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# Assessing the Impact of Firm Innovativeness on Environmental Disclosure among Listed Non-Financial Companies in Nigeria

Isah, Baba Bida[1]; Aliyu, Usman Baba[2]; Sanni, Mubarak[3]
Hassan, Ibrahim[4] ; Sayuti, Abdullahi Shafii[5*]

[1234]Department of Accounting, Ibrahim Badamasi Babangida University, Lapai, Nigeria
[5]*Department of Economics, Federal University, Birnin Kebbi
*Corresponding Author:* Sayuti, Abdullahi Shafii

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**Abstract: This study examines the effects of firm innovativeness on environmental disclosure using robust statistical modeling. The findings reveal that firm complexity negatively influences environmental disclosure, suggesting that higher firm complexity hinders effective environmental reporting. In contrast, technological infrastructures, research and development (R&D), and firm size positively and significantly impact environmental disclosure, highlighting the critical roles of innovation, technological capacity, and resource availability in fostering environmental transparency. Managerial efficiency shows a positive statistically significant effect. The study concludes by recommending simplification of organizational structures, investment in technology and R&D, leveraging the resources of larger firms, and enhancing managerial training to improve environmental disclosure practices. These insights offer valuable guidance for policymakers, corporate leaders, and researchers aiming to enhance sustainability reporting and transparency.**

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## I. INTRODUCTION

The increasing awareness of environmental issues and the role of businesses in mitigating their impact on the environment have led to growing demands for companies to disclose their environmental performance. Environmental disclosure is the process of providing stakeholders with information about a company's environmental performance, policies, and practices. It is an essential aspect of corporate social responsibility (CSR) and sustainability reporting.

In Nigeria, the need for environmental disclosure has become more pressing due to the country's vulnerability to environmental degradation. The oil and gas industry, which is a significant contributor to Nigeria's economy, have been criticize for its environmental impact. Despite the importance of environmental disclosure, many companies in Nigeria, particularly non-financial companies have been criticize for their lack of transparency and accountability in their environmental reporting. A study by the Nigerian Stock Exchange (NSE) found that only 12% of listed companies in Nigeria provide environmental information in their annual reports.

Firm innovativeness has been identified as a key driver of environmental disclosure. Innovative companies are more likely to adopt sustainable practices and disclose their environmental performance. Innovativeness enables companies to develop new products, services, and processes that reduce their environmental impact. It also enables companies to respond to changing environmental regulations and stakeholder expectations.

However, there is a paucity of research on the impact of firm innovativeness on environmental disclosure in Nigeria. Most studies on environmental disclosure in Nigeria have focused on the oil and gas industry, with little attention paid to non-financial companies. This study aims to fill this gap by investigating the impact of firm innovativeness on environmental disclosure of listed non-financial companies in Nigeria.

## II. LITERATURE REVIEW

Theoretical literature on the impact of firm innovativeness on environmental disclosure of listed non-financial companies in Nigeria is rooted in several conceptual frameworks. Some key theories are Stakeholder Theory which posits that companies have a responsibility to

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disclose environmental information to stakeholders, including shareholders, customers, and the wider community. Also, Legitimacy Theory suggests that companies disclose environmental information to legitimize their operations and maintain social license. Furthermore, Signaling Theory proposes that companies use environmental disclosure as a signal to stakeholders about their commitment to sustainability and environmental responsibility. Agency Theory suggests that environmental disclosure is influence by the agency relationship between managers and shareholders, with managers disclosing environmental information to reduce agency costs. Institutional Theory proposes that environmental disclosure is influence by institutional pressures, including regulatory requirements, industry norms, and stakeholder expectations.[5]

- *Empirical Studies*

Bello et al., (2021) examined the influence of board dynamics on Environmental, Social, and Governance (ESG) practices in listed non-financial firms in Nigeria. Utilizing a Generalized Least Square estimation technique, the study found that while board financial expertise and size positively impact ESG practices, the industry knowledge of independent directors has an insignificant positive effect. These findings highlight specific board attributes that could drive improved ESG practices in Nigeria's non-financial sector.

