Environmental Accounting Disclosure and Firm Performance in Listed Nigerian Manufacturing Firms

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Abstract

Knowledge of a firm's environment and environmental issues can assist in making effective management decisions and meeting environmental and consumer health requirements. This study examines whether an affirmative relationship exists between environmental accounting disclosure and firm performance measured by return on assets, Tobin's q, and economic value added of listed manufacturing firms in Nigeria. The study population comprises all listed manufacturing firms in Nigeria across different sectors, totaling forty-six (46), while a sample of forty-three was used, excluding firms with incomplete data. The study employed a correlational research design to analyze data from 2019 to 2022 using the OLS and Panel data regression analysis models. Findings revealed that environmental accounting disclosure has a statistically significant relationship with Return on Asset (ROA) but not with Tobin Q and Economic Value Added (EVA, both market-based financial performance measures. The study recommends that regulatory agencies in Nigeria, such as the SEC, should mandate firm managers to disclose their environmental accounting performance. This is crucial to ensure that firms are not disadvantaged if their environmental accounting disclosure does not affect the market value of their shares, as the market value is a more realistic measure of financial performance for investors.

Keywords: Environmental Accounting, Environmental Accounting Disclosure, Tobin Q, Return on Asset, Economic Value Added.

1.0 Introduction

Environmental wildlife is a significant constituent of the natural resources enterprises should report (Jones, 2003). It is expected that a firm's activities in its environment might have depleted its cash flow and thus had a consequent negative impact on its financial report. The situation of a business about its environment is readily explained by environmental accounting. Business activities either have a positive or negative effect on their environment. Also, the environment contributes to the benefits and drawbacks of the firm's productive business activities (Nguyen et al., 2017). Environmental accounting involves integrating the economic role of firms' environment into their financial statements (Jones, 2010; Hecht, 1999).

Jones (2003) observed that firms in the early 1990s were less willing to report on their environmental wildlife activities in the UK. However, the narratives have changed, with legislation and laws now mandating environmental accounting reporting and

sanctions for non-compliance. Similarly, Hecht (1999) noted the growing interest in environmental accounting in promoting an understanding of the links between the economy and the environment. Jones (2010) also emphasized the need for a holistic accounting that captures corporate environmental impacts and that firms should report their environmental accounting as a stewardship function to their stakeholders. Agyemang et al. (2023) also noted that China's inclusion of green accounting in its national sustainable development accounting suggests its high interest in standardizing corporate environmental accounting. Extant literatures are, therefore, suggestive of a growing interest in environmental accounting.

Environmental accounting examines how firms account for and disclose their environmental impacts as well as the impact of their environmental performance on their firm performance. The difficulty often encountered in environmental accounting research is the measurement and disclosure of environmental accounting. Environmental Accounting measurement seems diverse, with constructs like corporate social responsibility, sustainability reporting, social accounting, and environmental controlling costs being used to measure environmental accounting (Qian et al., 2021: Taygashinova & Akhmetova, 2019).

Measuring environmental costs in relative and absolute terms may have posed a challenge; hence, measuring environmental costs by their compliance and disclosure as required by the laws seems much more accessible and acceptable, especially considering that environmental disclosure is multidimensional and is driven by complementary forces (Cormier et al., 2005).

Jones (2003), though, noted that disclosing environmental activities that might have depleted a firm's cash flow and thus negatively affected its financial reports might be challenging. However, firm managers now seem constrained by legislation to report on their firms' environmental activities, particularly in the developed economies, Moreso that investors perceive firms that disclose their social and environmental activities as socially responsible.

Qian et al. (2021) posited that limited research exists on social and environmental accounting in developing countries. They noted further that environmental accounting received less focus in developing countries, compared to social accounting, despite the environmental hazards like climate change, water pollution, and biodiversity loss the developing countries are exposed to. Nigerian listed manufacturing firms, for instance, may have received less focus on their environmental accounting reporting and disclosure as there seems to be no regulation yet mandating such. Similarly, Ojo and Balogun (2019) examined the effect of environmental accounting disclosure on firms' profitability in Nigeria using the amount incurred on environmental protection by firms to proxy environmental accounting disclosure. The study used a panel dataset from 2012 to 2017 for eighteen

randomly selected quoted companies in the Nigeria Stock Exchange, of which three each were selected from different sectors in the manufacturing and servicing sector. Aside from the non-popularity of environmental protection costs to measure environmental accounting disclosure, the dataset distribution was such that it was not sufficient to make inferences for any sub-sector or the entire Nigerian sector.

