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DEBT FINANCING AND ENVIRONMENTAL RESEARCH AND DEVELOPMENT DISCLOSURE OF LISTED OIL AND GAS FIRMS IN NIGERIA

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ABSTRACT:

This study examined the effect of debt financing on environmental research and development disclosure of listed oil and gas firms in Nigeria for a period of eleven (11) years covering from 2012-2022. Specifically, this study ascertained the effect of debt to equity ratio, debt to asset ratio, debt to capital ratio, short term debt ratio and long term debt ratio on environmental remediation disclosure. Panel data were used in this study, which were obtained from the annual reports and accounts of nine (9) sampled listed oil and gas firms for the periods 2012-2022. Ex-Post Facto research design was employed. Inferential statistics using Pearson correlation coefficient and Panel Least Square (PLS) regression analysis were applied to test the hypotheses of the study. This study revealed that Debt to equity ratio has a significant but negative effect on environmental research and development disclosure (β_1 = -0.028870; p-value = 0.0000); debt to asset ratio has a significant but negative effect on environmental research and development disclosure (β_2 = -0.639728; p-value = 0.0004); debt to capital ratio has a significant but negative effect on environmental research and development disclosure (β_3 = -0.035584; p-value = 0.0000). In conclusion, the study upholds that debt finance significantly affects environmental research and development disclosure of listed Oil and Gas firms in Nigeria at 5% level of significance. It was recommended amongst others that firms should lever on the amount of debt they undertake to finance their undertakings, as it enhances firms' bottom line. Also, that firms should operate with a capital structure mix that would minimize the cost of capital and reducing the reputational risks associated with the company's operations.

1. INTRODUCTION

Sustainability is currently a burning issue and a major cause of concern across the globe. Amahalu and Okudo (2023) defined sustainability as meeting the needs of the present generation without compromising the ability of future generations to meet their own needs. The interest of investors in company's non-financial performance has grown significantly

over the past few years. In the wake of increased regulations and growth in level of awareness of stakeholders, the concept of corporate sustainability has been assuming great importance. Ndubuisi, & Moedu, (2023)defined corporate sustainability as the commitment of business to contribute to sustainable economic development, and to work with employees, their families, the local community and society at large to improve their quality of life. A sustainability report is an organizational report that gives information about economic, environmental, social and governance performance. A sustainability report also presents the organization's values and governance model, and demonstrates the link between its strategy and its commitment to a sustainable global economy. Sustainability reporting can assist organizations in measuring, understanding and communicating their economic, environmental, social and governance performance, and then fix goals, and bring about changes more efficiently (Oshiole, Elamah & Amahalu, 2020).

Debt financing refers to the act of borrowing funds from companies and investors through the use of bonds, banks, or financial institutions with refund obligation, in order to support a business's operations. The lender of such fund is repaid the total amount borrowed, plus the interest accumulated on it, at a later point in time (Adibeli & Amahalu, 2023). Finance is a crucial ingredient for environmental sustainability. Firms face several significant challenge towards being environmental friendly which include: shortage of lending; currency volatility; fears over the sustainability of supply chains; downward pressure on prices; globalization and expansion into new markets; low-cost country sourcing; pursuit of growth through innovation; product proliferation; service competition; going green; the war for talent; mergers, acquisitions, and divestitures; enterprise risk management, and compliance requirements (Mba, Mbonu,., & Ndubuisi, 2023). Addressing each of these areas present an enormous challenge to firms in their own right; taking together, the task is mind-boggling. Beating the competition and driving profitable growth to exceed investor expectations in this context is a daunting task. Sustainability reporting includes a wide range of information about a company's economic, social, environmental and governance performance and impacts. When viewed over time, they assist in placing annual positive and/or negative information about a company, in addition to demonstrating the long term commitment of the company. The key challenge of sustainability reporting is deciding who the audience is. The challenge is to think about how to use the reporting information gathered more flexibly, in order to meet the specific interests of different stakeholder groups in other to create value.

