Environmental Disclosures and Firms Value: An Empirical Evidence on Nigerian Firms

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DOI: 10.56201/jafm.v10.no2.2024.pg79.101

Abstract
This study investigated the relationship between environmental disclosures and firm value in Nigeria. The independent variable for the study was proxied using waste management disclosure (WMD), pollution control disclosure (PCD), environmental remediation disclosure (ERD) and environmental research and development disclosure (ERDD) while the dependent variable was proxied by net assets per share (NAPS). Four research questions and hypotheses were formulated for this study. Ex Post Facto design was used and data for the study were obtained from the Nigerian Exchange Group (NGX) Factbook and published annual financial reports and accounts of 52 firms listed under oil and gas sector, consumer goods sector, industrial goods sector, ICT sector, health care sector and conglomerate sector of Nigerian Exchange Group (NGX) with data spanning from 2017-2022 period. Using panel regression model, the study found that waste management disclosure, pollution control disclosure, environmental remediation disclosure and environmental research and development disclosure have positive and significant influence on firm value proxied as net assets per share at 1-5% level of significance. Based on this, the study concludes that environmental disclosures determine firm value in Nigeria. In lieu of the findings of the study, it was recommended that government agencies should encourage corporate organizations to comply with environmental laws regarding their environmental activities as this will encourage environmental reporting by them. Also, corporate organizations should ensure that they comply with the environmental laws and also disclose more of such information in relation to balancing the effect of continuing business operations in a particular environ as such disclosures ensures firms value.
Keywords: *Waste Management Disclosure; Pollution Control Disclosure; Environmental Remediation Disclosure; Environmental Research and Development Disclosure; Net Assets Per Share*

1.0 Introduction

The issue of environmental information has been debated in the recent years. Latest analyses by Mbabazi, Twesige, Claude and Jaya (2015), Hervé and Luc (2018), Emeke, Olaoye and Ogundajo (2021), Simsek and Ozturk (2021), Nkwoji (2021), Erinoso and Oyedokun (2022), Mohammed, Alhassan and Mohammed (2022) reported that most investors disregard environmental information disclosures in investment decision making process as it could not meet their expectations. Consistent with this argument, Ernst and Young (2017) pointed out that only 38 percent of investors acknowledged making use of environmental information in reaching investment decisions as emphasis were on other information. Odili (2018) also noted that ratio analysis and other interpretation techniques on the financial statements cannot measure all aspects of performance. For example, the effect of a business on the environment cannot be measured using financial criteria, but is increasingly regarded as an important aspect for investors' decision making. Despite the continued use of financial information in the decision making by private sectors in Nigeria, there has been a continued failure of private entities in Nigeria. The study however expressed concerns over the significant rise in the need for environmental reporting (ER) in the recent years and its effect on firms value is yet to be investigated.

Several stakeholders have also expressed concerns over the need for environmental disclosures to meet their expectations and not much have been done in academic literature in addressing the relationship which exists between environmental disclosures and firms value from the investors' perspective in Nigeria to the best of our knowledge.

In the developed nations, attempts were made as follows; Menike (2020) and Nimanthi and Priyadarshanie (2021) investigated environmental disclosure and firms' performance and found significant and positive relationship. Candy, Jingxin, Mingrui, Siyu, Shengan and Xiaaotong (2020), Jing and Qamruzzaman (2023) and Haixia and Jianping (2023) also found positive and significant relationship between environmental disclosures and firm performance in China. Felicia, Poppy, Vince and Vince (2022) found that environmental disclosure has a negative effect on firm performance in Indonesia. On the same note, Silvia, Mirella, Barbara and Luigi (2022) investigated if ESG disclosures influence firm performance in Italy? The study supports a positive relationship between ESG disclosure and firm Performance in Italy. Iorun (2021) and Doan and Sassen (2020) found positive and significant association between environmental disclosures and firm performance in Malaysia and Germany respectively. The previous literatures in the developed nations as shown above studied the relationship between environmental disclosures and corporate performance. Thus there is a gap in knowledge on the relationship which exists between environmental disclosures and firms value as not much have been done on this in the developed economies.

In the developing nations, efforts were made as follows; Ofurum, Iwunna and Nmehielle (2022) investigated environmental cost disclosure and firm performance and found significant and negative effect. Muffee (2021) also reported significant and positive effect on environmental accounting and corporate performance. Ismail and Anwarul (2019) and Musa, Toma and Monica

(2022) examined the impact of environmental accounting disclosures on performance of oil and gas companies Nigeria. Also, Ezeagba, John-Akamelu, and Umeoduagu (2017), Olusola and Babajide (2019), Falope, Offor and Ofurum (2019), Uniamikogbo and Ali (2021), Adebayo and Ezejiofor (2021), Emeke, Olaoye and Ogundajo (2021), Yusuf, Emmanuel, Akpan and Odumegwu (2022), Obiora and Omaliko (2022), Onyebuenyi and Ofoegbu (2022), Akinkunmi and Simeon (2022), Erinoso and Oyedokun (2022), Obiora, Onuora and Sandar (2022) examined the relationship between environmental disclosure and financial performance of firms in Nigeria. Most of these studies emphasized on corporate environmental reporting and firms performance other than firm value which reflects the firm's sustainability level from the investors' perspective. Also, none of these studies in the developing nations limited corporate environmental practices to firm value to the best of our knowledge using firms quoted under consumer goods sector, industrial goods sector, oil and gas sector, ICT sector, health care sector and conglomerate sector as a reference point. Hence the need for the present study to examine the relationship which exists between environmental disclosures and firms value in Nigeria from the investors' perspective

