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ENVIRONMENTAL DISCLOSURES AND FINANCIAL PERFORMANCE OF LISTED OIL AND GAS COMPANIES IN NIGERIA

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Abstract

This study investigates the effect of environmental disclosures on the financial performance of listed oil and gas companies in Nigeria by differentiating voluntary from mandatory environmental disclosures whereas financial performance was measured by earnings per share. The research was built on the resource-based view theory, adopted explanatory research design and collected secondary data from the annual reports of the seven listed oil and gas companies from 2015 to 2024. The data were analyzed using fixed/random effects regression with Driscoll-Kraay standard errors. The study found that while voluntary environmental disclosures have significant statistical links with financial performance, mandatory disclosures do not, so the study concluded that mandatory disclosure tends to impose compliance costs that erode short-term profitability whereas voluntary disclosure offers reputational and signaling benefits that can enhance financial performance of oil and gas companies. The study recommended that firms should utilize strategic voluntary disclosures to build corporate reputation and promote results.

Keywords: *Environmental Disclosure, Financial Performance, Mandatory Disclosure, Voluntary Disclosure, Sustainability.*

Introduction

The need to sustain favourable financial performance while operating within the bounds of the law influences majority of the courses of action taken by managers of business enterprises including the manner of disclosures made to communicate such actions and their subsequent implications on the goals of their business. One of the critical issues that managers of businesses in the 21st century grapple with, borders on environmental protection and the extent of its disclosures (Akinlo & Iredele, 2014). The task of ensuring that the environment is adequately protected has become a subject of peak interest to both the industry in practice and academia in research, thus managers are interested in making environmental decisions in a way that also sustains their targeted financial and overall performance.

According to Hamilton and Macintosh (2008), environmental protection deals with several activities engaged to preserve the ecosystem and their constituent parts including taking actions to prevent undesirable changes to them. The role of accounting in environmental protection as it concerns businesses is very vital because the accounting task of reporting economic events as it occurred to all stakeholders is the crux of accounting itself. Again, the reports or disclosures made by the directors to stakeholders of the business suggests that issues of critical interests are captured in the financial reports whether it is mandatory or otherwise, and also implies that information that are not disclosed may not be relevant to the organization. So, issues that are regarded as relevant to the growth of the firm are captured in the financial reports whether they are compulsorily required by the law, generally accepted in the industry or not.

Environmental protection disclosures comprise of all information, notes and disclaimers made by businesses in their reports to inform different stakeholders of their commitment to preserve the ecosystem and its constituents. Alok et al (2008) described environmental protection disclosure as the various ways through which firms report their environmental related activities in the financial reports. These information on environmental activities and investments are relevant and crucial owing to the importance of the environment to the business outfits, and also the effects of firms' businesses on the environment (Akinlo & Iredele, 2014). Li et al (2019) submit that corporate environmental disclosure connotes that the reporting firms have shown readiness to integrate environmental protection strategies into their daily routines since they are aware that these activities will be reported to users of financial reports who will judge them based on these disclosures. However, the extent of firms' involvement in environmental protection and accountability is dependent on the legal provisions guiding its activities with respect to environmental responsibility. Cai et al (2023) submit that after the standardization of environmental protection requirements for companies in China, the country witnessed an upward surge in their corporate environmental protection disclosure.

Managers of business corporations will continue to pursue the goal of profitability because the central objective of every business is to make profit prior to other reasonable objectives. So, the choice to become environmentally responsible is not always taken at the expense of making more profit but it is a wise option to avoid penalties and lack of public goodwill which will make it impossible to continue operating at a reasonable consideration in future. Akinlo & Iredele (2014) identified two major school of thoughts on the implication of

environmental responsibility to business profits. The first school of thought believes that business companies' engagement in environmentally responsible investments leads to inflating their total operational costs while the second school views environmental investments from value creation lens where such investments improve their reputation and leads to improved financial performance (Lawrence & Bernard, 2023).

Chang (2015) posits that firms' environmental disclosures signal the dawn of awareness and empowerment for the stakeholders, the study also suggests that environmental disclosures are necessary as investors are interested in making decisions about the future success of the business based on its current environmental performance as well as their environmental risks. As many companies strive to sustain their businesses through adequate disclosures to satisfy the information requirements of stakeholders (Dowell et al, 2000), they consider the legal requirements which can also be regarded as mandatory disclosures and also the disclosure efforts of peer companies within the same industry in addition to their own improvised disclosure efforts to effectively communicate to their stakeholders. Other environmental disclosures aside those required by the law are often regarded as voluntary disclosures since they are added by the reporting companies for the sole purpose of providing more information rather than to fulfill legal reporting requirements.

However, the degree of corporate environmental responsibility in a particular region depends greatly on the legal disposition of its government towards same. Corporate bodies tend to minimize costs at all means hence some businesses may compromise environmental safety in pursuit of more wealth. Evidences have shown that corporate environmental reporting improved after the legal background for environmental responsibility has been adequately laid out (Cai, et al, 2023; Akinlo & Iredele, 2014). Particularly, in the oil and gas sector of Nigeria, companies responded to legal disposition of the government when the Federal Environmental Protection Agency Decree was introduced in 1988 but prior to that time several environmental hazards were thrown to the environment without check by some companies such as the case of the Italian Company who dumped thousands of toxic wastes into a river located at Delta State (Lawrence & Bernard, 2023). Hence corporations basically respond to legal environmental requirements and also other environmental practices that upheld within their industry. Several academic research thrusts have been made on assessing the type of relationship that subsists between environmental responsibility and profitability of firms in Nigeria but it is important to identify the approach taken by each study. For example, some empirical literature approach environmental protection measuring the amount invested overtime (Lawrence & Bernard, 2023; Jin & Xu, 2020) whereas Cai, et al (2023) while others considered same from the disclosure standpoint (Akinlo & Iredele, 2014). Again, though there appears to be a consensus in literature with respect to the essential nature of environmental protection activities in Nigeria, there are varying research findings for its implication to financial performance hence this study explored the effect of environmental disclosures on the financial performance of listed oil and gas companies in Nigeria. Consequently, the following specific objectives will guide the pursuit of the central aim of this research;

i. To assess the effect of mandatory environmental disclosures on earnings per share of selected listed oil and gas companies in Nigeria
ii. To explore the influence of voluntary environmental disclosures on earnings per share of selected listed oil and gas companies in Nigeria