Agyemang et al. (2023) also examined the impact of environmental accounting disclosure on corporate performance using listed firms in China, though a developing economy as well, but not on the same pedestal as Nigeria. Also, Solanke et al. (2021) examined the effect of environmental accounting disclosure on the financial performance of listed ICT firms in Nigeria. The nature of the sector makes it less impactful on its environment, as its activities are mostly in space.

This study departs from existing studies by examining the effect of environmental accounting disclosure on firm performance in Nigeria, using a dataset from manufacturing firms listed on the Nigerian Exchange Group from 2019 to 2022. This study measures environmental accounting disclosure by the Environmental Accounting Disclosure Index (EAID) as released by the 2019 Nigerian Securities and Exchange Commission (SEC) guidelines for listed companies on sustainable financial principles for the Nigerian capital market. The guidelines require listed firms to give their sustainability report under three major environmental, social, and economic headings. The environmental activities include Greenhouse Gas Emissions, Energy and Water Use, Waste Management, Land Biodiversity, and Polluting Plant and Machinery assets to measure environmental sustainability performance (SEC Guidelines on Sustainable Financial Principles for the Nigerian Capital Market (2019). Firms that fully disclose these activities are thought to perform well in environmental sustainability.

Therefore, the main objective of this study is to ascertain the relationship between environmental accounting disclosure and the financial performance of listed manufacturing firms in Nigeria. This study would immensely benefit firm managers as it will enable them to know the impact of environmental accounting disclosure on their firms' performance. The study will also benefit the social and community analysts, who will identify the organization's impact on its environment and vice versa. Also, Governments at all levels, researchers, and International Environmental Organizations would find this study helpful as they would be informed on how best to regulate firms' activities on environmental resource use, environmental emissions, and environmental innovation. Finally, investors and potential investors may also be interested in knowing how well a firm is doing about its environment.

2.0. Literature Review

This section discussed the concepts, theories, and existing literature used in this study.

2.1. Environmental Accounting Performance

Financial information was thought to have left out high 'costs,' such as environmental

and social costs, as accounting had been restricted to the information represented by material and financial goods of entities (Stanciu et al., 2011). Environmental accounting is the identification, allocation, and analysis of material flows and environmental cash flows to provide insight into environmental impacts and the related financial consequences.′ (Stancui, et al., 2011). International Federation of Accountants (IFAC) (2005) also defined environmental accounting as assessing and disclosing environment-related financial information in financial accounting and reporting. Many definitions of environmental accounting suggest that a financial statement may only be wholly exclusive if it incorporates such costs associated with the environmental impacts caused by the environment on the business while not leaving out the impact of the business on the environment. In Nigeria, for instance, the primary source of Government revenue is crude oil exploration, which involves activities that occur continuously in the environment, affecting predominantly the immediate environment where such activities occur. The impact of oil exploration and mining activities on the environment has been described as huge and warrants adequate compensation for affected communities through the development of taxes and levies. Organizations involved would have to consider the economic costs of the impact of their activities on the environment, separate from their CSR activities and the taxes payable as enshrined in the relevant operational laws and guidelines (Petroleum Industry Act, 2021).

The GRI framework seems to have provided a comprehensive, consistent, reliable, and universally acceptable framework for reporting on sustainability reports, including the environmental report (KPMG, 2008; Unep & Uncga, 2010). The GRI focuses on corporate sustainability reporting, disclosure, and performance. The SEC guidelines on sustainable financial principles for the Nigerian capital market (2019) also focused on the disclosure of environmental matters in the ESG report. This study took a cue from this by emphasizing the disclosure. Hamilton (1994) argued that it is unethical to value wildlife as it suggests that it could be traded or even destroyed. Also, there seems to be no consensus on the appropriateness of valuing national assets and which valuation method to use (Peterson & Peterson, 1993). The problem of the appropriate valuation of the assets seems to pose a significant challenge. While some studies opined that the intrinsic value of the assets is usually ignored during valuation, others opined the non-appropriateness of valuing the actual assets and lack of knowledge of the valuation method that may be the best fit (Milne, 1991; Turner et al., 1994: Pearce, 1993).