Based on these observations in both developed and developing nations, the present study will adapt and modify the models of Adegbie, Ogidan, Siyanbola and Adebayo (2020) and Mohammed, Alhassan and Mohammed (2022) into a model in examining the relationship which exists between environmental disclosures and value of firms quoted on the Nigerian Exchange Group. In view of the objective of the study, the following hypotheses were formulated as thus;

Ho_1: There is no significant relationship between Waste Management Disclosure and Firms Value in Nigeria

Ho_2: Pollution Control Disclosure has no significant relationship with Firms Value in Nigeria

Ho_3: There is no significant relationship between Environmental Remediation Disclosure and Firms Value in Nigeria

Ho_4: Environmental Research and Development Disclosure has no significant relationship with Firms Value in Nigeria

2.0 Review of Related Literature

2.1.1 Environmental Disclosures

Environmental disclosure is a type of environmental information owned by a corporation that is disclosed in the firm's annual financial report, with the existence or absence of annual report disclosures depending on company policy. The Association of Chartered and Certified Accountants (ACCA) defined environmental disclosures as a combination of narratives, objectives, explanations, and numerical data, including the level of pollution, resources ingested for a particular accounting period, and the impact of a company on the environment. Environmental disclosure is a practical statement that defines companies' environmental actions and responsibility, which also includes the company's goals, environmental policies, and impacts

that are regularly published to the public (Ong, Tho, Goh, Thai, & Theh, 2021).

Environmental disclosure includes disclosing the effects of a company's operations on the environment, including waste management, recycling, carbon management, emission control, pollution control, and wildlife conservation (Gatimbu & Wabwire, 2019). Norhasimah (2019) maintained that Environmental disclosure places a strong emphasis on disclosing the involvement of organizations in environmental activities to draw investors and satisfy stakeholder demands. Ong, Tho, Goh, Thai, and Theh (2021) identified two main types of environmental disclosures. Which are: Mandatory and voluntary disclosure. In many countries, including Nigeria, environmental disclosure is still voluntarily reported without any legal or regulatory requirements.

2.1.2 Waste Management Disclosure

Waste is defined as any substance or article which constitutes a scrap material or an effluent or other surplus substances arising from application of any process (Environmental Protection Authority, 2020). Waste management is an overall approach to prevent waste and it combines a range of collection and treatment methods to handle all materials in the waste stream in an environmentally effective, economically affordable and socially acceptable way (Klassen & McLaughlin, 2021). Cooper (2020) defined waste management as the processes introduced by an organization for reducing, eliminating and ideally, preventing negative environmental impacts arising from its undertaking to environment. It encompasses management of all processes and resources for proper handling of waste materials, from maintenance of waste transport trucks and dumping facilities to compliance with health codes and environmental regulations. Waste management practices include solid waste collection and decomposing, waste reduction, reuse and recycling and waste composting.

2.1.3 Pollution Control Disclosure

Pollution control disclosure is a disclosure on introduction of contaminants that cause adverse change into the natural environment. Pollution can take the form of chemical substances or energy, such as noise, heat or light. Pollutants, the components of pollution, can be either foreign substances/energies or naturally occurring contaminants. Pollution is often classed as point source or nonpoint source pollution (Adedilan & Alade, 2020). According to Adedilan and Alade (2020), major forms of pollution include: Air pollution, light pollution, littering, noise pollution, plastic pollution, soil contamination, radioactive contamination, thermal pollution, visual pollution, water pollution.

Pollution control is an essential task. There are four types of control: legal, social, economical, and technological measure. These controls help to prevent the pollution by various methods of operations. Waste products enter the environment in various forms and threaten the quality of the air, land, and water. The presence of waste products in water is especially serious, as many of these products can enter the food chain, where the biochemical processes can rapidly increase their concentration to toxic level. Hence, it is extremely important to study the methods of

treating waste products and eliminating them from aqueous system (Thompson, 2021).

2.1.4 Environmental Remediation Disclosure

According to Nasir and Omar (2020), environmental remediation disclosure is a disclosure on the removal of pollution or contaminants from environmental media, such as soil, groundwater, sediment, or surface water. Remedial action is generally subject to an array of regulatory requirements, and may also be based on assessments of human health and ecological risks where no legislative standards exist, or where standards are advisory. Environmental Remediation Disclosure is a disclosure on extant measures and compliance to such measures by organizations whose activities are involved in environmental degradation. It involves all processes and methods put in place in the course of controlling emissions and effluents released into the environment (Ijeoma, 2021).

