Long Term Debt Financing and Environmental Sustainability: An Empirical Study of Nigerian Oil and Gas Firms

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Abstract
The study hence sought to examine the effect of long-term debt ratio on environmental remediation disclosure of listed oil and gas firms in Nigeria. Ex-post facto research design was employed in this study. The population of the study consisted of all the nine (9) Oil and Gas firms listed on the Nigerian Exchange (NGX) Group as at 31st December, 2024. Regression analysis was employed to test the hypothesis. This research demonstrated that the long-term debt ratio significantly and positively influences environmental remediation disclosure (β1 = 0.471796; p-value = 0.009017). This study suggested indicated that governments or lending institutions ought to create long-term financing solutions for companies, including credit and equity guarantees, along with industry-specific credit facilities.

Key words: *Debt financing, Long term debt ratio and Environmental remediation disclosure*

Introduction

Finance plays a vital role in achieving environmental sustainability. Businesses encounter various major obstacles to becoming environmentally friendly, such as limited access to financing; fluctuations in currency; concerns regarding supply chain sustainability; pressure from falling prices; globalization and entering new markets; sourcing from low-cost countries; seeking growth via innovation; proliferation of products; competition in services; adopting green practices; the talent acquisition battle; mergers, acquisitions, and divestitures; risk management for enterprises, and regulatory compliance (Wang, Shang, Li & Li, 2023). Tackling each of these areas poses a significant challenge for companies individually; combined, the undertaking is overwhelming. Surpassing rivals and achieving profitable growth to surpass investor expectations in this scenario is a challenging endeavor. Sustainability reporting encompasses various details regarding a company's performance and impacts related to economic, social, environmental, and governance aspects. When observed over time, they help to position yearly positive and/or negative details regarding a company, while also showcasing the long-term dedication of the company. The main difficulty of sustainability reporting lies in determining the target audience. The task involves considering how to utilize the collected reporting data more adaptively to address the unique needs of various stakeholder groups to generate value. In reality, though, and lacking a commonly agreed method for classifying all aspects of sustainability accounting, organizations that report may not adhere to a specific reporting standard for sustainability reporting. They observe confusion that leads to receiving several requests for

information regarding the same topic from various sources. This results in repeated efforts, additional administrative challenges, and confusion regarding what needs to be reported, the method of reporting, and the recipients.

Review of Related Literature

Environmental reporting enables companies to meet their responsibilities to society as organizations that utilize natural resources, to deliver pertinent information to stakeholders that could influence their decisions, and to enhance communication regarding environmental matters with them. Environmental reporting must deliver pertinent information in a systematic and thorough manner, adhering to the overall principles for environmental reporting outlined in the guidelines (Nguyen & Nguyen, 2020). Environmental reporting serves as the organization's open window and a crucial instrument for communicating environmental issues. Through this window, stakeholders can see the organization's proposed concepts and actions related to environmental concerns (Zhang, Chen & Feng, 2021). Debt financing takes place when a company issues fixed income instruments, like bonds, bills, or notes, to investors to raise the capital required for growth and expansion of its activities. When a firm releases a bond, the purchasers of the bond are creditors who can be either retail or institutional investors supplying the company with debt funding. The investment loan amount, referred to as the principal, needs to be repaid by a mutually decided date in the future. In the event of bankruptcy, lenders possess a superior claim to any liquidated assets compared to shareholders (Miller, 2019). A measure utilized to assess and contrast the proportion of a company's capital financed through debt is the debt-to-equity ratio (D/E) (Ward, 2020). When a company generates funds for capital by issuing debt securities to investors, it is referred to as debt financing. By providing the funds, the entities or persons act as creditors and are given an assurance that the debt's principal and interest will be reimbursed according to a set timetable (Reed, 2020).

Long Term Debt Ratio

The long-term debt ratio is a financial leverage ratio that assesses the extent of long-term debt utilized to fund a company's assets. This ratio indicates the level of financial leverage that the company utilizes. Using this ratio, analysts are able to assess the company's ability to fulfill its long-term debts (Smith, 2020). The long-term debt ratio is a solvency or coverage ratio utilized to determine the extent of a company's leverage. The ratio indicates the proportion of a firm's assets that would need to be sold off to settle its long-term obligations. It is the proportion that indicates the financial status of the company and its capacity to fulfill all financial obligations. It indicates the proportion of a company's assets that are funded through loans and other financial commitments that extend beyond one year. Since this ratio is computed on an annual basis, a decline in the ratio would indicate that the company is performing well and is less reliant on debts for its operational requirements (Harvey, 2020). Long Term Debt Ratio = $\frac{\text{Long Term Debt}}{\text{Total Assets}}$

Empirical Studies

Okafor (2020) conducted a research study analyzing the impacts of triple bottom line reporting on corporate sustainability in Nigeria from 2013 to 2018. The research adopted a field survey approach for gathering data, using a questionnaire given to 180 respondents. The method used for data analysis was the Kruskal-Wallis rank sum test statistic. The analysis indicated that triple bottom line reporting negatively impacts corporate sustainability.