Most organizations now report environmental accounting as part of the ESG or the sustainability report. Organizations are expected to be socially responsible for the resources in their immediate environment and their depletion (Rubinstein, 1992). ESG comprises moral contributions to economic growth and improves the standard of life of the employees, their families, and the people around them. ESG

looks pretty significant in developed countries, with encouraging environmental performance. However, it is still at a marginal compliance stage in emerging economies with environmental performance challenges (Kengkathran, 2018). Environmental performance is, therefore, an essential constituent of ESG reporting. Bennet and James (1997) opined that the organization's sound knowledge of the environment and environmental issues would assist in making effective management decisions. It also enables management to meet the requirements regarding the environment and the consumer's health. It also helps the organization avoid such sanctions associated with non-compliance. These points underscore the importance of environment and environmental accounting to the business.

The Nigerian Securities and Exchange Commission (SEC) released its guidelines in year 2019 for listed companies on sustainable financial principles for the Nigerian capital market. The guidelines require listed firms to give their sustainability report under three major environmental, social, and economic headings. The SEC (2019) guidelines also require firms to put in place effective governance structures and consider the impact of their operations and activities on the environment and society, innovate, and implement measures that promote the good of the communities and the natural environment in which they operate. Firms are also expected to report their activities under seven (7) enumerated principles, with each item listed under the principles scored as 'completed,' 'in progress,' 'yet to start,' and 'not applicable' (SEC Guidelines on Sustainable Financial Principles for the Nigerian Capital Market, 2019). Principles 1.3 and 1.5, which relate directly to environmental accounting and reporting, form the fulcrum of this study. Principle 1.3 states that firms should develop programs and manage their environment and social footprint. The programs so developed should reduce greenhouse gas emissions, promote efficient use of water and energy, and improve waste and construction management (SEC guidelines on sustainable financial principles for the Nigerian capital market, 2019). Principle 1.5 states that firms should develop and promote investment in community projects and initiatives to contribute to the sustainable development of their host communities (SEC Guidelines on Sustainable Financial Principles for the Nigerian Capital Market, 2019). The guidelines also specify the factors to consider for the above principles. These factors include the reduction of greenhouse gas emissions, efficient use of water and energy, and effective waste management, among others. This study adopted environmental greenhouse gas emission reduction, efficient energy consumption, efficient water usage, effective waste management, Land Biodiversity, and polluting Plant and Machinery assets as environmental accounting measures.

2.2. Environmental Accounting Disclosure and Firm Performance

Environmental accounting, a growing concern for entities, holds the potential to

create value for firms. Ting et al. (2020) observed that firms are considered socially responsible when they include reports on environmental activities in their financial statements. These activities could create value through improved productivity, corporate reputation, and market share. This aligns with the stakeholders' theory of satisfying the needs and expectations of various stakeholders in the firm, which, in turn, improves the firm's financial performance. Bennet and James (1997) also opined that a good knowledge of a firm's environment and environmental issues might assist in making effective management decisions. It also enables management to meet the requirements regarding the environment and the consumer's health. These points underscore the importance of environmental accounting and its disclosure on the firm's performance. However, Stanciu et al. (2011) observed that financial statements might have left out these ‘important costs,' such as environmental and social costs. The reason for this omission may not be unconnected with the little or no attention given to the business's environment and social issues, particularly in developing economies.

Ting et al. (2020) also noted that a firm's performance is affected largely by its social responsibility behavior. Socially responsible firms include reports on such activities that could lead to value creation in the form of improved productivity, improved corporate reputation, and market share to attract investors' confidence, which, in turn, improves shareholders' wealth. This position is also in tandem with the stakeholders' theory of satisfying the needs and expectations of various stakeholders in the firm, improving the firm's financial performance. Extant literature suggests that society also expects organizations to be socially responsible and clamor for penalties for organizations that seem not responsible, particularly concerning accounting for their environment (Ojo & Balogun, 2019; Qian et al., 2021).

2.3. Theoretical Review

Relevant theories to this study were reviewed in this section. Extant literature borrows corporate sustainability concepts, including environmental reporting elements from the established institutional theories, stakeholder theory, and resource-based theory (Laskar & Maji, 2018). The institutional theory opines that firms engage in environmental reporting as a norm, aligning with what similar firms do and as a response to external pressures from outside the firm. The stakeholders' theory relates to the demand for information from stakeholders on the firm's various activities (KPMG, 2013), while the resource-based theory opined that companies could develop and maintain a reasonable advantage over others by efficiently managing rare, valuable, and non-sustainable resources. This efficient management of resources will also include the management of its environmental resources, as disclosed in the environmental reporting (Lourenco et al., 2012).

