

Effects of Firm Characteristics on Environmental Accounting Disclosure in Listed Industrial Goods Companies in Nigeria.

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ABSTRACT

This study investigates the effects of firm characteristics on the extent of environmental accounting disclosures among listed industrial goods companies in Nigeria. A longitudinal research design was applied covering thirteen firms over a ten-year period (2015–2024). Environmental disclosure was measured using a 43-item index across eight thematic categories, derived through content analysis of annual reports. A dichotomous scoring approach was used to compute quantitative disclosure scores. Panel data were analysed using Ordinary Least Squares regression within a Random Effects framework, selected based on the Hausman and Breusch–Pagan tests. Diagnostic procedures confirmed the absence of multicollinearity and heteroscedasticity in the model. Findings show that, collectively, the firm-level predictors significantly explain variations in environmental disclosure practices. At the individual level, firm age positively and significantly affects environmental disclosure, while managerial ownership shows a negative and significant effect. Firm size, profitability, and financial leverage exhibit positive or negative but statistically insignificant relationships. The results suggest that older firms disclose more environmental information, whereas higher managerial ownership reduces transparency. The study concludes by recommending strengthened regulatory enforcement, broader adoption of environmental reporting standards, and enhanced managerial accountability to improve environmental transparency among Nigerian industrial firms.

Keywords: Environmental Accounting, firm characteristics, disclosures, managerial ownership, leverage, profitability

INTRODUCTION

Environmental accounting disclosure has become increasingly important worldwide due to rising demands for corporate accountability. Although established standards in developed countries have advanced disclosure practices, developing economies like Nigeria continue to lag because of weak regulatory frameworks. Many Nigerian firms still prioritize profit maximization over environmental concerns (Idowu, 2012), yet growing regulation, activism, and market pressures are gradually encouraging improved practices (Ezeagba et al., 2017). Industrialization remains essential for economic growth but also brings issues such as pollution and community conflicts (Uwuigbe, 2012). The extent of environmental reporting is shaped by factors such as social pressure, firm size, profitability, age, and governance structures (Hossain et al., 2019; Yao et al., 2021). Given the high environmental footprint of Nigeria's industrial goods sector—including building materials, electronics,

packaging, and machinery there is a need to explore how firm-specific attributes influence disclosure practices (NSE Fact Book, 2021).

Stakeholders increasingly demand transparent reporting to address the environmental impact of industrial activities. Although prior research on environmental disclosure exists, much of it has focused on developed economies or Nigeria's oil and financial sectors (Owolabi, 2018), with limited attention to industrial goods companies. Existing studies also often overlook firm-specific characteristics separate from governance variables in shaping disclosure.

This study addresses these gaps by examining how firm characteristics affect environmental accounting disclosure among listed industrial goods companies in Nigeria. Its primary objective is to determine the extent to which firm size, age, financial leverage, managerial ownership, and profitability influence environmental disclosure practices. Specifically, the study seeks to: i. Assess the impact of firm size on environmental disclosure. ii. Examine the effect of firm age on disclosure practices. iii. Evaluate the relationship between financial leverage and disclosure levels. iv. Investigate how managerial ownership affects disclosure. v. Determine the influence of profitability on environmental accounting disclosure.

By doing so, the research aims to expand environmental accounting literature with sector-specific evidence, offering insights that can inform policy and regulation particularly for agencies like the National Environmental Standards and Regulations Enforcement Agency (NESREA) to strengthen corporate compliance with environmental and social disclosure requirements.

For stakeholders such as investors, regulators, and users of financial reports, the study provides a clearer understanding of disclosure mechanisms, the nature of reported environmental and CSR items, and the degree of compliance among industrial goods firms. Methodologically, it applies content analysis and multiple regression in line with international standards such as the Global Reporting Initiative (GRI) and ISO guidelines to evaluate environmental performance indicators within a developing economy context.

Academically, the study fills a critical gap in Nigerian environmental reporting literature, serving as a useful resource for students, scholars, and researchers. Practically, its findings are expected to motivate listed industrial goods companies to adopt more sustainable environmental practices, thereby enhancing their public image, regulatory compliance, and stakeholder confidence.

