



ENVIROMENTAL ACCOUNTING DISCLOSURE, OPERATIONAL EFFICIENCIES AND FINANCIAL PERFORMANCE OF LISTED NON-FINANCIAL FIRMS IN NIGERIA.

IBRAHIM ADEYINKA ADERIBIGBE

Department of Accounting, Osun State University , Osogbo, Osun State
ibrahimaderibigbe36@gmail.com

ADEWUMI ZAID ADEYEMI

Department of Accounting, Osun State University , Osogbo, Osun State
adewumi.adeyemi@uniosun.edu.ng

OLUWATIMILEYIN ESTHER ADENLE

Department of Accounting, Osun State University , Osogbo, Osun State
oluwatimileyinadenle@uniosun.edu.ng

&

FATIMAT OLAJIDE

Department of Accounting, Osun State University , Osogbo, Osun State
fatimat.olajide@pgc.uniosun.edu.ng

Abstract

The study examined environmental accounting disclosure, operational efficiencies and financial performance of listed non-financial firms in Nigeria. The study adopted ex post facto research design. The study population covered 102 listed non-financial firms in Nigeria. A purposive sampling technique was used to select 70 non-financial firms in Nigeria that covered the period of 2015–2024. Secondary data were employed while descriptive and inferential statistics were used for the data analysis techniques. The findings revealed that mediation analysis in this study shows the impact of operational efficiency in the relationship between environmental accounting disclosure (EAD) and financial performance (FP) of listed non-financial firms listed in Nigeria, as shown $R^2 = 0.673$, Adjusted $R^2 = 0.630$, $F(12, 683) = 15.81$, $p < .001$ and $R^2 = 0.927$, Adjusted $R^2 = 0.917$, $F(13, 682) = 95.70$, $p < .001$. The study concluded higher operational efficiency can effectively convert environmental accounting disclosures into financial performance of listed non-financial firms in Nigeria with significant increase in assets turnover and return on assets. This study therefore recommends that Nigeria Securities and Exchange Commission (SEC) and Financial Reporting Council of Nigeria (FRCN) should set compulsory guidelines and reporting standards for environmental accounting disclosures. Firms should get themselves equipped with globally recognized framework such as the GRI for consistent, comparable and quality disclosure of environmental costs, compliance, waste management and emissions. This will build investor confidence, inform investment decisions on environmental risks and encourage firms to consider environmental factors in their business strategies, thereby enhancing financial outcomes and promoting sustainable growth.

Keywords: Operational Efficiency, Mediation, Environmental Accounting Disclosure, and Financial performance.

Introduction

Financial performance is a crucial indicator of a company's ability to generate revenue, manage costs, and maximise value for its stakeholders. It is commonly assessed using profitability, liquidity, and market-based financial metrics, which help investors and management evaluate a firm's economic strength (Ross et al., 2021). Interest of various Stakeholders and Practitioners on environmental accounting disclosure has been constantly rekindled since conduct of United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro

(Afolabi et al., 2025). Financial performance is a key determinant of a company's long-term success, influencing strategic decision-making, investment opportunities, and shareholder value. It is often measured using financial indicators such as Return on Assets (ROA), Return on Equity (ROE), and Earnings Per Share (EPS), which provide insights into a firm's profitability and efficiency (Gitman & Zutter, 2022). As noted by Iliemena et al (2019), the survival of contemporary business operations in Nigerian 21st century can be said to largely depend on the efficiency of its management. Management efficiency can be measured in a lot of ways

including reported profit and this can only be achieved through implementation of environmental friendly policies and effective strategies in cut down operating costs. An environmentally sustainable company can differentiate its products and thus increase its turnover, save labour, resources and regulatory costs and increase its net profits and return on capital employed. Environmental corporate policy birthed environmental accounting disclosure and consequently generate cost savings on environmental litigations, which also add to financial profitability (Iliemena et al., 2019). (Afolabi et al., 2025) asserted that firms need to begin to adjust their corporate policy towards adequate disclosure of their environmental performance in order to achieve "good" image. The good image of a company commands patronage and makes the firm famous even though at immediate cost to the firms. The publication of corporate sustainability information generally, which includes environmental accounting disclosure, sends the good image of a company beyond its immediate environment.

In the long run, the good reputation yields wider market share resulting in increased patronage, increase in market price of their shares and the overall market value. A sensible firm adopts environmental accounting disclosure for long run effect on corporate performance. Even though compliance might be at immediate discomfort to the firms, the reputation from environmental compliance encourages the firm to expand its scope to incorporate environmental accounting disclosure. This result in wider spread of its reputation thus increased patronage which consequently increases overall financial performance and economic growth (Arslan and Thewissen 2015). Operational efficiency is seen as the few methods and techniques used to achieve the essential goal of conveying quality products and services to clients within the most cost-effective and opportune ways (Nevine et al., 2024).

