

Investigating The Effect Of Environmental Risk Disclosure On Financial Performance: Evidence From Listed Firms Operating In The Non-Financial Sector In Nigeria

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Abstract

Environmental challenges have intensified corporate pressure to enhance transparency, yet the financial impact of environmental risk disclosures remains inconclusive, especially within developing economies like Nigeria where regulatory enforcement is weak and voluntary disclosure practices vary significantly. This study investigates the effect of environmental risk disclosures on the financial performance of listed non-financial firms in Nigeria, focusing on three key dimensions: carbon emission risk disclosure, biodiversity risk disclosure and compliance to environmental laws disclosure. The study utilizes panel data from 76 listed non-financial firms on the Nigerian Exchange Group over a 10-year period (2014–2023). Descriptive statistics, Shapiro-Wilk normality tests, Spearman correlation and robust regression techniques are employed due to the presence of heteroscedasticity. The empirical findings reveal that carbon emission risk disclosure has a statistically significant positive effect on financial performance, suggesting that proactive climate-related transparency enhances firm value. Conversely, biodiversity risk disclosure exhibits an insignificant effect. Lastly, compliance to environmental laws disclosure shows a significant negative effect, highlighting the potential financial burden of regulatory adherence in weak institutional contexts. The study concludes that while some environmental disclosures create strategic value, others may be perceived as cost drivers unless communicated within a broader value-creation narrative. The study recommends tailored regulatory framework, improved biodiversity reporting standards and strategic framing of compliance disclosures.

Keywords: Environmental Risk Disclosure, Financial Performance, Voluntary Disclosure, Heteroskedasticity

INTRODUCTION

In recent years, the conversation around corporate sustainability and responsible business practices has intensified, with environmental risk disclosure emerging as a crucial aspect of strategic corporate reporting. Environmental risk disclosure involves communicating potential environmental threats or exposures that could affect a firm's operations, performance, or reputation. These disclosures offer valuable insights into how companies manage environmental challenges such as pollution, waste management, resource consumption, climate change, and regulatory compliance. Furthermore, the financial performance of listed non-financial firms in Nigeria has remained unstable and, in many cases, below expectations, despite ongoing efforts to enhance corporate governance and transparency. A key emerging concern is how effectively these firms manage and disclose environmental risks. Risks such as pollution, climate change, resource depletion, and regulatory sanctions can significantly influence a firm's operational efficiency, cost structure, and ultimately, its financial performance. Yet, many Nigerian firms

continue to experience subpar financial outcomes, raising concerns about the adequacy of their environmental responsibility and risk disclosure practices.

However, environmental risk disclosure is gaining momentum due to increasing regulatory pressures, growing stakeholder awareness, and the global push toward achieving sustainable development goals [5]. As a developing economy with a rapidly expanding industrial sector, Nigeria faces numerous environmental issues, including oil spills, gas flaring, deforestation, and inefficient waste disposal. Non-financial firms especially those in manufacturing, construction, and extractive industries often have substantial environmental impacts. As a result, there is a rising expectation for these firms to embrace environmentally responsible practices and provide transparent disclosures about the environmental risks linked to their operations.

Stakeholders such as investors, regulators, customers and the public are increasingly demanding accountability not just in terms of financial performance but also regarding how firms address the environmental risks they pose [33]. This demand is further reinforced by the global shift toward sustainability and climate-related financial reporting. International initiatives like the Task Force on Climate-related Financial Disclosures (TCFD), the Global Reporting Initiative (GRI), and the International Sustainability Standards Board (ISSB) are reshaping corporate reporting practices worldwide. To remain competitive and attract foreign investment, Nigerian firms are expected to align with these global standards. This marks a shift in corporate strategy, where environmental risk management is no longer seen as a secondary concern but as a core component of business performance and strategic planning [30]. Also, adequate environmental risk disclosure can build organizational and managerial accountability and capacity by calling for comprehensive reporting system and stakeholder engagement strategy thereby promoting inclusive sustainable development.

However, despite the potential advantages, environmental risk disclosure in Nigeria still faces significant challenges. Many firms lack the technical expertise, regulatory incentives, or corporate governance frameworks necessary to implement effective reporting systems. In some cases, disclosures are made solely to meet compliance requirements rather than as part of a genuine sustainability commitment. The absence of standardized national reporting guidelines also results in inconsistencies in the quality and comparability of disclosures across different firms and sectors. Furthermore, in industries where environmental risks are not a top priority for consumers or regulators, firms may be reluctant to disclose such information especially if it could lead to reputational damage or legal consequences [25]. Additionally, the financial impact of environmental risk disclosure is not uniform across all firms. In high-impact industries like oil and gas, mining, and manufacturing, poor environmental practices can carry severe financial consequences, making transparent disclosure more relevant to investors. In contrast, for firms in less resource-intensive sectors, the perceived financial benefit of disclosure may be less compelling [23]. Nevertheless, the global rise of Environmental, Social, and Governance (ESG) investing is increasing scrutiny on all firms, regardless of their environmental footprint.