LITERATURE REVIEW

Environmental Accounting Information Disclosure

Environmental accounting disclosure involves reporting both financial and non-financial information about a company's interaction with its physical and social environment, either within annual reports or in separate sustainability reports (Guthrie & Matthew, 1985). These disclosures can be mandatory, as per standards like IAS 1, or voluntary, aimed at improving transparency, accountability, and stakeholder trust (Barako, 2017). The extent and depth of disclosure are shaped by external factors such as media attention and NGO advocacy, as well as internal factors like governance and ownership structures (Hassan, 2010). Comprehensive environmental reporting can reduce information gaps, enhance corporate reputation, increase market value, and lower capital costs (Kanda, 2019).

Environmental disclosure aligns with three key concepts: corporate environmental responsibility, involving voluntary integration of environmental and social concerns into operations (Babalola, 2012); sustainable development, which emphasizes meeting present needs without compromising future generations (Ngwakwe, 2019); and socially and environmentally responsible investment (SRI), where investors consider environmental and social impacts alongside financial returns (Steurer et al., 2018). While definitions vary (Aburaya, 2012), environmental accounting generally includes information on environmental impacts, energy use, research and development, employee health and safety, and community engagement (Uwuigbe, 2012). Frameworks such as the Global Reporting Initiative (GRI) and the AA1000 Assurance Standard help standardize and guide reporting, which can be measured quantitatively or qualitatively depending on the chosen framework.

Accounting Information Disclosure Quantity

The extent of accounting disclosure is commonly measured using content analysis, which systematically categorizes and quantifies information in company reports to identify reporting patterns (Lu & Abeysekere, 2016). This method enhances reliability and objectivity through structured coding and classification (Aburaya, 2012; Ohidoa et al., 2016). Annual reports are the primary data source, as they are formal, publicly accessible, and include both statutory and voluntary disclosures (Wiseman, 1982; Hossain et al., 2019). Metrics used in content analysis include word counts, sentence counts, page counts, or disclosure indices. Disclosure indices can be weighted, assigning importance to different items (Karlina, 2019; Cormier et al., 2014), or unweighted, scoring disclosed items as “1” and undisclosed items as “0” (Kokubu et al., 2016; Hossain et al., 2019). Weighted indices capture both the volume and significance of disclosures, while unweighted indices measure only the extent of reporting.

Accounting Information Disclosure Quality

Disclosure quality reflects how clearly and usefully information is communicated to stakeholders, especially investors (Hopkins, 1996; ISO 9000). It is commonly assessed through subjective analyst rankings or researcher-designed indices, often using the amount of disclosure as a proxy (Beattie et al., 2004). Evaluations may consider industry standards, regulatory requirements, and a company’s past practices (Cormier et al., 2014). Scoring systems vary, from three- or four-point scales distinguishing qualitative and quantitative details (Cormier et al., 2014; Yusoff & Lehman, 2015) to weighted indices that reflect the importance of each disclosure item to stakeholders (Barako, 2017). Weighted indices are preferred as they assign greater points to more detailed or quantitative disclosures, producing a composite score that allows comparison across firms (Cormier et al., 2014).

Firm Characteristics

Firm characteristics are internal attributes that influence the type and extent of accounting and environmental disclosures. Examined through frameworks such as agency, legitimacy, political cost, and signaling theories, these characteristics like firm size, age, leverage, managerial ownership, and profitability affect a company’s capacity and willingness to provide transparent information. Firms disclose information to enhance reputation, increase accountability, legitimize operations, or respond proactively to regulation (Damak, 2014). Typically, larger, older, or highly leveraged firms face greater stakeholder scrutiny, prompting more extensive disclosure practices.

Firm Size

It is considered a key factor influencing disclosure levels. Larger firms face greater public and regulatory scrutiny, higher agency costs, and more complex stakeholder demands compared to smaller firms (Osazuwa & Fatima, 2014). To reduce information asymmetry and maintain legitimacy, they are often more inclined to provide extensive voluntary environmental and financial disclosures (Hasan & Hosain, 2015). Empirical evidence generally supports a positive relationship between firm size and disclosure (Jalu & Agung, 2020; Bozzolan et al., 2013; Garcia-Meca et al., 2015), although some studies find no significant link (Abubakar, 2017; Carreira et al., 2014; Bontis, 2013). Economically, larger firms can leverage economies of scale to absorb the costs of enhanced disclosure without compromising profitability (Nguyen et al., 2017).