According to the researchers, asset utilisation, production, dispersion and inventory management are the foremost common perspectives of operational efficiency. Operational efficiency is additionally clarified as the capability of an organisation to diminish the unwelcomed and maximise asset capabilities so as to provide quality goods and services to clients (Ghosh & Sanyal, 2019). Operational efficiency is the key determinant

of the long-term viability of businesses (Ndolo, 2015). In reality, micro-economic or firm-specific indicators of finance' monetary health evolve around operational efficiency (Nevine et al., 2024). Been in pair with the opinion of (Ndolo, 2015), hypothesised that, progressing operational efficiency has a direct effect on the profit margins of organisations. Operational efficiency in the manufacturing sector continues to be a prominent issue among academics and industry players. An efficient manufacturing sector is an important solution to resolving the problems of unemployment and sustainable economic growth (Asaleye et al., 2018). Operational efficiency is frequently accomplished by streamlining firms' center operations in purpose of viably react to persistently changing market forces in a more cost-effective way.

In other words, firms can achieve operational efficiency by decreasing repetition and squander whereas leveraging their assets that contribute generally to their victory; additionally, utilizing the best of their workforce, innovation and business operations. Decreased inner costs that result from operational efficiency assist firms to be more effective in profoundly competitive markets, in this manner accomplishing higher profit margins. The association between operational efficiency and firms' financial performance has been broadly considered (Vangie, 2019). The IFRS and other GG, such as the GRI, providing frameworks to help company's structure their environmental disclosures in a standardized manner (Eccles & Krzus, 2018). Empirical research suggests that firms with strong environmental disclosures tend to attract institutional investors, reduce regulatory risks, and gain competitive advantages, all of which contribute to improved financial performance (Scholtens, 2020). Environmental accounting disclosure is a crucial aspect of corporate reporting that has garnered significant attention in recent decades due to the increasing awareness of environmental issues. It involves the process by which companies report on the financial and non-financial impacts of their activities on the environment, encompassing resource use, waste generation, and pollution. To mitigate these challenges, regulatory agencies and non-governmental organizations are working toward developing more comprehensive and uniform

reporting standards. The integration's of environmental accounting into mainstreams financial reporting frameworks is seen as a step toward greater corporate accountability and the long-term sustainability of businesses (Schaltegger & Wagner, 2006). Growing concerns about environmental degradation and the depletion of natural resources have become a major global issue. The environmental challenges being discussed today have implications that extend far beyond what anyone could have envisioned fifty years ago.

In Nigeria, non-financial firms often faces unrest from local communities surrounding their operational areas. This tension is largely driven by high unemployment and inadequate social amenities, which in some cases have led to vandalism of industrial facilities. Such problems could be mitigated if firms manage their social and environmental costs more efficiently and transparently (Olowookere et al., 2021). In recent years, Environmental Accounting Disclosure (EAD) has gained growing attention across the world. Organizations now recognize the importance of environmental reporting as part of their strategy for long-term sustainability. By disclosing environmental information within their financial statements, corporations enhance their value and demonstrate accountability to stakeholders. The push for standardized environmental reporting frameworks has crossed national boundaries, reflecting a deep commitment to sustainable developments in era of globalization (Votsi, Kallimanis & Pantis, 2017). These disclosures may include data on energy consumption, waste management practices, emissions reduction strategies, and the use of renewable resources. The International Financial Reporting Standards (IFRS) and other global guidelines, such as the Global Reporting Initiative (GRI), provide frameworks to help companies structure their environmental disclosures in a standardised manner (Eccles & Krzus, 2018).

However, a good number of studies have considered Environmental Accounting Disclosure and Financial Performance from various angles, while, none of these studies have focused on the possible impact of Environmental Disclosure, Operational Efficiencies and Financial Performance on the non-financial firms in Nigeria using cross-

sectional studies. Notwithstanding the prior studies, the level of Environmental Disclosure among the listed non-financial firms has not improved, suggesting more empirical studies to drive home the importance of environmental protection and adequate disclosure of efforts in this regard.

In bridging the gap in the literature, this study is motivated by the significance of a clean environment to humanity and the benefit of adequate environmental disclosure to corporate earnings and sustainable growth of non-financial firms in Nigeria. Consequently, this study will examined the impact of Environmental Accounting Disclosure, Operational Efficiencies and Financial Performance of listed non-financial firm in Nigeria.

