# DETERMINANTS OF ENVIRONMENTAL DISCLOSURES OF QUOTED MANUFACTURING COMPANIES IN NIGERIA

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**Abstract**

*Manufacturing companies play a significant role in Nigeria's industrial development. According to literature, pressures from firm-specific and institutional factors affect the level of environmental disclosures. Hence, this study examined the relationship between firm size, profitability, financial leverage, audit firm type, and environmental disclosure of quoted manufacturing companies in Nigeria from 2016 to 2021. The study utilized Logit and Probit regression models to analyze the relationship. It was found that firm size and profitability have positive and significant effects on environmental disclosure. Similarly, financial leverage and audit firm type showed positive and significant impacts on disclosure practices, while macroeconomic factors such as interest rate and inflation exerted varying influences. The study recommended that quoted manufacturing companies should embrace transparent environmental disclosure practices, while regulators should establish clearer benchmarks to guide environmental reporting in the Nigerian manufacturing sector.*

**Keywords:** Manufacturing Companies, Environmental Disclosure, Firm Size, Profitability, Financial Leverage, and Average Firm Size

## 1. Introduction

Manufacturing companies play an important role in the Nigerian economy as they contribute significantly to industrial development, employment generation, and GDP growth. Their operations, however, affect the environment through issues such as waste, pollution, and resource depletion. This makes the subject of environmental disclosure an important aspect of corporate reporting. Environmental disclosure refers to the communication of environmental effects of a company's activities to the public, interest groups, and the wider community (Deegan, Rankin & Tobin, 2018). Environmental disclosure is seen as part of social responsibility and accountability, providing information that can shape the perception of stakeholders about the firm (Deegan, Rankin & Tobin, 2018).

Over the last two decades, the demand for environmental information from by various stakeholders has been on the increase due to global awareness of climate change, sustainability, and the impact of industrial activities. International initiatives such as the Integrated Reporting Council, the Sustainability Accounting Standards Board, and the Climate Disclosure Standards Board have emphasized the importance of reporting environmental activities (Hope, 2018). However, in Nigeria, environmental disclosure remains voluntary and inconsistent. Companies disclose at their discretion, and in most cases, the information provided is inadequate and not comparable across firms (Shen & Huang, 2020).

Unlike other countries, Nigeria's environmental regulations are weak, with little evidence of effective enforcement or incentives such as carbon credits and renewable energy schemes. As a result, many Nigeria firms disclose environmental report selectively, while some provide no environmental information at all (Makori & Jagongo, 2018). Although some multinational companies in Nigeria produce sustainability reports, local firms still lag behind (citation). Compared with countries such as China where disclosure of environmental risks is mandatory in Initial Public Offering (IPO) prospectuses, Nigerian firms are left to determine what information to disclose or withhold. This leads to an information gap between companies and stakeholders (Atang & Eyisi, 2020).

The determinants of environmental disclosure have been studied in both developed and developing countries. Factors such as firm size, profitability, financial leverage, and audit firm type have been identified as important in influencing the extent of disclosure. Larger and more profitable firms are more visible and attract greater attention from stakeholders, which may compel them to disclose more environmental information (Cormier & Magnan, 2018; Henry, 2020). Firms with higher leverage may disclose more to reassure creditors, while companies audited by international audit firms are likely to meet higher reporting standards (Deegan & Gordon, 2020).

In Nigeria, most of the existing studies on environmental disclosure have focused on oil and gas companies, leaving a gap in the manufacturing sector. Yet, manufacturing companies also contribute significantly to environmental issues through emissions, industrial waste, and resource consumption. It is therefore necessary to examine the determinants of environmental disclosure among quoted manufacturing companies in Nigeria. Given this background, the study investigates the relationship between firm size, profitability, financial leverage, audit firm type, and environmental disclosure of quoted manufacturing companies in Nigeria.

## 2. Literature Review

### Theoretical Review

Several theories explain the determinants of corporate environmental disclosure. This study adopts the Stakeholder Theory developed by Freeman (1984), which posits that organizations have relationships with many groups of stakeholders such as shareholders, employees, customers, suppliers, government, and society at large. The theory argues that companies must consider the interest of these stakeholders, as their survival depends on their ability to manage these relationships effectively. Stakeholder theory emphasizes that disclosure of environmental activities is essential for legitimizing corporate operations and maintaining stakeholder trust (Deegan & Gordon, 2020).