2.1.5 Environmental Research and Development Disclosure

The scheme for environmental research and development was initiated for promoting and initiating need based environmental research in the priority areas of pollution monitoring, disaster management mitigation, low cost waste treatment, river/lake water quality monitoring, solid waste management, climate change studies and other need based areas, and this programme is being carried out (Oyedokun, Eberioyinemi & Abiola, 2019). Environmental research and development disclosure (ERDD) is a disclosure on the activities that companies undertake to innovate and introduce new products and services. It is often the first stage in the development process. The goal is typically to take new products and services to market and add to the company's bottom line (Adegbie, Ogidan, Siyanbola & Adebayo, 2020).

2.1.6 Firm Value

Laabs (2019) and Olayinka and Iredele (2022) reported that the methods used for valuation of a firm can be broadly classified into earnings based approach, asset based approach and market based approach. The earnings based approach is more appropriate in case of valuation for going concern and it is also applicable in an industry where human knowledge and creativity appears more relevant in comparison to physical assets in value creation. This approach value a business by capitalizing its earnings. Among the main methods under this approach are the discounted cash flow method and the sales multiple methods. The asset based approach implies that valuation of net assets is calculated with reference to the historical cost of the assets owned by the company. The market based approach adopts the market price method.

Firm value is an economic concept that reflects the value of a business. It's the value that a business is worthy at a particular date. Firm value is the current quoted price at which investors buy or sell a share of common stock or a bond at a given time often referred to as market capitalization. In the context of securities, firm value is often different from book value because the firm value takes into account future growth potential. Regulatory bodies have considered market value as one of the very important basis of determining firm value. This method is

basically proposed for this study.

Hence, firm value was proposed to be measured using a market based measure proxy as net assets per share (NAPS). Net assets per share is usually calculated by dividing net assets (that is, total assets on the balance sheet less total liabilities) by the number of equity shares in issue (excluding any shares held in treasury).

This is expressed mathematically as

$$NAPS = \frac{\text{Net Assets}}{\text{Paid up Capital}}$$

2.2 Theoretical Review

2.2.1 The Stakeholders' Theory

The theoretical foundation of this paper is anchored on the "Stakeholders Theory" Stakeholders Theory was propounded by Freeman in the year 1983. The theory sees corporate organizations as the elements of the social system or group where the firm's success is dependent upon the successful management of all the relationships that a firm has with its stakeholders; those groups without whose support the organization would cease to exist. Freeman's stakeholders' theory asserts that, managers must satisfy a variety of constituents (example, employees, customers, suppliers, local community and so on) who can influence the firm's outcomes. According to this view, it is not sufficient for managers to focus exclusively on the needs of stockholders, or the owners of the business. This implies that it can be beneficial for the firm to engage in certain environmental activities that nonfinancial stakeholders perceive important, because without this, these groups might withdraw their support from the business. The stakeholders' theory proposed an increased level of environmental awareness which creates the need for companies to manage these interests (groups' interest) in order for them to become environmentally friendly towards the environment in which the business is domiciled.

The main concern of the stakeholders' theory in environmental accounting is to address the environmental disclosure elements and valuation and its inclusion in the financial statements for external users consumption. The theory illustrates that the firm has one and only one goal to satisfy the desires of shareholders by making profits. However, profit may not be attainable if the environment in which the business operates is neglected. Hence, the study is anchored on this theory.

2.3 Empirical Review

2.3.1 Empirical Studies in Nigeria

Akinkinmi and Simeon (2022) reported that environmental disclosure by corporations has been increasing steadily in both size and complexity over the last two decades. Data were obtained from the financial statements and account of firms in the manufacturing and financial sectors listed in the Nigeria Stock Exchange. The study found that environmental disclosures ensure corporate performance. The study recommended that firms in certain operations that can have effect on the environment should disclose their financial commitments in the annual reports especially those firms that its operations have to do with pollution and other environmental hazard should disclose their environmental information.

Ofurum, Iwunna and Nmehielle (2022) investigated environmental cost disclosure and financial performance of oil and gas companies listed on NSE for the period of 2008 to 20019. The study specifically examined the impact of environmental cost disclosure, which includes waste management costs and pollution control costs, using return on assets as proxy of financial performance. The study adopted the ex-post facto research design and the data was sourced from the companies' annual audited financial reports and Department of Petroleum Resources (DPR) for the period from 2008 to 2019. The panel data regression technique was applied in estimating the study's parameters. Findings showed that employee health and safety costs have a negative and significant relationship with return on assets of oil and gas companies in Nigeria and also no significant relationship with return on equity. The study therefore concluded that environmental cost disclosure has a significant but mixed effect on the financial performance of oil and gas companies listed on the NSE for the period.

Uwuigbe (2022) examined the web based corporate environmental reporting in Nigeria. The sample for the study consists of 30 firms listed on the Nigerian stock exchange. While the content analysis technique was used as a basis for eliciting data from the corporate websites of the selected firms, the student t-test statistics was used to find out whether there is a significant difference in the level of web-based corporate environmental disclosure between financial and non-financial firms in Nigeria. In addition, the linear regression method of data analysis was employed to investigate whether there is a relationship between the financial performance of firms and the level of corporate environmental disclosures of the selected listed firms in Nigeria. The findings reported that there is no significant difference in the level of web-based corporate environmental disclosure between listed financial and non-financial firms in the Nigeria stock exchange.