LITERATURE REVIEW

Conceptual Review

Financial Performance

Financial performance measures a firm's economic success, capturing its abilities to earn incomes, manage costs, and give returns to shareholders. It makes stakeholders, investors, managers, and government regulators with insight into a companies profitability and long-terms viability. Both internal choices (for example, strategy and operations) and external conditions (market trends and regulation) influence financial performance. Within the framework of environmental accounting disclosure, financial performance is treated as the dependent variable because a company's reporting and sustainability practices can affect its financial outcomes (Brigham & Ehrhardt, 2022). In this study, Return on assets (ROA) is used as the indicators of financial performances.

Environmental Accounting Disclosures

Environmental disclosures refers to the responsibility of companies to report the steps they take to protects the environments and to communicates those impact to the public (Murdifn et al., 2019). McGuire (2014) describes it as a corporate duty to inform stakeholders and society about how the firm manages and controls waste generated by its operations. In addition, environmental disclosure encompasses the openness and accountability of environmentally sensitive firms involves providing the information stakeholders investors, shareholders, customers, regulators, employees, and others interested in the

company's performance need about the firm's environmental actions (Welbeck et al.,2017;Wijismanetal.,2019). Environmental accounting disclosure (EAD) is the practice whereby companies report on their environmental activities and the associated financial effects.. This includes information on environmental costs, policies, and performance, aiming to provide stakeholders with transparent insights into how corporate actions impact the environment and, subsequently, the company's financial health. Yao and Liang (2019) showed that environmental disclosure and Effective environmental accounting is essential for companies to stay competitive. It helps them meet reporting standards, improves their reputation, and supports their overall business success improving corporate product legitimacy. The two main types of environmental costs are social costs and private costs. While societal costs are paid by society, private costs are paid by the individual or business enterprise. Environmental pollution and control policy, energy policy, and waste management are important areas that focus on protecting the environment, managing resources efficiently, and handling waste properly. Management policy (WTP) and compliance and regulations (CLR) are the proxies used for environmental disclosure (EVD) in this study.

Environmental Accounting Disclosures and Financial Performance

Financial performance is not basically dependent on traditional financial indicators but is increases influencing by non financial indicators such as corporate social responsibility (CSR) and sustainability initiatives. From a stakeholder theory perspective, companies that actively engage in environmental accounting disclosures build stronger relationships with customers, investors, and regulators, leading to long-term financial benefits (Freeman et al., 2021). Transparent environmental reporting can mitigate risks related to regulatory penalties, legal liabilities, and reputational damage, thereby improving a firm's financial stability. Additionally, organizations that proactively disclose environmental information often experience operational efficiencies through better resource management and cost savings, further enhancing their financial performance (Michelon et al 2019).

The heightened focuses on environmental accounting disclosures of environmental accounting (EAD) arises by firms' needs to inform stakeholders about their environmental performances in order to strengthen corporate values, create stakeholder value, lay groundwork for future operational and financial improvements, since business activities affect the natural environment (Udo, 2018).

Operational Efficiency

Operational efficiency refers to the degree to which an organisation maximises output from a given set of inputs by minimising waste, cost, and time while maintaining product or service quality. In essence, it is a measure of how well a company utilises its resources to achieve its objectives efficiently. According to (Aguolu & Enekwe 2023), operational efficiency signifies the capacity of firms to streamline their operations in a way that reduces redundancies and improves productivity without compromising quality or sustainability. Operational efficiency encompasses not only cost management but also effective utilisation of labor, machinery, raw materials, and technology. Firms that are operationally efficient often experience higher profitability and competitiveness since they can produce more output with fewer resources (Olayinka & Adeniran, 2024).

In today's global and competitive environment, achieving operational efficiency is not limited to financial optimisation; it also includes environmental and social considerations. Companies that integrate sustainability into their operations tend to enhance their efficiency by reducing waste and energy consumption (Udeh et al., 2023).

Relationship between Operational Efficiency and Environmental Accounting

Operational efficiency and environmental accounting are closely intertwined. Environmental accounting focuses on identifying, measuring, and reporting environmental costs and benefits that arise from corporate activities. When firms integrate environmental accounting, they often achieve higher operational efficiency because they gain clearer insights into resource utilization and waste management. According to (Olayinka & Adeniran, 2024), environmental accounting enables firms to identify areas of energy inefficiency, excessive waste, and pollution-related costs, leading to more

efficient use of inputs. Similarly, (Udeh et al., 2023) observed that companies implementing green accounting practices experience significant cost savings through improved energy management and reduced material wastage. In manufacturing, oil and gas, and consumer goods sectors, operational efficiency has become a strategic tool for competitiveness. For example, manufacturing firms adopting cleaner production technologies reduce emissions and energy costs, leading to improved operational performance.