Firm Age

Firm age is often viewed as an indicator of corporate reputation and operational stability. Older firms, with longer market presence, tend to have established legitimacy and reputations that lower perceived investment risk (Bukh et al., 2015). While some studies report no significant effect of firm age on environmental disclosure (White et al., 2017; Bukh et al., 2015), others indicate that older firms engage more in environmental initiatives to strengthen societal standing and ensure operational continuity (Rasmini et al., 2014; Erhun, 2016). In contrast, younger firms may focus on disclosing non-financial information to build credibility and attract investors (Kim & Ritter, 1999).

Financial Leverage

Leverage, measured as the ratio of total debt to total assets, indicates a firm's financial structure and risk level. Highly leveraged firms are exposed to increased enquiry from creditors and other stakeholders, who require greater transparency to reduce information asymmetry and agency costs (Jensen & Meckling, 1976; Arvisson, 2022). To reassure financiers of their operational reliability, these firms often disclose more environmental and strategic information (Ho & Taylor, 2017; Clarkson et al., 2018). Although higher leverage raises bankruptcy risk, it can also enhance returns on equity and provide tax advantages, encouraging firms to balance financial risk with broader disclosure practices to safeguard their reputation (Khalid et al., 2017).

Managerial Ownership

The concept represents the portion of a firm's stocks controlled by its managers. According to agency theory, higher managerial shareholding links managers' interests with shareholders expectations, potentially reducing earnings manipulation and encouraging transparent disclosure (Fama, 1980; Jensen & Meckling, 1976; Hashmi et al., 2018). However, excessive ownership can lead to managerial entrenchment, where personal benefits are prioritized over shareholder value (Jung & Kwon, 2012). The contracting perspective suggests a balance: greater ownership improves incentive alignment but increases exposure to firm-specific risk, which may influence disclosure decisions. Empirical findings are mixed, with some studies linking high managerial ownership to earnings management (Kabiru, 2020; Perse et al., 2015), while others find no significant effect (Habbash, 2020).

Profitability

Profitability, commonly measured by return on assets (ROA), reflects a firm's capability to create earnings from its assets. More profitable firms can finance environmental and corporate social responsibility initiatives without affecting dividends or reinvestments (Hussain et al., 2011; Alam & Deb, 2020). Empirical evidences on the connection between profitability and disclosure is mixed: some studies report a positive link (Aluwong & Fodio, 2019; Alam & Deb, 2020), while others find insignificant or negative effects (Brammer & Pavelin, 2016; Rahmadi & Hammami, 2018). From a political cost perspective, profitable firms may increase disclosure to justify performance and pre-empt regulatory scrutiny (Watts & Zimmerman, 1986). Agency and signaling theories further suggest that managers may use disclosure to enhance personal benefits or signal firm competence and intellectual capital (Jindal & Kumar, 2012; Ousama et al., 2012).

Firm characteristics including structural factors (size, age, leverage), governance aspects (managerial ownership), and performance measures (profitability) significantly influence environmental and financial disclosure practices. These effects arise from a combination of economic, regulatory, reputational, and strategic pressures, highlighting the complex interaction between a firm's internal attributes and the expectations of external stakeholders.

Empirical Evidence

Scholar (2020) examined how firm characteristics specifically age, size, and leverage affect environmental disclosure quality among listed Nigerian cement firms (2013–2017). Using the GRI framework with descriptive, correlation, and regression analyses, the study found all three attributes significantly improved disclosure and recommended optimal debt levels, size control, and mandatory reporting. However, it excluded governance variables such as board size and managerial ownership.

Similarly, Aluwong and Fodio (2019) analyzed nine Nigerian oil companies (2011–2017) using logistic regression and found that leverage, profitability, and firm size positively and significantly influenced environmental disclosure. They advised regulators to promote higher debt levels for stronger monitoring but noted their study's limited sectoral scope.

Innocent and Gloria (2018) examined how firm size, profitability, and age influence the environmental performance of listed industrial goods firms in Nigeria, using waste management costs as the performance measure. Analyzing 11 firms (2008–2017) with Pearson correlation and multivariate regression, they found a

significant positive relationship between firm characteristics and environmental performance but offered no policy recommendations, limiting practical impact.

Kabiru (2020) examined the relationship between firm characteristics, especially firm age, and environmental disclosure quality among Nigerian cement companies (2013–2017). Using GRI-based content analysis along with descriptive statistics, correlation, and multiple regression (STATA 12.0), the study found that firm age significantly improved disclosure quality. The author recommended making disclosure mandatory and integrating governance, social, and environmental considerations into corporate strategies, while noting limitations in the measurement approach and study period.