Also, the study by Agyemang et al. (2023) was based on the theory of environmental economics, which focused on the connection between the environment and economic

conditions as investors seem to be concerned about the firm's overall success, including environmental performance (Cappellaro et al., 2020: Precul et al., 2022). Thus, firms tend to gain more acceptance for their environmental reporting and become more attractive to ethical investors, eventually increasing their market capitalization (Unep & Uncga, 2010). Firms also get more anticipated earnings with lower risk for investors and economic uncertainty (KPMG, 2013). Hence, firms tend to gain more advantages from environmental reporting. This study is hinged on environmental stewardship theory, which opines that organizations are accountable to stakeholders and society for financial and non-financial assets, including their environment (Jones, 2003). The theory suggests that firms must disclose their environmental performance as stewardship to their stakeholders. Firms also owe a deep sense of accountability to ensure the stability of the environment so that they can continue to achieve their organizational goals.

2.4. Empirical Review

Margolis and Walsh (2003) reported that social performance predicts firm performance. Orlitzky et al. (2003) noted that enterprises are expected to comply with environmental accounting reporting policies and disclosure requirements and that non-compliance attracts sanctions. This sanction is in addition to the loss occasioned by the non-disclosure (Jones, 2003). Patari et al. (2012) identified a positive relationship between companies' sustainability and financial performance. Ezeagba et al. (2017) examined the relationship between environmental accounting disclosure and return on equity (ROE), and return on capital employed (ROCE) to proxy financial performance of food and beverage companies in Nigeria using Pearson's correlation statistical technique and multiple regression. Their study revealed a significant relationship between environmental accounting disclosure and the role of selected companies.

Ojo and Balogun (2019), in their study of the relationship between environmental accounting disclosure and the profitability of randomly selected firms quoted on the Nigerian Stock Exchange (NSE) using data from annual reports of eighteen (18) randomly selected firms, analyzed using the multiple regression models, found that there is a significant positive relationship between Environmental Accounting Disclosure and Net Profit Margin (NPM) and Dividend per Share (DPS). Ting et al. (2020) studied the impact of firms' environmental, social, and governance (ESG) initiatives on financial performance in developed and emerging market firms. They used samples of 1317 emerging market firms and 3569 developed market firms. They found that ESG initiatives significantly improve firm performance.

Solanke et al. (2021) studied the impacts of environmental accounting disclosure on the Return on Asset (ROA) and Earnings Per Share (EPS) of four (4) listed Information and Communications Technology firms in Nigeria. Using secondary data from the published annual financial reports from 2010-2020 and multi-regression analysis, the study found a positive relationship

between ROA and environmental accounting disclosure. These findings have significant implications for understanding the relationship between environmental accounting disclosure and firm performance, and they invite further exploration and discussion.

Fasua and Osifo (2020) also investigated the significant relationship between environmental accounting and corporate performance of firms in Nigeria. The data for the study were collected from annual reports and accounts of 18 randomly selected quoted firms in the Nigerian stock exchange. The data were analyzed using the panel regression analysis method. The study found a statistically significant positive relationship between Environmental Accounting (EA), Return on Asset (ROA), and Net profit Margin (NPM).

Agyemang et al. (2023), in their study on the effect of environmental accounting information disclosure (EAID) on firm performance proxy by ROE, Quick Ratio, and ROA among China-listed firms, found a positive relationship between EAID and return on equity and quick ratio, while return on assets (ROA) has a positive but insignificant link with EAID using a sample of 34 listed mining companies and secondary data from 2000 to 2018 using the Generalized Methods of Moments (GMM) regression analysis is then employed to analyze the data.

In contrast, Fasua and Osifo (2020) reported a statistically significant negative relationship between Environmental Accounting (EA) and Earnings per Share (EPS). Ezeagba et al. (2017) and Ojo and Balogun (2019) also reported a significant negative relationship between Environmental Accounting Disclosure and ROCE. Similarly, Solanke et al. (2021) reported a negative relationship between EPS and environmental accounting disclosure. Also, Becchetti et al. (2008) revealed a negative relationship between a firm's social performance and financial performance, owing to the vast investment costs associated with corporate social performance investments. While previous studies may have presented mixed conclusions on the effect of environmental disclosures on firm performance, they all agree that corporate performance is significantly influenced by environmental accounting Disclosures (Agyemang et al., 2023). Tawiah et al. (2021) further observed that voluntary disclosure uniquely impacts firms' cost of capital compared to general monetary disclosure, suggesting a potential for positive change in the financial landscape.