Moreover, operational efficiency strengthens financial performance by lowering production costs and enhancing sustainability reporting credibility. Firms that demonstrate strong operational efficiency also tend to achieve better corporate reputation and investor confidence (Adebanjo & Lawal, 2025)

Theoretical Framework

This research integrates three perspectives: sustainability theory, stakeholders theory, and agency theory. Sustainability theory (Barbier, 1987) emphasizes that businesses have an obligation to manage environmental resources so as to preserve ecological quality for future generations. Stakeholder theory (Freeman, 1984; Walsh, 2005) argues that firms should conduct operations with attention to how actions affect all parties with an interest in the firm—not only shareholders—so that value is created for multiple stakeholder groups. Agency theory Jensen and Meckling, (1976) conceptualizes the firm as a set of principal agent relationships in which managers (agents) owe fiduciary duties to shareholders (principals) to act in their economic interests and maximize wealth. These theories collectively justify the focus of the study. Environmental accounting disclosures represents a corporate responsibilities to societies and the ecosystem, particularly in Nigeria where mandatory disclosure rules are lacking.

Although reporting is typically voluntary, prior studies indicate that environmental disclosure can significantly influence firm performance. Agency theory helps frame the study's financial performance measures, which include Returns on investments assets and earnings per-share. Empirical support for the theoretical link between environmental and economic performance appears in studies by Mahoney et al. (2007) and Tuwaijiri et al. (2004), who report significant relationships—

especially when disclosure is quantitative.

Empirical review

Carnini-Pulino et al. (2022) assessed how environmental, social, and governance (ESG) disclosures affects price earnings ratios and firms performances among larger multinational firms in Europe. Using Italy's regulatory benchmark rooted in Directive 254/2016, the authors analyzed panel data from 2011–2020 with panel regression techniques. They found that greater disclosure enhances stakeholder legitimacy and investor decision-making, which is associated with higher price–earnings ratios. Conversely, Olowookere et al. (2021) studied the impact of environmental accounting disclosures and financial performances for listed cement firms in Nigeria. Using ex post facto designs and nine years of annual report data (2011–2019) from three listed cement companies, the study examined ROA, ROE, firm size, leverage, and EAD. Panel regression results showed that environmental accounting disclosure positively and significantly affected financial performances for the sampled firms. Kurawa and Shuaibu (2022) examined the relationship between environmental disclosure and market value for 76 non-financial firms listed in Nigeria. Using a GRI-based disclosure checklist, and earnings per share and Tobin's Q as performance measures, their regression analysis identified a positive association between environmental disclosure indices and market value indicators. Their findings align with Jun et al. (2022), who also report positive links between ESG disclosure and firms' intangible capital and market valuation.

However, not all studies find positive effects. Igbekoyi et al. (2021) reported insignificantly negative relationship between environmental reporting and financial performances, highlighting context-specific variation in results. Jun et al. (2022) used panel regression to evaluate ESG disclosure's effect on market value and intangible capital; they found positive impacts on share market value and Tobin's Q. Their findings echo Pedron et al. (2021). By contrast, Uyar and Kilic (2012) found that leverage did not significantly influence voluntary disclosure levels, indicating mixed drivers of disclosure behavior. Uniamikogbo and Ali (2021) analyzed selected Nigerian manufacturing firms and reported that environmental accounting disclosures significantly

affect share price, Return On Assets, and Returns On Equity. Ayu et al. (2020) examined environmental and social cost disclosures' effects on financial performances, with Earnings managements as a mediator. Using the GRI framework and SmartPLS, they indicates that both environmental and social cost disclosure significantly influence ROA, consistent with stakeholder, legitimacy, and agency explanations.

In sum, multiple empirical studies suggest that more extensive environmental and social disclosure can create financial benefits for firms,

though results vary by context, measure, and methodology.

Methodology

The study was used ex-post facto research design, which involves observing multiple entities over time, to investigate the relationship between environmental accounting disclosure and Financial Performance. The population of the study comprises 102 listed non-financial on the Nigeria Exchange Group (NGX) as of December, 2024 and 70 non-financial firms were selected using purposive sampling techniques.