2.3.2 Empirical Studies in Developing Economies other than Nigeria

Jing and Qamruzzaman (2023) investigated the role of environmental and financial disclosure, IT adoption, and good governance on firms' sustainability from 1990–2019. A sample of 75 financial institutions enlisted in Bangladesh's capital market was considered for relevant data collection. Secondary data sources were used for data accumulation, including annual reports of

target FIs, economic review reports, and central banks publication. Several econometrical techniques have been implemented to document the empirical nexus and the elasticities of explained variables on firm performance. The study revealed a positive and statistically significant association between a firm's sustainability and target explanatory variables. Furthermore, the study extended the empirical valuation by implementing a system- GMM and documented a positive linkage between financial and environmental disclosure, IT adaptation, good governance, and the firm's performance sustainability.

Gatimbu and Wabwire (2022) investigated of the impact of corporate environmental disclosure on the financial performance of companies listed on the Nairobi Stock Exchange. The information was gathered from annual reports and financial statements of companies. The data obtained was subjected to an analysis using linear regression. According to the study's findings, environmental disclosure has a positive and statistically significant impact on the return on equity of a company.

Muffee (2021) assessed the effect of environmental accounting on corporate performance in Cameroun. The area of study was Development and management mission for industrial zones (MAGZI) Ombe. The analysis was computed using descriptive and inferential data gotten through the use of questionnaires that is purely primary data was used. Forty respondents were taken from six companies as sample from the population. The one way analysis of variance and the Pearson correlation methods of data analysis were used in analyzing the data gotten. From the analysis, the study concluded that environmental accounting has effect on corporate performance.

2.3.3 Empirical Studies in Developed Economies

Haixia and Jianping (2023) examined the relationship between environmental disclosure and financial performance. Thus the study focus on the heavy polluting enterprises in China from 2008 to 2019 to investigate the relationship between environmental disclosure and financial performance as well as the mediating effect of provincial level characteristics namely economic development and information penetration using hierarchical linear model (HLM). Findings show that there is positive relationship between both mandatory environmental disclosure and voluntary environmental disclosure and financial performance; economic development positively relates to corporate financial performance, and it also strengthens the relationship between environmental disclosure and financial performance; information penetration positively relates to corporate financial performance, but it weakens the relationship between environmental disclosure and financial performance. As time goes on, corporate financial performance will significantly rise in general.

Silvia, Mirella, Barbara and Luigi (2022) analyzed the impact of the environmental, social, and governance (ESG) disclosure on the firm performance, given the stakeholders' increasing attention to the firm's ESG practices. Using panel regression analysis, using a sample of the largest Italian listed companies, and considering a time span of 10 years (from 2011 to 2020). The study finds that there is a positive relationship between environmental, social, and

governance disclosure and firm performance, measured by EBIT. Our findings will help firms' stakeholders, decision-makers, policymakers, as well as academics, to improve their awareness of the impact of ESG disclosure on the performance of the firm, both as a comprehensive factor and individually by pillar. The findings, which support the positive relationship between ESG disclosure and firm performance, should incentivize managers to invest in CSR practices.

Agyemang, Yusheng, Twun, Edziah and Ayamba (2021) examined the effect of environmental disclosure on environmental performance for listed mining companies in China. The study analysis used China's Environmental Information Disclosure Degree (EIDD) and the Chinese Securities Regulatory Commission's disclosure guidelines to propose the Environmental Information Disclosure Index. The study employed a recent environmental disclosure index and modified it for environmental performance analysis. A reliability and robustness test was used in the study. Using panel data for thirty-four mining companies from both Shanghai and Shenzhen Stock Exchange for the period 2000–2018, the co-integration estimation analysis showed that corporate environmental performance and environmental information disclosure has a positive and significant relationship at a 1% level. Trend analysis revealed that mining companies comply with environmental information disclosure in China. This was seen from the great improvement in the environmental disclosure for mining companies between 2008 and 2010 after the enforcement of EIDD.

3.0 Methodology

Ex Post Facto Design was adopted for the study. This was based on the fact that our data is secondary data that exists already which cannot be manipulated or controlled. The population of the study consists of the entire 65 firms quoted under consumer goods sector, industrial goods sector, oil and gas sector, ICT sector, healthcare sector and conglomerate sector of Nigerian Exchange Group (NGX) spanning from 2017-2022.

However, out of 65 firms that formed the population of the study a total of thirteen (13) firms were removed due to incomplete financial information needed for the study. Hence, a total of 52 firms formed our sample size with 312 observations. The data collected were analyzed using panel regression model with the aid of E-view 12. Various robustness tests such as Correlational Matrix, Heteroskedasticity and Variance Inflation Factor were carried out for the test of auto-correlation and multi-collinearity existence of the regressors in order improve the validity of the results obtained.

3.1 Operationalization and Measurement of Variables

3.1.1 Dependent Variable

The dependent variable in this study is Firms' Value and it was proxied and measured using Net Assets Per Share. This is in harmony with the works of Nahiba (2020), Brockman (2019) and Oliveira, Rodrigues and Craig, (2021).