Review of Related Literature

Financial Performance

The concept of financial performance has always been utilized to test the efficacy of several managerial and corporate factors intending to portray the effectiveness of such policy or decisions on the business results. Solomon (2020) regarded financial performance as the reflection of companies' policies, activities and choices in financial terms. This definition connotes that every action and policies implemented by companies influences their financial performance, thus it further strengthens the application of the variable in testing different corporate and managerial concepts in business research overtime. Dan et al (2025) posited that financial performance underscores the efficiency and productivity of a company's assets due to the manner with which they are being applied by the company's executives. According to the authors, financial performance of firms can be viewed from three different angles; productivity, profitability and value. Financial performance also extends to the profitability of the companies overtime. Erinoso and Oyedokun (2022) opined that financial performance can be assessed on the basis of firms' current performance level and capacity to create revenue. It therefore suggests that profitability is a subset of financial performance and profitable businesses can be equated to financially well-performing. The study supported the use of accounting data from the financial reports of corporation to assess their level of profitability as a measure of financial performance. The variables often applied to capture profitability includes return on asset, return on equity (Uniamikogbo & Ifeanyichukwu, 2021), and net/gross profit margin. Appah et al (2021) classified returns on total assets, equity, capital employed, assets and sales as measures of profitability. They argued that if the purpose is to evaluate the percentage of returns on any existing resource of the company, then it should aid investors arrive at the decision of how that particular activity influenced their profitability. This implies that financial performance also captures the level of current and past profitability recorded by an organization as a result of a unit of investment made by the owners in it. Hence, earnings per share is the measure of financial performance utilized in this study to capture the profitability and value creation financial performance in oil and gas industry of Nigeria.

Environmental Disclosure

According to Erinoso and Oyedokun (2022), environmental protection disclosure includes articulation of costs incurred on waste management, pollution control and environmental rehabilitation. This implies that recognizing and reporting the expenses particularly incurred on activities that has to do with preservation, management and remediating negative effects of the company's interaction on physical and atmospheric surroundings, amounts to environmental disclosure. Saleh et al (2022) described environmental protection disclosure as sustainability reports prepared in line with ethical and moral standards on environmental responsibility with a view to highlight compliance with such standards.

Environmental disclosure is incidental to accounting information reporting as it is produced through preparation of annual financial reports of listed companies. It involves the communication of all facts related to a firm's environmental impacts, which can be positive or negative, including consequent restoration activities, to its stakeholders via the instrument of financial report. Al-Jubouri and Chakroun (2022) defined environmental disclosure as a report presented by industrial companies to its stakeholders on the environmental interactions

undertaken by the company in the report year as part of the financial report. The authors argued that accounting disclosure is limited to business outcomes which do not reveal environmental implications of companies' decisions and actions during the year, thus justifying the need for environmental protection disclosure practices especially for industrial companies whose activities exploits the natural state of the atmospheric conditions in their locations. The research draws from the position of Al-Qatati (2007) who emphasized the need for elaborate statement for environmental protection to consist of future estimates of operating expenditures on pollution control, remediation costs, articulation of legal environmental requirements as against facilities invested on, discussion of policies with respect to environmental disclosures and quantitative data to accompany the reports. Al-Qatati (2007) defined environmental disclosure as the presentation of facts on company's daily activities from which environmental data are derived, to inform stakeholders' control, planning and assessment of environmental performance.

The above positions suggest that environmental disclosure can take various forms or presentation format but is required to communicate a basic understanding of reporting company's investments into activities that control negative effects on the environment, account for unpreventable negative impacts as well as highlights legal expectations on the company to enable its audience decipher its compliance to standard or otherwise. This viewpoint aligns with that of Bello and Ogungbenle (2022) who posited that environmental disclosure captures the commitment and loyalty of a reporting company to organize its operations in a manner that take into consideration that interests of various stakeholders of the company and especially that of the immediate environment. This is because companies who are committed to reporting environmental implications of their activities will most likely be responsible in their choices of environmentally-related actions. Onyekachi (2025) opined that environmental disclosure captured as 'climate change accounting' in the study, is critical to the business of every corporate organization especially in the long run because continuous negligence of the protection and reparation needs of the climate will not only be endemic to the organization's survival and financial performance, but will also amount to injustice to the future generations of our ecosystem.

Al-Jubouri and Chakroun (2022) identified two basic types of environmental protection disclosures; mandatory and voluntary environmental disclosures. While mandatory disclosure seeks to fulfill legal expectations, voluntary disclosures underscore individual higher initiatives taken by corporate bodies to reflect their commitments and loyalties in achieving a safe environment and risk-free climatic conditions.

Mandatory Environmental Protection Disclosure

Mandatory environmental disclosures are compulsorily required by regulatory authorities charged with oversight functions over the reporting entities hence their minimal expectations are complied with, to avoid sanctions. Thus, mandatory environmental protection disclosures comprise of the minimal environmental reports or information contents legally required from corporate bodies for the purpose of rendering the stewardship obligation it owes its stakeholders with respect to environmentally related activities and responsibility.