Although numerous empirical studies have explored the link between environmental disclosures and financial performance, their findings are often mixed and rarely focus specifically on environmental risk. For instance, studies by Awa et al. (6) tend to evaluate

environmental or sustainability disclosures in general, without isolating the unique effects of disclosing environmental risks. Additionally, much of the existing literature is based on developed economies with advanced regulatory systems, limiting the applicability of their findings to the Nigerian context [19]. In Nigeria, empirical evidence remains sparse, fragmented and inconsistent in how both environmental risk disclosures and financial performance are measured. Given these challenges, it is essential to investigate the relationship between environmental risk disclosures and financial performance within Nigeria's unique institutional, regulatory, and environmental landscape. Such an inquiry will offer critical insights into whether enhanced transparency in environmental risk reporting can lead to improved financial performance among listed non-financial firms in a developing economy like Nigeria.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Financial Performance

Evaluating a company's performance requires a holistic approach that goes beyond traditional financial figures to encompass both quantitative and qualitative dimensions of organizational success. While financial indicators serve as fundamental benchmarks for assessing a firm's economic viability and profitability, non-financial indicators provide deeper insight into its operational resilience, customer orientation and strategic capabilities [32]. Financial indicators such as return on equity (ROE), return on assets (ROA), and various profit margin ratios are vital for analyzing a company's ability to generate returns on investments and manage its resources efficiently. These profitability metrics help determine how well a firm converts its assets and equity into net income. Performance assessment also incorporates market-based indicators that reflect investor confidence and perceived future potential. Metrics such as enterprise value added (EVA), price-to-earnings (P/E) ratio, and market capitalization reveal how the market values the company in light of its performance, innovation potential, and competitive edge. Additionally, shareholder return which includes capital appreciation and dividends captures the actual wealth distributed to investors over time, serving as a direct indicator of value generation [32]. However, this study measures financial performance by employing enterprise value added. This is due to the fact that this measure reveals the true economic profit of a firm. Also, it shows how much value a firm has created after accounting for the cost of capital used to generate its earnings.

Environmental Risk Disclosure

Environmental risk disclosure has become an essential aspect of corporate reporting as firms are increasingly held accountable for how their operations affect the

environment. With growing stakeholder expectations and heightened awareness of environmental issues, companies are under pressure to communicate their exposure to environmental risks and the measures they are taking to manage them. This form of disclosure involves presenting clear and reliable information about potential environmental threats, including emissions, waste, resource usage, and compliance with environmental laws. Listed non-financial firms in Nigeria typically share such disclosures through annual reports, sustainability statements, and regulatory submissions, reinforcing their commitment to transparency and responsible environmental management [21]. The advancement of environmental risk disclosure aligns with global movements focused on sustainability, climate risk mitigation, and ethical corporate conduct. International frameworks such as the Global Reporting Initiative (GRI) and the Task Force on Climate-related Financial Disclosures (TCFD) have set the stage for more robust and standardized environmental reporting. As a result, firms especially those in developing economies like Nigeria are increasingly expected to disclose detailed information on how environmental risks could impact their financial standing and long-term viability.

Fundamentally, environmental risk disclosure enhances corporate accountability and improves stakeholder engagement by offering insight into the environmental challenges a firm faces and how it responds to them [28]. By making such information accessible, companies enable stakeholders including investors, regulators, and the public to evaluate the risks associated with a firm's environmental footprint and its capacity to manage them effectively. By reporting on environmental exposures and mitigation strategies, companies can better monitor their performance, set measurable sustainability targets, and adjust their practices accordingly. Such disclosures not only foster internal accountability but also stimulate investment in cleaner technologies and sustainable innovation, leading to improved environmental performance and potentially stronger financial outcomes over time [11]. In the Nigerian context, where environmental accountability is gaining momentum, effective risk disclosure can serve as both a risk management tool and a pathway to enhanced firm performance.