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Different strands of literature holds different views regarding the relationship between debt financing and environmental research and development disclosure, yet no consensus has been reached. This lacuna created a gap in literature which this study tends to fill.

1.1 Objectives of the Study

The main objective of the study is to examine the effect of debt financing on environmental research and development disclosure of listed oil and gas firms in Nigeria.

The specific objectives of this study are to:

i. determine the effect of debt to equity ratio on environmental research and development disclosure of listed oil and gas firms in Nigeria.
ii. ascertain the effect of debt to asset ratio on environmental research and development disclosure of listed oil and gas firms in Nigeria.
iii. evaluate the effect of debt to capital ratio on environmental research and development disclosure of listed oil and gas firms in Nigeria.

2. LITERATURE REVIEW

2.1 Conceptual Review

2.1.1 Debt to Equity Ratio

The Debt to Equity ratio (also called the debt-equity ratio, risk ratio, or gearing), is a leverage ratio that calculates the weight of total debt and financial liabilities against total shareholders' equity. Unlike the debt-assets ratio which uses total assets as a denominator, the D/E Ratio uses total equity. This ratio highlights how a company's capital structure is tilted either toward debt or equity financing (Fernando, 2023). The Debt/Equity Ratio is a ratio of ordinary shareholders' equity and the stake of creditors in a company. In other words, it is a measure of a company's financial leverage (Okudo, Amahalu & Oshiole, 2023). The debt-to-equity ratio (D/E ratio) shows how much debt a company has compared to its assets. It is found by dividing a company's total debt by total shareholder equity.

$$\text{Debt/Equity Ratio} = \frac{\text{Total Liabilities}}{\text{Total Shareholders' Equity}}$$

2.1.2 Debt to Asset Ratio

Debt-to-assets is a leverage ratio that defines how much debt a company owns compared to its assets. Debt-to-assets information can reflect how financially stable a company is. The higher the ratio, the higher the degree of leverage (DoL) and, consequently, the higher the risk of investing in that company (Blakely, 2023). The debt-to-total-assets ratio shows how much of a business is owned by creditors (people it has borrowed money from) compared with how

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much of the company's assets are owned by shareholders (Ndubuisi, Okudo, & Ezechukwu, 2023).

$$\text{Debt to Assets Ratio} = \frac{\text{Short-Term Debt} + \text{Long-Term Debt}}{\text{Total Assets}}$$

2.1.3 Debt to Capital Ratio

The debt-to-capital ratio (D/C ratio) measures the financial leverage of a company by comparing its total liabilities to total capital. The debt-to-capital ratio formula measures the proportion of debt that a business uses to fund its ongoing operations as compared with capital (Hargrave, 2021). The debt-to-capital ratio is a measurement of a company's financial leverage. The debt-to-capital ratio is calculated by taking the company's interest-bearing debt, both short- and long-term liabilities and dividing it by the total capital. Total capital is all interest-bearing debt plus shareholders' equity, which may include items such as common stock, preferred stock, and minority interest (Amahalu & Osonwa, 2023).The debt-to-capital ratio is a measurement of a business's total debt against total capital. This can be used to determine how much leverage a business has.

$$\text{Debt-To-Capital Ratio} = \frac{\text{Debt}}{\text{Debt} + \text{Shareholders}' \text{ Equity}}$$

2.1.4 Environmental Research and Development Disclosure

Research and development (R&D), refers to innovative activities undertaken by corporations or governments in developing new services or products, or improving existing services or products. Research and development constitutes the first stage of development of a potential new service or the production process (Mbonu & Amahalu, 2023). An important component of a company's research and development is its R&D expenses, which can be relatively minor or can easily run into billions of dollars for large corporations. Companies in the industrial, technological, health care, and pharmaceutical sectors usually have the highest levels of R&D expenses. Some companies for example, those in technology reinvest a significant portion of their profits back into research and development as an investment in their continued growth (Amahalu, Ezechukwu, & Okudo, 2022).