Population and Sample Size Based on the Classification of Sector

S/N	Sector	No. of Companies	No. of Companies Eliminated	No. of Companies to be Sampled
1.	Agriculture	5	3	2
2.	Conglomerates	6	3	3
3.	Construction/Real Estate	12	3	9
4.	Consumer Goods	20	5	15
5.	Healthcare	7	1	6
6.	ICT	9	2	7
7.	Industrial Goods	12	3	9
8.	Natural Resources	4	2	2
9.	Oil And Gas	7	3	4
10.	Services	20	6	14
	Total	102	32	70

Source: Author's Compilation, 2026

Ten years of validated data (2015–2024) were considered from the audited financial statements and annual reports of the selected companies; 2024 reports were included because earlier studies did not cover that year. Data reliability is supported by the statutory external audits of the financial

statements. Both descriptive statistics and inferential analysis using pooled ordinary least squares (POLS) regression were used to the panel data. Hypotheses were tested at the 5% significance level.

Table 1: Measurement of Variables
Measurements of Variables

Variables	Proxies	Variable Labels	Measurement	Sources	Expected sign
Dependent					
Financial performance	Return on asset	ROA	Net profit before tax /total asset x 100/1	Henry and Herawaty (2024).	
	Earnings per share	EPS	Net profit after tax – Pref. dividend / No of ord. shares issued	Saman (2019)	
Independent					
Environmental accounting	Energy pollution	ENP	1 for disclosure otherwise 0	Pizus, Tasnia, Nikher, AdhoraandTushar	±

disclosure				(2019).	
	Water pollution	WPO	1 for disclosure otherwise 0	Hossain (2016)	±
	Carbon emissions	CBE	1 for disclosure otherwise 0	Ismail and Anwarul (2019)	±
	Waste management	WAS	1 for disclosure otherwise 0	Ismail and Anwarul (2019)	±
	Biodiversity	BIO	1 for disclosure otherwise 0	Adekanmi (2015)	±
	Compliance	COMP	1 for disclosure otherwise 0	Adekanmi (2015)	±
	Product and service stewardship	PSS	1 for disclosure otherwise 0	Tochukwu (2018)	±
	Award Received for installing environmental management	ARE	1 for disclosure otherwise 0	Charles, John-Akamelu and Umeoduagu (2017)	±
Operational Efficiency	Asset Turn Over	ATO	Revenue/Assets	Dahunsi et al 2022	±
Control variables	Leverage	LEV	Total debt / total asset	Oraka and Egbunike (2016).	±
	Firm size	FSI	total assets	Oraka and Egbunike (2016)	±
	Firm age	FAG	No of years listed in Nigeria stock exchange	Karambu and Joseph (2016)	±

Source: Researcher's (2026)

Model Specification

The study's model showed the relationship between environmental accounting disclosure, operational efficiency as the independent variable and financial performance, measured by Asset turnover, as the dependent variable.

$$ATO_{it} = \alpha_a + \beta_{1a}ENP_{it-1} + \beta_{2a}WPO_{it-1} + \beta_{3a}CBE_{it-1} + \beta_{4a-1}BIO_{it-1} + \beta_{5a}WAS_{it-1} + \beta_{6a}COMP_{it-1} + \beta_{7a}PSS_{it-1} + \beta_{8a}ARE_{it-1} + \beta_{9a}LEV_{it-1} + \beta_{10a}FSI_{it-1} + \beta_{11a}FAG_{it-1} + \epsilon_{it} \dots \dots \dots (i)$$

$$ROA_{it} = \alpha_b + \beta_{1c}ENP_{it-1} + \beta_{2c}WPO_{it-1} + \beta_{3c}CBE_{it-1} + \beta_{4c-1}BIO_{it-1} + \beta_{5c}WAS_{it-1} + \beta_{6c}COMP_{it-1} + \beta_{7c}PSS_{it-1} + \beta_{8c}ARE_{it-1} + \beta_{9c}ATO_{it-1} + \beta_{10c}LEV_{it-1} + \beta_{11c}FSI_{it-1} + \beta_{12c}FAG_{it-1} + \epsilon_{it} \dots \dots \dots (ii)$$

Where:

ENP_{it}: (Environmental Protection Expenditure)

WPO_{it}: (Waste Pollution)

CBE_{it}: (Carbon Emission)

BIO_{it}: (Biodiversity Impact Disclosure)

WAS_{it}: (Waste Management)

COMP_{it}: (Environmental Compliance)

PSS_{it}: (Product and Service Stewardship)

ARE_{it}: (Award Received for installing environmental management)

OPE_{it}: Operational efficiency of firm *i* at time *t*

EAD_{it}: Environmental accounting disclosure index

FSI_{it}: Firm size (log of total assets)

FAG_{it}: Firm age (years since incorporation or listing)

LEV_{it}: Leverage (total debt to total assets ratio)

ROA_{it}: Return on assets (proxy for performance control)