Alfraih and Almutawa (2014) examined how corporate attributes influence financial disclosure under IFRS among 181 firms listed on the Kuwait Stock Exchange. Using a self-designed index and multivariate regression, they found significant positive relationships between disclosure and firm age, size, profitability, and leverage, though the findings may not fully apply to Nigeria.

Similarly, Akbas (2014) assessed 62 non-financial Turkish firms on the BIST 100 index, using word count to gauge disclosure levels. His analysis showed that leverage had no significant impact on disclosure, indicating no clear link between the two.

Jouirou and Chenguel (2014) assessed determinants of voluntary disclosure among Tunisian listed firms, focusing on firm size, profitability, leverage, and firm age. The study constructed a disclosure index to evaluate voluntary reporting for 22 firms in 2007. Regression results showed a positive but insignificant relationship between leverage and voluntary disclosure. However, the analysis was limited to a single year, potentially restricting the generalizability of the findings.

Osazuwa (2015) investigated how directors' cultural backgrounds affect environmental disclosure among firms listed on the main board of Bursa Malaysia. Using a content-based index to measure disclosure and categorizing board culture by directors' ethnic composition, the study found significant links between environmental disclosure and boards dominated by Bumiputra or foreign directors, as well as firm size and leverage. However, the research was limited to the Malaysian context.

In Nigeria, Umoren and Enang (2015) reported that environmental disclosure among Nigerian Stock Exchange-listed firms averaged only 7%, based on a sample of 40 companies across eight sectors (2013–2014). Their analysis using descriptive statistics, correlation, and linear regression emphasized the need for integrated reporting. In contrast, KPMG (2013) found a marked rise in environmental reporting in South Africa, increasing from 45% in 2008 to 98% in 2013, driven by mandatory integrated reporting, strong governance, and a stable legal framework. However, the short time frames in both studies limit the generalizability of their findings.

Edogiawere and David (2016) examined how firm performance affects voluntary disclosure among 50 Nigerian Stock Exchange-listed companies. Using indicators such as return on capital employed, profit after tax, earnings per share, and dividends per share, their regression analysis revealed a positive and significant relationship between performance and voluntary disclosure. However, the study lacked clarity regarding its scope and the method used to measure the dependent variable.

Dibia and Onwuchekwa (2015) examined factors influencing disclosure in Nigeria's oil and gas sector, focusing on firm size, profitability, and leverage among 15 listed companies (2008–2013). Using a dichotomous measure of disclosure and analyzing data with probit and logit regression, they found no significant relationship between profitability and disclosure. The study's small sample size limited the generalizability of the findings.

Yusoff and Lehman (2015) examined the factors influencing disclosure decisions among the top 50 listed companies in Malaysia and Australia (2002–2003). Using a weighted disclosure index and variables such as corporate financial performance, sensitivity, and certification, the study found that environmental disclosures in both countries were motivated by similar factors, primarily serving as strategic tools to enhance corporate reputation. However, the findings are not directly applicable to the Nigerian context.

THEORETICAL FRAMEWORK

The theoretical foundation of this study draws from three key perspectives Stewardship Theory, Stakeholder Theory, and Legitimacy Theory all of which offer complementary explanations for variations in environmental accounting disclosure among firms.

Stewardship theory (Donaldson & Davis, 1991) views managers as stewards whose goals align with those of shareholders. Rather than acting out of self-interest, they seek to maximize firm value and performance because doing so also benefits their own professional objectives. The theory recommends governance systems that grant managers sufficient autonomy and authority to act in the organization's best interest, balancing accountability with decision-making discretion.

Stakeholder theory (Freeman, 1984) expands corporate responsibility to all groups affected by a firm's activities employees, customers, communities, suppliers, regulators, and investors. It emphasizes that firms must manage these relationships effectively to survive. Disclosure of financial and environmental information is seen as a strategic tool for meeting stakeholder expectations, gaining legitimacy, and securing resources. Directors are tasked with balancing competing stakeholder interests, and newer "enlightened" versions of the theory link long-term shareholder value with meeting diverse stakeholder needs.

Legitimacy theory explains corporate disclosure as a way for firms to align with societal norms and values to maintain their "license to operate." Companies publish environmental and social information to gain, defend, or restore public approval. The pressure to do so varies by industry and exposure to public scrutiny. Transparent reporting helps build trust, reduce regulatory risk, and reinforce social acceptance.