Drawing from the existing literature, there seem to be mixed conclusions concerning the relationship between the firm's environmental accounting performance and financial performance, especially in a developing economy like Nigeria. Also, the manufacturing sector may not have been well researched in line with the Nigerian SEC environmental sustainability disclosure guidelines, despite the sector being seen as the most affected by the disclosure requirements of the environmental principles, a gap this study intended to fill.

The study aims to answer the question, 'How does environmental accounting disclosure affect the financial performance of Nigerian listed manufacturing firms'. The hypotheses for this study were stated in the null form as follows:

$H_0$1-3: There is no significant relationship between environmental accounting disclosure and firm performance, measured by Tobin Q, Return on Asset, and Economic Value Added, among listed manufacturing firms in Nigeria.

3.0. Methodology

This section explains the research design, data source, and the data analysis method used in this study.

This study adopts the correlational research design to measure the variables over four years. The study population comprises all manufacturing firms, totaling 43, listed on the Nigerian Stock Market, otherwise known as the Nigerian Exchange Group (Nigerian Exchange Group, 2023) as of December 2022. A purposive sampling technique was used to select a sample size of 41, representing firms with data for all the variables employed for the study. Data were analyzed using the multivariate linear regression model. The environmental accounting disclosure score reflects the firm's fulfillment of its environmental performance. The environmental performance score comprises six (6) important measures that reflect the environmental elements. Their disclosure index was measured with the variables '1' and '0'. Where 1 represents disclosure and 0 represents non-disclosure.

Consistent with Bello & Umar (2019) and Ting et al., (2020) the firm's financial performance was measured using the variables of Return on Asset (ROA) and Tobin's Q, , and Economic Value Added (EVA). Tobin Q is suitable for analyzing the valuation effects of the observable and unobservable aspects of the relationship between the firm and stakeholders (Bello, Kurfi & Tijjani, 2021; Kumbirai & Webb, 2010). Tobin Q is based on the market value and book value of assets. The market value of assets is estimated as the book value of assets plus the market value of common stocks less the sum of the book value of common stock (Ting et al., 2020). Also, listed manufacturing firms represent firms that produce goods and services for consumers across different sectors of the Nigerian Exchange Group (NExG).

Table 1 shows the components of the environmental score employed for this study, namely the use of greenhouse gas emissions, energy consumption, water usage, Waste Management, Land Biodiversity, and Polluting Plant and Machinery Assets to measure environmental sustainability performance (SEC Guidelines on Sustainable Financial Principles for the Nigerian Capital Market, 2019).

Table 1: Measurement of Variables and Classification Scores.

Type of Variable	Name of Variable	Score/Symbol	Description/Measurements
Independent	Environmental Accounting Performance Disclosure score	Environmental Accounting Performance Disclosure score (Enviro)	This is calculated by evaluating each company's disclosure of environmental accounting information using the index of the six variables, with disclosure scores of 1 and 0 for disclosure and non-disclosure, respectively. The disclosure index represents greenhouse gas emissions, energy, water, waste management, land biodiversity, and polluting plant and machinery assets.
		Environmental Greenhouse Gas Emissions Score (GES)	The Environmental Greenhouse Gas Emission Score reflects the firm's obligation and efficiency in reducing the environmental gas emissions in its manufacturing and operating processes). 1 for disclosure and 0 for non-disclosure.
		Environmental Energy Score (ES)	The Energy Score indicates a firm's ability to reduce energy use and find eco-efficient alternatives. 1 for disclosure and 0 for non-disclosure.
		Environmental Water Score (WS)	The Water Score indicates a firm's ability to optimize its water consumption. It is 1 for disclosure and 0 for non-disclosure.
		Environmental Waste Management Score (WMS)	The Waste Management Score reflects a company's ability to improve its waste management while creating new market opportunities through new environmental technologies and practices or eco-