Similarly, Ye *et al.,* (2022) investigated how green organizational strategy and environmental CSR affect organizational sustainable performance through green technology innovation amid COVID-19. Exploring survey research design, the study adopted structural equation modeling. Using environmental CSR, organizational sustainable performance, green technology innovation and green organization strategy as variables. The findings revealed that GOS has a strong positive effect on ECSR, GTI, and OSP. Further, ECSR has a strong positive impact on GTI and OSP.

More so, Xu *et al.,* (2022) pathways to sustainable development: corporate digital transformation and environmental performance in China. Adopting corporate digital transformation, environmental performance, green technology innovation, corporate governance, and sustainable development as variables. The study explored mixed research design using descriptive and inferential. The result shows that corporate digital transformation has effectively curbed environmental pollution emissions and improved environmental performance.

Pechancová *et al.,* (2019) examined environmental management systems using an effective tool of corporate sustainability. Using mixed research design, the study adopted mature environmental management system, corporate environmental policy, environmental behavior, and sustainability as variables. Adopting instrumental variables approach, the findings underscore the critical role of the management strategy approach and stakeholder requirements´ monitoring.

Likewise, using an empirical evidence of Malaysian SMEs, Rasit *et al.,* (2019) examined the green supply chain management (GSCM) practices for sustainability performance. He applied sustainability performance, environmental management system, and green supply chain management as variables. The study adopted survey research design and the data collected was analysed using resource-based view (RBV) model. Findings from this research suggest that GSCM practices positively influence sustainability performance.

Also, Ahmed, Ashraf, Khan, Kusi-Sarpong *et al.,* (2020) analyzed the impact of environmental collaboration among supply chain stakeholders on a firm's sustainable performance. They adopted green supply chain, supplier collaboration; customer collaboration; environmental performance, organizational performance as variable, the study employed survey research design. The result indicates significant and positive impacts of institution pressure and customer monitoring on the adoption of green supply chain management (GSCM) practices by organizations.

Exploring the nexus among green supply chain management, environmental management, and sustainable performance, Marri *et al.,* (2021) examined the mediating role of environmental management. Using a survey research design, the study employed Kendall's tau correlation coefficients and Cronbach alpha statistic. Adopting green supply chain management, environmental management and sustainable performance as variables. The study concludes that green purchasing overall acts as a mediating factor between the association of operational performance and eco-design.

Also, Bello *et al.,* (2021) examined the effect of Board Dynamics on Environmental, Social and Governance (ESG) Practices of Listed Non-Financial Firms in Nigeria. The study employed an ex-post-facto research design and the method of data analysis employed is the Generalized Least Square data estimation technique. The finding reveals that, independent director's industry knowledge has an insignificant positive influence on ESG practices; while board financial expertise and board magnitude have a significant positive effect on ESG practices of listed non-financial firms in Nigeria.

Likewise, Bello *et al.,* (2021) examined the effect of board dynamics on environmental, social and governance (ESG) practices of listed non-financial firms in Nigeria. The study employed an ex-post-facto research design and utilized is the Generalized Least Square data estimation technique. The finding reveals that, independent director's industry knowledge has an insignificant positive influence on ESG practices, while board financial expertise and board magnitude have a significant positive effect on ESG practices of listed non-financial firms in Nigeria.

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## III. METHODOLOGY

The ex-post facto research design was used in this study. Data was collected from every non-financial company listed on the Nigeria Stock Exchange as of December 31, 2022. The unit of analysis in this study is quoted manufacturing company on the Nigerian Stock Exchange as at December 31, 2022. Sample size was calculated using formula by Krejcie and Morgan (1970). the study employed stratified random sampling techniques to determine the specific sample size for each sector. Table 1 shows the breakdown of the sampling and the sample size