The mandatory environmental protection disclosure requirements in Nigeria includes;

1. Petroleum Industry Act (PIA) 2021: The Petroleum Industry Act (PIA) of 2021 was enacted to regulate the environmental effects of activities of upstream, midstream and downstream players in the oil and sector of Nigeria. The oversight function of this act is divided between two government agencies; Nigerian Upstream Petroleum Regulatory Commission (NUPRC) and Nigerian Midstream & Downstream Petroleum Regulatory Authority (NMDPRA). The PIA summarily provides for five mandatory items for firms in upstream, midstream and downstream oil business in Nigeria. They include
   i. Submission of environmental management plan
   ii. Contributions for environmental remediation and clean-up costs
   iii. Gas flaring/elimination and methane management plan
   iv. Reporting/disclosure of Greenhouse gas and methane emissions
   v. Set up of funds for decommissioning projects in line with international best practices.
2. Environmental Impact Assessment (EIA) Act 1992 and Environmental Guidelines and Standards for the Petroleum Industry in Nigeria (EGASPIN): The EIA provides for securing of approval before commencement of any public or private projects that can influence the environment. On the other hand, EGASPIN is a regulatory guideline overseen by NUPRC and NMDPRA revised in 2018. It demands for clean-up and remediation of accidental spillage on the environment. With respect to mandatory environmental protection disclosure, compliant companies will disclose their compliance with this Act or admit its non-applicability to their activities during the accounting year.
3. National Oil Spill Detection Response Agency Act (NOSDRA): NOSDRA Act is the legal backing that established the Agency to check oil spillage on the Nigerian environment in October 2006. The key provisions of NOSDRA Act as mandatory environmental protection disclosure component includes the requirement to send a written report of cases of oil spillage within 24 hours of its occurrence and otherwise, attracts a penalty of ₦500,000 per day.
4. National Environmental Standards and Regulations Enforcement Agency (NESREA) Act of 2007: The NESREA Act (No. 25 of 2007) was established as another legal structure to ensure that environmental standards and procedures are adhered to, by corporate bodies whose activities have impact on the environment. The NESREA Act covers impact on the air, noise, disposal of waste and hazardous substances, water body and biodiversity management. The Act is saddled with issuing of Environmental Business Permits including licensing and monitoring environmental effects of the companies' operations from time to time.
5. Corporate and governance obligations in CAMA 2020 and Climate Change Act of 2021: Both Companies and Allied Matters Act (2020) and Climate Change Act (2021) as distinct legal provisions made demands on registered companies and their directors with respect to environmental management and they are part of mandatory environmental protection disclosure which attest to a reporting company's commitment to preserve the environment by upholding the standards of best practice when they are complied with, and disclosed as such. In section 305 (3) of CAMA, directors as the first line governors of corporations are required to take cognizance of the effect of their

operations on their immediate environment thereby encouraging them to comply with environmentally friendly policies and guidelines which amounts to voluntary compliance to environmental standards.

In the light of the various mandatory environmental protection components, one shortcoming that stands out is the issue of weak implementation of the well-structured legal frameworks of environmental protections. Nevertheless, a compliant company's annual report will provide information that underscores its awareness of the legal expectations in a bid to disclose its efforts and compliance ability.

Voluntary Environmental Protection Disclosure

Voluntary environmental protection disclosure represents additional efforts made by individual corporations beyond the specific requirements and legal standards they are expected to uphold for environmental safety. The common voluntary disclosure standards for firms in the oil and gas sector are;

i. Global Reporting Initiative (GRI) Standard 11: Oil and gas sector: GRI standards are issued by Global Reporting Initiative, an independent body that provides reporting standards widely used by companies all over the world to prepare annual reports. The use of GRI standards became more pertinent with globalization of commercial transactions which introduced the need for comparison among companies, their locations and nationalities notwithstanding. This is because the GRI provides guidelines for reporting on governance, social and environmental impacts. As companies key into the guideline of GRI, the Initiative aims to promote transparency and accountability in sustainability disclosures of organizations. Specifically, some companies in oil and gas sector voluntarily comply with GRI 11 standards on their sector and especially on environmental safety best practices though it is not legally required of them in their home countries. The GRI 11 standard provides for various components of reporting on environmental protection, specifically flaring, spillage and biodiversity hence they form components of voluntary environmental protection disclosure for selected companies in oil and gas sector.

ii. International Financial Reporting Standards (IFRS) S1 and S2: The issue of environmental reporting is contemporary and interestingly growing popular in recent accounting research discussions. Some researchers has previously enjoined the standards setting Board; International Accounting Standards Board, to dedicate a standard to environmental reporting/disclosure (Onyekachi et al, 2020). Rising to the demand of environmental disclosure standard, International Sustainability Standards Board has issued IFRS S1 and S2. However, these standards are still on voluntary basis for firms in the Nigerian oil and gas sector. The IFRS standard 1 on General Requirements for Disclosure of Sustainability-related Financial Information provides a general framework for companies globally to report sustainability related risks and opportunities. Environmental safety compliant companies may further exhibit their flair by complying with IFRS S1 without being mandated by legal provisions to do so. Khansa and Komala (2024) posited that IFRS S1 differs from GRI because it calls for integrated reports that highlights sustainability impact with respect to strategy, financial performance and

position. IFRS S2 provides a sector specific guideline for oil and gas companies to disclose climate-related information. Though issued in 2023, companies looking to adopt a recognized procedure to disclose their environmental compliant financial reporting policies may have started working with it though the FRCN has drawn a roadmap for implementation of this standards in the Nigerian market.

Environmental Protection Disclosures and Firm Performance

The idea projected by this study is that of exploring possible link between environmental disclosure and financial performance of listed companies in the Nigerian oil and gas sector. The concept of this study is built on the financial implication of environmental disclosures on the business results recorded over time. Furthermore, the concept of splitting environmental protection disclosures into mandatory and voluntary distinguishes the mandatorily required reporting methods from compliant efforts of companies who truly adopt measures that promote safe climatic conditions. This concept is presented diagrammatically below;

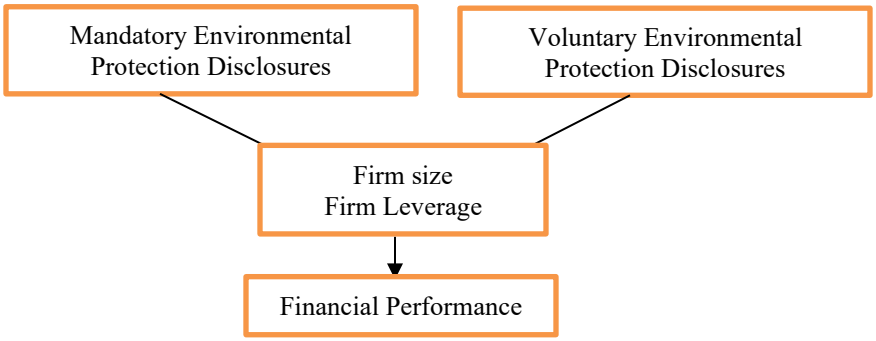

Figure 1: *Framework of environmental protection disclosures and financial performance*

According to Hummel and Schlick (2016), companies adopt voluntary environmental disclosure to distinguish themselves as superior in environmental performances from others who only fulfill the minimal legal environmental protection requirements. So the concept of this study models a linkage from mandatory and voluntary environmental protection disclosures to financial performance of listed companies in the oil and gas sector controlled by their size and available financial resources.