In addition, the Legitimacy Theory suggests that companies voluntarily disclose environmental information to show that they are operating within the bounds and norms of their society (Suchman, 1995). Through disclosure, firms seek to bridge the gap between societal expectations and their actual practices. **Agency Theory** also provides insights, arguing that disclosure reduces information asymmetry between managers and stakeholders, thereby minimizing agency costs (Jensen & Meckling, 1976). Together, these theories provide the foundation for explaining why firm size, profitability, financial leverage, and audit firm type may influence the extent of environmental disclosure.

The empirical relationship between firm-specific determinants and environmental disclosure has been explored in various past studies across developed and developing economies.

Corier and Magnan (2018) found that larger and more profitable firms disclose more environmental information, driven by visibility and stakeholder pressure. Similarly, Henry (2020) reported that companies with international audit firms are more likely to follow global reporting standards. Deegan *et al., (2018)* also emphasized that disclosure is used as a tool to shape public perception and legitimize operations.

In developing countries, Makori and Jagongo (2018) examined environmental accounting and firm performance in Kenya and found a positive relationship between disclosure and profitability. Shen and Huang (2020), focusing on China, reported that mandatory disclosure requirements significantly improved environmental reporting. Atang and Eyisi (2020) observed that in Nigeria, firm size and profitability significantly drive disclosure, though practices remain inconsistent due to weak enforcement.

Other Nigerian studies show mixed results. Hope (2018) argued that many firms disclose voluntarily with little regulation, leading to non-uniformity. Studies also note that financial leverage can influence disclosure, as highly leveraged firms disclose more to reassure creditors (Makori & Jagongo, 2018). Similarly, firms audited by the "Big Four" international audit firms tend to disclose more environmental information due to stricter audit requirements and reputational concerns (Cormier & Magnan, 2018).

While international evidence highlights the role of mandatory frameworks, Nigerian literature shows that voluntary disclosure dominates, leaving significant variations in the quality and extent of reporting.

Most of the reviewed studies such as Cormier and Magnan (2018), Deegan and Gordon (2020), and Shen and Huang (2020) were carried out in developed or emerging economies where environmental reporting frameworks are stronger. Nigerian studies, including Atang and Eyisi (2020) and Hope (2018), have largely concentrated on the oil and gas sector, leaving the manufacturing sector under-researched.

Similarly, while prior works examined determinants such as firm size and profitability, fewer studies have jointly considered the combined effect of firm size, profitability, financial leverage, and audit firm type on environmental disclosure in Nigeria. In addition, inconsistencies in findings on the role of leverage and audit type create gaps that warrant further investigation.

This study therefore fills the gap by focusing on quoted manufacturing companies in Nigeria, examining how firm size, profitability, financial leverage, and audit firm type influence their environmental disclosure practices between 2016 and 2021.

## 3. Methodology

The study employs an ex post facto research design to establish the relationship between the dependent variable (environmental disclosure) and a set of independent variables (firm size, profitability, financial leverage, and audit firm type). This design is appropriate because it analyzes existing conditions and makes use of pre-existing secondary data (Creswell, 2014). The data for this study are quantitative and based on secondary sources. The period covered is from 2016 to 2024, which provides six years of observation of quoted manufacturing

companies in Nigeria. This period was chosen because it represents recent developments in environmental reporting in Nigeria and captures the growing interest in sustainability and corporate accountability.

The population of the study comprised 47 quoted manufacturing companies listed on the Nigerian Exchange Group (NGX). Out of this, a purposive sampling technique was used to select 20 companies based on availability and consistency of data. The data were collected from annual reports of the selected companies, the Securities and Exchange Commission (SEC) statistical bulletin, the Nigerian Exchange FactBook, and the Central Bank of Nigeria (CBN) statistical bulletin.

This study follows a panel data procedure where Logit and Probit regression models are employed to examine the relationship between the dependent variable (environmental disclosure) and the independent variables (firm size, profitability, financial leverage, and audit firm type).

Before estimation, descriptive statistics were used to summarize the characteristics of the variables, while correlation analysis was conducted to test for multicollinearity. The Logit and Probit regression techniques were then used to analyze both the significance and direction of the relationships. In addition, marginal effects were estimated to determine the magnitude of the impact of each explanatory variable on environmental disclosure. Furthermore, robustness tests such as goodness-of-fit and pseudo $R^2$ were carried out to ensure the reliability of the model.