2.1.5 Debt Financing on Environmental Research and Development Disclosure

Global warming and its impacts on society in general leave little doubt that businesses play a major role in delivering environmental performance outcomes through production, operations, and efforts to achieve innovations of more sustainable products and practices

(Okudo & Ndubuisi, 2023). The current green (environmental) concept is to improve the environment, restore the ecology and maintain sustainable operation. Green (environmental) design is environment oriented; in other words, environmental concerns carry the same weight as profitability in the product design and development process. Amahalu and Okudo (2023) found that the investment in research and development about environmental pollutants could drive firm's productivity improvements . In a similar vein, Eze, Okoye, Amahalu & Obi (2022) suggested that the sustainable development requires stimulating revolutionary technological innovations through environmental, health, safety, economic, research and development, and labor market regulations. On the contrary, Okudo and Ndubuisi, (2021) found that investment in R&D decreased financial performance

2.2 Theoretical Framework

This work derives theoretical support from Stakeholder Theory

2.2.1 Stakeholder Theory

Stakeholder theory was first described by Dr. F. Edward Freeman in 1984, a professor at the University of Virginia, in his landmark book, "Strategic Management: A Stakeholder Approach." It suggests that shareholders are merely one of many stakeholders in a company. Stakeholder theory suggests that a business must seek to maximize value for its stakeholders. It emphasizes the interconnections between business and all those who have a stake in it, namely customers, employees, suppliers, investors and the community. Stakeholder engagement is a consequence of the stakeholder approach to corporate governance. This approach to corporate governance recognizes that there are persons other than shareholders who are affected by the operations of business organizations. Thus, a company needs to be governed in the interest of its stakeholders.

2.3 Empirical Review

Giannarakis (2021) investigated the effect of CSR disclosure on financial leverage of USA firms from 2015-2019. A sample of 100 companies listed in the US was studied for the year. The study employed a Multiple Linear Regression via statistical package of E-views to test the effect of independent variable on the dependent variable. The result of the study indicated that CSR disclosure has a negative effect on debt-to-equity ratio.

Muhammad and Muhammad (2022) examined the effect of board characteristics on corporate social responsibility disclosure of listed food and beverage firms in Nigeria over the period 2005-2020. The study made use of secondary data generated from Annual Reports and Accounts of the sampled firms and the Nigerian Stock Exchange Fact book. The data were

analyzed by means of descriptive statistics, correlation and regression analysis using STATA (version 12) package. The study revealed that managerial ownership has a significant negative effect on corporate social responsibility disclosure.

Okafor, Egbunike and Amahalu (2022) ascertained the determinants of environmental disclosure of quoted Oil and Gas firms in Nigeria for a period of thirteen (13) years spanning from 2008 to 2020. Specifically, this study ascertained the relationship between Leverage, Firm Size and Audit Committee Size and Effluent Disclosure. Panel data were used in this study, which were obtained from the annual reports and accounts of eleven (11) sampled quoted Oil and Gas firms for the periods 2008-2020. *Ex-Post Facto* research design was employed. Descriptive statistics of the dataset from the sampled firms were used to describe using the mean, standard deviation, minimum and maximum values of the data for the study variables. Inferential statistics using Pearson correlation coefficient, Multicollinearity test, Panel Least Square (PLS) regression analysis and Hausman test were applied to test the hypotheses of the study. The results of the tested hypotheses revealed that there is a significant and positive relationship between Leverage and Effluent Disposal of quoted Oil and Gas firms in Nigeria at 5% level of significance (β_1 = 0.546845; P-value = 0.0000 < 0.05); there is a significant but negative relationship between Firm Size and Effluent Disposal of quoted Oil and Gas firms in Nigeria at 5% level of significance (β_2 = -0.030633; P-value = 0.0026 < 0.05); there is a significant and positive relationship between Audit Committee Size and Effluent Disposal of quoted Oil and Gas firms in Nigeria at 5% level of significance (β_3 = 0.08007; P-value = 0.0000 < 0.05). The study recommended amongst others that oil and gas firms should be encouraged to leverage on debt source of fund in order to build wealth with other people's money so as to enable the firms get more involved in environmental development.