**Table 1: Sample Size and Sampling Technique**

| S/N | Sector | Population | | Sample Size |
|---|---|---|---|---|
| 1 | Healthcare | 9 | 9/75*49 | 6 |
| 2 | Natural Resources | 4 | 4/75*49 | 3 |
| 3 | Construction/Real Estate | 9 | 9/75*49 | 6 |
| 4 | Conglomerates | 7 | 7/75*49 | 4 |
| 5 | Oil and Gas | 13 | 13/75*49 | 8 |
| 6 | Consumer Goods | 21 | 21/75*49 | 14 |
| 7 | Industrial Goods | 13 | 13/75*49 | 8 |
| | **Total** | **76** | **49** | **49** |

➢ *Model Specification*

The model adapted the framework proposed by Oluwatoyin et al. (2021), with adjustments made to align with the specific objectives and requirements of the current investigation, using Environmental Disclosure as the dependent variable. This refined approach facilitates a more focused examination of the interactions between a company's innovative initiatives and its practices related to environmental disclosures. Therefore, the modified versions of the decomposed model are presented as follows:

$$EnD_{it} = \beta_0 + \beta_1 FC_{it} + \beta_2 TI_{it} + \beta_3 R\&D_{it} + \beta_4 ME_{it} + \beta_5 FS_{it} + \mu_{it} \quad \text{..... 3.3}$$

Where:
$EnD_{it}$ = Environmental Disclosures "i" firm and time "t"
$FC_{it}$ = Firms Complexity "i" firm and time "t"
$TI_{it}$ = Technological Infrastructures "i" firm and time "t"
$R\&D_{it}$ = R&D Research and Development "i" firm and time "t"
$ME_{it}$ = managerial efficiency "i" firm and time "t"
$FS_{it}$ = Firm Size "i" firm and time "t"
$\beta_0$ = Intercept
$\beta_1 - \beta_5$ = coefficient of slop or regression coefficient
$\mu_{it}$ = error term

The a priori expectation for this model is that all independent variables—Firm Complexity (FC), Technological Infrastructure (TI), Research and Development (R&D), Managerial Efficiency (ME), and Firm Size (FS)—will have positive relationships with Environmental Disclosures (EnD). This implies that as firm complexity increases, technological infrastructure improves, R&D efforts expand, managerial efficiency strengthens, and firm size grows, the level of environmental disclosures is also expected to rise. Specifically, we anticipate that: $\beta_1 > 0$ (Firm Complexity), $\beta_2 > 0$ (Technological Infrastructure), $\beta_3 > 0$ (Research and Development), $\beta_4 > 0$ (Managerial Efficiency), and $\beta_5 > 0$ (Firm Size). Overall, these factors are hypothesized to positively influence environmental disclosures.

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## IV. DATA PRESENTATION

Table 2 presents the descriptive outcome of the environmental disclosure and firm innovativeness indicators across non-financial companies

**Table 2: Summary Analysis of the Variables Included in the Model**

| Variables | Obs. | Mean | Std. Dev. | Minimum | Maximum |
|---|---|---|---|---|---|
| EnD | 634 | 0.417 | 0.228 | 0 | 2 |
| FC | 634 | 2.516 | 0.670 | 1 | 4 |
| TI | 634 | 0.761 | 0.448 | 0 | 2 |
| R&D | 634 | 0.546 | 0.498 | 0 | 1 |
| ME | 634 | 1.188 | 1.081 | 0.02 | 12.76 |
| FS | 634 | 10.172 | 1.020 | 0.94 | 12.96 |

***Source: Author's Computation, 2024:***

*Explanatory Notes:, EnD is Environmental Disclosure, , FC is Firms' Complexity, TI is Technological Infrastructures, R&D is Research and Development, ME is Managerial Efficiency, and FS is Firm Size*

The study proceeded to describe environmental disclosure, which has an average value of 0.417 with a standard deviation of 0.228, indicating that environmental disclosure values are not far off from the average value. The minimum value of environmental disclosure is 0, while the maximum value is 2.

- *Preliminary Estimation Techniques*

Table 3, 4 and 5 shows the preliminary estimation techniques such as Multicollinearity Test, unit root test and correlation matrix with correlation coefficients, and their respective p-values which were utilized in scrutinizing the distribution of individual variables.