Theoretical Stance and Hypothesis Formulation

The resource-based view is a strategic management theory developed by Jay Barney in 1991 though the theory draws from earlier studies by Penrose (1959) and Wernerfelt (1984) who coined the term 'resource-based view'. Almarri and Gardiner (2014) explained the resource-based view as a theory that upholds the application of resources of an organization to achieve a competitive advantage especially in project management. This implies that an organization's acquired capabilities overtime, in a particular aspect of operations, such as environmental protection strategies including its disclosure in the annual reports can yield an advantage which other firms in the same industry cannot easily adopt. For instance, Khan et al (2016) submitted that U.S companies in his studies tend to innovate environmental protection and disclosure so as to outperform their peers in financial results thereby gaining competitive

advantage through that. This confirms the tendency of corporate leadership to utilize assets and capacities for advancing their financial advantage as upheld by resource-based view.

This study conceived oil and gas companies as capable of developing strategies of environmental protection including minimal compliance with legal requirements or innovative disclosure methods which gives them advantage of improved financial performance over others. The resource-based view theory is all inclusive (Almarri & Gardiner, 2014) in its definition of assets and resources which can be utilized to the benefit of the company. The capabilities of the oil and gas companies in this theory can be expressed in their innovative application of green technologies, compliance efficiency, carbon footprint reduction and even more importantly sustainability disclosures; aligning with the thought behind resource-based theory. Building on this theoretical background, the study hypothesizes as follows in null form;

i. Mandatory environmental disclosure has no significant effect on the earnings per share of listed oil and gas companies in Nigeria
ii. Voluntary environmental disclosure has no significant influence on the earnings per share of selected listed oil and gas companies in Nigeria

Analyses of Previous Empirical Literature

Various studies on environmental accounting have been conducted abroad and in Nigeria, mostly employing the use of secondary data from the Nigerian oil and gas sector. However, some studies measured expenditure or costs of environmentally-related activities as proxy for environmental protection disclosure (Sunday & Chimezie, 2024; Lawrence & Bernard, 2023; Ofurum et al, 2022; Okeke et al, 2021). Furthermore, Lin (2026) approached environmental disclosure from a national scale and found that disclosure indirectly enhances performance through the optimization of resource allocation in China. On the other hand, some studies including Adepoju and Adeagbo (2025), Samuel and Akinyosoye (2025), Olaniyan et al (2025), Odoemelam and Fred-Horsfall (2025), and Erinoso and Oyedokun (2022) applied content analyses method to elicit information on environmental protection disclosure while Emeke and Ekekotu (2025), Aminu et al (2022), Popoola and Onmonya (2024), Almaqtari et al (2023) and Li et al (2019) applied checklists of GRI/ESG guidelines in scoring selected companies.

Interestingly, the results of the studies barely contradict based on the operationalization approach towards environmental disclosures. For instance, Adepoju and Adeagbo (2025), Emeke and Ekekotu (2025), Olaniyan et al. (2025), Samuel and Akinyosoye (2025), Odoemelam and Fred-Horsfall (2025), Nguyen et al. (2025), Afolabi et al. (2024), Gündüz and Gündüz (2025), Masum et al (2024) all found environmental disclosure to have significant and positive influence on their selected measures of financial performance though Nguyen et al (2025) provide more cautious evidence, emphasizing that in emerging economies with weak institutional enforcement, environmental disclosure may function more as a legitimacy or signaling tool than as a direct driver of within-firm financial gains. Even the submissions of Lin (2026) on national scale substantiated the significance of environmental disclosure to favourable performance. However, Nnamani et al (2024) and Bamishe and Adegbie (2024) found no significant relationship existing between environmental disclosure and financial performance whereas Popoola and Onmonya (2024) had mixed significance outcomes for the measures of financial performance covered in their study.

A notable gap that stands out in conceptualization from these consulted empirical submissions is the lack of differentiation between mandatory and voluntary disclosures which paves a way to crystallize the efforts of corporations who went further to improvise on better environmental disclosure procedures. Tian et al (2024) however focused on Chinese companies' mandatory environmental disclosure which was found to be negatively impacting on debt capital cost through its prior negative influence on financial performance. There is need for evidential empirical research from emerging markets, particularly Nigeria and in the oil and gas sector because it will serve as a pointer to their readiness to embrace the changes associated with the implementation of IFRS S1 and S2 presently being midwifed by the Financial Reporting Council of Nigeria.

So, this study employed a disaggregated disclosures approach to distinguish between mandatory and voluntary disclosures prior to evaluating their impacts on financial performance of selected oil and gas companies.

Methodology

Explanatory research design being a causal research design that evaluates cause-and-effect relationships between variables aligned with the purpose of this study and was adopted to achieve the objectives defined. The study covered the oil and gas sector of the Nigerian stock market. Nigeria is an emerging or frontier market, a term used to describe yet-to-develop but sizable and growing economies. Data was collected from the financial reports of all the 7 listed companies in the oil and gas sector. Content analyses was adopted in the extraction of data for both mandatory and voluntary environmental disclosures with the aid of checklists built to score them. While the mandatory disclosures are scored with respect to relevant legal disclosure requirements for companies in the oil sector (Oladejo et al, 2019), voluntary disclosures are based on scores of an environmental disclosure index developed from the Global Reporting Initiative (GRI) framework and IFRS S1 and S2 (The investor-focused disclosure requirements) which have not become mandatory for the companies now (KPMG, 2025). They are attached as appendix 1 and 2 to this study. The data were analyzed using fixed/random effects regression with Driscoll-Kraay standard errors based on the outcomes of the pre-estimation checks, to ensure robust outcomes in the presence of cross-section dependence and autocorrelation. This research adapted the model studied by Wu and Li (2023) who studied 537 Chinese companies from various sectors, and modelled both mandatory and voluntary environmental disclosures on ROA, ROE and TOBIN's Q. The model pursued by this study is specified as;

$$EPS_{it} = \beta_0 + \beta_1 MED_{it} + \beta_2 VED_{it} + \beta_3 FIRMSZ_{it} + \beta_4 LEV_{it} + \mu_{it}$$