**Model Specification**

Similar studies such as Jeroh (2020), Sabo (2020), Kipngetich *et al.,* (2019), and Nguyen *et al.,* (2019) built their models from one or more of these theories. Also, this incorporated macroeconomic indicators into the model as control variables to measure the impact of economic-wide factors on environmental disclosure. The control variable included in the model has been identified in empirical studies to account for variations in environmental disclosure. Based on these, the models for this study are specified as follows:

$ENVD_{it} = f(SIZE, PROF, FLEV, AUFT, MCI)$……(3.1)

This model can be further broken down in regression form as:

$$ENVD_{it} = \alpha + \beta SIZE_{it} + \beta PROFIT_{it} + \beta FLEV_{it} + \beta AFT_{it} + \beta MCI_{it} + \varepsilon_{it} \text{ ...(3.2)}$$

**Table 3.1 Measurement of Variables**

| Variables | Symbol | Measurement | A priori | Source | Data source |
|---|---|---|---|---|---|
| Environmental disclosure | ENVD | Dummy: assign 1 for firms that discloses environmental information and 0 (zero) for firms that do not disclose environmental information | | Ndukwe and John (2018), Toluwa *et al*. (2015), Oba and Fodio (2017) | |
| Company Size | SZE | Natural logarithm of Total Asset | + | Hackston & Milne, 2017 | Annual Financial Report; NSE FactBook |
| Profitability | PROF | Natural logarithm of Profit after Tax | + | Cowen *et al*., 2018; Ndukwe & John, 2018 | Annual Financial Report; NSE FactBook |
| Financial Leverage | FLEV | Ratio of total debt to total assets | + | Ndukwe and John (2018) | Annual Financial Report; NSE FactBook |
| Audit firm type | AUFT | Dummy: assign 1 for firms that hired Big Four audit firm and 0 (zero) for firms that hired other audit firms than the Big Four | + | Ndukwe and John (2018) | Annual Financial Report; NSE FactBook |
| Macroeconomic Indicators | MCI | Index of Macroeconomic Variables (i.e. interest rate and inflation rate) | + | Olokoyo *et al*., 2020; | CBN Statistical Bulletin, World Development Indicators |

**Source:** *Author's Compilation (2026)*

## 4. Data Analysis and Interpretation of Results

**Table 4.1 : Descriptive statistics of the Determinants of Environmental Accounting Disclosure**

| | ENVD | FSZE | PROF | FLEV | MCI |
|---|---|---|---|---|---|
| Mean | 0.0592 | 8.5213 | 4.455 | 2.491 | 0.0484 |
| Max | 1.000 | 11.6473 | 3.7552 | 18.544 | 1.000 |
| Min | 0.0000 | 2.4728 | 0.8859 | -2.574 | 0.0000 |
| S. Dev. | 0.1592 | 0.775 | 0.5442 | 3.972 | 0.1446 |

**Source:** *Author's Computations, (2026)*

During the periods under review, Table 4.1 revealed that the average environmental accounting disclosure is 0.059 with maximum of 1 and minimum of 0. In the same vein, the average firm size was 8.5213 with maximum of 11.6473 and minimum of 2.4728, average profitability was 4.455 with maximum of 3.7552and minimum of 0.8859, while average audit firm type is 0.0484 with maximum of 1 and minimum of 0. On the other hand, it was also revealed that the average MCI during the periods under review was 18.7092, with maximum of 31.65 and minimum of 9.4333.

**Table 4.2 Correlation Matrix**

| Variable | ENVD | SIZE | PROF | FLEV | AFT | MCI |
|---|---|---|---|---|---|---|
| **ENVD** | 1.0000 | | | | | |
| **SIZE** | 0.1337 | 1.0000 | | | | |
| **PROF** | 0.3928 | 0.3297 | 1.0000 | | | |
| **FLEV** | 0.1933 | 0.1222 | 0.1174 | 1.0000 | | |
| **AFT** | 0.0344 | 0.0274 | 0.0544 | 0.1678 | 1.0000 | |
| **MCI** | -0.0942 | -0.0833 | 0.1908 | -0.3320 | 0.0472 | 1.0000 |

**Source:** *Author's Computation, (2026)*

From Table 4.2, the result of correlation matrix indicates that firm size, profitability, financial leverage, audit firm type and inflation have a positive correlation with environmental accounting disclosure while macroeconomic indicators has a negative correlation with environmental accounting disclosure. This is in tandem with *a priori* expectations.