**Table 3: Pairwise Correlation Matrix**

| Variables | EnD | FC | TI | R&D | ME | FS |
|---|---|---|---|---|---|---|
| ED | 1 | | | | | |
| FC | 0.463 (0.000) | 1 | | | | |
| TI | 0.573 (0.000) | -0.114 (0.003) | 1 | | | |
| R&D | -0.172 (0.000) | 0.092 (0.019) | 0.041 (0.307) | 1 | | |
| ME | 0.007 (0.862) | 0.103 (0.009) | 0.028 (0.478) | 0.083 (0.037) | 1 | |
| FS | 0.136 (0.001) | -0.035 (0.373) | 0.198 (0.000) | -0.301 (0.000) | 0.0239 (0.548) | 1 |

***Source: Author's Computation, 2024***

Table 3 reveals that environmental disclosure is positive related with social disclosure, sustainability reporting index, research and development, and firm size with coefficients of correlation of 0.463, 0.573, 0.136, and 0.212 respectively with associated p-values of 0.000 in each case except for R&D with p-value of 0.001. On the other hand, it is negative related with firms' complexity with coefficient of correlation of -0.172 with an associated p-value of 0.000, while it is not correlated with technological infrastructure and managerial efficiency as indicated by their respective p-values.

**Table 4: Multicollinearity Test (VIF and Tolerance)**

| Variables | VIF | Tolerance |
|---|---|---|
| Firms' Complexity (FC) | 1.03 | 0.967 |
| Technological Infrastructure (TI) | 1.07 | 0.936 |
| Research and Development (R&D) | 1.13 | 0.884 |
| Managerial Efficiency (ME) | 1.02 | 0.981 |
| Firm Size (FS) | 1.16 | 0.863 |
| **Average VIF** | 1.08 | |

***Source: Author's Computation, 2024***

The multicollinearity test for the independent variables (predicators) as presented in Table 4 indicated that all the predicators had VIF less than 5. The highest was 1.16, which is firm size. Meanwhile, the tolerance in all the predicators was observed to be greater than 0.1. This therefore indicated that there was no threat of multicollinearity.

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**Table 5: Fisher-type Unit Root Test**

| Variables | P | Z | L* | Pm | Order of Integration |
|---|---|---|---|---|---|
| EnD | 63.0208 | -3.2363 | -3.3136 | -2.4985 | I(1) |
| FC | 22.8154 | -2.2244 | -2.4435 | -5.3703 | I(1) |
| TI | 269.5380 | -8.6949 | -13.6061 | 12.2527 | I(0) |
| R&D | 93.4047 | -6.9142 | -8.6068 | -0.3282 | I(1) |
| ME | 390.5296 | -10.4970 | -14.3467 | 20.8950 | I(0) |
| FS | 336.2351 | -7.4434 | -9.7971 | 17.0168 | I(0) |

***Source: Author's Computation, 2024***

Table 5 confirms that all study variables are either stationary at level (I(0)) or at first difference (I(1)), making them appropriate for dynamic panel data analysis. The Fisher-type unit root test shows a mix of I(0) and I(1) variables, with none classified as I(2). Firm complexity, technological infrastructure, managerial efficiency, and firm size are stationary at level (I(0)), allowing for direct regression analysis. Conversely, economic disclosure and research and development are stationary at first difference (I(1)), requiring differencing for stationarity. Overall, the high test statistics strongly reject the null hypothesis of a unit root, reinforcing the robustness of the econometric analyses.

