Balanced Scorecard in Jordan: A Case Study of Jordanian Banks. *Economia: Journal of Economics and Management.* 2022; 1(1).
20. Kameri-Mbote P, Pisupati B, Smagadi A, Meso A, Sung H, Gachie A. United Nations Environment Programme: The Role of Environmental Law and Governance in Transformational Change to Address the Triple Planetary Crisis. *Law, Environment and Development Journal.* 2023; 19(1):251-265.
21. Koval V, Mikhno I, Udovychenko I, Gordiichuk Y, Kalina I. Sustainable natural resource management to ensure strategic environmental development. *TEM Journal.* 2021; 10(3):1022.
22. La Soa Nguyen MDT, Nguyen TXH, Le QH. Factors affecting disclosure levels of environmental accounting information: The case of Vietnam. *Accounting and Finance Research.* 2017; 6(4).
23. Landy FJ. Hugo Münsterberg: Victim or Visionary? *Journal of Applied Psychology.* 1992; 77(6):787.
24. Lee J. Theoretical Translation of Clean Water to



- Wastewater Oxygen Transfer Rates. *Journal of Environmental Engineering*. 2023; 149(1):4022085.
25. Lee MT, Suh I. Understanding the effects of Environment, Social, and Governance conduct on financial performance: Arguments for a process and integrated modelling approach. *Sustainable Technology and Entrepreneurship*. 2022; 1(1):100004.
  26. Li M, Wiedmann T, Hadjikakou M. Towards meaningful consumption-based planetary boundary indicators: The phosphorus exceedance footprint. *Global Environmental Change*. 2019; 54:227-238.
  27. Liu Z. Unraveling the complex relationship between environmental and financial performance- A multilevel longitudinal analysis. *International Journal of Production Economics*. 2020; 219:328-340.
  28. Liu Z, Bai Y. The impact of ownership structure and environmental supervision on the environmental accounting information disclosure quality of high-polluting enterprises in China. *Environmental Science and Pollution Research*, 2022, 1-17.
  29. Long C, Jiang Z, Shangguan J, Qing T, Zhang P, Feng B. Applications of carbon dots in environmental pollution control: A review. *Chemical Engineering Journal*. 2021; 406:126848.
  30. Ma X, Chai Y, Li P, Wang B. Metal-organic framework films and their potential applications in environmental pollution control. *Accounts of Chemical Research*. 2019; 52(5):1461-1470.
  31. Madhani PM. The resource-based view (RBV): Issues and perspectives. *PACE, A Journal of Research of Prestige Institute of Management*. 2010; 1(1):43-55.
  32. Mattos F, Calmon JL. Social Life Cycle Assessment in Municipal Solid Waste Management Systems with Contribution of Waste Pickers: Literature Review and Proposals for New Studies. *Sustainability*. 2023; 15(2):1717.
  33. Nguyen L, Tran M. Disclosure levels of environmental accounting information and financial performance: The case of Vietnam. *Management Science Letters*. 2019; 9(4):557-570.
  34. Nguyen TD. Factors influencing environmental accounting information disclosure of listed enterprises on Vietnamese stock markets. *The Journal of Asian Finance, Economics and Business*. 2020; 7(11):877-883.
  35. Nkwoji N. Environmental accounting and profitability of selected quoted oil and gas companies in Nigeria (2012-2017). *Journal of Accounting and Financial Management*. 2021; 7(3):22-39.
  36. Oduro S, Adhal Nguar KD, De Nisco A, Alharthi RHE, Maccario G, Bruno L. Corporate social responsibility and SME performance: A meta-analysis. *Marketing Intelligence & Planning*. 2022; 40(2):184-204.
  37. Ofoegbu GN, Megbuluba A. Corporate environmental accounting information disclosure in the Nigeria manufacturing firms. *International Journal of Management Sciences and Business Research*. 2016; 5(12).
  38. Onodi BE, Ibiam O, Akujor JC. Management accounting information system and the financial performance of consumer goods firms in Nigeria. *European Journal of Business and Management Research*. 2021; 6(1):112-120.
  39. Oraka AO, Egbunike FC. Appraisal of Environmental Accounting Information in the Financial Statements of Consumer Goods Manufacturing Companies in Nigeria. *NG-Journal of Social Development*. 2016; 5(6):6-28.
  40. Osemene OF, Kolawole KD, Oyelakun O. Effects of environmental accounting practices and sustainable development on the performance of Nigerian listed manufacturing companies. *Journal of Sustainable Development in Africa*. 2016; 18(2):128-143.
  41. Pellow DN. Toward a critical environmental justice studies: Black Lives Matter as an environmental justice challenge. *Du Bois Review: Social Science Research on Race*. 2016; 13(2):221-236.
  42. Resta B, Gaiardelli P, Pinto R, Dotti S. Enhancing environmental management in the textile sector: An organisational-life cycle assessment approach. *Journal of Cleaner Production*. 2016; 135:620-632.
  43. Rounaghi MM. Economic analysis of using green accounting and environmental accounting to identify environmental costs and sustainability indicators. *International Journal of Ethics and Systems*, 2019.
  44. Scoones I. Livestock, methane, and climate change: The politics of global assessments. *Wiley Interdisciplinary Reviews: Climate Change*. 2023; 14(1):790.
  45. Shabbir MS, Wisdom O. The relationship between corporate social responsibility, environmental investments and financial performance: Evidence from manufacturing companies. *Environmental Science and Pollution Research*. 2020; 27:39946-39957.
  46. Spaargaren G, Mol APJ. Sociology, environment, and modernity: Ecological modernization as a theory of social change. *Society & Natural Resources*. 1992; 5(4): 323-344.
  47. Susanto A, Meiryani M. The impact of environmental accounting information system alignment on firm performance and environmental performance: A case of small and medium enterprises of Indonesia. *International Journal of Energy Economics and Policy*. 2019; 9(2):229.
  48. The D, Khan T, Corbitt B, Ong CE. Sustainability strategy and blockchain-enabled life cycle assessment: A focus on materials industry. *Environment Systems and Decisions*. 2020; 40:605-622.
  49. Thabit TH, Jasim YA. The Role of Environmental Accounting Disclosure to Reduce Harmful Emissions of Oil Refining Companies. *ZANCO Journal of Pure and Applied Sciences*. 2016; 28:54-60.
  50. Umoren AO, Akpan MO, Okafor LN. Oil companies performance and environmental accounting reporting in Nigeria. *Asian Journal of Economics, Business and Accounting*. 2018; 8(1):1-8.
  51. Van S, Cheremisin A, Chusov A, Zueva O, Dolgoplov A, Nikulina E, Switala F, Davydov R. New architectural and planning solutions as a mean of ecological modernization and reconstruction of urban environment (on the example of Shanghai city, China). *IOP Conference Series: Earth and Environmental Science*. 2019; 390(1):12011.
  52. Woo C, Kim MG, Chung Y, Rho JJ. Suppliers' communication capability and external green integration for green and financial performance in Korean construction industry. *Journal of Cleaner Production*. 2016; 112:483-493.
  53. Yin Z, Zhu L, Li S, Hu T, Chu R, Mo F, *et al.* A comprehensive review on cultivation and harvesting of

microalgae for biodiesel production: Environmental pollution control and future directions. *Bioresource Technology*. 2020; 301:122804.