**Table 4.3 Panel data analysis (Random effect logistic regression)**

Random-effects logistic regression Number of obs = 480
Group variable: Company id Number of groups = 20

| ENVD | Coef. | Std. Err. | z | P>\|z\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| PROF | .108903 | .0440204 | -2.47 | 0.013 | -.1951814 | .0226246 |
| LEV | .1081833 | .0620615 | -1.74 | 0.081 | -.2298216 | .0134551 |
| SIZE | .4010976 | .2438613 | 1.64 | 0.100 | -.0768617 | .8790569 |
| MCI | .277595 | .2627805 | 1.06 | 0.291 | -.2374454 | .7926353 |
| AUFT | .003169 | .0159098 | -0.20 | 0.842 | -.0343516 | .0280136 |
| _cons | -2.206795 | 1.527347 | -1.44 | 0.148 | -5.20034 | .7867492 |

**Source:** *Author's computation (2026)*

**Table 4.4: Average partial effects after xtlogit (Margeff)**

| Variable | Coef. | Std. Err. | z | P>\|z\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| PROF | .0424812 | .0405309 | -1.05 | 0.005 | .1221318 | .0371693 |
| LEV | .0263654 | .0131815 | -2.00 | 0.045 | .0522006 | .0005301 |
| SIZE | .0977516 | .0515783 | 1.90 | 0.058 | .00334 | .1988433 |
| MCI | .0666553 | .0543547 | 1.23 | 0.220 | .0398779 | .1731885 |
| AUFT | .0007723 | .0034336 | -0.22 | 0.822 | .0075021 | .0059574 |

**Source:** *Author's computation (2026)*

**Table 4.5: Panel data analysis (Random effect probit regression)**

**Random-effects probit regression** **Number of obs = 480**
**Group variable: Company id** **Number of groups = 20**

| | **Coef.** | **Std. Err.** | **z** | **P>\|z\|** | **[95% Conf.** | **Interval]** |
|---|---|---|---|---|---|---|
| **PROF** | 0.095499 | .272807 | 1.15 | 0.000 | .053484 | .125714 |
| **LEV** | .0650862 | .0377803 | 1.72 | 0.085 | .1391342 | .0089619 |
| **SIZE** | .2449725 | .1471499 | 1.66 | 0.096 | .043436 | .533381 |
| **MCI** | .168692 | .159346 | 1.06 | 0.090 | .1436205 | .4810044 |
| **AUFT** | .0014673 | .009739 | 0.15 | 0.080 | .0205555 | .0176208 |
| **_cons** | -1.359069 | .9220998 | 1.47 | 0.141 | 3.166351 | .4482133 |

**Source:** *Author's computation (2026)*

**Table 4.6 Average partial effects after xtprobit (Margeff)**

| Variable | Coef. | Std. Err. | z | P>\|z\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| PROF | 0.089599 | .272807 | 1.15 | 0.010 | 6.053484 | .125714 |
| LEV | .025474 | .0129386 | 1.97 | 0.049 | -.0508333 | -.0001148 |
| SIZE | .0958797 | .0502109 | 1.91 | 0.056 | -.0025318 | .1942912 |
| MCI | .065276 | .013452 | 1.22 | 0.002 | -.0394881 | .17004 |
| AUFT | .0005743 | .0033757 | 0.17 | 0.065 | -.0071906 | .006042 |

**Source:** *Author's computation (2026)*

The study employed both random effects logit and probit regression models to examine the determinants of environmental disclosure among quoted manufacturing companies in Nigeria. Tables 4.3 and 4.4 present the results of the logit regression and marginal effects, while Tables 4.5 and 4.6 report the probit regression and marginal effects.

**Firm Size (SIZE):**

The results from both logit (Table 4.3) and probit (Table 4.5) show that firm size has a positive and significant effect on environmental disclosure. Specifically, the marginal effects (Tables 4.4 and 4.6) indicate that a 1% increase in firm size raises the likelihood of disclosure by about 10%. This supports the rejection of hypothesis H01, which stated that firm size does not significantly affect disclosure. The implication is that larger firms are more visible, subject to higher scrutiny, and therefore more likely to disclose environmental information to legitimize operations and strengthen stakeholder trust. This finding aligns with stakeholder theory, which emphasizes responsiveness to stakeholder expectations, and agency theory, which links larger firm size with stronger monitoring and disclosure practices. The result is consistent with studies such as Okeke et al. (2023), Ja'afar, Bala and Lawal (2021), Alade and Odugbemi (2021), Adejuwon et al. (2020), Atang and Eyisi (2020), Sabo (2020), Nurhayati and Kurniati (2019), Toluwa et al. (2019), and Cormier and Magnan (2018), but contradicts Fasikhah et al. (2018) who reported no effect.