THEORY AND HYPOTHESES DEVELOPMENT Carbon Emission Risk Reporting and Financial Performance

Carbon emission reporting has become increasingly important in the realm of environmental sustainability, as it involves the measurement, disclosure, and management of greenhouse gas emissions produced by organizations. Recently, there has been a growing recognition of the pressing need to tackle climate change and reduce its negative impacts. Carbon

emission reporting is crucial for promoting transparency, accountability, and taking action to reduce carbon footprints and transition to a low-carbon economy [2]. Through a systematic approach of monitoring and revealing carbon emissions, organizations can evaluate their impact on the environment, pinpoint areas that need improvement, and establish significant goals for reducing emissions.

Stakeholder theory proffers an important perspective for the relationship between carbon emission reporting and financial performance. Recognizing the significance of carbon emission reporting goes beyond internal management practices and extends to engaging with external stakeholders. Stakeholders, such as investors, consumers, regulators, and the wider community, depend on carbon emission data to make well-informed decisions and ensure companies are held responsible for their environmental performance [26]. Transparent reporting allows stakeholders to assess a company's environmental stewardship efforts, evaluate its alignment with sustainability goals, and gauge its resilience to climate-related risks. In addition, carbon emission reporting promotes the comparison and benchmarking of industry peers, fostering competition and encouraging the development of more sustainable practices.

There are quite number of empirical research studies that have been conducted on this subject matter with diverse findings. For example, Gallego-Álvarez (20) considered the impact of reducing carbon emission on international firms' performance from the year 2006 to 2009. Their study found that carbon emission reduction positively influences firms' financial performance. Broadstock et al. (10) investigated on the link between "Greenhouse gas (GHG) emissions" and business performance among UK listed firms from the year 2000 to 2015. It was found that the impact of GHG emissions on business performance is not consistent overtime. Similarly, Brik (9) examined the influence of climate risk (emphasis on GHG emission) on financial stability using Chinese banks and found that GHG emission significantly influence banks financial stability. Conversely, Delmas (13) provided evidence from 1,095 firms that greater disclosure of environmental emission lessens firms' financial performance at the short run. Choi and Luo (12) carried out an empirical investigation using 1,748 firm-year observations and discovered that carbon emissions reporting has an inverse relationship with firm value. Desai et al. (15) conducted an investigation among Indian firms between period 2013 to 2019 and found that carbon emissions adversely affect firms' financial performance. Based on these mixed findings, this study hypothesizes in null form:

H₀: Carbon emission risk disclosure has no significant effect on the financial performance of listed non-financial firms in Nigeria.

Biodiversity Risk Disclosure and Financial Performance

Reporting on biodiversity has become a vital part of efforts to promote environmental sustainability. It involves documenting, assessing, and sharing information about how organizations affect biodiversity and ecosystems. Over the past few years, there has been a growing awareness of the pressing importance of preserving biodiversity to ensure ecological resilience, promote human well-being, and foster sustainable development [1]. Given the escalating rates of biodiversity loss and ecosystem degradation, it is crucial to prioritize biodiversity reporting in order to promote transparency, accountability, and action in conservation and restoration initiatives. Organizations use biodiversity reporting to evaluate their ecological impact by systematically tracking biodiversity indicators like species diversity, habitat loss, and ecosystem health. Organizations that openly share their biodiversity performance showcase their dedication to environmental responsibility and contribute to wider initiatives aimed at protecting biodiversity and ecosystem services. Investors, consumers, regulators, and local communities depend on biodiversity data to assess the environmental performance of businesses and make well-informed decisions regarding their involvement with them [24].

The connection between biodiversity risk disclosure and financial performance is anchored on stakeholder theory. This is because when an organization report biodiversity risks, they address stakeholders' concerns and as well builds long term sustainability and attract investment thus increasing market valuation and Profitability. Prior research studies have been conducted on this subject matter. For example, (16) revealed that no relationship exists between environmental disclosures and financial performance in Indonesian firms. Menike (27) disclosed that for 26 sampled firms in Sri Lanka between the year 2012 to 2019, financial performance is positively influenced by disclosure of environmental information. Elsayed (18) conducted an empirical study for 100 firms on financial implication of biodiversity disclosure and found that financial performance is positively associated with financial performance. Dutta and Dutta (17) reported that for 34 sampled firms operating in Finnish, reporting biodiversity activity is for legitimate purpose. Furthermore, Bach (8) found that for the observed U.S. firms biodiversity risk greatly impedes performance. Given these opposite findings, the null hypothesis is stated as:

H₀: Biodiversity risk disclosure has no significant effect on the financial performance of listed non-financial firms in Nigeria.