			designed products. It is 1 for disclosure and 0 for non-disclosure.
		Environmental Land Biodiversity Score (LBS)	The Land Biodiversity Score reflects a company's ability to improve its Land Biodiversity while ensuring that the land's original nature is preserved. It is 1 for disclosure and 0 for non-disclosure.
		Environmental Polluting Plant and Machinery Asset Score (EPPMS)	The Environmental Polluting Plant and Machinery Asset Score reflects a company's ability to invest in assets that help to minimize environmental pollution effectively. 1 for disclosure and 0 for non-disclosure.
Firm Performance Proxies used as dependent Variables	Tobin Q		The asset's market value divided by its book value.
	ROA		Return on Asset is the profit after tax, divided by total assets. It is expressed in percentage.
	EVA		Economic Value Added is the total revenue minus the cost of revenue, divided by the total assets.

Source: SEC Guidelines on sustainable financial principles for the Nigerian capital market (2019).

3.4. Model Construction

Ordinary Least Square (OLS) regression models were used to assess the association between FP and EAD as follows:

$FP_{it} = f(Enviro_{it})$

Where FP_i measures the firm's financial performance for the year, and $Enviro_i$ measures the firm's environmental accounting disclosure for the year.

FP_i is represented by the variables of Tobin's Q, ROA, and EVA. The values are for a four-year period (years 2019 to 2022).

$ROA_{it} = \beta_0 + \beta_1 Enviro_{it} + \varepsilon_{it}$ ……(1)

$TobinQ_{it} = \beta_0 + \beta_1 Enviro_{it} + \varepsilon_{it}$ .....(2)

$EVA_{it} = \beta_0 + \beta_1 Enviro_{it} + \varepsilon_{it}$ .....(3)

4.0. Data Analysis and Présentation

4.1. Descriptive Statistics

Table 2.: Descriptive Statistics and Normality Tests of Variables

stats	roa	tobinq	econom~d	enviro~l
mean	1.340978	.9866848	.2191848	.3186413
p50	2.73	.42	.16	.33
min	-179.92	0	-1.03	0
max	108.9	52.39	5.85	.83
sd	19.53993	3.976089	.4643379	.1029022
skewness	-3.815015	11.97425	9.798548	-.2764905
kurtosis	46.89549	153.8344	119.5269	11.94259
Pr(Skewnes)	0.0000	0.0000	0.0000	0.0000
Pr(Kurtosis)	0.0000	0.0000	0.0000	0.0000
adj chi22)	.	.	.	33.84
Prob>chi2	0.0000	0.0000	0.0000	0.1182
N	184	184	184	184

Source: Author's computation, 2024.

The descriptive statistics from Table 1 show that the variables ROA, Tobin Q, and EVA have mean values of 1.34, 0.99, and 0.22, respectively, suggesting that a firm's ROA and TobinQ is greatly affected its environmental accounting disclosure, while A firm's EVA is barely affected by its environmental performance disclose. Also the variable of Enviro with a mean of 0.32 suggests that only about 32% of listed manufacturing firms in Nigeria disclose their environmental accounting performance. ROA and Tobin Q with a high standard deviation of 19.54 and 3.98, respectively, suggesting a wide dispersion. The variables ROA and EVA with negative minimum values could, however, be of concern. Also, the results show that the variables are not normally distributed with p-values less than 0.05. This is not a surprise owing to the fact that the variables were panel in nature and from different cross-sectional firms. In view of this result, the model estimation takes into consideration the characteristics of the variables in the dataset.

Correlation Test

Table 3: Correlation Test of Variables

correlate roa tobinq economicvalueadded environmentalsustainabilitydiscl (obs=184)

	roa	tobinq	econom~d	enviro~l
roa	1.0000			
tobinq	0.0268	1.0000		
economicva~d	0.2517	0.0317	1.0000	
environmen~l	0.1449	0.0165	0.0748	1.0000

Source: Author's computation, 2024.

The results in Table 2 revealed a significant relationship between return on assets (roa), tobinq, economic value added (eva) and environmental accounting disclosures. The correlation coefficients showed a positive relationship among the variables which might suggest absence of multicollinearity. Also, there is no problem about correlation as the correlation coefficients were less than 0.8 (Gujarati, 2004; Iorsue et al. (2018).