Where EPS is earnings per share; MED is Mandatory environmental disclosure; VED is Voluntary environmental disclosure; FIRMSZ is firm size applied as a control variable in this model. It is calculated as natural log of total assets; LEV is leverage ratio applied as a control variable in this research; i represents the number of a given companies and t, number of a particular year. The pre-estimation tests comprising of descriptive analyses of all the variables, cross-dependence tests to determine possible cross-dependence relations among the companies that make up the panel, panel unit root tests to assess the order of integration and apply an appropriate technique for hypotheses testing added econometric rigor to ensure valid statistical inference. The research variables are further specified on table 1;

Table 1: Specification of Research Variables

Variable	Source	Description
Mandatory environmental protection disclosure	Financial reports of each selected company (2015-2024) and various relevant legal provisions on MEPD checklist	Raw scores of each item contained in MEPD checklist total of 12 items for each company in a given year. A company is scored 1, 2 or 3 for each item identified in its financial report of a given year in a narrative, quantitative or both forms.
Voluntary environmental protection disclosure	Financial reports of each selected company (2015-2024) based on GRI 11 and IFRS S1 and S2 as captured on VEPD checklist	Raw scores of each item contained in VEPD checklist total of 26 items for each company in a given year. A company is scored 1, 2 or 3 for each item identified in its financial report of a given year in a narrative, quantitative or both forms.
Earnings per share	Financial statement of each selected company (2015-2024).	The profit attributable to ordinary shareholders for the period divided by the weighted average number of ordinary shares outstanding during the period, measured in Naira (₦) per share. Calculated as Profit for the year/Weighted average outstanding shares
Firm size	Financial statement of each selected company (2015-2024).	Calculated as natural log of total assets. It served as control variable in the equation.
Leverage	Financial statement of each selected company (2015-2024).	Leverage represents the level at which borrowing of the companies at a time is covered by investments in its equity. This is calculated as the total debt in Naira divided by total equity value.

Source: Research review 2025

Results and Discussion

Pre-Estimation Tests

Descriptive Statistics of Variables

The first pre-estimation procedure undertaken in this study is the descriptive analyses. The target is to reflect the spread and normality of the variables' distributions. The results are presented on Table 1.

Table 2: Descriptive results of study variables

	MDI	VDI	EPS	FIRMSIZE	LEV
Mean	5.371429	10.91429	14.10229	25.63633	0.657415
Median	7.000000	11.00000	3.710000	24.89500	0.690000
Maximum	9.000000	18.00000	247.3600	29.91557	2.480000
Minimum	1.000000	1.000000	-351.0000	23.08000	0.041000
Std. Dev.	2.756660	5.707211	77.74703	1.692503	0.423785
Skewness	-0.767804	-0.439424	-1.168176	0.584063	1.235551
Kurtosis	1.877887	1.927252	10.54143	2.308375	7.417360
Jarque-Bera	10.55025	5.609222	181.8008	5.375015	74.72330
Probability	0.005117	0.060530	0.000000	0.068050	0.000000

Source: Analytical outcome 2025

The descriptive analyses showed that mandatory disclosure index (MDI) has a mean of 5.37 and a median of 7. This implies that most companies in the oil sector maintains moderate adherence to environmental reporting guidelines, though the slight negative skew suggests that few of them still lag behind, thereby pulling the average down. The mean and median of the voluntary disclosure index (VDI) closely aligned at around 11, indicating that sampled companies are quite consistent in their willingness to share environmental management information beyond what is mandated by the Act and other reporting guidelines. Since the perfect score for voluntary disclosure is 18, this suggested a moderate level of transparency generally. The picture changed drastically with the analysis of earnings per share (EPS). While its mean is 14.1, the median is much lower at 3.71, showing that there are extreme outliers distorting the average. The wide range from -351 to 247, underscores the volatility of earnings, with some firms experiencing severe losses while others achieve extraordinary gains. Firm size being a control variable, was one of the most stable indicators in the dataset. The mean of 25.63 and median of 24.89 were tightly clustered, with a small standard deviation. The implication is that the firms under study were broadly similar in scale, with only a few larger players stretching the distribution slightly.

The average ratio of 0.65 highlights that debt makes up a significant portion of firms' capital structures. Most firms clustered around this level, but the positive skew and high kurtosis revealed that a handful of companies are far more indebted, raising concerns about financial vulnerability and aligning with the obvious knowledge that oil companies often operate with highly geared structure (Agbachi et al, 2025).

To address cases of outliers as is evident in EPS, the Yeo-Johnson transformation offers a flexible means of reducing skewness while accommodating both positive and negative values, thereby reshaping the data into a more symmetric form suitable for modeling. Complementing this, z-score standardization ensures comparability across variables measured on different scales, centering them around a common mean and variance. Together, these procedures enhanced the robustness of the analysis by minimizing the undue influence of extreme observations and aligning the dataset more closely with the statistical requirements of regression. These procedures are essential for producing valid results that reflect the typical performance of firms rather than being distorted by rare shocks.

The descriptive results of the transformed variables are shown on Appendix 3 of this study. Following the application of the Yeo-Johnson transformation and subsequent z-score standardization with the aid of R software package, the descriptive statistics revealed a dataset that is centered and scaled, with each variable exhibiting a mean close to zero and a standard deviation of one. This adjustment has effectively reduced the distortions caused by extreme skewness and heavy-tailed distributions, particularly in earnings per share and leverage. While some variables still show moderate skewness and kurtosis, the transformation has brought them closer to symmetry, thereby improving their suitability for estimation.

Cross-Section Dependence/Stationarity/Multicollinearity Analyses

Cross-section dependence, stationarity and variance inflation factor were performed for all the variables to determine whether the observations are independent across firms, stable and the independent variables not significantly correlated. The results obtained were shown on Table 3.