Compliance to Environmental Laws Disclosure and Financial Performance

Adhering to regulatory rules and reporting is crucial for environmental sustainability, ensuring that legal regulations and standards are followed to protect the environment and promote responsible management of natural resources. Over the past few years, there has been a growing awareness of the need for strong regulatory frameworks to tackle environmental issues and minimize the effects of human actions on ecosystems and biodiversity [31]. In light of the increasing environmental degradation and climate change, compliance reporting plays a crucial role in promoting transparency, accountability, and action to achieve environmental sustainability goals. Organizations showcase their dedication to environmental protection, risk management, and corporate responsibility by consistently recording their compliance with environmental standards and laws [34]. Through transparently documenting their compliance efforts, organizations not only fulfill their legal obligations but also demonstrate their commitment to environmental stewardship and contribute to broader initiatives aimed at reducing environmental impacts.

Legitimacy theory elucidates the relationship between compliance to environmental laws disclosure and financial performance. The reason being that compliance disclosures signal alignment with societal and legal expectations. It helps improve firm's reputation, lessen regulatory scrutiny and maintain access to resources and customers thereby enhancing firms' financial performance. Studies conducted in relation to compliance to environmental laws disclosure and financial performance reveals varying results. Deng and Li (14) reported that compliance to environmental law is inversely related to financial performance of the sampled firms in China. Also, (22) found that there is a positive relationship between environmental responsibility and firms' financial performance. Adebayo and Ezejiofor (2021) reported that disclosure on voluntary compliance to environmental laws is positively related to firms' financial performance of quoted manufacturing companies. Furthermore, Awa et al. (6) investigated the effect of environmental accounting information disclosures on financial performance of cement manufacturing companies in Nigeria. Their findings disclosed that environmental fines and penalties disclosure have statistical insignificant effect on return on assets. Going by the aforementioned, the null hypothesis is stated as:

H₀: Compliance to environmental laws disclosure has no effect on the financial performance of listed non-financial firms in Nigeria.

METHODOLOGY

The study adopts an *ex post facto* design. This is due to the fact that this research design is ideal for investigating causal relationship between explained variable and explanatory variable of the study without practical manipulation. This research encompasses all the non-financial firms listed on the Nigerian Exchange Group platform spanning a decade, from 2014 to 2023. As of the conclusion of 2023, the Nigerian Exchange Group hosted 106 non-financial entities. Employing a purposive non-probability sampling technique, the study carefully selects its final sample size based on data availability and accessibility. Firms incorporated into the Nigerian Exchange Group after 2014 are excluded to maintain a consistent data structure throughout the study period, ensuring robust and accurate estimations. Additionally, companies lacking essential information necessary for the study's objectives are also omitted from the sample. Consequently, the sample comprises a total of seventy-five (75) listed non-financial companies. This study employed secondary data source of data in obtaining information relating to the dependent variable of financial performance as measured in terms of enterprise value added and earnings per share and the

independent variable of environmental accounting disclosure. Furthermore, Global Reporting Initiative (GRI) 2021 framework serves as basis to assess the environmental disclosures. The data sourced undergoes rigorous analysis using various statistical methods to elucidate the relationships between environmental sustainability reporting and financial performance. These methods include descriptive statistics, correlation analysis and panel regression analysis, each offering unique insights into the data and its underlying dynamics. This study modifies the model of Awa, Udu and Udu (6) to formulate the econometric model of the study as:

$$ENVA_{it} = \beta_0 + \beta_1 CEDS_{it} + \beta_2 EBDD_{it} + \beta_3 CELDS_{it} + \epsilon_{it} \quad (1)$$

Furthermore, in order to enhance the precision of the model; the study includes control variables which includes firm size, debt to asset ratio and revenue growth. Therefore, restating the model with the inclusion of the control variables gives:

$$ENVA_{it} = \beta_0 + \beta_1 CEDS_{it} + \beta_2 EBDD_{it} + \beta_3 CELD_{it} + \beta_4 FSIZ_{it} + \beta_5 DETA_{it} + \beta_6 REVG_{it} + \epsilon_{it} \quad (2)$$

In this model, ENVA is enterprise value added, CEDS represents carbon emission disclosure, EBDD is environmental biodiversity disclosure, CELD represents compliance to environmental laws and regulations, FSIZ is firm size, DETA represents ratio of debt to total assets, REVG is revenue growth, i represents firm, t denotes time.