ϵ_{it} : Error terms

RESULTS AND DISCUSSION

Table 1: Descriptive Statistics

	ROA	EPS	ENP	WPO	CBE	WAS	BIO	COMP	PSS	ARE	ATO	LEV	FSI	FAG
Mean	6.53	6.10	0.50	0.49	0.53	0.47	0.46	0.54	0.47	0.44	1.10	0.52	14.58	27.92

23	Salem Journal of Business & Economy, Vol. 12 No. 2 June ,2026													
Median	6.51	6.05	1	0	1	0	0	1	0	0	1.1	0.52	14.57	30
Maximum	9.32	9.55	1	1	1	1	1	1	1	1	1.63	0.84	16.23	57
Minimum	3.76	3.01	0	0	0	0	0	0	0	0	0.56	0.22	13.17	1
Std. Dev.	1.17	1.32	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.20	0.11	0.48	13.56
Skewness	0.05	0.08	-0.02	0.04	-0.12	0.12	0.14	-0.17	0.13	0.24	0.00	0.10	0.13	-0.27
Kurtosis	2.09	2.15	1.00	1.00	1.01	1.01	1.02	1.03	1.02	1.06	2.60	2.98	3.06	1.74
Jarque-Bera	24.2	21.81	116.	116.	116.0	116.0	116.	116.0	116.0	116.	4.68	1.17	2.17	54.62
	2		00	00	1	1	01	3	1	10				
Probability	0.00	0.000	0.00	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.096	0.558	0.338	0.000
	0		0	0			0			0				
Sum	454	4247.	351	341	369	328	323	378	325	306	767.2	364.5	10147	19432
	3.15	3									3	2	.85	
Sum Sq. Dev.	952.	1217.	173.	173.	173.3	173.4	173.	172.7	173.2	171.	26.90	8.13	159.5	12770
	47	13	99	93	7	3	10	1	4	47			6	7.50
Observations	700	700	700	700	700	700	700	700	700	700	700	700	700	700

Source: Researcher's Computation, 2026

Table 1 presents the descriptive statistics of the study variables. The return on assets (ROA) exhibited an average value of 6.53 with a standard value of 1.17 on 700 observations, which is moderately variable. Earnings per share has mean of 6.10 and standard deviating of 1.32. Environmental disclosure variables such as energy pollution (ENP), water pollution (WPO), carbon emission (CBE), biodiversity (BIO), waste management (WAS), compliance (COMP), product and service stewardship (PSS) and awards received (ARE) presented mean values ranging between approximately 0.44 and 0.54 and standard deviations 0.50, suggestive of binary or proportion-based measures. The means of firm-level control

variables like asset turnover (ATO), leverage (LEV), firm size (FSI), and firm age (FAG) are 1.10, 0.52, 14.58, and 27.92, respectively.

The results of skew and kurtosis of all the variables used in the study ranged (skewness) from -0.045 to 0.152 and kurtosis 1.0 to 3.09. A skewness i.e. with results close to ZERO indicates that the data is normally distributed while for kurtosis results varying from platykurtic to mesokurtic. The Jarque-Bera test indicated that a set of variables, such as ENP, WPO, CBE, BIO, were significantly not normally distributed ($p < .001$), compared to FSI which normally distributed ($p > .05$).

Table 2: Correlation Analysis

Interpretation of Results

Pearson Correlation Matrix

Table 4.2: Correlational Analysis

	ROA	EPS	ARE	ATO	BIO	CBE	COMP	FAG	FSI	LEV	PSS	WAS	WPO	ENP
ROA	1													
EPS	0.93	1												
ARE	0.72	0.72	1											
ATO	0.76	0.73	0.49	1										
BIO	0.73	0.72	0.69	0.5	1									
CBE	0.73	0.74	0.67	0.55	0.69	1								
COMP	0.74	0.73	0.67	0.53	0.69	0.71	1							
FAG	-0.05	-0.03	-0.04	-0.01	0.01	-0.04	-0.01	1						
FSI	0.71	0.7	0.47	0.53	0.48	0.5	0.51	0.03	1					
LEV	0.5	0.48	0.39	0.49	0.37	0.42	0.41	-0.06	0.42	1				
PSS	0.73	0.73	0.73	0.5	0.73	0.73	0.66	-0.02	0.49	0.38	1			
WAS	0.75	0.74	0.72	0.52	0.72	0.73	0.73	-0.02	0.52	0.39	0.76	1		
WPO	0.72	0.72	0.75	0.48	0.72	0.76	0.71	-0.07	0.47	0.37	0.68	0.73	1	