3.1.2 Independent Variable

The independent variable (Environmental Disclosures) was proxy using Waste Management Disclosures (WMD), Pollution Control Disclosures (PCD), Environmental Remediation Disclosures (ERD) and Environmental Research and Development Disclosures (ERDD). These were measured using a dichotomous procedure by (GRI) in scoring the items whereby specifically, a "1-point" score was awarded for each item that is disclosed in the annual report and otherwise, a "0-point".

3.2 Model

In line with the previous researches, the researcher adapted and modified the Models of Adegbie, Ogidan, Siyanbola and Adebayo (2020) and Mohammed, Alhassan and Mohammed (2022) into a model in determining the relationship between environmental disclosures and firm value. This is shown below as thus:

Adegbie, Ogidan, Siyanbola and Adebayo (2020): $\mathbf{MPS = \beta_0 + \beta_1 SMD + \beta_2 WMD + \beta_3 EPD + \mu}$
Mohammed, Alhassan and Mohammed (2022):
$\mathbf{ROAit = \beta_0 + \beta_1 EADit + \varepsilon it-}$
$\mathbf{ROEit = \beta 0 + \beta 1 EADit + \varepsilon it-}$
$\mathbf{NPMit = \beta 0 + \beta 1 EADit + \varepsilon it}$

The functional model for the study is shown below as thus:

NAPS = F(WMD, PCD, ERD, ERDD)

The explicit form of the regression modified for the study is expressed as thus:

$$\mathbf{NAPS_{it} = \beta_0 + \beta_1 WMD_{it} + \beta_2 PCD_{it} + \beta_3 ERD_{it} + \beta_4 ERDD_{it} + \mu}$$

Where:
NAPS = Net Assets Per Share
WMD = Waste Management Disclosure
PCD = Pollution Control Disclosure
ERD = Environmental Remediation Disclosure
ERDD = Environmental Research and Development Disclosure
μ = Stochastic Term
$\beta_{1\text{-}4} > 0$ = The expected signs of the coefficients (a priori expectations)

4.1 Data Analysis

Table 4.1.1: Descriptive Statistics

	NAPS	WMD	PCD	ERD	ERDD
Mean	10.91131	4.016154	2.689103	2.099359	1.926282
Median	4.235000	3.000000	3.000000	2.000000	2.000000
Maximum	96.50000	5.000000	5.000000	5.000000	5.000000
Minimum	-16.27000	0.000000	0.000000	0.000000	0.000000
Std. Dev.	18.97297	1.206381	1.115288	1.295453	1.074858
Skewness	2.413369	0.324616	0.786580	0.113887	0.071096
Kurtosis	2.794037	2.426341	3.219891	2.112765	1.086636
Jarque-Bera	39.24873	9.757613	32.80138	10.90787	0.360419
Probability	0.898732	0.457606	0.785629	0.504279	0.835095
Sum	3404.330	1044.000	839.0000	655.0000	601.0000
Sum Sq. Dev.	111951.8	452.6154	386.8429	521.9199	359.3045
Observations	**312**	**312**	**312**	**312**	**312**

Source: Authors' Computation, E-Views 12 (2024)

The table 4.1.1 above shows that the mean value of net assets per share (NAPS) among the sampled firms was 10.91. This implies that firm value is determined by environmental disclosures by 10.91% at a degree risk of 18.9%. The distribution of (NAPS) for the study is platykurtic since the kurtosis (2.79) is less than 3, implying that the outliers are few. The Jarque-Bera probability of 0.899 is greater than 0.05, which means that the distribution of net assets per share comes from a normal distribution. The mean value of waste management disclosure (WMD) for the sampled firms' was 4.02. This means that firms with WMD values of 4.02 extremely disclosed this information in their financial reporting. Also, the maximum value for the study was 5 while the minimum value was 0. This wide variation in maximum and minimum WMD values among the sampled firms justify the need for this study that firms with higher WMD values have higher value than those firms with low WMD values at a degree risk of 1.21%. The distribution of (WMD) for the study is platykurtic since the kurtosis (2.43) is less than 3, implying that the outliers are few. The Jarque-Bera probability of 0.458 is greater than 0.05, which means that the distribution of waste management disclosures does not deviate from a normal distribution.

The average value of pollution control disclosure (PCD) for the sampled firms' was 2.69. This means that firms with PCD values of 2.69 moderately disclosed this information in their financial reporting. Also, the maximum value for the study was 5 while the minimum value was 0. This disparity in maximum and minimum PCD values among the sampled firms justify the need for this study that firms with higher PCD values have higher value than those firms with low WMD values at a degree risk of 1.12%. The distribution of (PCD) for the study is leptokurtic since the kurtosis (3.22) is more than 3, implying that the outliers are many. However, the Jarque-Bera probability of 0.786 is greater than 0.05, which means that the

distribution of pollution control disclosure comes from a normal distribution.