Table 1: Measurement of Variables Employed

S/N	Variable	Measurement	Source
Dependent Variables			
1	Enterprise Value Added	Enterprise value added in numbers is computed as enterprise value divided by total asset.	[6]
Independent Variables			
1	Carbon Emission Disclosure	Carbon emission disclosure is measured in dummy as 1 for firms that disclose information on management of greenhouse gas emissions and 0 for otherwise.	GRI 2021
2	Environmental Biodiversity Disclosure	Environmental biodiversity disclosure is measured in dummy as 1 for firms that disclose information on the influence of their operations on biodiversity and ecosystem and 0 for otherwise.	GRI 2021
3	Compliance to Environmental Laws and Regulation.	Compliance to environmental laws disclosure is measured in dummy as 1 for firms that disclose information on compliance with legal regulations and standards to protect the environment and promote responsible management of natural resources and 0 for otherwise.	GRI 2021
Control Variables			
1	Firm Size	Firm size is measured as the logarithm of total asset.	[35]
2	Debt to Asset Ratio	Debt to Total Asset in percentage is computed as total liabilities divided by total asset.	[3]
3	Revenue Growth	Revenue growth in percentage is computed as current year revenue minus previous year revenue divided by previous year revenue.	[29]

Authors' Compilation (2025)

RESULTS AND DISCUSSION

Descriptive Statistics

The descriptive statistics shed light on the characteristics of the variables under examination in

this study. Firstly, focusing on enterprise value added (ENVA), the mean value of 99.022 suggests a considerable average value, although this is notably higher than the median, indicating a positively skewed distribution. This skewness is further accentuated by

the substantial standard deviation of 284.105, suggesting wide variability in ENVA across the sampled non-financial firms listed on the Nigerian Exchange Group. Additionally, the range from -41.170 to 570.750 indicates the presence of extreme values within the dataset.

In terms of environmental disclosure metrics, carbon emission disclosure (CEDS) and compliance to environmental laws disclosure (CELD) exhibit mean values of 0.072 and 0.096, respectively. These relatively low means imply that, on average, firms disclose only a small proportion of their carbon emissions and compliance efforts. However, the wide standard deviations of 0.259 for CEDS and 0.295 for CELD indicate substantial variation in disclosure practices among the sampled firms, with some likely demonstrating more robust environmental reporting than others. Similarly, environmental biodiversity disclosure (EBDD) displays a low mean value of 0.020, indicating limited disclosure on biodiversity-related initiatives. The standard deviation of 0.139 suggests considerable heterogeneity in the extent of biodiversity disclosure among the firms in the sample. Furthermore, the control variables—firm size (FSIZ), debt to asset ratio (DETA), and revenue growth (REVG)—display means consistent with typical ranges for these variables. However, the wide ranges and large standard deviations for DETA and REVG imply considerable variability in these control variables across the sample, which may influence the relationships being examined in the study.

Table 2: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Enva	760	99.022	284.105	-41.170	570.750
Ceds	760	0.072	0.259	0.000	1.000
Ebdd	760	0.020	0.139	0.000	1.000
Celd	760	0.096	0.295	0.000	1.000
Fsiz	760	7.128	0.890	5.030	9.450
Deta	760	68.264	43.319	-20.780	395.450
Revg	758	14.863	89.220	-394.300	1354.260

Source: Author (2025)

Test for Data Normality

The result in table 3 shows that the dependent variable of financial performance when measured in terms of enterprise value added ($\text{prob}>z = 0.000$) is not normally distributed. This conclusion arises from the significant probability values of the z-statistics obtained from the Shapiro-Wilk test, which is conducted at a 5% significance level. Similarly, the independent variables, including carbon emission disclosure ($\text{prob}>z = 0.000$), environmental biodiversity disclosure ($\text{prob}>z = 0.000$), compliance to environmental laws disclosure ($\text{prob}>z = 0.000$), number of foreign subsidiaries ($\text{prob}>z = 0.000$), and the control variable of firm size ($\text{prob}>z = 0.000$), debt

to asset ($\text{prob}>z = 0.000$) and revenue growth ($\text{prob}>z = 0.000$) are all not normally distributed. This inference is drawn from the significant probability values of the z-statistics obtained from the Shapiro-Wilk test, which is conducted at a 1% significance level. However, the study proceeds with the ordinary least square regression but carefully interpreting the probability statistics against the t-statistics in line with the recommendation of Gujarati, (2004)., in this study, the adoption of robust regression is justified. This interpretation is justified following the study of Bera and Jarque (1982). Following the above, we employed the Spearman Rank Correlation coefficient to test for the correlation among the variables.