Nkwoji (2021) explored the relationship between environmental accounting and the profitability

of selected listed oil and gas companies in Nigeria from 2012 to 2017. Data were gathered from the annual reports and financial statements of the firms available on their websites and from the Nigerian Stock Exchange. Regression was utilized for data analysis and hypothesis testing. The study revealed that there was no significant relationship between environmental expenditures and the net profits of the oil and gas firms analyzed in Nigeria.

Handoyo and Angela (2021) investigated the connection between a company's attributes and the quality of its environmental disclosures. The characteristics of firms examined in the research included size, ownership concentration, age, and leverage. This study utilized content analysis for sustainability reporting. The research encompassed 33 companies on the Indonesia Stock Exchange (IDX) that regularly published sustainability reports between 2014 and 2016. Simultaneous testing revealed that firm characteristics considerably accounted for the variance in environmental disclosure quality, while the partial test indicated that leverage was the sole variable significantly affecting environmental disclosure quality.

Okoli and Okafor (2023) assessed the connection between corporate social responsibility and value generation of listed oil and gas companies in Nigeria over a timeframe of fourteen (14) years from 2008 to 2021. Descriptive statistics of the dataset from the selected firms were utilized to concisely summarize the mean, standard deviation, minimum, and maximum values of the data for the research variables. Pearson correlation coefficient and Panel least squares regression analysis was utilized in the study to evaluate the hypotheses through inferential statistics. The findings indicated a notable and positive correlation between occupational health and safety responsibility and cash value added ($\beta1=1.930842$; p-value = 0.0006); a notable and positive correlation between emissions responsibility and cash value added ($\beta2=0.575137$; p-value = 0.0116); a notable and positive correlation between employment responsibility and cash value added ($\beta3=0.075661$; p-value = 0.0000) among quoted oil and gas companies in Nigeria at a 5% significance level, respectively.

Methodology

Research Design

Ex-post facto research design was employed in this study. This study was treated as *ex-post facto* research since it relied on historical data.

The population of the study consisted of all the nine (9) Oil and Gas firms listed on the Nigerian Exchange (NGX) Group as at 31st December, 2024. They are: Ardova Plc, Conoil Plc, Eterna Plc, Japaul Gold and Venture Plc, MRS Oil Nigeria Plc, Oando Plc, Seplat Energy Plc, Total Nigeria Plc, and Capital Oil Plc.

Since the entire population size was used as sample hence, no need for sample size.

Source of Data

The data to be used in this study were collected mainly from secondary source. These data were obtained for eleven (11) year's annual reports and account from 2014-2024 of the sample Oil and Gas firms.

Method of Data Analysis

The thrust of this study was to ascertain the effect of debt financing on environmental sustainability disclosure of listed oil and gas firms in Nigeria over a period of eleven (11) years from 2014 to 2024. Ex-post facto research design was adopted for the study. This study made use of panel data from secondary sources through the sampled firms annual reports and accounts.

Descriptive statistics was utilized to describe the mean, median, standard deviation, kurtosis, skewness, maximum and minimum values of the study variables via E-Views 10 statistical software. Inferential statistics of this study was carried out using:
Pearson Correlation Analysis: This is a good measure of relationship between two variables which tells us about the strength of relationship and also the direction of relationship.
Panel Least Square (PLS) regression analysis: was used to predict the value of the dependent variable based on the value of the independent variable.
Moreover, content analysis was adopted in this study. A content analysis was performed on the sample environmental reports to study how organizational boundaries are set for the whole report and how operational boundaries are set for specific environmental indicators. This study adopted the Global Reporting Initiative (GRI) framework disclosures according to the G4 guidelines for the purpose of developing the environmental sustainability disclosure indices.
Therefore,
ESDI =TDP/MP
Where;
ESDI = Environmental Sustainability Disclosure Index
TDP = Total Disclosure Points of a Firm
MP = Maximum Points for a Firm

Model Specification
This study adapted and modified the model of Uyagu, Okpanachi, Nyor and Muhammad (2017):
$ED = \beta o + \beta_1 DER_{it} + \beta_2 PROF_{it} + +\mu_{it}$ - - - - eq (i)
Where:
ED = Emission Disclosure
DER = Debt to Equity Ratio
PROF = Profitability
Consequent upon the adapted model, the following regression equation was constructed:
$ERD_{it} = \beta o + \beta_1 DER_{it} + \mu_{it}$ - - eq i
$ERD_{it} = \beta o + \beta_1 LTDR_{it} + \mu_{it}$ - - eq ii
Where:
β_o = Constant term (intercept)
β_{it}= Coefficients of Debt Financing estimated for firm í in period t
μ_{it} = Error term/unexplained variable(s) of firm í in period t
ERD_{it} = Environmental Remediation Disclosure of firm í in period t
$LTDR_{it}$ = Long Term Debt Ratio of firm í in period t