The mean value of environmental remediation disclosure (ERD) for the sampled firms' was 2.09. This means that firms with ERD values of 2.09 moderately disclosed this information in their financial reporting. The maximum value for the study was 5 while the minimum value was 0. This high variation in maximum and minimum ERD values among the sampled firms justify the need for this study that firms with higher ERD values have higher value than those firms with low ERD values at a degree risk of 1.29%. The distribution of (PCD) for the study is platykurtic since the kurtosis (2.12) is less than 3, implying that the outliers are few. The Jarque-Bera probability of 0.504 is greater than 0.05, which means that the distribution of environmental remediation disclosure does not deviate from a normal distribution.

The average value of environmental research and development disclosure (ERDD) for the sampled firms' was 1.93. This means that firms with ERDD values of 1.93 poorly disclosed this information in their financial reporting. Also, the maximum value for the study was 5 while the minimum value was 0. This disparity in maximum and minimum ERDD values among the sampled firms justify the need for this study that firms with higher ERDD values have higher value than those firms with low ERDD values at a degree risk of 1.07%. The distribution of (ERDD) for the study is platykurtic since the kurtosis (1.09) is less than 3, implying that the outliers are few. However, the Jarque-Bera probability of 0.835 is greater than 0.05, which means that the distribution of environmental research and development disclosure comes from a normal distribution.

4.1.2 Correlation Matrix

Variables	NAPS	WMD	PCD	ERD	ERDD
NAPS	1.000000				
WMD	0.049074	1.000000			
PCD	0.036354	0.264261	1.000000		
ERD	0.089241	0.028251	-0.284060	1.000000	
ERDD	0.239331	-0.069528	0.179308	0.266220	1.000000

Source: Authors' Computation, E-Views 12 (2024)

Table 4.1.2 above shows the relationship between all pairs of independent variables and dependent variable used in the regression model. It reveals that all the independent variables have positive correlation with the dependent variable (NAPS) while some of these components of environmental disclosures have negative relationship with one another. The values on the diagonal are all 1.0000 which shows that each variable is perfectly correlated with itself.

In checking for multi-collinearity, we noticed that no two explanatory variables were perfectly correlated. This means that there is an absence of multi-collinearity in our models. Multi-collinearity between the explanatory variables may result to wrong signs or implausible magnitudes in the estimated model coefficients and the bias of the standard errors of the

coefficients.

4.2 Robustness Test

Robust test was done on our data using Breusch Pagan-Godfrey Heteroskedasticity (HT) and Variance Inflation Factor (VIF). Thus shows the appropriateness of the Model for the study with the four explanatory variables (WMD, PCD, ERDD & ERDD).

4.2.1 Heteroskedasticity Test

Heteroskedasticity was assed using B-P-G test to ascertain whether the residuals have a constant variance. The opposite of heteroskedasticity is homoscedasticity which refers to a situation where the variance of the residuals is equal over a range of measured values.

Table 4.2.1.1 Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	2.086331	Prob. F(4, 307)	0.6873
Obs*R-squared	1.765232	Prob. Chi-Square(4)	0.5102
Scaled explained SS	2.865355	Prob. Chi-Square(4)	0.5398

Source: Authors' Computation, E-Views 12 (2024)

The null hypothesis of the test is that the model is homoscedastic. Thus the null hypothesis was accepted at 5% significant level, implying that the model is free from heteroskedasticity.

4.2.2 Multi-Collinearity Test

Multi-collinearity is a condition in which the independent variables are highly correlated such that the effects of the independents on the outcome variable cannot be separated. It reduces the validity of the regression estimates since the independent variables become extremely the same when there is a strong collinearity in the predictors. Multi-collinearity practically inflates unnecessarily the standard errors of the coefficients. By overinflating the standard errors, multi-collinearity makes some variables statistically insignificant when they should be significant. To assess the strength of the collinearity subsisting among the predictors, the study deployed Variance Inflation Factors as shown in Table 4.2.2.1.

Table 4.2.2.1 Variance Inflation Factors
Variance Inflation Factors
Date: 11/15/23 Time: 10:35
Sample: 2017-2022
Included observations: 312

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
WMD	1.099669	4.649451	1.101232

PCD	0.794836	4.202414	1.156206
ERD	1.118276	8.237587	1.205695
ERDD	0.871895	9.589048	1.099886
C	17.64107	15.34029	NA

Source: Authors' Computation, E-Views 12 (2023)

From the table above, the centered VIF ranges from 1.101 to 1.099 which suggests non multi-collinearity feature. Multi-collinearity feature exists when centered VIF exceeds 10 i.e VIF>10.

4.3 Test of Hypotheses

Panel Regression model was developed to test the linear relationship between the dependent and independent variables. It was operated using E-Views 12 as shown in the table 4.3.1-4.3.3 below. Thus, the hypotheses for the study were restated as follows;

Ho_1: There is no significant relationship between Waste Management Disclosure and Firms Value in Nigeria

Ho_2: Pollution Control Disclosure has no significant relationship with Firms Value in Nigeria

Ho_3: There is no significant relationship between Environmental Remediation Disclosure and Firms Value in Nigeria

Ho_4: Environmental Research and Development Disclosure has no significant relationship with Firms Value in Nigeria

$$NAPS_{it} = \beta_0 + \beta_1 WMD_{it} + \beta_2 PCD_{it} + \beta_3 ERD_{it} + \beta_4 ERDD_{it} + \mu$$

Decision Rule: accept Ho if P-value > 1%-5% significant level otherwise reject Ho

Table 4.3.1: Fixed Effect Regression Result on the Relationship between Environmental Disclosures and Firm Value in Nigeria.