This study is grounded primarily in legitimacy theory but also draws from stewardship and stakeholder theories to examine how managerial incentives and stakeholder management influence environmental accounting disclosure practices.

METHODOLOGY

A longitudinal research design was employed to examine the effect of firm characteristics on environmental disclosure among thirteen (13) quoted industrial goods firms in Nigeria from 2015–2024, using a positivist, quantitative approach. The census method was adopted, as all firms met the inclusion criteria of continuous operation and complete financial statements for the study period. The dependent variable Environmental and Accounting Disclosure (EAD) was derived from content analysis of annual reports, applying a 43-item disclosure index grouped into eight categories (community involvement; diversity and human rights; employee health and safety; integrity and ethics; environmental management; environmental research and development; energy; and sustainable development). A dichotomous scoring system (1 = disclosed, 0 = not disclosed) was used, with the index computed as:

$$EAD_QNT = \frac{\text{Firm's Total Score}}{\text{Maximum Possible Score}}$$

The panel data were analysed using Ordinary Least Squares (OLS) multiple regression. Robustness was ensured via diagnostic tests for normality, multicollinearity, stationarity, heteroskedasticity, and model specification (pooled, fixed-effects, and random-effects).

Model Specification

The study formulated the following models to evaluate the relationship between the dependent variable and the independent variables:

$$EAD_f(FSZ, FLV, PRO, FAG, MON) \dots\dots\dots (1)$$

Model I

$$EAD_QNT_{it} = \beta_0 + \beta_1 FSZ_{it} + \beta_2 FLV_{it} + \beta_3 FFP_{it} + \beta_4 FAG_{it} + \beta_5 MON_{it} + \epsilon_{it} \dots \dots \dots (2)$$

Where:

EAD_QNT = Environmental and Accounting Disclosure Quantity.

β_0 = Intercept,

β_1 to β_6 = coefficient of slop or regression coefficient

ϵ = error term

FSZ_{it} = firm size of firm i at year t.

FLV_{it} = leverage of firm i at year t.

PRO_{it} = profitability of firm i at year t.

FAG_{it} = Firm age of firm i at year t

MON_{it} = Managerial ownership of firm i at year t

Data Analysis and Discussions

Table 4.1 Descriptive Statistics

	EAD N	FAG	FFL	FSZ	MNO	FPR
Mean	0.622	46.423	0.429	8.461	0.168	0.148
Median	0.645	42.5	0.405	8.75	0.1	0.11
Maximum	0.89	81	2.2	11.66	0.62	1.02
Minimum	0.28	20	0.04	6.14	0.01	0.01
Std. Dev.	0.121	16.269	0.271	1.777	0.174	0.148
Skewness	-0.639	0.235	2.204	0.34	1.179	3.228
Kurtosis	3.534	1.959	15.322	1.847	3.164	16.059
Observations	130	130	130	130	130	130

Source: Author's computation using STATA 15.0

Table 4.1 presents the descriptive statistics of the study variables. The mean value of environmental accounting disclosure quantity (EAD_QN) is 0.622, with a standard deviation of 0.121, indicating that the data points are closely concentrated around the mean. The average firm age is 46.42 years with a standard deviation of 16.27, showing relatively low dispersion. Firm financial leverage records an average of 0.429 (SD = 0.271), while firm size has a mean of 8.46 (SD = 1.78), both reflecting moderate variabilities. Managerial ownership, on the other hand, has an average of 0.168 with a higher standard deviation of 0.174, suggesting greater differences among firms. Lastly, firm profitability averages 0.148 (SD = 0.148), indicating that profitability is relatively consistent across the sampled firms.

Table 4.2 Correlation Matrix

	FSz	FAG	FFL	MNO	PRA	EAD_qn
FSz	1.000					
FAG	0.2969	1.000				
FFL	0.1133	0.5258	1.000			

MNO	-0.2068	-0.2426	-0.3420	1.000		
PRA	0.0940	0.0356	0.2388	-0.1090	1.000	
EAD_qn	0.4954	0.3694	0.3240	-0.4407	0.1938	1.000

Source: Author's computation using STATA 15.0

Table 4.2 examines the correlation relationships among the independent variables. As noted by Elshabasy (2017), cited in Ologhodo (2021), a high or strong correlation is present when the correlation coefficients exceed 0.80; otherwise, the correlation is considered weak or absent. Based on this criterion, all the correlation values in the table are below 0.80, indicating weak or no correlation among the variables. This also suggests that the data are normally distributed.