Table 3: Cross-section dependence/stationarity/multicollinearity tests for explanatory variables

Variables	Cross-section	Unit root technique	Probability at level	Probability at first differencing	Conclusion	VIF
MDI	Independent	Levin, Lin & Chu t*	0.0012		I(0)	6.73
VDI	Dependent	Cross-sectionally Augmented IPS	<0.05		I(0)	6.52
EPS	Dependent	Cross-sectionally Augmented IPS	>=0.10	<0.01	I(1)	
FS	Dependent	Cross-sectionally Augmented IPS	>=0.10	<0.01	I(1)	1.61
LEV	Independent	Levin, Lin & Chu t*	0.0000		I(0)	1.35
Mean VIF						4.06

Source: Analyses output from Eviews 13

The cross-section dependence tests of each of the variables summarized on Table 3 showed that voluntary disclosure, earnings per share and firm size have significant dependence across firms. But MDI and leverage are independent with little evidence of spillover effects from one firm to another. Further, the stationarity tests on the panel data indicated that the variables are integrated at different orders because EPS and FS only became stationary at first differencing.

For multicollinearity, VDI and the MDI yielded VIF values of 6.73 and 6.52, respectively which are way below the more widely accepted threshold of 10, generally considered to signal serious multicollinearity. This outcome points to a moderate level of correlation between VDI and MDI, a finding that is unsurprising given the conceptual overlap between the two disclosure measures. The control variables; firm size and leverage produced much lower VIF values of 1.61 and 1.35, suggesting that collinearity is not a concern in their cases. The overall mean VIF of 4.06 also falls well below the critical benchmark, reinforcing the conclusion that multicollinearity is not severe enough to compromise the reliability of the regression estimates.

This cross-section dependence and mix of I(0) and I(1) variables therefore, highlighted the need to apply robust estimation techniques in order to ensure that the analysis remains consistent with the statistical properties of the data and avoids spurious regression outcomes and avoid spurious regression.

Co-Integration Test

The need to determine the possibility of existence of long-run association between the variables stemmed from the outcome of the stationarity tests conducted in subsection 4.1.2. Since the variables have been found to consist of mixed order, co-integration tests were taken to align them appropriately to the estimation procedure. The results for the robust p-value of the test statistics are shown Table 4.

Table 4: Summary of co-integration tests

Test statistics	Results	Conclusions
Group mean test	0.140	No significant co-integration
Group mean alpha	0.280	No significant co-integration
Panel t-stat	0.040	Significant co-integration in Pt
Panel alpha	0.320	No significant co-integration

Source: Researcher's computation on STATA 13

The Westerlund co-integration test on Table 4 indicated significant co-integration based on the robust p-value of the panel t-statistics (Pt) alone. The group statistics of the 7 sampled companies remained non-significant for both t-statistics and ADF statistics but at the panel level for t-statistics, the robust p-value was 4% which is below the acceptance benchmark of 5% hence the study concluded that although the individual companies data may not significantly co-integrated at the long-run, the panel data showed significant evidence of long-run association based on the panel level t-statistics.

Test of Hypotheses

Considering the number of the listed oil and gas companies panel and time coverage of the study (7* 10), it may not be appropriate for panel VAR, PMG ARDL and GMM to be applied hence the estimation procedure was restricted to panel fixed/random effects regression with Driscoll-Kraay standard errors for short-run dynamics alone while differencing all the variables that were integrated at order 1. This is more essential as there is need to account for cross-section dependence and possibly autocorrelation and heteroscedasticity.

Testing the influence of environmental disclosure indices on earnings per share of listed oil and gas companies in Nigeria

Table 5: EPS fixed/random effects regression model with Driscoll-Kraay standard errors

Variables	FE (Robust check)		RE (Baseline)		Conclusion
	Coefficient	t-stat(prob)	Coefficient	t-stat(prob)	
MDI	-0.295	-0.86	-0.196	-0.87	No robust effect
VDI	1.148	4.74(0.00)	0.790	5.62(0.00)	Robust positive effect
FS	-0.504	-2.22(0.05)	-0.171	-1.53	No robust effect
LEV	-0.023	-0.27	-0.169	-0.90	No robust effect
Constant	-0.597	-0.01	-0.322	-0.01	
F-stat/Wald χ2	9.34(0.00)		64.32(0.00)		Robust efficient regressors
R^2	0.18		0.34		RE is more fitted
Hausman χ2	5.90(0.21)				Accept RE as preferred model
Pesaran CD	(Before FE/RE DK estimation) 2.558(0.01)				Justified FE/RE with DK

Source: Researcher's computation on STATA 13 extracted from Appendices 4a – 4c

From the results summarized on Table 5, the Pesaran CD post estimation test justified the application of Driscoll-Kraay standard errors to the fixed/random effects model to account for possible cross-section dependence. The hausman test conducted to guide the selection of most appropriate of the two models, informed the selection of random effect model, given that the test yielded a non-significant chi square value of 5.90 thereby implying that individual-specific effects are not correlated with the regressors.

Focusing on the credibility of the selected random effect model, the study noted that the r-squared value of 34% and Wald chi-square significant at 1%, both lend credibility to the random effects model. Both criteria suggest that the regressors can explain up to 34% of variations found in the EPS and this joint explanatory power is significant at 1%. So the model was utilized for testing the first and second hypotheses.

Restatement of Hypothesis 1: Mandatory environmental disclosure has no significant effect on the earnings per share of listed oil and gas companies in Nigeria

Judging from the random effect beta coefficient for mandatory environmental disclosure index (MDI) on Table 5, the MDI associates negatively with variations in the EPS of listed oil and gas companies. The coefficient is -0.196 implying that MDI elicits negative response from EPS as a measure of financial performance. The observed negative impact of MDI returned a significance level outside the acceptable benchmark of 5% thereby implying that it does not contribute meaningfully to the explanation of the variations occurring in the EPS. While this outcome did not align with the theoretical stance of this thesis, it highlighted the peculiarities within the Nigerian oil and gas sector and the possibility that reporting minimal legal requirements expected from companies may not attract meaningful results in terms of increased patronage or returns for shareholders' investment. This can be attributed to the fact that societal expectations required companies to improvise means of distinguishing themselves to be environmentally responsible and friendly.