Okoli and Okafor (2023) examined the relationship between corporate social responsibility and value creation of quoted oil and gas firms in Nigeria for a period of fourteen (14) years spanning from 2008 to 2021. Specifically, the study examined the relationship between occupational health and safety responsibility, emissions responsibility, employment responsibility and cash value added. enel data were used in this study, which were obtained from the annual reports and accounts of the ten (10) sampled firms. Ex-Post Facto research design was employed. Descriptive statistics of the dataset from the sampled firms was employed to summarily describe the mean, standard deviation, minimum and maximum values of the data for the study variables. Inferential statistics using Pearson correlation coefficient and Panel least square regression analysis were employed to test the hypotheses of the study. The results showed that there is a significant and positive relationship between

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occupational health and safety responsibility and cash value added (β1=1.930842; p-value = 0.0006); a significant and positive relationship between emissions responsibility and cash value added (β2=0.575137; p-value = 0.0116); a significant and positive relationship between employment responsibility and cash value added (β3=.0.075661; p-value = 0.0000) of quoted oil and gas firms in Nigeria at 5% level of significance respectively.

3. MATERIAL AND METHOD

Ex-post facto research design was employed in this study. The population and sample size of the study consisted of all the nine (9) Oil and Gas firms listed on the Nigerian Exchange (NGX) Group as at 31st December, 2022. 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. The data used in this study were collected mainly from secondary source. These data were obtained for eleven (11) years annual reports and account from 2012-2022 of the sample Oil and Gas firms.

Table 1 Variable Description

Variables	**Definition**	**Measurement**
Independent Variables (Debt Financing)		
DER	Debt to Equity Ratio	$\frac{\text{Total Liabilities}}{\text{Total Shareholders' Equity}}$
DAR	Debt to Assets Ratio	$\frac{\text{Short-Term Debt + Long-Term Debt}}{\text{Total Assets}}$
DCR	Debt-To-Capital Ratio	$\frac{\text{Debt}}{\text{Debt + Shareholders' Equity}}$
Dependent Variable (Environmental Research and Development Disclosure)		
ERAD	Environmental Research and Development Disclosure	$\frac{\text{Total Environmental Research and Development Disclosure Score}}{\text{Maximum Environmental Disclosure Score Possible for a Firm}}$

Content analysis was adopted in this study. 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. Environmental sustainability disclosure was evaluated by 21 indicators (refer to appendix A).

For each of these sustainability reports, all the 21 indicators were scored as follows:

i. a score of 0 for an item not referred to in a report;
ii. a score of 1 when the report only briefly mentioned something pertinent to the item or provided only qualitative statements;

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iii. a score of 2 when the report provided detailed information with some numerical support; and rarely

iv. a score of 3 was given when a report provided extensive numerical support with data on goals achieved or fully accomplished.

Therefore,

ESDI =TDP/MP

Where;

ESDI = Environmental Sustainability Disclosure Index

TDP = Total Disclosure Points of a Firm

MP = Maximum Points for a Firm

$ERAD = \beta o + \beta_1 DER_{it} + \beta_2 DAR_{it} + \beta_3 DCR_i + \mu_{it}$

β_o = Constant term (intercept)

β_{it} = Coefficients of Debt Financing estimated for firm i in period t

μ_{it} =Error term/unexplained variable(s) of firm i in period t

ERAD = Environmental Research and Development Disclosure of firm i in period t

DER_{it} = Debt to Equity Ratio of firm i in period t

DAR_{it} = Debt to Asset Ratio of firm i in period t

DCR_{it} = Debt to Capital Ratio of firm i in period t

4. RESULT AND DISCUSSIONS

4.1 Data Analysis

Table 2 Pearson Correlation Matrix

	ERAD	DER	DAR	DCR
ERAD	1.0000			
DER	-0.4333	1.0000		
DAR	-0.3331	0.7624	1.0000	
DCR	-0.7133	0.4239	0.4166	1.0000

Source: E-Views 10.0 Correlation Output, 2024

From the findings on the correlation analysis between ERAD and the other study variables in table 2, the study found that there a negative correlation coefficient between DER (-0.4333), DAR (-0.3331), DCR (-0.7133) and ERAD respectively.