ENP 0.73 0.73 0.68 0.51 0.69 0.71 0.65 -0.03 0.48 0.4 0.7 0.7 0.69 1

Source: Researcher's Computation, 2026

The correlational analysis in Table 4.2 shows the linkages between the key variables looked at in the research. Return on assets (ROA) is strongly and positively correlated with earnings per share (EPS) ($r = 0.93$) and awards received (ARE) ($r = 0.72$). There also is a strong correlation with asset turnover (ATO) ($r = 0.76$). The ROA is positively influenced by a range of environmental disclosure variables whose Pearson's r is fairly robust, indicating a strong association. The variables include biodiversity (BIO; $r = 0.73$), carbon emissions (CBE; $r = 0.73$), compliance (COMP; $r = 0.74$), product and service stewardship (PSS; $r = 0.73$), waste management (WAS; $r = 0.75$), water pollution (WPO; $r = 0.72$), and energy pollution (ENP; $r = 0.73$). There are strong links between

enhanced environmental disclosure and improved financial results.

Also, ATO was positively correlated with most of the environmental variables, including BIO ($r = 0.50$), CBE ($r = 0.55$), COMP ($r = 0.53$), and ENP ($r = 0.51$). This observation indicates operational efficiency benefits associate with environmental practices. The size of a firm (FSI) showed a positive association with ROA ($r = 0.71$), as well as other financial variables.

According to the correlation diagnostic analysis, leverage (LEV) has a moderately POSITIVE correlation with representing other variables and ROA ($r = 0.50$) and a negligible NEGATIVE association with FAG (FIRM AGE; $r = -0.06$) There is little or weak correlation of most variables with firm age itself.

Table 3: Diagnostic Test Table 3: Summary of Serial Correlation, Multicollinearity and Heteroscedasticity Tests Results

Diagnostic Test	Statistic(s)	d.f.	p-value	Decision ($\alpha = 0.05$)	Interpretation
Hausman Test (Random Effects)	Chi-Square = 143.07	12	0.0000	Reject null hypothesis	Fixed effects model preferred over random effects
Breusch-Pagan-Godfrey (Heteroskedasticity)	F = 0.27	12, 689	0.9921	Fail to reject null hypothesis	No heteroskedasticity detected
Breusch-Godfrey LM Test (Serial Correlation)	F = 1.21	14, 689	0.3004	Fail to reject null hypothesis	No autocorrelation detected in residuals
Variance Inflation Factors (Centered VIF)	ENP: 3.87, WPO: 4.14, CBE: 4.81, BIO: 3.56, WAS: 4.10, COMP: 4.60, PSS: 3.91, ARE: 2.43, ATO: 1.45, LEV: 1.34, FSI: 2.11, FAG: 1.18	—	—	All VIFs < 5, no multicollinearity concern	No significant multicollinearity among predictors

Source: Researcher's Computation, 2026

Table Estimated Panel Analysis

Step 1: EAD → ATO				
Variable	Coefficient	Std. Error	p-value	t-value
ENP (Energy Pollution)	-0.014	0.016	0.386	-0.868
WPO (Water Pollution)	-0.029	0.018	0.111	-1.597
CBE (Carbon Emissions)	0.046	0.018	0.009	2.608

BIO (Biodiversity)	-0.001	0.017	0.949	-0.064
WAS (Waste Management)	-0.007	0.018	0.685	-0.406
COMP (Compliance)	0.012	0.016	0.439	0.775
PSS (Product & Service Stewardship)	0.002	0.018	0.92	0.100
ARE (Award Received)	0.004	0.017	0.81	0.240
LEV (Leverage)	-0.002	0.06	0.969	-0.040
FSI (Firm Size)	-0.016	0.014	0.248	-1.156
FAG (Firm Age)	0.009	0.002	<.001	5.334
R ² = 0.673, Adjusted R ² = 0.630, F(12, 683) = 15.81, p < .001				
Step 2: EAD + OPE → ROA				
ENP (Energy Pollution)	0.139	0.045	0.002	3.088
WPO (Water Pollution)	0.161	0.052	0.002	3.119
CBE (Carbon Emissions)	0.069	0.05	0.165	1.391
BIO (Biodiversity)	0.145	0.047	0.002	3.079
WAS (Waste Management)	0.121	0.051	0.017	2.374
COMP (Compliance)	0.196	0.045	<.001	4.306
PSS (Product & Service Stewardship)	0.141	0.049	0.005	2.843
ARE (Award Received)	0.212	0.048	<.001	4.442
ATO (Asset Turnover)	0.921	0.114	<.001	8.099
LEV (Leverage)	-0.793	0.169	<.001	-4.697
FSI (Firm Size)	0.334	0.039	<.001	8.577
FAG (Firm Age)	0.02	0.005	<.001	4.105
R ² = 0.927, Adjusted R ² = 0.917, F(13, 682) = 95.70, p < .001				