The implication of this result to the first hypothesis as restated above is specifically based on the p-value (0.40) of the t-statistics. Comparing the p-value against the 0.05 benchmark informed the acceptance of the null hypothesis as restated hence the study concluded that mandatory environmental disclosure has no significant effect on the earnings per share of listed oil and gas companies in Nigeria.

Restatement of Hypothesis 2: Voluntary environmental disclosure has no significant influence on the earnings per share of selected listed oil and gas companies in Nigeria

Table 5 also showed the contributions of VDI in the random effects regression with Driscoll-Kraay standard errors. The beta coefficient of VDI is 0.79 approximately, implying that VDI influences EPS positively, and also strongly based on the t–statistics (5.62) and its corresponding p-value of less than 1%. The results confirmed that VDI of firms in the oil and gas sector of Nigeria provokes direct and reliable response from their financial performance which was captured by EPS. They also implied that companies who found ways to engage in meaningful environmentally preserving activities and report them dutifully tend to exhibit improved financial outcomes.

In the light of the above outcomes for VDI, the study considered the null hypothesis as restated above especially against the p-value of the VDI t-statistics and rejects the proposition which holds that voluntary environmental disclosure index has no significant effect on earnings per share of listed oil and gas companies in Nigeria. In doing so, this research affirmed that voluntary environmentally friendly strategies is likely to improve the financial performance of companies within the oil and gas sector which is also known to be notorious in desecrating the Nigerian domestic space.

Discussion of Findings

The estimation of empirical datasets normally starts with pre-estimation or diagnostics which informs the choice of main estimation procedure while taking the data structure and objective of study into account. The issues of cross-section dependence among company panels and mixed order stationarity influenced the choice of fixed/random effects regression with Driscoll-Kraay standard errors to ensure valid results that has capacity to back up recommendations.

The results obtained highlighted a clear divergence between mandatory and voluntary environmental disclosure indices. The fixed effects outcome showed that mandatory disclosure (MDI) exerts a negative influence on firm performance. This finding is consistent with that of Tian et al. (2024) which reported that mandatory disclosure increased capital costs in heavy polluting sectors, and with Afolabi et al. (2024), who highlighted the short-term financial burden of compliance in Nigerian oil and gas firms. Contrastingly, Samuel and Akinyosoye (2025) found positive effects of mandatory disclosure in manufacturing firms. This sharp departure perhaps, can be linked to the sectoral differences since the study focused on the manufacturing sector.

For voluntary environmental disclosure index (VDI), the result obviously aligned with conceptual and theoretical stances, for example the act of improvising environmentally protective procedures and reporting same highlights strong corporate commitment to environmental responsibility and genuine accountability. This legitimizes their image as holding a significant stake in the scheme of activities in the society and turns to a resource for wealth creation. This position tends to contrast greatly with efforts made at mandatory environmental disclosure index which can be passed off as compliance-driven to avoid fines and sanctions. The result also aligned with Emeke and Ekekotu (2025) and Nguyen et al. (2025), who found that voluntary disclosure enhanced firm value by signaling proactive environmental responsibility and automatically leading to strengthened stakeholder trust.

In consideration of the control variables, the effects of firm size and leverage on financial performance were generally weak but similar findings were reported by Olaniyan et al (2025) and Afolabi et al (2024) respectively, who observed that firm size and leverage did not exert a stable influence on profitability in Nigerian manufacturing firms. On the other hand, Nguyen et al (2025) found that larger firms in Vietnam benefited more from environmental disclosure due to stronger institutional capacity and stakeholder engagement. Again, the contrary outcomes highlighted that in Nigeria's oil and gas sector, size alone may not guarantee improved performance, possibly because regulatory burdens and environmental liabilities scale with firm size thereby diluting potential efficiency gains as the companies grow. So, the study found that voluntary environmental disclosure index has more positive and pronounced influence on financial performance of listed oil and gas companies in Nigeria than mandatory environmental disclosure index.

Conclusion and Recommendation

In consideration of these findings, the study concluded that mandatory disclosure tends to impose compliance costs that erode short-term profitability, while voluntary disclosure offers reputational and resourceful benefits that can enhance financial performance of oil and gas companies. The study recommended for regulators such as the Nigerian Environmental Standards and Regulations Enforcement Agency (NESREA) to streamline compliance requirements and provide clearer guidelines. This will reduce unnecessary engagement and reporting burdens while ensuring that disclosure remains meaningful and cost-effective. More so, strategic voluntary disclosure should be encouraged as a communication tool, focusing on transparency that enhances investor confidence and reputation. Industry associations of oil sector can even develop best-practice frameworks to guide listed companies in making disclosures that are credible and value-adding.

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Appendices

Appendix 1: Checklist for mandatory environmental protection index

Code	Legal Source(s) Represented	Disclosure Item	Scoring (0/1/2/3)
ENV1	PIA 2021, EIA Act 1992, NESREA Act 2007	Environmental Planning & Approvals – Disclosure of environmental management plans, impact assessment approvals, and required permits/licences.	0 = No evidence; 1 = Qualitative only; 2 = Quantitative only; 3 = Both qualitative & quantitative
ENV2	PIA 2021, EGASPIN 2018, NOSDRA Act 2006	Pollution Control, Emissions & Remediation – Disclosure of gas flaring/methane reduction strategies, emissions reporting, and compliance with spill clean-up/remediation standards.	0 = No evidence; 1 = Qualitative only; 2 = Quantitative only; 3 = Both qualitative & quantitative
ENV3	PIA 2021, NESREA Act 2007	Environmental Funds, Decommissioning & Compliance – Disclosure of contributions to remediation funds, decommissioning provisions, and compliance with sectoral environmental regulations.	0 = No evidence; 1 = Qualitative only; 2 = Quantitative only; 3 = Both qualitative & quantitative
ENV4	CAMA 2020, Climate Change Act 2021	Corporate Responsibility & Climate Action – Disclosure of directors' report on environmental impact and measures aligned with climate change/net-zero targets.	0 = No evidence; 1 = Qualitative only; 2 = Quantitative only; 3 = Both qualitative & quantitative