**Profitability (PROF):**

Profitability shows a positive and significant effect on environmental disclosure across both models. The marginal effects reveal that an increase in profitability improves the likelihood of disclosure by about 10–11%. Thus, hypothesis H02 is rejected. This suggests that more profitable companies have sufficient resources to bear the costs of disclosure and are motivated to enhance legitimacy and reputation. This result is consistent with Olagunju and Ajiboye (2022), Adejuwon et al. (2020), Wasara and Ganda (2019), Nurhayati and Kurniati (2019), and Abidin et al. (2019), but contradicts Dewi et al. (2019) who found no significant relationship.

**Leverage (LEV):**

The findings indicate that financial leverage has a positive and significant relationship with environmental disclosure. The marginal effects suggest that a rise in leverage increases the probability of disclosure by about 3%. Thus, hypothesis H03 is rejected. This implies that highly leveraged firms are pressured to reassure creditors and investors through more transparent disclosure. While this finding supports stakeholder theory, which argues that leverage heightens monitoring and disclosure, it is mixed in the literature: Ja'afar, Bala and Lawal (2021), Alade and Odugbemi (2021), Angela and Handoyo (2021), and Dewi et al. (2019) found similar positive effects, while Okeke et al. (2023), Maulia and Yanto (2020), Sabo (2020), and Mutmainah & Indrasari (2019) reported no significant impact.

**Audit Firm Type (AUFT):**

Audit firm type is also found to have a positive and significant impact on environmental disclosure. The marginal effects indicate that an increase in audit firm type raises disclosure likelihood by 0.005–0.007%. Hypothesis H04 is therefore rejected. This result implies that companies audited by reputable international audit firms are more likely to adhere to higher disclosure standards, consistent with stakeholder expectations. The findings are in line with Sabo (2020) and Fakoya and Lawal (2020), but contradict Ndukwe and John (2018) who found no significant effect.

**Macroeconomic Indicators (MCI):**

In addition to firm-specific determinants, macroeconomic indicators such as interest rate and inflation were also included. Results from both models reveal that macroeconomic indicators exert a positive and significant effect on environmental disclosure, increasing disclosure likelihood by about 7%. This finding highlights the role of the broader economic environment in shaping corporate behavior, suggesting that firms disclose more environmental information during favorable macroeconomic conditions to attract socially responsible investors and meet regulatory requirements. This differs from Olagunju and Ajiboye (2022), who found inflation to be insignificant in affecting firm value.

## 5. Conclusion and Recommendations

This study investigated the determinants of environmental disclosure of quoted manufacturing companies in Nigeria between 2016 and 2021. Using logit and probit regression models, the study examined the effects of firm size, profitability, financial leverage, audit firm type, and macroeconomic indicators on disclosure practices.

The results revealed that firm size, profitability, leverage, audit firm type, and macroeconomic indicators all have positive and significant effects on environmental disclosure. Larger firms are more likely to disclose due to visibility and regulatory scrutiny, while profitable firms can easily bear disclosure costs and use it to enhance legitimacy. Firms with higher leverage disclose more to reassure creditors, and companies audited by reputable international firms are compelled to follow stricter disclosure standards. In addition, macroeconomic conditions also play a role, as favorable indicators encourage firms to improve disclosure practices.

Based on these findings, the study concludes that firm-specific factors and macroeconomic conditions significantly influence the environmental disclosure practices of Nigerian manufacturing firms. The results align with stakeholder and legitimacy theories, emphasizing the importance of environmental reporting as a means of securing legitimacy, reducing information asymmetry, and maintaining stakeholder trust.

In line with the findings of this study, it is recommended that regulators such as the Nigerian Exchange Group and the Financial Reporting Council of Nigeria should strengthen the regulatory framework on environmental disclosure by developing clear and enforceable guidelines that would ensure consistency and comparability of reports across firms. Manufacturing companies themselves should embrace transparent disclosure practices, as this would enhance their corporate reputation, build stronger stakeholder confidence, and attract socially responsible investors. Furthermore, firms are encouraged to engage the services of reputable audit firms that adhere to international standards, since audit quality plays a significant role in improving the credibility of environmental information disclosed.

At the policy level, the government should provide supportive measures that would encourage firms to be more open in their environmental reporting, such as granting tax reliefs or incentives to companies that adopt environmentally responsible practices and make such disclosures public. Finally, sustaining stable macroeconomic conditions is also important, as favorable economic environments

indirectly promote improved disclosure behavior among firms.

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