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4.2 Test of Hypotheses

Table 3: Panel Least Square (PLS) Regression Analysis testing the effect of DER, DAR, DCR on ERAD

Dependent Variable: ERAD

Method: Panel Least Squares

Date: 02/19/24 Time: 15:36

Sample: 2012 2022

Periods included: 11

Cross-sections included: 9

Total panel (balanced) observations: 99

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.177432	0.137313	8.574793	0.0000
DER	-0.028870	0.006101	-4.731983	0.0000
DAR	-0.639728	0.173359	-3.690189	0.0004
DCR	-0.035584	0. 003548	-10.02939	0.0000

R-squared	0.787548	Mean dependent var	0.674545
Adjusted R-squared	0.779172	S.D. dependent var	0.178018
S.E. of regression	0.161283	Akaike info criterion	-0.791313
Sum squared resid	2.523195	Schwarz criterion	-0.738886
Log likelihood	81.16998	Hannan-Quinn criter.	-0.770101
F-statistic	42.39166	Durbin-Watson stat	1.528030
Prob(F-statistic)	0.000000		

Source: E-Views 10.0 Regression Output, 2024

The slope coefficient in table 3 shows that the probability value is P(x_1=0.0000<0.05; x_2=0.0004<0.05; x_1=0.0000<0.05). This result implies that debt to equity ratio, debt to asset ratio and debt to capital ratio is statistically significant with ERAD. The R-squared which is known as the coefficient of determination is 0.787548 (78.75%), this means that about 78.75% variations in ERAD could be attributed to the explanatory variable (DER, DAR and DCR) while 21.25% could be attributable to other factors capable of influencing ERAD in Nigeria oil and gas firms.

ERAD = 1.177432 - 0.028870DER - 0.639728DAR - 0.035584DCR

The implication of this result is that a unit/one naira change in the explanatory variables (DER, DAR & DCR) will lead to a corresponding reduction in ERAD. The overall significance of

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the model (Prob > F = 0.000000) is statistically significant at 5% level of significance. Conclusively, H_1 is accepted and H_0 rejected.

Based on the analysis of this study, the following findings were deduced:

i. Debt to equity ratio has significant but negative effect on environmental research and development disclosure of listed oil and gas firms in Nigeria (β_1 = -0.028870; p-value = 0.0000).
ii. Debt to asset ratio has significant but negative effect on environmental research and development disclosure of listed oil and gas firms in Nigeria at 5% level of significance at 5% level of significance (β_2 = -0.639728; p-value = 0.0004).
iii. Debt to capital ratio has significant but negative effect on environmental research and development disclosure of listed oil and gas firms in Nigeria at 5% level of significance (β_3 = -0.035584; p-value = 0.0000).

CONCLUSION AND RECOMMENDATIONS

In line with the conclusion of this study, the following suggestions were offered:

i. Based on the negative relationship between debt to equity ratio and environmental sustainability disclosure, this study recommends that, firms should lever on the amount of debt they undertake to finance their undertakings, as it enhances firms' bottom line. Also, that firms should operate with a capital structure mix that would minimize the cost of capital and reducing the reputational risks associated with the company's operations.
ii. In order to revert the negative relationship between debt to asset ratio and environmental sustainability disclosure, this study suggests that firms judiciously optimal debt to asset ratio in financing operations so as to improve and sustain their environmental performance.
iii. Sequel to the negative but significant relationship that exists between debt to capital ratio and environmental remediation disclosure, firms should use always use the debt to capital ratio to track a firm's improvement over time as it acquires properties. The debt-to-capital proportion can be used by shareholders to determine if a company seems to have enough income to finance its financial commitments and whether it can expect to be paid rates of return.

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