Decision Rule
Accept the null hypothesis (H_o) if the p-value of the test is greater than 0.05, otherwise reject and accept the alternate hypothesis (H_1).
Data Analysis

	ERD	LTDR
Mean	0.674545	0.342727
Median	0.730000	0.330000
Maximum	0.910000	0.660000
Minimum	0.370000	0.140000
Std. Dev.	0.185761	0.147654

Skewness	-0.492973	0.885374
Kurtosis	2.077613	3.202480
Jarque-Bera	0.835490	1.455917
Probability	0.658530	0.482894
Sum	7.420000	3.770000
Sum Sq. Dev.	0.345073	0.218018
Observations	99	99

Source: E-Views 10.0 Output, 2025

Table 1 presents the descriptive statistics for the variables in the study. The figure of 99 in table 1 arises from the panel data set that incorporates both time series data and cross-sectional data (11 years x 9 firms). The average long term debt ratio was 34.27%, with a maximum of 66%, a minimum of 14%, and a standard deviation of 14.77%.

Table 2 Pearson Correlation Matrix

	ERD	LTDR
ERD	1.0000	
LTDR	0.3681	1.0000

Source: E-Views 10.0 Correlation Output, 2026

From the findings on the correlation analysis between ERD and the other study variables in table 2, the study found that there a positive correlation exist between LTDR and ERD at a coefficient of 0.3681.

Test of Hypothesis

H_{o1}: Long term debt ratio has no significant effect on environmental remediation disclosure of listed oil and gas firms in Nigeria.

H_1: Long term debt ratio has significant effect on environmental remediation disclosure of listed oil and gas firms in Nigeria.

Table 3: Panel Least Square (PLS) Regression Analysis testing the effect of Long Term Debt Ratio on Environmental Remediation Disclosure

Dependent Variable: ERD
Method: Panel Least Squares
Date: 12/19/26 Time: 15:50
Sample: 2014 2024
Periods included: 11
Cross-sections included: 9
Total panel (balanced) observations: 99

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.513508	0.043914	11.69357	0.0000
LTDR	0.471796	0.119010	3.964342	0.0001

R-squared	0.139430	Mean dependent var	0.674545
Adjusted R-squared	0.130558	S.D. dependent var	0.178018

S.E. of regression	0.165991	Akaike info criterion	-0.733775
Sum squared resid	2.672633	Schwarz criterion	-0.681348
Log likelihood	38.32185	Hannan-Quinn criter.	-0.712563
F-statistic	15.71601	Durbin-Watson stat	1.040427
Prob(F-statistic)	0.000141		

Source: E-Views 10.0 Regression Output, 2026

In table 3, the slope coefficient indicates that the probability value is P(x1=0.0001<0.05). This outcome indicates that the long-term debt ratio has statistical significance with ERD. The R-squared, referred to as the coefficient of determination, is 0.139430 (13.94%); this indicates that approximately 13.94% of the variations in ERD can be ascribed to the explanatory variable (LTDR), while 86.06% can be ascribed to other factors that may influence ERD in Nigerian oil and gas companies. Table 4.7 indicates that ERD is positively correlated with the explanatory variable (LTDR). This equation illustrates the relationship:

ERD = 0.513508 + 0.471796 * LTDR.

This result implies that a one naira change in the explanatory variables (LTDR) will result in a corresponding rise in ERD. The overall importance of the model (Prob > F = 0.000141) is statistically meaningful at a 5% significance level.

Conclusion and Discussion of Findings

This research investigated the impact of long-term debt financing on the environmental sustainability reporting of publicly listed oil and gas companies in Nigeria. The Pearson correlation coefficient and panel least squares regression estimation was utilized. This research demonstrated that the long-term debt ratio significantly and positively influences environmental remediation disclosure (β1 = 0.471796; p-value = 0.009017). The slope coefficient for hypothesis V indicates that the probability value is P(x1=0.0001<0.05). This outcome indicates that the long-term debt ratio has a statistically significant relationship with ERD. The R-squared, referred to as the coefficient of determination, is 0.139430 (13.94%); this indicates that approximately 13.94% of the changes in ERD can be ascribed to the explanatory variable (LTDR), while 86.06% can be linked to other factors that may affect ERD in Nigeria's oil and gas companies. The regressed coefficient indicates that ERD is positively correlated with LTDR. The findings of this study align with those of Ammar-Zahid, Saleem, and Maqsood (2023); Zarefar, Agustia, and Soewarno (2022); Erhirhie and Ekwueme (2019) but are not in agreement with the results from Houqem, Opare, Zahir-ul-Haassan, and Ahmed (2022); Muhammad & Muhammad (2022).

In conclusion, this current study asserts that debt financing significantly affects the environmental sustainability disclosure of publicly traded oil and gas companies in Nigeria. This study suggested indicated that governments or lending institutions ought to create long-term financing solutions for companies, including credit and equity guarantees, along with industry-specific credit facilities.

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