0 = no evidence of disclosure in annual report.
1 = disclosure present in qualitative form only
2 = disclosure present in quantitative form only
3 = disclosure present in both qualitative and quantitative forms

Appendix 2: Voluntary environmental disclosure checklist

Code	Legal/Framework Sources Represented	Disclosure Item	Notes
VOL1	IFRS S1/S2, GRI 11	Governance & Oversight – Disclosure of board/committee oversight, management roles, and use of established reporting frameworks.	Covers G-S1, G-S2, G-S3
VOL2	IFRS S1/S2, GRI 11	Strategy & Risk Management – Disclosure of material sustainability topics, climate strategy, scenario analysis, and integration with enterprise risk management.	Covers S-1, S-2, S-3, R-1
VOL3	IFRS S2, GRI 11	Emissions & Targets – Disclosure of GHG (Scopes 1–3), methane emissions, and emission reduction targets.	Covers M-1, M-2, M-3, M-4, T-1
VOL4	IFRS S2, GRI 11	Financial & Capital Allocation – Disclosure of CapEx/Opex for transition projects, financial impacts of climate	Covers C-1, R-2, 11.7-1, 11.7-2

		risks/opportunities, and closure/rehabilitation provisions.	
VOL5	GRI 11 (sector topics)	Environmental Impacts & Resource Use – Disclosure of air emissions, biodiversity impacts/actions, waste, water/effluents, and spill incidents.	Covers 11.3-1, 11.4-1, 11.4-2, 11.5-1, 11.6-1, 11.6-2, A-1
VOL6	IFRS S1/S2, GRI 11	Controls, Assurance & Policy Engagement – Disclosure of assurance of sustainability data, public policy/lobbying positions, and just-transition/community support measures.	Covers D-1, P-1, 11.2-1

0 = no evidence of disclosure in annual report.
1 = disclosure present in qualitative form only
2 = disclosure present in quantitative form only
3 = disclosure present in both qualitative and quantitative forms

Appendix 3: Descriptive results of the transformed variables

	MDI_Z	VDI_Z	EPS_Z	FIRMSIZE_Z	LEV_Z
Mean	-2.57E-08	-8.57E-10	-3.81E-17	5.39E-17	2.86E-10
Median	0.559358	-0.012987	-0.239784	-0.322783	0.199123
Maximum	1.591199	1.271053	3.680089	1.952276	3.129647
Minimum	-1.524403	-1.691377	-3.682534	-1.920185	-1.747202
Std. Dev.	1.000000	1.000000	1.000000	1.000000	1.000000
Skewness	-0.610013	-0.376083	0.437387	0.097191	0.000774
Kurtosis	1.814600	1.893546	7.889542	2.042447	3.577124
Jarque-Bera	8.439778	5.220821	71.96249	2.784520	0.971467
Probability	0.014700	0.073504	0.000000	0.248513	0.615246
Sum	-1.80E-06	-6.00E-08	-2.44E-15	5.88E-15	2.00E-08
Sum Sq. Dev.	69.00000	69.00000	69.00000	69.00000	69.00000
Observations	70	70	70	70	70

Appendix 4a

```
Regression with Driscoll-Kraay standard errors   Number of obs    =        70
Method: Fixed-effects regression                 Number of groups =         7
Group variable (i): firmid                       F(  4,     9)    =      9.34
maximum lag: 2                                   Prob > F         =    0.0029
                                 within R-squared =    0.1797
------------------------------------------------------------------------------
             |         Drisc/Kraay
       d_eps_z |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       mdi_z |   -.2947241   .3416439    -0.86   0.411    -1.067576    .4781282
       vdi_z |    1.14787   .2423097     4.74   0.001     .5997276    1.696013
  d_firmsize_z |   -.5042636   .2267894    -2.22   0.053    -1.017297    .0087697
       lev_z |   -.0230252   .0850524    -0.27   0.793    -.2154271    .1693767
       _cons |   -0.597109   .1015057    -0.01   0.982    -.2296218    .1926218
------------------------------------------------------------------------------
```

Appendix 4b

```
Regression with Driscoll-Kraay standard errors  Number of obs    =        70
Method: Random-effects GLS regression           Number of groups =         7
Group variable (i): firmid                      Wald chi2(4)     =     64.32
maximum lag: 2                                  Prob > chi2      =    0.0000
corr(u_i, Xb) = 0 (assumed)                     overall R-squared =    0.3447
------------------------------------------------------------------------------
             |               Drisc/Kraay
       d_eps_z |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        mdi_z |   -.1963325   .2255167    -0.87   0.407    -.7064867    .3138217
        vdi_z |    .7896067   .1405293     5.62   0.000     .4717074    1.107506
    d_firmsize_z |   -.171435   .1120124    -1.53   0.160    -.4248248    .0819547
        lev_z |   -.1688658   .1879357    -0.90   0.392    -.5940059    .2562742
        _cons |   -0.322109   .2870938    -0.01   0.929    -.6494513    .5194531
-------------+----------------------------------------------------------------
      sigma_u |  .49140956
      sigma_e |  .65399472
          rho |  .36085786   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Appendix 4c

```
                ---- Coefficients ----
             |      (b)        (B)          (b-B)     sqrt(diag(V_b-V_B))
             |     FE_DK       RE_DK       Difference          S.E.
-------------+----------------------------------------------------------------
        mdi_z |   -1.012089   -.3109048      -.7011845       .1830914
        vdi_z |    1.428871    .6331365       .7957345       .2754484
    d_firmsize_z |    .3059908    .3925661      -.0865753              .
        lev_z |   -.1938909   -.3825607       .1886698              .
------------------------------------------------------------------------------
                    b = consistent under Ho and Ha; obtained from xtscc
         B = inconsistent under Ha, efficient under Ho; obtained from xtscc

  Test:  Ho:  difference in coefficients not systematic

              chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                      =       5.90
            Prob>chi2 =     0.2064
            (V_b-V_B is not positive definite)
```

Appendix 4d

```
xtcsd, pesaran abs
Pesaran's test of cross sectional independence =2.558, Pr =        0.0105
Average absolute value of the off-diagonal elements      =     0.426
```