**Table 6 Estimates of the Models on the Effect of Firm innovativeness, Managerial Dynamics on Environmental Disclosure (EnD) with Robust Standard Error**

| Variable | Coefficient | T | p-value |
|---|---|---|---|
| FC | -0.067 | -18.20 | 0.000 |
| TI | 0.043 | 3.00 | 0.003 |
| R&D | 0.111 | 5.92 | 0.000 |
| ME | 0.009 | 1.69 | 0.091 |
| FS | 0.065 | 7.37 | 0.000 |
| Constant | -0.117 | -1.27 | 0.203 |
| | | | |
| R-squared | 0.131 | | |
| Wald Chi-Squared | 975.55 | | 0.000 |

**Source, Author's Computation (2024)**

*FC is Firms' Complexity, TI is Technological Infrastructures, R&D is Research and Development, ME is Managerial Efficiency, and FS is Firm Size*

Table 6 shows that the random effects model accounts for 13.1% of the variation in environmental disclosure, with an R-squared value of 0.131. The Wald Chi-Squared statistic of 975.55 ($p < 0.001$) confirms the model's significance. Findings indicate that firm complexity (-0.067, $p < 0.000$) and technological infrastructure (0.043, $p = 0.003$) positively impact environmental disclosure, while research and development (0.111, $p < 0.000$), managerial efficiency (0.009, $p < 0.091$) and firm size (0.065, $p < 0.000$) positively influence it. Specifically, a one-point increase in firm complexity decreases environmental disclosure by 0.067 points, and an increase in technological infrastructure decreases it by 0.043 points. In contrast, a one-percentage point increase in research and development raises environmental disclosure by 0.111 points, while an increase in firm size leads to a 0.065 point increase.

## V. DISCUSSION OF FINDINGS

This study's finding that firm complexity negatively affects environmental disclosure supports the notion that increased complexity might lead to inefficiencies in sustainability reporting. This are in line with the work of Li et al. (2018) and De Villiers et al. (2014) indicate that organizational complexity can hinder the ability of firms to effectively engage in environmental disclosure due to challenges in coordination and resource allocation.

The positive influence of technological infrastructures in this study aligns with the argument that technology facilitates transparency and compliance with environmental regulations. Also, Firms with better technological infrastructures are more likely to engage in environmental disclosure, which align with García-Sánchez et al. (2016) and Adams & McNicholas (2007) suggests that advanced technological infrastructures enable firms to better track and report their environmental impacts.

The significant positive effect of R&D found is consistent with research linking innovation with enhanced sustainability efforts. The study supported by Clarkson et al. (2011) and Berrone et al. (2013) highlight that firms investing in R&D often pursue innovation that aligns with sustainability goals, leading to improved environmental practices and disclosures.

Managerial efficiency has a positive but statistically insignificant effect on environmental disclosure. This suggests its influence might not be substantial or consistent.

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The positive and significant effect of firm size in this study reinforces the well-documented relationship between firm size and disclosure practices. Larger firms are more likely to engage in or report on environmental practices, likely due to greater resources or public scrutiny. The findings are in line with prior research by Patten (2002), Prado-Lorenzo et al. (2009), and Kolk (2003) shows that larger firms are more likely to disclose environmental information due to greater public scrutiny, regulatory pressures, and resource availability.

## VI. CONCLUSION AND RECOMMENDATIONS

The study explores the impact of firm innovativeness, managerial dynamics on environmental disclosure (EnD). The findings reveal that Firm complexity negatively impacts on environmental disclosure, while Technological infrastructures and R&D significantly enhance environmental disclosure. The Firm size and Managerial efficiency also has positive influence on environmental disclosure. Based on the findings from this study, the following are recommend:

Firms should reduce operational and reporting complexities to streamline environmental disclosure processes. This will be achieving by adopting standardized frameworks for sustainability reporting, such as GRI (Global Reporting Initiative);

In addition, Organizations should prioritize investments in advanced technologies, such as data analytics and automated reporting tools, to improve the accuracy and efficiency of environmental reporting;

Furthermore, policymakers and firms should focus on fostering R&D initiatives that integrate environmental goals. Tax incentives or subsidies for eco-friendly innovations can motivate firms to enhance their sustainability efforts;

Beside, larger firms should use their financial and operational advantages to set benchmarks for environmental disclosure. Regulators should encourage smaller firms to emulate best practices observed in larger organizations; and

Moreover, managerial efficiency has shown an insignificant effect, enhancing managerial capacity in sustainability-related decision-making can indirectly improve environmental disclosure. Firms can achieve this through training and incorporating sustainability into performance evaluations.

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