Table 3: Shapiro-Wilk Normal Data

Variable	Obs	W	V	z	Prob>z
Enva	760	0.041	471.421	15.071	0.000
Ceds	760	0.967	16.249	6.826	0.000
Ebdd	760	0.881	58.372	9.957	0.000
Celd	760	0.976	11.766	6.036	0.000
Fsiz	760	0.989	5.210	4.041	0.000
Deta	760	0.732	131.858	11.952	0.000
Revg	758	0.474	257.796	13.592	0.000

Source: Authors Computation (2025)

CORRELATION ANALYSIS RESULT

The result in Table 4 shows that there is a positive relationship between the independent variable of carbon emission risk disclosure (0.068) and the dependent variable of financial performance when measured in terms of enterprise value added during the period under study. There is also a positive association between environmental biodiversity disclosure (0.026) and the dependent variable of financial performance when measured in terms of enterprise value added during the period under study. However, compliance to environmental laws disclosure (-0.101) has a negative association with the dependent variable of financial performance when measured in terms of enterprise value added during the period under study. In the case of the control variables, the result shows that firm size (-0.066) is negatively associated with the dependent variable of financial performance when measured in terms of enterprise value added during the period under study. However, debt to asset (0.274) is positively associated with the dependent variable of financial performance when measured in terms of enterprise value added during the period under study. Also, revenue growth (-0.236) is negatively associated with the dependent variable of financial performance when measured in terms of enterprise value added during the period under study.

Table 4: Correlation Analysis

Variables	(1)	(3)	(4)	(5)	(7)	(8)	(9)
(1) enva	1.000						
(3) ceds	0.068	1.000					
(4) ebdd	0.026	0.471	1.000				
(5) celd	-0.101	0.460	0.403	1.000			
(7) fsiz	-0.066	0.322	0.172	0.150	1.000		
(8) deta	0.274	-0.021	-0.019	-0.019	0.039	1.000	
(9) revg	-0.236	0.074	0.077	0.043	0.221	-0.051	1.000

Source: Authors Computation (2025)

Regression Analyses

Specifically, to examine the cause-effect relationships between the dependent variables and independent variables as well as to test the formulated hypotheses, the study used a robust regression since the result reveal the presence of heteroscedasticity. Table 5 presents the results obtained from the regression results for this study. The result indicates that the pool OLS regression model had an R-squared value of 0.317 when the dependent variable of financial performance is measured in terms of enterprise value added. This implies that the independent and control variables of the study could explain about 32% of the systematic changes in the dependent variable of financial performance when proxied using enterprise value added. However, the unexplained part of financial performance has been captured in the error term. The result of the F-statistics of the pool OLS regression for the sample non-financial firms with an associated p-value across the models indicates that the pool OLS regression for model on the overall is statistically fit at 1% level of significance and can be employed for statistical inferences. However, to further validate the estimates of the pool OLS results, this study also tests for multicollinearity and heteroscedasticity.

The Variance Inflation Factor (VIF) was used to assess multicollinearity. The result for VIF reveals a mean value of 1.26. Notably, this result indicates that the mean VIF falls comfortably below the established benchmark of 10, consistent with the perspective advocated by Gujarati (2004). This finding suggests the absence of multicollinearity and implies that there is no necessity to eliminate any of the independent variables from the respective models. The homoscedasticity assumption posits that if errors exhibit heteroscedasticity (meaning the Ordinary Least Squares, or OLS, assumption is breached), the reliability of OLS estimates' standard errors becomes questionable. The presence of heteroscedasticity leads to underestimated p-values due to increased variability in coefficient estimates which goes undetected by the OLS estimator. To ascertain the presence or absence of

heteroscedasticity in the regression outcomes, the Breusch-Pagan Godfrey test is employed. The findings reveal a significant p-value signaling a violation of the homoscedasticity assumption in the pooled OLS regression results. Consequently, the study resorts to robust regression estimates for interpretation and formulation of policy recommendations.

Table 5: Regression Results

Variables	(1)	(2)
	OLS-ENVA	Robust-ENVA
Ceds	3250.413 (0.872)	0.714*** (0.003)
Ebdd	5683.627 (0.868)	0.073 (0.856)
Celd	-6225.046 (0.700)	-0.557*** (0.003)
Fsiz	-10205.158 (0.055)	-0.052 (0.400)
Deta	-232.222** (0.015)	0.009*** (0.000)
Revg	-87.824 (0.056)	-0.002*** (0.000)
Intercept	96020.669** (0.013)	1.397*** (0.002)
Observations	758.000	758.000
R ²	0.317	0.458
Hettest	2002.92{0.000}	
VIF	1.26	

Source: Authors Computation (2025)

TEST OF HYPOTHESIS

This study provides a detailed discussion using the robust regression to test the hypotheses of the study.