Dependent Variable: NAPS
Method: Panel Least Squares
Date: 11/15/23 Time: 10:31
Sample: 2017 2022
Periods included: 6
Cross-sections included: 52
Total panel (balanced) observations: 312

Variable	Coefficient	Std. Error	t-Statistic	Prob.
WMD	0.842475	0.175588	4.798022	0.0001
PCD	0.941038	0.202259	4.652638	0.0020
ERD	0.479095	0.120606	3.972398	0.0133
ERDD	0.763250	0.181153	4.213289	0.0032

C	10.90164	1.707746	6.383641	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.911687	Mean dependent var	10.91131
Adjusted R-squared	0.892713	S.D. dependent var	18.97297
S.E. of regression	6.214524	Akaike info criterion	6.652804
Sum squared resid	9886.799	Schwarz criterion	7.324625
Log likelihood	-981.8374	Hannan-Quinn criter.	6.921310
F-statistic	48.05054	Durbin-Watson stat	2.082343
Prob(F-statistic)	0.000000		

Source: Result Output from E-Views 12 (2023).

Table 4.3.2: Random Effect Regression Result on the Relationship between Environmental Disclosures and Firm Value in Nigeria

Dependent Variable: NAPS
Method: Panel EGLS (Cross-section random effects)
Date: 11/15/23 Time: 10:31
Sample: 2017 2022
Periods included: 6
Cross-sections included: 52
Total panel (balanced) observations: 312
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
WMD	0.963234	0.273662	3.519794	0.0026
PCD	0.855521	0.100839	8.484029	0.0000
ERD	0.701404	0.219955	3.188852	0.0145
ERDD	0.189687	0.080329	2.361376	0.0305
C	10.86703	3.050284	3.562629	0.0004

Effects Specification

	S.D.	Rho
Cross-section random	18.27036	0.8963
Idiosyncratic random	6.214524	0.1037

Weighted Statistics

R-squared	0.910039	Mean dependent var	1.500773
Adjusted R-squared	0.882859	S.D. dependent var	6.191500
S.E. of regression	6.200346	Sum squared resid	11802.40
F-statistic	8.778319	Durbin-Watson stat	1.955662
Prob(F-statistic)	0.539973		

Unweighted Statistics

R-squared	0.007424	Mean dependent var	10.91131
Sum squared resid	111120.6	Durbin-Watson stat	0.069639

Source: Result Output from E-Views 12 (2023).

Table 4.3.3: Hausman Test

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	4.600770	4	0.0267

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
WMD	0.242475	0.263234	0.001443	0.5847
PCD	-0.041038	-0.055521	0.001141	0.6680
ERD	-0.479095	-0.501404	0.000417	0.2748
ERDD	0.163250	0.189687	0.000628	0.2914

Cross-section random effects test equation:
Dependent Variable: NAPS
Method: Panel Least Squares
Date: 11/15/23 Time: 10:32
Sample: 2017 2022
Periods included: 6
Cross-sections included: 52
Total panel (balanced) observations: 312

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.842475	0.175588	4.798022	0.0001
WMD	0.941038	0.202259	4.652638	0.0020
PCD	0.479095	0.120606	3.972398	0.0133
ERD	0.763250	0.181153	4.213289	0.0032
ERDD	10.90164	1.707746	6.383641	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.911687	Mean dependent var	10.91131
Adjusted R-squared	0.892713	S.D. dependent var	18.97297
S.E. of regression	6.214524	Akaike info criterion	11.65284
Sum squared resid	9886.799	Schwarz criterion	10.32425
Log likelihood	-981.8374	Hannan-Quinn criter.	6.921310

F-statistic	48.05054	Durbin-Watson stat	2.082343
Prob(F-statistic)	0.000000		

Source: Result Output from E-Views 12 (2023).

In testing for the cause-effect relationship between the dependent and independent variables in our model, the two widely used panel data regression estimation techniques (fixed effect and random effect) were adopted. The table above (table 4.3.1-4.3.2) presents the two panel data regression estimation techniques results using fixed effect model and random effect model. The estimation of the fixed effect panel regression was based on the assumption of no correlation between the error term and explanatory variables, while that of the random effect, considers that the error term and explanatory variables are correlated. In selecting from the two panel regression estimation results (fixed effect and random effect) for the study, the Hausman test was conducted and the test is based on the null hypotheses that the random effect model is preferred to fixed effect model.

A look at the p-value of the Hausman test as shown above (Table 4.3.3) shows 0.0267. Thus implies that we should reject the null hypothesis and accept the alternative hypothesis that random effect model is not preferred to fixed effect model at 5% level of significance. Based on this, we adopted the fixed effect panel regression results in drawing our conclusion and recommendations. Thus implies that the fixed effect results tend to be more appealing statistically when compared to the random effect. Following the above, the discussion of the fixed effect results became imperative. The coefficient of determination "R-Square" shows 0.912% indicating that the variables considered in the model accounts for about 91.2% change in the dependent variable of NAPS. Thus implies that the remaining 8.8% is as a result of other variables not addressed by this model. This is to say that there are other factors that contribute to firms net assets per share other than environmental information disclosures.