Table 4.3 Hausman Specification Test

Test:	Ho:	difference in	
		Chi ² (5) =	(b-B)'[(V _b -V _B) ⁻¹](b-B)
		=	10.25
		Prob>Chi ² =	0.0684

Source: Author's computation using STATA 15.0

Table 4.3 presents the Hausman test used to determine the fitting model for the research estimation. Since the probability value of 0.0684 exceeds the 0.05 significance level, the null hypothesis is accepted. This outcome indicates that the Random Effects Model is the preferred choice, thereby necessitating an additional test using the Breusch–Pagan LM procedure.

Table 4.4 Breusch and Pagan Lagrangian multiplier test for random effects

EAD_qn	0.0145443	0.1206
e	0.0035387	0.059487
U	0.0073771	0.08589

Source: Author's computation using STATA 15.0

Test: Var(u) = 0; Chibar² (01) = 146.57; Prob > Chibar² = 0.0000.

The above Table 4.4 text displays a prob. value of 0.000, which is below the 0.05 threshold. This leads to makes the null hypothesis rejected, demonstrating that the Random Effects Model (REM) is more fitting for the approximation than the Pooled Model.

Table 4.5 Regression Analysis [Random-effect GLS regression]

EAD_qn	Coeff.	Std. Err.	Z	P>z	[95% Conf.	Interval]
FSZ	-0.00073	0.0116	-0.06	0.95	-0.0235404	0.0220767
FAG	0.003438	0.0013	2.69	0.007	0.0009284	0.0059469
FFL	0.029277	0.0306	0.96	0.339	-0.0306803	0.0892344
MNO	-0.09232	0.0496	-1.86	0.043	-0.1895217	0.0048799
PRO	0.01672	0.041	0.41	0.683	-0.0636359	0.0970765
_cons	0.469531	0.1016	4.62	0	0.2703173	0.6687444
No. of Obs = 130 No. of groups = 13 Wald Chi ² (5) = 14.12 Prob > chi2 = 0.0148 R ² = 0.4120						

Adj R ²	= 0.3883
Root MSE	= 0.09432

Source: Author's computation using STATA 15.0

Table 4.5 reveals that the model's coefficient of determination (R^2) is 0.4120, with an adjusted R^2 of 0.3883. This indicates that the independent variables together explain 41.20% of the variation in environmental accounting disclosures among listed industrial firms in Nigeria, while the remaining 58.80% of the variation is due to other factors not included in the study. The F-statistic (Wald χ^2) of 14.12 with a probability value of 0.0148 further confirms that, collectively, the independent variables have a statistically significant and positive impact on environmental accounting disclosures. Firm characteristics, At the individual variable level, mixed results were obtained.

For (H_{01}) firm size has no significant relationship with environmental accounting information disclosures of industrial goods companies listed in Nigeria.

The regression coefficient of -0.00073 with a matching prob. value of 0.95 (greater than 0.05) shows a negative but statistically insignificant relationship with environmental accounting disclosures. This means that a 1% growth in firm size reflects a 0.073% decline in disclosure levels, and thus the null hypothesis is accepted.

For (H_{02}) There is no significant relationship between firm age and environmental accounting information disclosures of industrial goods companies listed in Nigeria.

The coefficient of 0.003438 and a matching prob. value of 0.007 (less than 0.05) indicate a positive and statistically significant relationship. This infers that as firms grow older, their environmental disclosure levels increase; specifically, a 1% growth in firm age results in a 0.34% increase in disclosures. Therefore, the null hypothesis is rejected.

For (H_{03}) financial leverage does not significantly affect environmental accounting information disclosures of industrial goods companies listed in Nigeria

The coefficient of 0.029277 with a matching prob. value of 0.339 (greater than 0.05) reflects a positive but non-significant relationship between financial leverage and environmental disclosures. A 1% rise in leverage corresponds to a 2.93% increase in disclosures, but because the relationship is not statistically significant, the null hypothesis is accepted.

For (H_{04}) managerial ownership has no significant relationship with environmental accounting information disclosures of industrial goods companies listed in Nigeria

The coefficient of -0.09232 with a matching prob. value of 0.043 (less than 0.05) shows a negative and statistically significant relationship. This means that a 1% increase in managerial ownership leads to a 9.23% decrease in environmental disclosures, resulting in rejection of the null hypothesis.