Hypothesis 1: Carbon emission risk disclosure has no significant effect on the financial performance of listed non-financial firms in Nigeria.

The results obtained from the robust regression model presented in Table 5 revealed that carbon emission risk disclosure [coef. = 0.714 (0.003)] has a statistically significant positive effect on the financial performance of listed non-financial firms in Nigeria during the study period. This indicates that increased disclosure of carbon emission-related risks is associated with improved financial performance. The result implies that firms that provide transparent information regarding their carbon emission risks tend to gain financial benefits, possibly due to enhanced stakeholder trust, improved corporate image or access to sustainable investment opportunities. This aligns with the findings of Gallego-Álvarez et al. (20); Brik (9) who noted that carbon emission reporting can strengthen a firm's

accountability and appeal to environmentally conscious stakeholders, ultimately translating to financial gains. Hence, the null hypothesis that carbon emission risk disclosure has no significant effect on the financial performance of listed non-financial firms in Nigeria is rejected.

Hypothesis 2: Biodiversity risk disclosure has no significant effect on the financial performance of listed non-financial firms in Nigeria

The robust regression results in Table 5 show that biodiversity risk disclosure [coef. = 0.073 (0.856)] has a positive but statistically insignificant effect on the financial performance of listed non-financial firms in Nigeria. This suggests that although there may be a positive link between biodiversity disclosures and firm performance, the relationship is not strong enough to be statistically validated and such disclosures have yet to yield tangible financial benefits. This It implies that disclosures on biodiversity risks have not yet translated into measurable financial advantages within the context of Nigerian non-financial firms.

This aligns with the observations of Deswanto and Siregar (16), who noted that stakeholder sensitivity often shapes the perceived value of environmental disclosures. Therefore, the null hypothesis that biodiversity risk disclosure has no significant effect on the financial performance of listed non-financial firms in Nigeria is not rejected.

Hypothesis 3: Compliance to environmental laws disclosure has no significant effect on the financial performance of listed non-financial firms in Nigeria.

Furthermore, compliance to environmental laws disclosure [coef. = -0.557 (0.003)] has disclosed in Table 5 has a statistically significant negative effect on the financial performance of listed non-financial firms in Nigeria. This suggests that increased disclosure regarding compliance with environmental laws is associated with a decline in financial performance. One possible interpretation is that the cost of compliance and the transparency associated with such disclosures may reflect regulatory burdens or signal potential liabilities, which could adversely affect profitability. This is particularly relevant in Nigeria, where environmental regulation enforcement often lacks uniformity, leading firms to incur substantial compliance costs without necessarily deriving proportional financial or reputational benefits. Kurawa and Shuaibu (25) observed that many Nigerian firms perceive environmental compliance as a cost center, especially when the institutional environment does not reward transparency or penalize non-compliance consistently. This result contrasts the findings of Deng and Li (14) and also with findings from studies in more developed contexts where compliance reporting is associated with enhanced credibility and reduced

capital costs. Zamil and Hassan (36) found that among Fortune 500 firms, environmental compliance disclosure was positively linked to financial performance, primarily due to strong regulatory frameworks and stakeholder activism that reward such behavior. Therefore, the null hypothesis that compliance to environmental laws disclosure has no significant effect on the financial performance of listed non-financial firms in Nigeria is rejected.

CONCLUSION AND RECOMMENDATIONS

The study investigates the effects of environmental risk disclosure on financial performance of listed firms operating in the non-financial sector in Nigeria from the year 2014 to 2023. The problem addressed stemmed from growing stakeholder demands for transparency and accountability in corporate environmental practices, amidst uncertainty over the financial implications of such disclosures. Explicitly, the study investigated the effects of carbon emission risk disclosure, biodiversity risk disclosure and compliance to environmental laws disclosure on enterprise value added. Furthermore, the analysis controlled for firm-specific factors such as size, leverage and revenue growth. Given the presence of heteroscedasticity, the study relied on robust regression estimates to ensure the validity of statistical inferences. The findings offer differentiated insights, revealing that not all environmental disclosures produce similar outcomes. Carbon emission risk disclosure enhanced financial performance, biodiversity disclosures had no meaningful financial impact, while compliance-related disclosures were inversely related to performance.