The sig. (or p-value) for the Model is .0000 which is below the .01 level; hence, we conclude that the overall model is statistically significant, or that the variables have a combined or joint effect on the dependent variable. With this, the researcher affirms the validity of the panel regression model adopted in this study. Also, the Durbin Watson (DW) statistics which was obtained from our regression result in table 4.3.1 stood at 2.082343 which agrees with the Durbin Watson rule of thumb. This indicates that the data is free from autocorrelation problem and as such fits for the regression result to be interpreted and result relied on. Akika Info Criterion and Schwarz Criterion which are 11.65 and 10.32 respectively further strengthen the fitness of our regression result for reliability as it confirm the goodness of fit of the model specified.

In addition to the above, the specific finding from each explanatory variable from fixed effect regression model as shown on table 4.3.1 are provided below as follows:

Ho_1: There is no significant relationship between Waste Management Disclosure and Firms Value in Nigeria

This hypothesis was tested and the result of the regression model as exposited on table 4.3.1

indicates that the relationship between waste management disclosure and firm value is positive and significant with a p-value (significance) of 0.0001 for the model which is less than the 1% level of significance adopted. Likewise the result of positive coefficient of 0.84 for the model indicates that, an increase in corporate waste management practices increases NAPS by 84%. Thus implies that firms waste management disclosure determines its value.

Decision: Since p-value (0.0001) is less than 0.01, we reject the null hypothesis and accept the alternate hypothesis. This means that there is a significant relationship between waste management disclosure and firms value in Nigeria

Ho_2: Pollution Control Disclosure has no significant relationship with Firms Value in Nigeria

This hypothesis was tested and the result of the regression model as exposited on table 4.3.1 indicates that the relationship between pollution control disclosure and firm value (NAPS) is positive and significant with a p-value (significance) of 0.0020 for the model which is less than the 1% level of significance adopted. Likewise the result of positive coefficient of 0.94 for the model indicates that, an increase in firms' pollution control practices increases NAPS by 94%. Thus implies that pollution control disclosure is a determinant of firm value in Nigeria..

Decision: Since p-value (0.0020) is less than 0.01, we reject the null hypothesis and accept the alternate hypothesis. This means that pollution control disclosure has significant relationship with firms value in Nigeria

Ho_3: There is no significant relationship between Environmental Remediation Disclosure and Firms Value in Nigeria

This hypothesis was tested and the result of the regression model as exposited on table 4.3.1 indicates that the relationship between environmental remediation disclosure and firms value (NAPS) is positive and significant with a p-value (significance) of 0.0133 for the model which is less than the 5% level of significance adopted. Likewise the result of positive coefficient of 0.48 for the model indicates that, an increase in corporate environmental remediation practices increases NAPS by 48%. Thus implies that environmental remediation practices ensure firms' value in Nigeria.

Decision: Since p-value (0.0133) is less than 0.05, we reject the null hypothesis and accept the alternate hypothesis. This means that there is a significant relationship between environmental remediation disclosure and firms value in Nigeria

Ho_4: Environmental Research and Development Disclosure has no significant relationship with Firms Value in Nigeria

This hypothesis was tested and the result of the regression model as exposited on table 4.3.1 that the relationship between environmental research and development disclosure and firm value (NAPS) is positive and significant with a p-value of 0.0032 which is less than the 1% level of significance adopted. The result of positive coefficient of correlation of 0.76 indicates that

environmental research and development ensures firm value by 76%. Thus implies that corporate environmental research and development determines firm value in Nigeria.

Decision: Since p-value (0.0032) is less than 0.01, we reject the null hypothesis and accept the alternate hypothesis. This means that environmental research and development disclosure has significant relationship with firm value in Nigeria.

5. Conclusion

The study evaluated the relationship between environmental disclosures and firm value in Nigeria. To this effect, the environmental disclosures as the independent variable was disaggregated into waste management disclosure (WMD), pollution control disclosure (PCD), environmental remediation disclosure (ERD) and environmental research and development disclosure (ERDD) while the dependent variable of firm value was proxied by net assets per share (NAPS). Using panel regression model, the findings of the study revealed that environmental disclosures determine firm value in Nigeria. Thus, the relationship between environmental disclosures and firms value is positive and significant.

5.1: Recommendations

In lieu of the findings of the study, the following recommendations were made:

1. Government agencies should encourage organizations to comply with its environmental laws on waste management as this will encourage environmental reporting by corporate organizations.

2. Corporate organizations on their part should ensure that they comply with the environmental laws and also disclose more of pollution control information in relation to balancing the effect of continuing business operations in a particular environ as such disclosure ensures firms value.

3. In relation to those organizations that comply with environmental laws, especially on the issue of environmental remediation disclosure, tax holidays should be granted to them in order to prompt full disclosure.

4. Since significant and positive association was found between environmental research and development disclosures and firm value, firms should disclose more of this information in their annual reports for investors' consumption. Thus, enables the investors to ascertain those firms that are socially responsible as socially responsible firms have higher value.

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