OLS REGRESSION

Table 5: OLS Regression Results

ROA

```
      Source |       SS       df       MS      Number of obs   =       184
-------------+------------------------------   F(1, 182)       =      3.90
       Model |  1467.18273     1  1467.18273   Prob > F        =    0.0497
    Residual |  68403.8594   182  375.845381   R-squared       =    0.0210
-------------+------------------------------   Adj R-squared   =    0.0156
       Total |  69871.0421   183  381.808973   Root MSE        =    19.387

------------------------------------------------------------------------------
         roa |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
environmenta~l |   27.51643    13.9269     1.98   0.050     .0374768    54.99538
       _cons |  -7.426893   4.662156    -1.59   0.113    -16.62572    1.771934
```

Source: Author's computation, 2024.

ROA has a positively significant relationship with Environmental Accounting Disclosure (coef=27.51643, $p \leq 0.05$). This result is line with studies by Agyemang et al. (2023); Solanke et al. (2021) and Fasua and Osifo.

TOBINQ

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      Source |       SS       df       MS      Number of obs   =       184
-------------+------------------------------   F(1, 182)       =      0.05
       Model |  .791026705     1  .791026705   Prob > F        =    0.8237
    Residual |   2892.3072   182  15.8917978   R-squared       =    0.0003
-------------+------------------------------   Adj R-squared   =   -0.0052
       Total |  2893.09823   183  15.8092799   Root MSE        =    3.9865

------------------------------------------------------------------------------
       tobinq |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
environmenta~l |   .6389186   2.863759     0.22   0.824    -5.011519    6.289356
       _cons |   .7830989   .9586692     0.82   0.415    -1.108436    2.674634
```

Source: Author's computation, 2024.

EVA

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      Source |       SS       df       MS      Number of obs   =       184
-------------+------------------------------   F(1, 182)       =      1.02
       Model |  .220656928     1  .220656928   Prob > F        =    0.3130
    Residual |  39.2359198   182  .215581977   R-squared       =    0.0056
-------------+------------------------------   Adj R-squared   =    0.0001
       Total |  39.4565767   183  .215609709   Root MSE        =    .46431
------------------------------------------------------------------------------
economicvalu~d |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------+--------------------------------------------------------------
environmenta~l |   .3374495   .3335463     1.01   0.313    -.3206655    .9955644
         _cons |   .1116594   .1116576     1.00   0.319    -.1086505    .3319694
```

Source: Author's computation, 2024.

Tobin Q and EVA are both market-based financial performance measures. The results showed that both variables have a statistically insignificant relationship with Environmental Accounting Disclosure (coef=0.6389186, p>0.05) and (coef= 0.3374495, p>0.05) respectively.

Test of Hypotheses

Hypothesis 1-3: The relationship between Environmental Accounting Disclosure and ROA, TobinQ, and EVA in Listed Manufacturing Firms in Nigeria

Table 6: Panel Data Analyses -Fixed Effects

ROA- Fixed Effect

```
Fixed-effects (within) regression               Number of obs      =       184
Group variable: firm                            Number of groups   =        46
R-sq:                                           Obs per group:
     within  = 0.0062                                         min =         4
     between = 0.2167                                         avg =       4.0
     overall = 0.0210                                         max =         4
                                                F(1,137)           =      0.85
corr(u_i, Xb)  = -0.4151                        Prob > F           =    0.3570
------------------------------------------------------------------------------
         roa |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
environmenta~l |  -18.62722   20.15458    -0.92   0.357    -58.48151    21.22706
         _cons |   7.276381   6.570414     1.11   0.270    -5.716161    20.26892
-------------+----------------------------------------------------------------
       sigma_u |  11.534597
       sigma_e |  18.831051
           rho |  .27282979   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0: F(45, 137) = 1.24                     Prob > F = 0.1719
```

TOBINQ -Fixed Effect

```
Fixed-effects (within) regression               Number of obs      =       184
Group variable: firm                            Number of groups   =        46
R-sq:                                           Obs per group:
     within  = 0.0001                                         min =         4
     between = 0.0020                                         avg =       4.0
     overall = 0.0003                                         max =         4
                                                 F(1,137)          =      0.01
corr(u_i, Xb)  = -0.0410                        Prob > F          =    0.9324

------------------------------------------------------------------------------
      tobinq |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
environmenta~l |  -.3307082   3.892155    -0.08   0.932    -8.027176     7.36576
       _cons |   1.092062   1.268847     0.86   0.391    -1.416995     3.601119
-------------+----------------------------------------------------------------
     sigma_u |  2.4521659
     sigma_e |   3.636562
         rho |  .31256946   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0: F(45, 137) = 1.82                     Prob > F = 0.0046
```