Source: Researcher's Computation, 2026

This study aims to determine whether operational efficiency (asset turnover, ATO) mediates the relationship between environmental accounting disclosure and financial performance (ROA) of non-financial firms in Nigeria. The study revealed that most environmental accounting disclosure variables were insufficient in predicting operational efficiency, this study focus on the ones that were found to have significant positive relationship with operational efficiency. The panel regression results showed only carbon emissions disclosure (β -value = 0.046, p-value = .009) and firm age (β -value = 0.009, p-value < .001) positively predict ATO. None

of the other variables or controls affected operational efficiency significantly.

Step 2: When both environmental disclosure variables and operational efficiency were included in the model, and the effect on financial performance was investigated, operational efficiency has a strong significant positive effect on ROA (β = 0.921, p < .001). The ROA was also positively affected directly and significantly by environmental disclosure variables including energy pollution, water pollution, biodiversity, and more. A negative impact in ROA was caused by leverage, whereas firm size and age were positive significant predicting factors.

The model accounted for approximately 92.7% of the variation in financial performance (R^2 value of 0.927) which is good. The results suggest a partial mediation. It is found that operational efficiency significantly mediates between some environmental disclosures and financial performance while many environmental disclosures directly affect financial performance.

Discussion Of Findings

The mediation analysis in this study provides important insights into the role of operational efficiency in the relationship between environmental accounting disclosure (EAD) and financial performance (FP) of non-financial companies listed in Nigeria. The mediation of operational efficiency (measured by asset turnover (ATO) in this study) is consistent with the empirical evidence that firms that achieve higher operational efficiency can effectively convert environmental disclosures into financial performance. In particular, the findings indicate that carbon emissions disclosure and firm age have a positive effect on operational efficiency, which in turn has a significant effect on financial performance (return on assets - ROA). This is in line with Olayinka and Adeniran (2024) and Udeh et al. (2023), who stressed that environmental accounting activities increase efficiency through improved resource management and waste reduction, leading to cost reduction and increased profitability.

Additionally, the positive influence of operational efficiency on financial performance confirms claims by Adebajo and Lawal (2025) about how operational efficiency enhances competitiveness and financial performance.

However, the partial mediation noted, in which many environmental disclosure variables have direct significant impacts on financial performance, even after controlling for operational efficiency, suggests a significant relationship between environmental disclosure and financial performance. This mixed result is consistent with Olowookere et al. (2021) and Uniamikogbo and Ali (2021) who confirmed positive direct effects of environmental disclosure on financial performance measures (ROA and return on equity (ROE)) of Nigerian firms without considering operational efficiency.

On the other hand, this study's finding is inconsistent with Popoola and Onmonya (2024),

who reported a significant negative influence of environmental disclosure on some financial performance measures such as ROA and earnings per share (EPS) in the oil and gas sector, suggesting industry differences or different time horizons between disclosures and earnings. This suggests the need to examine industry-specific features and the timing of benefits from sustainability activities in subsequent empirical studies.

Theoretically, the results support the stakeholder theory framework adopted in this study, which suggests that corporations' interactions with stakeholders (such as regulators, community, investors and customers) through the clear environmental reporting contribute to improving the legitimacy, operations and financial performance of firms (Ojo, 2016; Okafor, 2018). The prominent mediating role of operational efficiency implies that to meet stakeholder expectations and translate these into economic success, firms must go beyond compliance with environmental disclosure requirements and engage in environmental accounting that is embedded in their operational strategies. This is consistent with the theory's focus on achieving a balance between stakeholder expectations and corporate resources to maintain competitive position. It also echoes the reasoning of Martins (2020) and Gbenga (2020) that when integrated into the operational processes, environmental accounting creates efficiencies and image benefits that enhance firm performance.

CONCLUSION AND RECOMMENDATIONS

Conclusion

The study concluded that mediation of operational efficiency (measured by asset turnover (ATO) in this study) is consistent with the empirical evidence that firms that achieve higher operational efficiency can effectively convert environmental accounting disclosures into financial performance that environmental accounting disclosure and operational efficiency as significant impact on financial performance of listed non-financial firms in Nigeria. It recommends that the Nigerian Securities and Exchange Commission (SEC) and the Financial Reporting Council of Nigeria (FRCN) should establish mandatory environmental accounting disclosure standards, while firms should adopt the Global Reporting Initiative (GRI)

framework and strengthen environmental compliance through employee training, regulatory awareness, and collaboration with relevant government agencies to improve investor confidence and promote sustainable business growth.

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