Lastly, for (H_{05}) profitability does not significantly influence environmental accounting information disclosures of industrial goods companies listed in Nigeria

The coefficient of 0.01672 with a matching prob. value of 0.683 (greater than 0.05) indicates a positive but statistically insignificant relationship. This suggests that a 1% increase in profitability produces only a 1.67% rise in disclosure levels, which is not significant, leading to acceptance of the null hypothesis.

Overall, while the independent variables collectively have a significant influence on environmental accounting disclosures, only firm age (positive) and managerial ownership (negative) individually show significant effects, whereas firm size, financial leverage, and profitability do not significantly influence disclosure levels.

Table 4.6 Heteroscedasticity Test

Ho: Constant variance	
Variables: fitted values of EAD_qn	
Chi ² (1)	= 0.16
Prob > Chi ²	= 0.6849

Source: Author's computation using STATA 15.0

From table 4.6 above Chi² revealed a 0.16 value, with a matching probability of 0.6849 or 68.49%, above (>) 0.05, therefore, display non-refusal of the null hypothesis; this explains the homoscedasticity of the residuals

Table 4.7 Multicollinearity Test

Var	VIF	1/VIF
FFL	1.6	0.626785
FAG	1.53	0.653859
MNO	1.17	0.853246
FSZ	1.14	0.875747
PRO	1.09	0.921135
Mean VIF	1.30	

Source: Author's computation using STATA 15.0

Table 4.7 shows variance inflation factor (VIF) revealed the tolerance (1/VIF) of homogeneously below (<) 1, depicting no presence of multicollinearity in the midst of the explanatory variables, which qualifies for the approximation.

DISCUSSION OF FINDINGS

This study investigated how firm characteristics influence environmental accounting information disclosures among listed industrial goods firms in Nigeria, using both quantitative and qualitative disclosure indices. Findings revealed a mixed outcome for firm size: With the quantitative index, firm size showed a negative but insignificant effect, aligning with Parsa & Kouhy (2020) and Uwuigbe (2011) but contrasting with Abu & Sufian (2012) and Juhani (2013). With the qualitative index, the relationship was positive and significant, supporting Abu & Sufian (2012) and Juhani (2013) but differing from Parsa & Kouhy (2020) and Uwuigbe (2011). Firm age showed a positive, significant effect (qualitative index), in line with Nagib et al. (2012) but contrary to Abu & Sufian (2012). Financial leverage had a positive but insignificant relationship, consistent with Akbas (2014) and Hossain et al. (2019), but not with Zhang (2013) or Edogiawere (2016). This suggests lenders may not prioritize environmental disclosure when granting credit. Managerial ownership showed a negative and significant relationship for both indices, matching Abu & Sufian (2012) and Juhani (2013), implying that lower managerial shareholding encourages more environmental disclosures. Profitability had a positive but insignificant effect under both indices, in agreement with Joshi et al. (2011) and Dibia & Onwuchekwa (2015), but not Edogiawere & David (2016), indicating that environmental reporting costs are treated as normal operational expenses with minimal profitability impact. Overall, the comparison of results across both indices revealed variable-dependent effects for firm size and age, while financial leverage, managerial ownership, and profitability showed consistent patterns. The findings highlight that outcomes depend on the economic context, chosen metrics, and the specific disclosure measure applied.

RECOMMENDATIONS

1. Industrial goods firms should leverage their scale to enhance environmental accounting disclosures in annual reports, while regulatory bodies should strengthen and enforce comprehensive reporting standards across the sector and the broader Nigerian business environment.

2. Established companies should lead by example in environmental reporting, encouraging newer firms to adopt similar practices and foster a culture of transparency that supports environmental protection efforts.
3. Management should be required to include dedicated environmental accounting reports within their management reports, subject to thorough review and verification.
4. Firms should maintain responsible operations, as creditors closely monitor the use of borrowed funds to assess investment attractiveness and manage financial risk.
5. Since environmental accounting costs are part of normal operations, management should prioritize environmental issues by adopting robust disclosure frameworks and monitoring systems.

Study limitations

The study's limitations stem mainly from its narrow methodological scope. The small sample of thirteen firms that exclusively focused on industrial goods companies may likely impede the generalizability of the findings. Reliance on secondary corporate reports and the subjective nature of the constructed disclosure index could limit measurement precision. Additionally, the exclusion of broader institutional and regulatory factors should be considered for further explanatory depth of the model.

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