EVA – Fixed Effects

```
Fixed-effects (within) regression               Number of obs      =       184
Group variable: firm                            Number of groups   =        46
R-sq:                                           Obs per group:
     within  = 0.0011                                         min =         4
     between = 0.0476                                         avg =       4.0
     overall = 0.0056                                         max =         4
                                                 F(1,137)          =      0.15
corr(u_i, Xb)  = -0.1981                        Prob > F          =    0.6964

------------------------------------------------------------------------------
economicvalu~d |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------+--------------------------------------------------------------
environmenta~l |  -.1835677   .4694161    -0.39   0.696    -1.111806    .7446705
         _cons |    .277677   .1530302     1.81   0.072    -.0249296    .5802837
---------------+--------------------------------------------------------------
       sigma_u |  .27293095
       sigma_e |  .43859021
           rho |  .27914767   (fraction of variance due to u_i)
------------------------------------------------------------------------------

F test that all u_i=0: F(45, 137) = 1.49                     Prob > F = 0.0424
```

Source: Author's computation, 2024.

The redundant fixed effect was estimated to determine the difference between the fixed effect and pooled OLS. The test will indicate whether a significant fixed effect exists in the model. If the test is statistically significant, the fixed effect model is better than the pooled OLS, while if the test is statistically not significant, the pooled OLS is better than the fixed. For the variables of ROA, TobinQ, and EVA, the fixed effects tests show that ($p>0.05$) no significant effect exists in the model, and therefore, OLS is better than Fixed Effect. The relationship between the variables can be predicted using the OLS results.

4.3. Discussions

The OLS regression results revealed that Environmental accounting disclosure has a statistically significant positive relationship with ROA ($t=1.98, p<0.5$) but not with Tobin Q and EVA. We, therefore, reject the null hypothesis and accept that environmental accounting disclosure has a significant positive relationship with ROA. For Tobin Q and EVA, the OLS results reveal that environmental accounting disclosure has no statistically significant relationship with Tobin Q and EVA. This result agrees with the findings of several studies (Agyemang et al., 2023; Solanke et al., 2021; Fasua & Osifo, 2020). The results, however, suggest that environmental accounting disclosure is not affected by marked-based performance financial performance measures. Investors' choices might have drifted towards market-based performance measures like Tobin Q and Economic value added (Al Matari et al., 2014).

5.0. Conclusion and Recommendation

This study concludes that environmental accounting disclosure has no effect on the market-based performance measures of Tobin Q and economic value added. The market-based measurement is considered forward-looking and reflects the shareholders' expectations of the firm's future performance based on previous or current performance (Al Matari et al., 2014). Firm managers may feel no need to disclose their environmental performance if such disclosure has no effect on their market performance or if such disclosure is even counterproductive, as revealed by the previous findings by Fasua and Osifo (2020) and Solanke et al. (2021) which revealed a negative relationship between environmental accounting performance and a firm's earnings per share (EPS), also a market-based financial performance measure.

One reason that could be adduced to the 'no effect or 'negative effect' of the environmental accounting disclosure on firms' market-based financial performance measure is the possibility of firms that disclose being at a disadvantage to firms that do not disclose. Disclosing their environmental performance might put those firms at a disadvantage to those that do not disclose at all. Thus, there will likely be a continuous decline in firms that disclose their environmental performance. It is, therefore, important for regulatory agencies like the SEC and CAC to enact laws mandating environmental accounting disclosure by all listed firms so that firms that disclose are not disadvantaged. Also, there will be a fair basis for comparison of the effect of environmental accounting

disclosure on the market-based financial performance of firms. Also, future studies may need to focus on the listed firms in Nigeria as against the sectoral basis.

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Appendix

Appendix 1- Post Estimation Tests

Table 6: Multicollinearity and Heteroskedasticity Tests

Variable	VIF	1/VIF
environmen~l	1.00	1.000000
Mean VIF	1.00	

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance chi2(1) = 0.10 Prob > chi2 = 0.7519
Source: Author's computation, 2024.

A Variance Inflation Factor (VIF) of 1 suggests no multicollinearity issues, while the Breusch-Pagan test also indicates no heteroscedasticity issue (p>0.05).