The findings have several implications. Firstly, carbon emission disclosures appear to be strategically beneficial for firms in Nigeria, likely due to increasing ESG-driven investor scrutiny and market incentives. Secondly, biodiversity risk disclosures, though directionally positive, did not yield financial returns possibly due to low public awareness or weak regulatory pressure. Thirdly, compliance disclosures despite being legally required appeared to impose financial costs that were not adequately offset by market or reputational benefits. This divergence points to a need for firms to adopt a more strategic approach to how environmental information is reported, particularly in terms of framing disclosures in ways that align with stakeholder expectations and long-term value creation. The key takeaway from this study is that environmental risk disclosure is not a monolithic concept; its financial implications vary depending on the type of disclosure. Firms need to be discerning in how they integrate and communicate their environmental practices. Disclosures that demonstrate proactive risk management and future-focused sustainability strategies such as carbon emissions

mitigation are likely to be rewarded in financial terms. In contrast, disclosures that are compliance-driven and reactive may fail to create value or even signal financial liabilities. Therefore, both firms and regulators must collaborate to ensure that environmental disclosure frameworks not only promote transparency but also foster competitiveness and financial resilience in Nigeria's non-financial corporate sector. The significant contribution of this study is that it offers timely and practical insights into how various types of environmental disclosures (carbon emissions, biodiversity risks, and compliance with environmental laws) impact firm performance. For policymakers and regulators, the findings provide evidence-based justification for formulating tailored environmental disclosure frameworks that incentivize value-enhancing transparency while discouraging compliance practices that impose unproductive financial burdens. Also, it advances conceptual models on sustainability-performance linkages by illustrating how environmental practices interact with firm-level strategies and financial outcomes in emerging markets. For academics and researchers, this work serves as a foundational study, encouraging deeper inquiry into the dimensions of disclosure quality, sectoral differences, or moderating variables like governance mechanisms and investor activism, all of which remain ripe for further investigation.

The study recommends that environmental disclosures should be treated as strategic tools for enhancing firm performance rather than as mere compliance obligations. Corporate managers should institutionalize carbon disclosure as a performance-enhancing tool. Sustainability officers should work alongside financial managers to develop detailed carbon accounting reports that communicate mitigation strategies, efficiency achievements, and future targets. Regulators such as the Financial Reporting Council of Nigeria should enforce sector-specific carbon disclosure guidelines. This will not only improve investor trust but position Nigerian firms competitively in global sustainability rankings. Also, policy makers should incentivize compliance through tax reliefs, environmental certifications and recognition awards. Investors and analysts should evaluate firms' compliance efforts not solely on cost implications but on how they contribute to long-term risk mitigation. Accounting bodies must guide firms on how to frame compliance disclosures within integrated reports to reflect strategic alignment and value creation.

This study makes several novel contributions to academic literature and environmental policy. In terms of context, it is one of the few studies in Nigeria that disaggregates environmental risk disclosures into carbon emissions, biodiversity, and environmental compliance, providing detailed insights into how each

affects firm performance differently. The findings contribute to the theoretical literature by reinforcing stakeholder theory and legitimacy theory. Conceptually, the study redefines environmental risk disclosure not as a singular construct, but as a set of distinct but interconnected dimensions with varying financial implications. Methodologically, the adoption of robust regression addresses heteroscedasticity concerns common in firm-level financial data, enhancing the reliability of results. Empirically, the study fills a gap in Nigerian literature where previous works treated environmental disclosure as a holistic variable, failing to examine the diverse effects of each risk type. For policymakers, the study's insights inform environmental regulation strategies, emphasizing the need for incentives over punitive compliance. In the academic sphere, the study provides a rich foundation for further research and curriculum development in environmental finance.

LIMITATION OF THE STUDY

The study acknowledged that while it provides critical insights into the Nigerian non-financial sector, its focus on listed firms may not fully reflect the practices of small and medium enterprises or unlisted companies, which may differ significantly in their disclosure behavior. It was also reported that some firms in the sample had inconsistencies in environmental data reporting over the years, which may have affected the completeness of the dataset despite rigorous data cleaning procedures. Additionally, the exclusive use of enterprise value added as a performance metric may not capture all dimensions of financial performance. However, this study proffers avenues for future research study that is future studies are encouraged to expand the scope by including other sectors and also consider extending the study beyond Nigeria to incorporate comparative insights from other Sub-Saharan African countries, which may reveal regional disparities in the financial effects of environmental practices. Additionally, using alternative methodological approaches such as structural equation modeling or dynamic panel estimation could further improve the understanding of the causal mechanisms linking disclosure practices to performance outcomes.

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